INCREASING THE IDENTIFICATION ACCURACY OF CHILD EYEWITNESSES WITH IDENTIFICATION PROCEDURES

by

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ABSTRACT

This thesis consists of three studies examining the identification abilities of child eyewitnesses and procedures developed to improve their identification accuracy. The first chapter provides a general introduction to identification research. Chapter 2 examines the identification accuracy of children compared to adults using meta-analytic techniques; this chapter will appear in *Law and Human Behavior* (1998). The third chapter examines 4 procedural modifications to a 'standard' lineup procedure (i.e., simultaneous lineup) and will appear in *Expert Evidence* (1998). Chapter 4 describes a hypothesized Two-Judgment Theory of Lineup Identification and investigates identification procedures designed based on this Theory. Chapter 4 has been submitted for publication. Chapter 5 provides a general discussion. Results from these three studies suggest that a) children over the age of 5 years produce correct identifications at a rate comparable to adults; however, children produce significantly more false positives shown a lineup that does not contain the criminal than adults; b) Procedures designed and examined to decrease false positive responding in children by reducing the social demands to make a selection were ineffective, however, these procedures may slightly aid correct identification; c) Compared to simultaneous lineup presentation, procedures developed based on the Two-Judgment Theory of Lineup Identification (called Elimination lineup procedures), produce significantly lower false positive responding rates in children; these child false positive rates are similar to adult rates; Finally, d) compared to simultaneous lineup presentation, Elimination procedures do not significantly decrease children's correct identification rates. The Two-Judgment Theory of Lineup Identification provides the first theoretical framework to understand the processes involved in identification for both children and adults. Furthermore, the procedures developed present

promise for successful real world implementation.

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CHAPTER 1

GENERAL INTRODUCTION

Children, all too frequently, are victims and or witnesses to criminal behaviour. In child sexual assault cases, often the crime occurs between the child and the perpetrator with no one else present. Children also may be the sole eyewitness to other crimes, such as murder, theft, and acts of vandalism. Although physical evidence may be obtainable, the child witness is a critical source of information for law enforcement officials. As an eyewitness, the child is asked to recount what occurred during the crime and to describe the perpetrator. Once someone is suspected, the child may be asked to examine a lineup (or photo array) to provide an identification of the criminal; that is, the child may be asked to indicate whether one of the lineup members presented is the person who committed the crime.

The majority of child eyewitness research examines children's ability to recall details of an event (see Ceci & Bruck, 1993; 1995 for reviews). Child eyewitness identification has received little attention and empirical inquiry. For example, since 1979 over 100 studies have appeared on children's suggestibility ("the degree to which children's encoding, storage, retrieval, and reporting of events can be influenced by a range of social and psychological factors", Ceci & Bruck, 1993, p. 405), whereas, studies examining children's eyewitness identification performance total about 20, to date.

The goals of this dissertation were twofold; 1) to delineate the problem with child eyewitness identification, and 2) to examine potential solutions. A meta-analysis and two empirical studies were conducted. The meta-analysis compared child and adult identification performance. The meta-analysis reports that with criminal-present lineups (i.e., the criminal is among the faces presented), children between the ages of 5 and 14 years produce comparable correct identification rates to adults. With criminal-absent lineups (i.e., the criminal is not among the faces presented), children, even up to 14 years, are more likely than adults to falsely select someone. The two empirical studies investigated alternative identification procedures (to the 'standard' simultaneous lineup) to reduce children's propensity for false positive responding with criminal-absent lineups (i.e., increase children's identification accuracy).

A general knowledge of eyewitness identification research is provided to set the context and assist the reader to comprehend the rationale and implications of this research. Unless otherwise stated, the research cited in this chapter is based on the behaviour of adult participants. A review of the child identification literature and relevant adult identification literature is presented in the meta-analysis (Chapter 2).

The present work takes a system variable (compared to an estimator variable) approach to understanding and improving identification accuracy. The distinction between system and estimator variables is made by Wells (1978, 1988). System variables are defined as variables that are under the control of the police and/or legal system. In contrast, estimator variables are those variables that cannot be controlled by police and/or the legal system. Estimator variables include such factors as length of exposure to the criminal, and individual differences such as race of the witness or criminal, and sex of the witness or criminal. Although estimator variables may be important to identification accuracy, the primary mandate of this dissertation was to find a lineup procedure (system variable) that aids children's identification performance. Once an effective identification procedure has been developed, estimator variables may then be examined to understand their impact on identification accuracy given this identification procedure[1].

Eyewitness Versus Face-Recognition Methodology

It could be argued that eyewitness identification is a form of face-recognition. Hence, to investigate eyewitness identification abilities in children and adults, the face-recognition literature should be examined. Many differences exist, however, between eyewitness and face-recognition methodology that may not allow results to transfer across the two domains. Participants in eyewitness identification studies are exposed to an "event" (e.g., theft) without prior knowledge, and, in particular, without warning that they will later have to recall the details of the event or to identify the confederate seen in the event (e.g., Lindsay, Wells, & Rumpel, 1981). The unexpectedness in staged crimes simulates the incidental nature of real life crime. The event may be seen live or shown by slides or videotape. With a live, staged event, for instance, the participant may encounter a confederate (who will later have to be identified) while waiting for the experimenter or the study to begin (e.g., Lindsay, Wallbridge, & Drennan, 1987). With a videotaped event, participants may be asked to watch a videotape while the experimenter prepares for the experiment (e.g., Brigham & Cairns, 1988). Regardless of the mode of exposure to the event, the participant is "a witness" once the event has been seen (Wells, 1993). During the

[1] Sex differences in identification, in particular, were not examined in the meta-analysis because many studies used in the meta-analysis did not report identification rates across sex. Hence, it was not possible to consider sex differences in identification. Studies 2 and 3 also did not examine identification rates across sex for a variety of reasons. Some studies have suggested that during adolescence girls are slightly superior to boys at recognizing previously seen faces (Cross, Cross, & Daly, 1971; Goldstein, 1965), other studies report no difference for face recognition between girls and boys (see Shepherd, 1981 for a review). Chance and Goldstein (1979) reported a 5% advantage for female adults over male adults for face recognition. Chance and Goldstein (1984) state "the female advantage is so slight that it does not suggest that a witness' sex is a valuable index of accuracy" (p. 75). Because sex does not seem a significant factor impacting identification differentially and because identification is a dichotomous variable, and therefore sample sizes would have to be doubled to have sufficient power to examine identification across sex, sex differences in identification were not examined. Sex was balanced proportionally across cells.

recognition phase, a small set of photographs is shown to the participant (e.g., six), only one, or even none of which have previously been seen by the participant.

In contrast, participants in face-recognition studies are exposed to a series of faces (e.g., 20) by photographs or slides (e.g., Fleishman, Buckley, Klosinsky, Smith, & Tuck, 1976; Going & Read, 1974; Light, Kayra-Stuart, & Hollander, 1979). Depth of processing or encoding strategy may be manipulated. For example, Mueller, Carlomusto, and Goldstein (1978) asked participants to judge faces on a friendly-unfriendly dimension (deep encoding or holistic processing) or to judge length of forehead on a long-short dimension (superficial/shallow encoding or feature processing). Alternatively, participants are asked to "please remember these faces for a later recognition task" (e.g., Laughery, Alexander, & Lane, 1971). Target faces are interspersed with faces never seen before for the recognition test. All faces are displayed in pairs (two-alternative, forced-choice paradigm) or shown sequentially (or simultaneously) to participants.

A meta-analysis by Shapiro and Penrod (1986) demonstrated that compared to eyewitness studies, face-recognition studies produced consistently higher hit rates and consistently lower false positive rates. A fundamental difference between face-recognition and eyewitness methodology is the nature of the stimuli. Face-recognition studies typically use the same photo during the recognition phase as was used at encoding (e.g., Courtois & Mueller, 1979, 1981; Podd, 1990). This type of recognition is sometimes called portrait recognition rather than person identification (Wells, 1993). In eyewitness studies, the initial view of the target differs in many ways from the exposure used in the identification task (e.g., different lighting conditions, facial expression, pose, etc.). In addition, participants in face-recognition studies normally are aware they will have to identify the targets unlike many eyewitness-participants and actual eyewitnesses. Although generalization of facial recognition studies to eyewitness contexts may be difficult, identification results from face-recognition studies of children and adults are reviewed and contrasted to identification results from eyewitness studies in the meta-analysis conducted (Chapter 2). This contrast may facilitate a more complete understanding of children's identification abilities and how they compare to adults' abilities across the two bodies of literature.

Lineups

Critical to most, if not all, eyewitness identification research is the lineup. The central issues regarding lineups are presented below.

Function and Structure. Wells (1993) describes the function of a lineup as an opportunity to gain information from the "eyewitness' recognition memory that the eyewitness was not able to articulate in verbal recall" (p.556). Hence, a lineup decision provides information about the probability of the suspect's guilt beyond the initial verbal description provided by the witness (Luus & Wells, 1991; Wells & Luus, 1990). An identification of the suspect increases the probability that the suspect is the criminal. The nonidentification of the suspect increases the probability the suspect is not the criminal.

Using Bayesian logic, a diagnosticity ratio can be calculated to determine how informative the decisions are from a particular lineup in experimental studies (Wells & Lindsay, 1980). The diagnosticity ratio refers to the rate of correct identification of the guilty suspect divided by the rate of false identification of the innocent suspect. This ratio may be particularly useful when comparing various identification procedures. A procedure producing a higher ratio of correct to false identification suggests more information is gained about the probability of the suspect's guilt from the eyewitness' decision using that procedure than from using a procedure resulting in a lower ratio.

Related to diagnosticity is the structural property of presence versus absence of the target (or criminal). Target-present lineups simulate the situation when the suspect is guilty and target-absent lineups simulate the situation when the suspect is innocent. By varying target presence, researchers can determine the rate of correct identification (the rate that a guilty suspect will be identified) and false identification (the rate that an innocent suspect will be identified). For example, an alternative lineup procedure compared to a 'standard' lineup presentation, may decrease false positive responding from a target-absent lineup; however, presented with a target-present lineup, correct identifications may also decrease. Identification accuracy across target-present and target-absent lineups was considered in the meta-analysis as a moderating factor of identification accuracy and studies 2 and 3 both use target-present and target-absent lineups.

Lineup construction. Single-suspect lineups contain one suspect with a set of foils, also known as distracters, known innocents, or fillers. Foils are individuals who are known to be innocent to police for the crime in question and should be selected based on their match to the witness' description (Luus & Wells, 1991; Wells, 1988, 1993; Wells, Rydell, & Seelau, 1993). When foils are used in a lineup, identification errors can be partitioned into known errors and false identifications (Wells, & Turtle, 1986). A known error is a foil identification, is considered by police to be an error made by the eyewitness, and is without legal consequence for the foil. The term false identification is reserved for an identification of an innocent suspect. A false identification may lead to wrongful prosecution and conviction. Using a single suspect model, a false identification can only occur with a target-absent lineup. Hence, target-absent, single-suspect models may result in one of three outcomes; correct rejection (no one is identified), false identification, or foil identification. Target-present, single-suspect models may result in one of three outcomes; correct identification, false rejection (no one is identified), or foil identification. In both target-present and target-absent lineups, foil identifications are known errors and the identified lineup members are not pursued by police as suspects for the case in question. False rejections may result in a guilty suspect going free unless other evidence is available against the suspect. False identifications are considered the most serious problem in the eyewitness area: they may result in wrongful prosecution and conviction, and the guilty party is still at large but no longer pursued.

Although multiple-suspect or even all suspect-models are possible, single-suspect models are more informative and guard against false identification somewhat because of the discrimination of known errors (Wells & Turtle, 1986). The all-suspect model has no foils, rather each lineup member is a suspect for the crime under investigation. Hence, false identifications (in the legal sense) may occur with target-present as well as target-absent lineups. Any identification made with an all-suspect model, other than a correct identification, is a false identification with legal consequences. For this reason, the single suspect model is the preferred method of lineup construction (Brooks, 1983; Sobel, 1985; Wall, 1965). Eyewitness research is commonly based on a single-suspect model (Wells & Seelau, 1995).

Lineup size. Twelve person lineups are used in Canada, whereas in the United States, six person lineups are typical. Nosworthy and Lindsay (1990) compared the identification accuracy produced by lineups varying in nominal size (the number of people in a lineup) from 4 to 20 and found no significant differences in the rates of either correct or false identification. Wagenaar and Veefkind (1992) also found 6 and 10 person lineups produced nonsignificant differences in correct identifications and false positives for target-absent lineups. Studies in the meta-analysis were based on six person lineups. Studies 2 and 3 also used six person lineups. Given the similar identification accuracy rates obtained with larger lineups and the lower associated cost of producing a smaller lineup, there was no clear advantage to using larger lineups.

Lineup presentation (procedure). The simultaneous lineup, sequential lineup, and showup are the main lineup procedures used by police. The traditional and still most common method of lineup presentation is the simultaneous lineup. With a simultaneous lineup, a witness views all the lineup members at the same time. This type of identification task allows and perhaps encourages a relative judgment strategy; identifying the lineup member who most resembles a witness' image of the criminal relative to the other members in the lineup (Lindsay & Wells, 1985; Wells, 1984; 1993). With target-present lineups, a relative judgment may be an effective strategy because the guilty suspect usually most closely resembles the witness' image of him or her. The relative judgment strategy becomes problematic with target-absent lineups because the most similar person is not the criminal, hence providing potential for a false positive to occur.

To reduce reliance on a relative judgment strategy, sequential lineup presentation has been investigated (Lindsay & Wells, 1985). With a sequential lineup, photographs are shown to the witness one at a time. Witnesses are instructed to make a decision each time a photograph is presented ("yes, this is the criminal" versus "no, this is not the criminal"). Witnesses are informed that once a photograph has been presented, they will not be permitted to return to it, to reexamine it, or to change their decision. Furthermore, witnesses are unaware of the number of photographs to be shown. Lindsay and Wells (1985) argued that a sequential lineup limits the use of a relative judgment strategy and replaces it with an absolute judgment strategy; a witness compares his/her memory of the criminal to the photo being shown and determines if it is the criminal. Although witnesses could mentally compare among previously seen photographs, they would be uncertain whether a better match would be shown subsequently. Thus, photographs would continue to be rejected until a match between the witness' memory of the criminal and the photo was made. Compared to simultaneous lineup presentation, sequential lineups produce similar correct identification rates and significantly lower false/foil identification rates (Cutler & Penrod, 1988; Lindsay, Lea, & Fulford, 1991; Lindsay et al., 1991; Lindsay & Wells, 1985).

A showup is the presentation of a single person, the suspect, to an eyewitness for identification and may also require an absolute judgment strategy. The showup however, is an all-suspect model. Hence, an incorrect identification with a showup is a false identification in the legal sense. In addition, some argue the showup may be highly prejudicial to the suspect (Kassin, Ellsworth, & Smith, 1989). With a simultaneous or sequential lineup, the witness does not know who the suspect is; i.e., who the police suspect. In contrast, the witness is aware that the person in a showup is the suspect. This knowledge may lead to an increase in false identifications with a showup compared to simultaneous or sequential presentation (Wagenaar & Veefkind, 1992; Yarmey, Yarmey, & Yarmey, 1996). Generally, simultaneous and sequential lineups are preferable to showups due to false positive responses having the opportunity to be distributed across foils, thus reducing the rate of false identifications. The meta-analysis examined identification accuracy for children and adults across method of lineup presentation. Studies 2 and 3 use a simultaneous lineup as the 'standard' control condition given their prevalence over sequential lineups. In addition, sequential lineups have a detrimental effect on accuracy for children as the meta-analysis will demonstrate.

Measuring identification accuracy. From target-present lineups, identification accuracy is simply the rate of correct identification; that is, the proportion of participants that correctly identified the target from a lineup that contained the target.

In most studies, a highly similar substitute for the target was used as a target replacement in target-absent lineups. Only identifications of the target-replacement were considered false identifications. However, this practice may overestimate false identification rates because innocent suspects in the real world may not necessarily look highly similar to the criminal. Suspects may be arrested for reasons other than a match to the criminal's appearance (e.g., prior record of similar offenses or being found in the area of the crime shortly after the event). Some recent studies have treated each lineup member as an innocent suspect and examined the rate of false identification for each lineup member and total false positive rate (Lindsay et al., 1997). This type of analysis allows for an examination of the overall rate of choosing (i.e., total false positive rate) as well as the rate of identification for each innocent individual. Alternatively, correct rejection rates (i.e., stating the criminal is not present) have been used as an accuracy measure with target-absent lineups. The correct rejection rate is the complement of the total false positive rate. Either the rate of correct rejection or the total false positive rate can be effective measures when trying to demonstrate the superiority of one lineup procedure over another for increasing identification accuracy or decreasing false positives. The meta-analysis and Study 2 used correct rejection as the criterion for identification accuracy with target-absent lineups. Study 3 examined false positive rate as a function of each lineup member presented rather than correct rejection due to the nature of the experimental lineup procedures.

General Cognitive and Social Features of Lineup Identification

When presented with a lineup identification task, the witness is usually given a set of instructions similar to the following: "I am going to show you a set of photographs, the criminal's (target's) picture may or may not be here. Please look at the photos and decide if you see the criminal's picture. If you see the criminal's picture, please tell me the number of his photo. If the criminal's picture is not here, please tell me that the criminal's picture is not here". The witness must then decide whether the criminal's photo is present and an identification decision must be produced (e.g., the criminal's picture is Number 5 or the criminal's picture is not here). There are several aspects inherent to the lineup task that lead to an identification decision. These features include, face memory, face processing, and demand characteristics (Orne, 1962).

When presented with a lineup, the witness must remember what the criminal looks like. That is, witnesses must use their memory to produce an image of the previously seen target (i.e., face memory). The witness must then examine the lineup members and determine whether a match to one's memory of the criminal is present in the lineup. It is here that issues of face processing may be important. For example, if the criminal's face was encoded featurally, then the witness may rely on a featural (rather than features and the relationships among the features) comparison between the memory for the criminal and the lineup members to determine whether a match is present in the lineup. Lastly, before an identification decision is reached, the witness will need to interpret the instructions of the experimenter or police officer. Am I supposed to pick someone out? The development of face memory, differences in facial processing strategies between children and adults (as an explanation for the development of face memory), and a discussion of demand characteristics will be presented to better understand lineup identification by children and adults.

The Development of Face Recognition (Memory). Numerous studies have demonstrated increasing ability to recognize faces with increased age; that is, with increasing age comes improved recognition of unfamiliar faces (Blaney & Winograd, 1978; Carey & Diamond, 1977; Carey, Diamond, & Woods, 1980; Chance, Turner, & Goldstein, 1982; Ellis, Shepherd, & Bruce, 1973). For example, in a study by Blaney and Winograd (1978), 10-year-olds displayed superior recognition performance (i.e., higher correct identification/hit rate) compared to 8-year-olds or 6-year-olds. Furthermore, 8 year-olds produced a higher correct identification rate than 6-year-olds. Increased recognition ability is also found through adolescence. For instance, Chance, Turner, and Goldstein (1982) reported higher correct identification rates with increased age; 6- to 7-year-olds, 10- to 11-year-olds, 12- to 13-year-olds, and undergraduates. Note, some studies report a decrease in facial recognition around 12 years (Carey, Diamond, & Woods, 1980; Flin, 1980); however, this dip in accuracy is neither consistent nor always at 12 years (Diamond, Carey, & Back, 1983). In a literature review, Chung and Thomson (1995) found only three out of 11 face recognition studies obtained a significant drop in correct identifications for children 12 years of age. Overall, it seems appropriate to conclude that correct identifications increase with increasing age. Conversely, false positives are generally found to decrease with increased age (Chance, Turner, & Goldstein, 1982; Cross, Cross, & Daly, 1971; Ellis, Shepherd, & Bruce, 1973). I expected a pattern of results with eyewitness identification studies to coincide with the pattern of results obtained with face recognition studies. Specifically, children were expected to produce fewer correct identifications than adults and more false positives than adults in the meta-analysis conducted using eyewitness studies. In an attempt to gain a greater understanding of why children and adults produce differential recognition and to provide direction on how to reduce children's false positive responding, an examination of potentially relevant factors to lineup identification was undertaken in the meta-analysis.

Explaining the Development of Facial Recognition. Various theories have been espoused in an attempt to explain why identification accuracy increases with age. Three main explanations have been proposed: Encoding shift hypothesis, Pattern of feature salience, and Greater information encoded.

1) *Encoding shift hypothesis.* Carey (1981; Carey & Diamond, 1977; Carey, Diamond, & Woods, 1980) has suggested that increased face recognition with increased age is a result of greater knowledge of faces. She argues that children under the age of 10 years (novices) encode faces primarily on the basis of featural information (e.g., small eyes). On the other hand, older children and adults encode faces primarily on the basis of configural information; i.e., the global pattern of the face taking into consideration the relationships between features. Encoding faces using configural information is believed to be a more efficient strategy. Hence, superior performance with face recognition results from an encoding shift that occurs at about 10 years of age. Evidence from studies examining the recognition of inverted faces and faces disguised with paraphernalia are used by Carey to support the encoding shift hypothesis.

Carey and her associates have reported that adult's recognition abilities are affected more negatively than children under 10 years when faces are inverted during the recognition phase (Carey & Diamond, 1977; Carey, Diamond, & Woods, 1980). It was believed that the decrement in performance for adults was a result of having to switch to a featural processing strategy, whereas the faces were encoded using configural relationships. Young children however, were believed to be less affected by inverted face recognition because they encoded the face on a featural basis and features on inverted faces were less disrupted than configural patterns. Inversion effects, however, have been found in infants, 3 year-olds, and 6 year-olds (Bertelson, cited in Carey, 1981; Mehler, cited in Carey, 1981; Fagan, 1972).

Carey also suggested that evidence for younger children using a primarily featural strategy to encode faces can be found with work examining the recognition of faces with paraphernalia (e.g., hat or glasses). Children under 10 years were more likely to choose distractors wearing the same paraphernalia as the target during exposure. In contrast, older children were more likely to identify the correct target (Carey & Diamond, 1977; Diamond & Carey, 1977). It was suggested that younger children are more likely to rely on isolated features to encode faces and as a result are more likely to use those features for recognition than children over 10 and adults. On the other hand, Flin (1985) found recognition errors with paraphernalia occurred when the target and distractor were similar in appearance and accuracy increased when targets and distractors were not highly similar in general appearance. Baenninger (1994) also found that if targets and distractors wore similar paraphernalia children 6 to 10 years were capable of correctly identifying the target. In another experiment, Baenninger (1994) also found 8 year-olds, 11 year-olds, and adults were more negatively impacted by manipulations of configural information than featural information.

Furthermore, the encoding switch hypothesis would suggest that children under 10 years produce similar identification rates and that children over 10 years and adults produce similar identification rates. Facial recognition studies, however, show an increase in identification accuracy for young children (i.e., 4 to 5 year-olds) into adolescence. The encoding switch hypothesis does not seem to be supported at this time.

2) *Pattern of feature salience.* Chung and Thomson (1995) speculated that face recognition accuracy may improve with age due to older participants depending on features that are more useful for recognition than younger participants. Differences in feature salience were not found however for 7-year-olds, 9-year-olds, 11-year-olds or adults in a study by Chung (cited in Chung & Thomson, 1995). Using photofit faces, rather than photographs of faces, Flin (cited in Chung & Thomson, 1995) also found no differences with feature salience between 7 year-old children and adults. Thus, the little data that is available at this time does not support feature salience as an explanation for improved recognition accuracy with age (Goldstein & Mackenberg, 1966).

3) *Greater information encoded.* Flin and Dziurawiec (1989) have suggested that older participants merely encode more information, rather than different information, than younger participants (also Blaney & Winograd, 1978; Winograd, 1981). Supporting this view is research by Ellis and Flin (1990), who found older children encoded more information than younger children within any specified amount of time. Chung and Thomson (1995) suggest older children encoded more information because as age increases efficiency with the task increases; that is, the efficiency of both featural and configural encoding increases with age. Also consistent with this notion of younger children encoding less information than older participants is the work on recall memory. For example, in a study by Marin, Holmes, Guth, and Kovac (1979), younger children (i.e., 6 year-olds) recalled less information after a staged event than adults. The

information for the children was not less accurate however, than the information provided by adults (also, Goodman & Reed, 1986). Thus, the explanation for children's increasing ability for recognition accuracy with increasing age as a result of encoding greater information seems promising and future research is necessary to determine its validity.

Demand Characteristics. Another factor that may be central to understanding differences in identification accuracy between children and adults and a key to increasing identification accuracy in children is demand characteristics (or just demand). Orne (1962) describes demand characteristics of an experimental situation as the cues that convey a hypothesis to the participant and that in turn effect the participant's behaviour. Wells and Luus (1990) draw an analogy between the methodology of a social psychology experiment and a lineup identification situation. For example, the police officer conducting the lineup is similar to an experimenter conducting an experiment, witnesses are participants, and instructions to the participant are similar to instructions to the witness. In addition, police have a hypothesis (e.g., who the criminal is) as does an experimenter. Thus, just as an experimental participant is influenced by cues so is a witness. Orne (1962) suggests that the sophistication, intelligence, and previous experience of the participant will influence the perception of demand characteristics. Children may be considered less sophisticated and have fewer life experiences than adults. In addition, compared to adults, children may be more motivated to comply to the demands of adults who are perceived as powerful authority figures. Consequently, children's perceptions of what is expected and what to do in a lineup situation may differ from adult's perceptions leading to differential identification accuracy.

1) *Language Pragmatics.* A specific source of demand in identification studies may be

lineup instructions. Language pragmatics refers to the structure of the language, notably the assumptions and rules that are implicit in the social context (Bruner, 1983). It has been argued that children and adults may interpret the same question in different ways (Beal & Belgrad, 1990; Bonitatibus, 1988; Siegal, 1991a, 1991b; Siegal & Peterson, 1994). In experimental testing sessions for example, although children and adults may understand the semantics of the words, due to different life experiences and expectations children and adults may be using language differently. "Do you see the criminal?" may be interpreted as an order by children inducing them to pick someone but may be interpreted as an information seeking question by adults requiring them to indicate whether or not the criminal is among the lineup members presented. When children are asked an informational question (e.g., can you pick out the criminal), children may interpret this type of question as one that has a correct response (that the experimenter already knows) and one that requires them to do something (e.g., picking someone out) rather than doing nothing (e.g., not picking anyone out). Siegal (1996) suggests experimenters need to ask children explicit questions that do not require children to make assumptions. Children's identification accuracy may be facilitated by matching children's understanding of the goal of the task and its relevance with that intended by the experimenter.

Improving Children's Identification Accuracy

In the second experiment conducted, the lineup procedures designed to improve identification accuracy in children focused on demand characteristics, particularly language pragmatics. The lineup identification task was altered to reduce perceived pressure children may be experiencing from an authority figure (i.e., an adult). The goals of the lineup task were made more explicit by providing greater contextual information. For example, participants were informed about their option to say "I don't Know" if they were uncertain if the target was present. Also, participants were given greater instructions highlighting the undesirability of identifying an innocent person and the negative consequences an identified person would incur. In other lineup modifications, participants were given examples of different types of lineups (i.e., target-present and target-absent) by videotape presentation and in paper format and were told the appropriate response to be made with each. The experimenter also explained why each decision was appropriate (e.g., because no picture is of the target, a lineup should be rejected). It was anticipated that the expectations for a particular response (e.g., to pick someone out) would be decreased and children would be responding based on the information they had rather than on what they thought the experimenter wanted.

In the third experiment, cognitive requirements, demand characteristics and language pragmatics were addressed. It was speculated that the lineup task itself was too difficult and would need to be divided into a task requiring two judgments rather than one response to an entire process. By partitioning the task to require a relative judgement and an absolute judgment, participants were given the steps needed to reach an identification decision. Once again, any assumptions that were necessary with a traditional simultaneous lineup task now were made explicit (e.g., the judgements needed in order to reach an identification decision). Also, when witnesses were asked to make an absolute judgement, they were informed of how to make this type of judgement. To reduce the cognitive requirements of the task, an absolute judgment was made with one photograph rather than with all the lineup members presented. If children are less efficient at facial processing than adults, then having children focus on one photograph rather than six may concentrate their processing effort making it more efficient. In addition, although children may have less experience using facial information, providing instructions explaining how they can make an absolute facial judgment may also facilitate children's identification accuracy. It was expected that a two-judgment lineup task and greater instructions would decrease children's uncertainty with regard to what the experimenter was requesting and explicitly state how an accurate identification decision could be reached.

The Present Studies

Study 1. The first study reported in this dissertation is a meta-analysis that addressed two main questions. First, do children and adults produce differential eyewitness identification accuracy rates? Second, what factors might influence identification performance? The identification performance of children and adults was examined across the lineup factors of presence versus absence of target and method of lineup presentation. Also, the impact of mode of target exposure and identification training were examined.

When attempting to specify differences in identification accuracy between children and adults, it is significant if the mode of target exposure (i.e., live, slide, and videotape) influences child and adult witnesses differentially. Provided mode of exposure does not have differential effects on children and adults, any mode of exposure will allow a fair comparison of identification abilities. On the other hand, if mode of target exposure does influence identification accuracy differentially for children versus adults, researchers should use the mode of target exposure that produces the most generalizable results to the real world (e.g., live target). Few studies have examined the comparability of identification data obtained from the various modes of event/target exposure. In one study with adult witnesses, Lindsay and Harvie (1988) found correct identification rates (target-present lineups only) did not differ significantly across live, slide, and videotaped events. False positives (target-absent lineups only) were found to be somewhat higher with a live exposure of the criminal compared to slide or videotape presentation. Slide and videotape exposure produced similar false positive rates to one another. The effect of mode of exposure on identification accuracy for children versus adults was examined in the meta-analysis conducted.

Identification training refers to attempts made to increase identification accuracy. For example, the eyewitness is asked to identify the experimenter from a lineup prior to the actual identification task in order to illustrate how the procedure is conducted and the correct response when the target is present and when the target is absent. Identification training was included as a factor in the meta-analysis, given its sufficient prevalence across eyewitness studies. Note, the identification and training results from Study 2 were included in the meta-analysis because of their availability at the time of analysis. For completeness, the meta-analysis considered all eyewitness studies to March, 1997 involving adults and children of any age. The focus of Studies 2 and 3 however, was on children between 9 and 14 years of age given their potential to be victims and/or witnesses and the possibility of greater acceptance of their testimony by the legal system compared to younger children.

Studies 2 and 3. The meta-analysis demonstrated that correct identification rates did not differ between children over 5 years and adults; however, when presented with a target-absent lineup, children produce more false positive responses than adults. The impetus for Studies 2 and 3 was to design and test alternative identification procedures to reduce children's false positives with target-absent lineups (i.e., increase children's identification accuracy). Study 2 examined four alternative lineup procedures and compared identification accuracy to a 'standard' simultaneous lineup. As mentioned earlier, sequential lineups were not used as a comparison because of children's higher false positive rates with sequential lineups (see meta-analysis) and the prevalence of simultaneous lineups generally.

The alternative procedures examined in Study 2 were based on the hypothesis that children produce a high rate of false positive responding due to the social demands of the situation. Researchers have argued that the mere presentation of a lineup places implicit pressure on the witness to select someone and that children are less likely than adults to resist such demands (Ceci, Toglia, & Ross, 1987). Hence, four modifications to the simultaneous lineup were designed, each attempting to alter lineup demands by clarifying lineup instructions. The four alternative lineup procedures were; 1) providing a salient "I don't know" response option to the lineup task, 2) elaborating lineup instructions to include the negative consequences associated with selecting an incorrect person, 3) showing a lineup demonstration video prior to the identification task that illustrated the correct response to a lineup that contains the target and to a lineup that does not contain the target, and 4) providing a reference handout illustrating the correct response to target-present and target-absent lineups prior to the identification task.

Study 3 examined two alterative lineup procedures to 'standard' simultaneous lineup presentation in an attempt to reduce children's false positive responding from target-absent lineups. These procedures were based on the logic of relative and absolute decision strategies. A Two-Judgment Theory of Lineup Identification was posited: Judgment one, determine who looks most like the criminal (a relative judgment); Judgment two, determine if he is the criminal (an absolute judgment). The alternative identification procedures required witnesses to make judgments corresponding to the Two-Judgment Identification Theory when presented with a simultaneous lineup. First, witnesses narrow the multi-person, simultaneous lineup to the single person most similar in appearance to their memory for the criminal (Judgment one). Once a single lineup member remains, the witness may be asked to make an identification decision (Judgment two).

Implications for False Positive Responses

False positive responding has several consequences for the witness and judicial system. Recall, two types of false positives may occur, foil identification and false identification. Witnesses who make foil identifications have made known errors and jeopardize their credibility. For example, other details of the event offered by the witness may be less believable after a known identification error has been made. If an innocent suspect was arrested and the eyewitness identified a foil, the reasonableness of obtaining an identification from this witness given another lineup and a different suspect is greatly reduced or even eliminated. The graver error is to falsely identify an innocent suspect. The misidentification of an innocent suspect may lead to prosecution and conviction of an innocent person while the criminal remains free. Hence, reducing false positive responding preserves the credibility of the witness and may lead to a fairer justice system because innocent suspects are less likely to be prosecuted.

Summary

A meta-analysis of eyewitness studies comparing the identification performance of children and adults was conducted. Shown a target-present lineup, children between the ages of 5 and 14 years produced comparable correct identifications to adults. Shown a target-absent lineup, children, even up to 14 years of age, produced fewer correct rejections compared to adults. Two studies were conducted in an attempt to increase children's identification accuracy, and in particular, reduce children's false positives when shown a target-absent lineup. Study 2 attempted to decrease children's false positive responding by altering the demands of the lineup task; that is, by reducing the perceived pressure to make an identification. Study 3 altered the lineup presentation and instructions compared to 'standard' simultaneous lineup presentation in an attempt to reduce children's false positive responding. The lineup procedures designed in Study 3 were successful at decreasing children's false positive responding compared to simultaneous lineup presentation. Implications of the present work and future directions for identification research are reviewed in the General Discussion (Chapter 5).

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CHAPTER 2

IDENTIFICATION ACCURACY

OF CHILDREN VERSUS ADULTS: A META-ANALYSIS

Foreword

Chapter 2 consists of a manuscript to be published in *Law and Human Behavior.* The manuscript that appears in this chapter has been slightly altered from the version that will be published to increase readability for the general reader. The manuscript was co-authored with Dr. R.C.L. Lindsay who also served as thesis supervisor. This chapter was a collaborative effort with the first author taking primary responsibility for the concepts, data, and interpretation of results (APA, 1994).

Pozzulo, J.D., & Lindsay, R.C.L. (In press). Identification accuracy of children versus adults: A meta-analysis. *Law and Human Behavior.*

Abstract

Identification accuracy of children and adults was examined in a meta-analysis. Preschoolers (M = 4 years) were less likely than adults to make correct identifications. Children over the age of 5 did not differ significantly from adults with regard to correct identification rate. Children of all ages examined were less likely than adults to correctly reject a target-absent lineup. Even adolescents (M = 12 to 13 years) did not reach an adult rate of correct rejection. Compared to simultaneous lineup presentation, sequential lineups increased the child-adult gap for correct rejections. Providing child witnesses with identification practice or training did not increase their correct rejection rates. Suggestions for children's inability to correctly reject target-absent lineups are discussed. Future directions for identification research are presented.

Introduction

Historically, children have been viewed by the legal system as inferior witnesses compared to adults, with children considered less reliable and less accurate (see Ceci & Bruck, 1993, for a review). Negative views ostensibly were justified by cases where children provided inaccurate testimony. Such cases included the Salem Witch Trials of 1692, where some children gave inaccurate testimony leading to the execution of over 20 residents (Ceci & Bruck, 1995), and numerous cases early in the 20th century (see Whipple, 1912). Only recently have views of children's potential value as witnesses begun to change. In a recent review of the literature examining children's ability to correctly recall events, Ceci and Bruck (1993) concluded that "there are significant age differences in suggestibility but that even very young children are capable of recalling much that is forensically relevant" (p. 403). One aspect relevant to a witness' performance is the ability to correctly identify a criminal. In comparison to children's ability to recall events, few studies have addressed children's ability to recognize faces in general or more specifically in the context of eyewitness identification. Yet, the small set of eyewitness studies is capable of providing a clearer picture of children's identification accuracy compared to adult eyewitness' identification performance.

Literature reviews of children's identification abilities have been conducted (e.g., Davies, 1993; 1996); however, the statistical significance of the results has been inconsistent and formal statistical techniques examining overall significance levels and effect sizes have not been applied. It is difficult to determine from the reviews whether children are less accurate than adults, under what conditions this might be true, and what factors might influence their identification accuracy. A closer examination of this research using meta-analytical techniques was conducted to more fully illuminate differences and similarities between child- and adult-witness' identification performance.

Eyewitness versus Facial Recognition Methodology: The effect of age

To study eyewitness identification, participants are exposed to an "event" (e.g., theft) without their prior knowledge and, in particular, without warning that they will later have to identify the confederate (e.g., Lindsay, Wallbridge, & Drennan, 1987; Malpass & Devine, 1980; Murray & Wells, 1982; Wells, Lindsay, & Ferguson, 1979). The event may be seen live or shown by slides or videotape. Typically there is only one target. A delay between the event and recognition test may or may not be imposed. For the recognition phase, a small set of photographs is shown (often six), only one, or even none of which have previously been seen by the participant. Data are analysed in terms of correct identification from target-present lineups (photo arrays) or correct rejection from target-absent lineups.

In contrast, initially conducted by cognitive researchers, the framework employed to investigate facial recognition was adopted from paradigms designed to explore aspects of general memory. Participants are exposed to a series of faces (e.g., 20) through the use of photographic material, usually slide presentation. Instructions attempting to manipulate encoding may also be delivered (e.g., depth of processing, Bower & Karlin, 1974; Strnad & Mueller, 1977; Mueller, Carlomusto, & Goldstein, 1978; Winograd, 1976). Alternatively, participants are requested to remember the faces (e.g., Brown, Deffenbacher, & Sturgill, 1977). Participants may be tested immediately for their memory or dismissed and asked to return days, weeks, or even months later for the completion of the study. For the recognition phase, photographs of previously seen faces interspersed with new faces are shown to participants whose task is to identify any previously seen photographs (targets). Data are analysed in terms of hits and false positives or false alarms.

I) Hits. Facial recognition studies using the above paradigm have generally found that the proportion of hits, and thus the level of accuracy increases with participants' age (Blaney & Winograd, 1978; Carey, Diamond, & Woods, 1980; Chance, Turner, & Goldstein, 1982; Cross, Cross, & Daly, 1971; Ellis, Shepherd, & Bruce, 1973; Feinman & Entwistle, 1976; Flin, 1980). In a review of this literature, Chance and Goldstein (1984) reported hit rates were between 35 and 40% for children at a kindergarten level (4 to 5 years); between 50 and 58% for 6 to 8 year-olds; between 60 and 70% for 9 to 11 year-olds; and between 70 and 80% for 12 to 14 year-olds. Adult performance has been found to be similar to that of 12 to 14 year-olds (Goldstein, 1977). Shapiro and Penrod (1986), in a meta-analysis of facial identification studies, found age yielded a large effect size for hits. In the present meta-analysis, we examine the rates of correct identification by children of various ages compared to adults, to determine if correct identification rates in eyewitness studies parallel hit rates in facial recognition studies and, more specifically, at what age children produce a correct identification rate comparable to adult performance using an eyewitness paradigm.

II) False Positives. As important as it is for a witness to be able to identify the criminal (i.e., make a correct identification), it is also important for a witness to be able to correctly reject a lineup when the criminal is not present (i.e., when an innocent suspect has been arrested). We can only assess the rate at which participants make correct rejections in facial recognition studies if false positive (or false alarm) rates are reported. Some, but not all, facial recognition studies report rates of false positive responding. False positives are generally found to decrease with increased age (Chance et al., 1982; Cross et al., 1971; Ellis et al., 1973; Flin, 1980). Shapiro and Penrod (1986) also found age yielded one of the largest effect sizes for false positives. Chance and Goldstein (1979) reported adolescents, 13 years and older, produce similar false positive rates to adults. Cross et al. (1971) reported false positive rates of those 12 years, 17 years, and adults (*M* = 36 years) were comparable (11%, 9%, and 7%, respectively). We compared lineup correct rejection rates of various aged children to adults. We also considered whether correct identification (target-present lineups) and correct rejection (target-absent lineups) rates reach adult performance at similar ages. Facial recognition research would suggest children reach adult level performance on these two measures of accuracy at approximately the same age.

Moderating Factors of Identification Accuracy

We also were interested in examining factors that might influence identification performance other than age and presence versus absence of the target in the recognition task. We examined the method section of eyewitness studies and noted any relevant variables influencing identification accuracy[1]. Method of lineup presentation, mode of target exposure, and identification training emerged as potentially relevant to age and identification accuracy and were present sufficiently often in the database to be examined (i.e., 3 or more hypothesis tests with the particular variable).

[1]Initially we turned to facial recognition studies, in particular Shapiro and Penrod's meta-analysis (1986), and considered factors that had been found to influence such performance. We then considered if these factors were applicable to eyewitness studies (i.e., given our set of studies, the variable had to be manipulated and or there had to be variability with regards to the variable across studies). Aside from age, presence versus absence of target, and mode of target exposure, no other variables examined in Shapiro and Penrod's meta-analysis were applicable for the present meta-analysis.

Method of lineup presentation. The identification task or lineup generally takes one of three forms; simultaneous lineup, sequential lineup, or showup. With a simultaneous lineup, all the lineup members are presented to the witness at the same time. This method of lineup presentation has been criticized for affording witnesses the opportunity to employ a "best choice" or "relative judgment" strategy. The individual who most looks like the target, even though the target may not be present, may frequently be chosen (Wells, 1984).

Presenting photographs sequentially has been suggested to combat such a relative judgment strategy (Lindsay & Wells, 1985). With a sequential lineup, the witness is shown photographs one at a time. A decision as to whether or not the photograph is of the target is made each time a photograph is presented. Witnesses are informed they will not be permitted to reexamine any previously seen photographs in the sequence, nor will they be allowed to change their decision once it has been made. In addition, witnesses are blind to the number of photographs to be presented. With adult participants, Lindsay and Wells (1985) found that, compared to simultaneous lineups, sequential lineups did not influence correct identification rates but significantly reduced false identification rates (i.e., identifying an innocent suspect) by increasing the probability that criminal-absent lineups would be rejected (i.e., no one would be identified). Subsequent studies have replicated this pattern of results with adult participants (Cutler & Penrod, 1988; Lindsay, Lea, Nosworthy, Fulford, Hector, LeVan, & Seabrook, 1991; Lindsay, Lea, & Fulford, 1991). Shown a sequential lineup, witnesses may make an "absolute judgment" for each photograph by comparing the photograph to their memory of the target. With witnesses unaware of the number of photographs to be presented, they simply keep rejecting photographs, expecting the criminal will subsequently be presented.

An alternative lineup task is the showup; the presentation of a single picture or person to an eyewitness for identification. Although a witness may use an absolute judgment with a showup, this procedure may be highly prejudicial to the suspect (Lindsay, Pozzulo, Craig, Lee, & Corber, 1997; Wagenaar & Veefkind, 1992; Yarmey, Yarmey, & Yarmey, 1994). With a simultaneous or sequential lineup, the witness does not know who the police suspect. In contrast, the witness is aware that the person in a showup is the suspect. This knowledge may influence identification decisions; in particular, an increase in false identifications compared to simultaneous presentation might occur (Lindsay et al., 1997; Yarmey, Yarmey, & Yarmey, 1996). We examined whether method of lineup presentation would impact identification accuracy for children versus adults differentially.

Mode of target exposure. Participants may be exposed to a target by a live presentation, a sequence of slides, or a videotape presentation. Few studies have examined the comparability of these exposure modes on identification accuracy. A study by Lindsay and Harvie (1988) examined identification rates obtained from a slide sequence and videotaped, staged-crime each presented to individual participants and the same event presented live either to individuals or to large groups of participants. Correct identification rates did not differ significantly due to the mode of exposure employed. Correct rejections (collapsing across false and foil identifications) were somewhat higher in the slide and videotape conditions compared to the live exposure conditions. Of significance to the present research is whether mode of target exposure has differential effects on children's versus adults' identification abilities. We considered whether identification accuracy would be influenced by mode of target exposure differentially for children versus adults.

Identification training. Some studies have attempted to increase identification accuracy of children by providing training (Lindsay et. al., 1995; Parker & Ryan, 1993; Pozzulo & Lindsay, in press; Pozzulo & Lindsay, 1997). In previous studies, training generally consisted of a practice identification trial prior to the presentation of the actual lineup and identification task. For example, the Parker and Ryan (1993) training manipulation had participants identify the experimenter from a set of photographs. After the trial, the experimenter stated whether or not the participant was correct, if incorrect, the correct response was indicated. Along similar lines, Pozzulo and Lindsay (in press) tested several alternative identification training techniques. One procedure provided a practice lineup but used animal drawings rather than human faces to help simplify the identification task. In another procedure, children were shown a demonstration video illustrating the correct decision to make with a target-present lineup and a target-absent lineup. In an attempt to reduce children's perception of having to make a selection, Pozzulo and Lindsay (in press) provided lineup forms with an "I don't know" response option. These researchers also provided extensive instructions explicitly stating the importance of not selecting an innocent person (e.g., the consequences a wrongly identified person would incur). We examine whether identification accuracy increases for children who have received training compared to children who have not received training.

The goals of the present research were to: a) determine the differences in identification accuracy between children and adults, b) examine moderators that may differentially influence the identification accuracy of children and adults, and c) outline future directions for identification research with children.

Method

Locating Studies

A computer search using the PsycInfo database (1984 to March 1997) was conducted with the key words eyewitness; age crossed with identification; child crossed with lineup; witness; photo and identification; and witness and identification. Given the bias for published studies to report significant findings and our goal of examining the most comprehensive data set possible to date, we sought to include unpublished research. An attempt was made to discover relevant works, unpublished (and published) by contacting via E-mail researchers who had published in the area. To uncover other empirical pieces not listed by PsycInfo (e.g., law reviews) or provided by researchers, a complete search of relevant references cited in any of the located articles was conducted. Studies were restricted to those that included children and an adult comparison group[2]. The age of the child sample was not restricted. The age range for child participants was 3 to 15 years.

Deriving Hypothesis Tests from Retrieved Studies

Most studies examined more than one "child" sample in a particular experiment. For instance, Leippe, Romanczyk, and Manion (1991) examined 5 to 6 year-olds, 9 to 10 year-

[2]To include studies with just child participants or just adult participants would include every identification study ever conducted. Aside from this volume of studies being unwieldy, there are methodological reasons not to include such single sample studies in our meta-analysis. Differences in method (e.g., type of crime) and stimuli (e.g., confederate, photos used) across studies could not be controlled for with single sample studies. Thus, it would be impossible to gauge and control for the task difficulty across single sample studies so that valid comparisons could be made between children and adults.

olds, and adults. In any experiment with more than one child sample and only one adult sample, the single adult sample was used for comparison with each child sample. There was only one study (Marin, Holmes, Guth, & Kovac, 1979) that examined three child samples and one adult sample. All other studies either had one or two child samples and one or two adult samples.

Leippe et. al. (1991) presented two lineups to participants with a different confederate in each. Parker, Haverfield, and Baker-Thomas (1986) presented two lineups to participants with the same confederate in each but in a different position. To avoid confounds of practice and the violation of the assumption of independence of scores in meta-analyses, we only used data from the first lineup shown to participants. Also, Parker et. al (1986) used child and adult targets, we only use data that were collected with an adult target to avoid a confound of age of target. All studies used in the meta-analysis used an adult target. The final sample consisted of 51 hypothesis tests examining identification accuracy with a total *N* of 2,086 (children = 1066; adults = 1020). These data were derived from nine published papers[3], one conference paper, and one unpublished manuscript.

Given identification practice and training were designed to improve children's identification accuracy, in a separate analysis we examined whether children with training

[3]A published study by Yarmey (1988) qualified to be included in the meta-analysis, however, was excluded because the actual rate of correct identification and/or correct rejection was not recoverable. We acknowledge the effort made to locate the original data by the author, however, the search was unsuccessful. We would like to point out the direction of these results. Yarmey (1988) presented two lineups to children; first a target-absent, then a target-present. Yarmey reported no reliable differences across ages with target-absent lineups (mean ages for child participants were 6.3 years and 10.4 years). This result is contradictory with the present meta-analysis; that is, children of all ages were less likely to correctly reject target-absent lineups than adults. With the target-present lineups, young children (*M* = 6 years) were less likely to correctly identify the target than adults. Children over 5 years were found as likely as adults to correctly identify the target in the present meta-analysis.

were more accurate than children without training. Hypothesis tests were derived from studies that compared identification performance of children without training to children with training. The children without training are the same children that were compared to adults in the above analysis. The data for this meta-analysis were derived from two published papers (Parker & Ryan, 1993; Pozzulo & Lindsay, in press), one conference paper (Lindsay et. al, 1995), and one unpublished manuscript (Pozzulo & Lindsay, 1997).

Pozzulo & Lindsay (in press) investigated four types of training with one control group. Thus, we collapsed across the training manipulations rather than violate the assumption of independence by using the control group several times. A control group was not used more than once in the other training studies. The final sample consisted of 16 hypothesis tests examining the effect of training on identification accuracy with a total of 1,147 children.

Study Characteristics

Information on four characteristics were coded for each study.

1) *Age*. Across the hypothesis tests four mean ages for the "child" samples (i.e., M = 4; M = 5 to 6 years; M = 9 to 10 years; and M = 12 to 13 years) were represented. Given theories of social and cognitive development (e.g., Bandura, 1986; Piaget, 1977), we felt grouping studies together may obscure findings, if children at various ages perform differentially on the identification tasks. Additionally, we were not able to treat age as a continuous variable because it was not clear the difference between ages was similar (e.g., from 5 to 6 years to 9 to 10 years versus 9 to 10 years to 12 to 13 years). We also were unsure if identification ability changes linearly with age (e.g., a dip in facial recognition accuracy at 11 and 12 years has been reported; Flin, 1980). Furthermore, the full spectrum of

ages was not available in the studies examined. Thus, our hypothesis tests were partitioned by mean age into four categories.

2. *Presence versus absence of target.* Lineups were classified as either target-present tasks (the target was among the photographs shown to the participant) or target-absent tasks (the target was not among the photographs shown to the participant).

3. *Method of lineup presentation.* If all lineup members were presented at the same time, this was coded as a simultaneous lineup. A hypothesis test was coded as having used a sequential lineup if a witness was shown photographs one at a time and asked to make a decision as to whether or not it was the target after the presentation of each photograph. Hypothesis tests where only one photo was shown to the witness were coded as having used a showup.

4. *Mode of target exposure.* The mode of target exposure used was coded (i.e., live versus slides).

Dependent Variable

The dependent variable in each study was identification accuracy; that is, with a target-present lineup, the frequency of correct identifications was the dependent measure and for a target-absent lineup the frequency of correct rejections was the dependent measure.

Statistical Analyses

We followed the meta-analytic approach of Rosenthal (1984) and Mullen (1989) for our analyses. Recovery of sample sizes and frequency of correct identifications/correct rejections per condition allowed X^2 to be calculated. To determine the significance level of each hypothesis test, a Z score and exact probability was then calculated. In addition, an effect size for each hypothesis test was determined that resulted in a Z_{FISHER}, r, r^2, and Cohen's d. The significance level of combinations of hypothesis tests are reported with a Z score and associated one tailed probability. The effect size of combinations of hypothesis tests are reported with a mean Z_{FISHER}, and mean Cohen's d. All hypothesis tests were weighted by sample size when combined and compared. We predicted identification accuracy would be lower for children than adults. More specifically, children would have a lower correct identification rate than adults and children would have a lower correct rejection rate than adults. We also predicted that children who received identification training or practice would have a higher accuracy rate than children without training or practice.

Results

We were initially interested in examining the typical outcome for target-present conditions and target-absent conditions. Our aim was to determine the combined level of significance and examine the mean effect size for our data sets. Recall our discussion of the inappropriateness of grouping studies together that examined different aged children. We examined the significance levels and mean effect sizes for each group of studies with a different mean age for children (i.e., preschoolers, $M = 4$; young children, $M = 5$ to 6 years; older children, $M = 9$ to 10 years; adolescents, $M = 12$ to 13 years) across target-present tasks and target-absent tasks separately. Within the target-present tasks and the target-absent tasks, we contrasted the mean effect sizes of the groups of studies to determine whether the data sets differed from each other.

Are children less likely to make correct identifications than adults?

Five hypothesis tests examined whether preschoolers ($M = 4$) and adults produced comparable correct identification rates, (see Table 1). Children, approximately 4 years of age, had a significantly lower rate of correct identification (.47) than adults (.67), $Z = 3.44$, $p < .01$. The effect sizes for these tests produced a mean $Z_{FISHER} = .25$ and a mean Cohen's $d = .50$. A fail-safe number (FSN) was calculated to estimate the number of additional tests averaging null results that would be needed in order to bring the significance level attained through the meta-analysis to a $p = .05$. Approximately 16 studies averaging null results would be necessary to achieve an overall combined probability level of $p = .05$. Rosenthal (1984) suggests using a "5k + 10" benchmark for determining a tolerable fail-safe number for a database where k = number of hypothesis tests. With this database our benchmark would be 5(5) + 10 = 35. Since the fail-safe number was below this benchmark, we should exercise caution in our conclusions. Thus, this result may not be tolerant for future null results.

With studies contrasting the performance of children between 5 and 6 years of age to adults, correct identification rates differed but not in the expected direction (six hypothesis tests; .71 versus .54 correct identification rate, respectively), $Z = -3.79$, $p < .01$, mean $Z_{FISHER} = -.21$; mean Cohen's $d = -.42$. These children made significantly more correct identifications than adults.

Across 13 hypothesis tests comparing older children ($M = 9$ to 10 years) to adults, similar correct identification rates were obtained (.47 versus .48), $Z = .42$, $p = .34$, mean $Z_{FISHER} = .02$, mean Cohen's $d = .03$. Adolescents ($M = 12$ to 13 years) also maintained adult like performance given our data set with six hypothesis tests (.66 versus .57, respectively), $Z = -1.12$, $p = .13$, mean $Z_{FISHER} = -.07$; mean Cohen's $d = -.14$.

Table 1. Target-Present Hypothesis Tests: Testing Whether Children have Lower Correct Identification Accuracy than Adults

											Effect Sizes			
Year	Author	Nch	Agech	Pidc	Nad	Pida	LT	Tg	Dir	Z	Fz	r	r^2	d
1996	Dekle et al.	18	5/6	.61	67	.30	Sim	2	—	-2.45	-.27	-.27	.07	-.55
		18	5/6	.83	50	.28	Sho	2	—	-4.07	-.54	-.49	.24	- 1.14
1991	Goodman et al.	20	3/4	.30	19	.58	Sim	1	+	1.76	.29	.28	.08	.59
		28	5/6	.54	25	.43	Sim	1	—	-.41	-.06	-.06	-.00	-.11
1986	Goodman & Reed	16	6/7	.94	16	.75	Sim	1	—	-1.51	-.26	-.26	.06	-.53
		16	3/4	.38			Sim	1	+	2.14	.40	.38	.14	.82
1991	Leippe et al.	14	5/6	.79	15	.93	Sim	1	+	1.15	.22	.21	.04	.44
		16	9/10	.63			Sim	1	+	2.05	.39	.37	.14	.79
1995	Lindsay et al.	12	10	.25	12	.58	Sim	2	+	1.66	.35	.34	.11	.72
		12	10	.17	12	.00	Seq	2	—	-1.23	-.26	-.25	.06	-.52
1997 Exp 1	Lindsay et al.	21	9/10	.71	31	.55	Sim	1	—	-1.21	-.17	-.17	.03	-.34
		20	12/13	.80			Sim	1	—	-1.84	-.26	-.26	.07	-.53
		26	9/10	.65	58	.62	Seq	1	—	-.29	-.03	-.03	.01	-.06
		31	12/13	.71			Seq	1	—	-.84	-.08	-.08	.01	-.18
		22	9/10	.68	30	.50	Sho	1	—	-1.3	-.18	-.18	.03	-.37
		18	12/13	.72			Sho	1	—	-1.15	-.22	-.22	.05	-.45
Exp 2		19	4	.53	20	.80	Sim	1	+	1.8	.30	.29	.08	.61
		19	4	.26	40	.45	Seq	1	+	2.3	.31	.30	.09	.63
		19	4	.90	20	.85	Sho	1	—	-.42	-.06	-.07	.00	-.13
1979	Marin et al.	24	5/6	.54	24	.54	Sim	1	—	00	00	00	00	00
		24	8/9	.46			Sim	1	+	.58	.08	.08	.01	.17

Year	Author	Nch	Agech	Pidc	Nad	Pida	LT	Tg	Dir	Z	Fz	r	r^2	d
		24	12/13	.75			Sim	1	_	-1.51	-.22	-.22	.05	-.45
1989	Parker & Carranza	12	9	.33	12	.08	Sim	2	_	-1.51	-.32	-.31	.09	-.65
1986	Parker et al.	24	8	.58	24	.71	Sim	2	+	.42	.02	.02	.00	.03
1993	Parker & Ryan	12	9	.42	12	.42	Sim	2	_	0.00	.00	.00	.00	.00
		12	9	.25	12	.08	Seq	2	_	-1.10	-.23	-.22	.05	-.46
In press	Pozzulo & Lindsay	37	10/11	.24	25	.52	Sim	1	+	2.23	.29	.28	.08	.59
		54	12/13	.35			Sim	1	+	1.42	.16	.16	.02	.32
1997	Pozzulo & Lindsay	18	10/11	.67	28	.68	Sim	1	+	.08	.01	.01	.00	.03
		39	12/13	.64			Sim	1	+	.32	.04	.04	.00	.08

Note. Nch = total number of children in test. Agech = mean age of child participants. Pidc = proportion of correct identifications for children. Nad = total number of adults in test. Pida = proportion of correct identifications for adults. LT = lineup type; Sim = simultaneous, Seq = sequential, Sho = show up. Tg = type of target exposure; 1= live, 2 = slides. Dir = direction of effect. Fz = Fisher's *Z*.

We compared the mean effect size of the preschooler data set with the mean effect sizes of the other child data sets. We found the mean effect size of the preschooler data set significantly differed from that of young children ($Z = 4.10$, $p < .001$), older children ($Z = 2.71$, $p < .01$), and adolescents ($Z = 3.77$, $p < .001$). Thus, the preschooler-adult gap was larger than any of the other child-adult gaps[4].

Are children less likely to make correct rejections than adults?

There were only two hypothesis tests comparing the performance of preschoolers to adults with a target-absent lineup (see Table 2). Preschoolers were significantly less likely to

[4] The young child-adult gap also was significantly different than the older child-adult gap, $Z = 1.98$, $p < .05$. This result should be interpreted with caution given the small data set with young children and that 1 of these hypothesis tests (i.e., Dekle et al.) produced an anomalous large effect size. Removal of this hypothesis test resulted in a nonsignificant difference in mean effect size between young and older children's data sets, $Z = .93$, $p = .18$ while the gap between the preschooler's and young children's data sets remained significant, $Z = 3.12$, $p < .001$. No other significant differences in mean effect sizes were present between the various target-present data sets.

correctly reject a target-absent lineup (.39) than adults (.98), $Z = 5.12$, $p < .001$. The mean effect size for this set of tests was $Z_{FISHER} = .83$; Cohen's $d = 1.86$. The FSN (17) was not sufficiently tolerant for future null results. Further research is needed before any conclusions can be drawn regarding preschoolers' ability to make correct rejections with target-absent lineups.

Across three hypothesis tests, young children made fewer although not significantly less correct rejections (.57) than adults (.65), $Z = .23$, $p = .41$, mean $Z_{FISHER} = .04$; mean Cohen's $d = .07$. Once again, this result should be interpreted with great caution given the small number of hypothesis tests in this data set. With so few hypothesis tests for preschoolers and young children we do not examine these groups further.

Effect sizes from eleven hypothesis tests were available to examine older children's correct rejection rates to adult rates. Older children were significantly less likely to correctly reject a target-absent lineup (.41) compared to adults (.70), $Z = 6.67$, $p < .001$, mean $Z_{FISHER} = .34$; mean Cohen's $d = .69$. The FSN(154) was acceptably tolerant for future null results. Across five hypothesis tests, adolescents also were significantly less likely to correctly reject target-absent lineups (.48) than adults (.74), $Z = 5.00$, $p < .001$, mean $Z_{FISHER} = .27$; mean Cohen's $d = .54$. The FSN (43) for this data set was also acceptably tolerant for future null results.

We examined whether the mean effect size for the older children's data set differed from that of the adolescents' data set. The older child-adult gap was not significantly different than the adolescent-adult gap for correct rejection, $Z = .76$, $p = .22$. An examination of the correct rejection rates reached by older children and adolescents compared to adults does not suggest older children's correct rejection performance more closely approximate adult's correct rejection performance as the children enter adolescence.

Table 2. Target-Absent Hypothesis Tests: Testing Whether Children have Lower Correct Rejection Accuracy than Adults

											Effect Sizes			
Year	Author	Nch	Agech	Prgc	Nad	Prga	LT	Tg	Dir	*Z*	Fz	*r*	r^2	*d*
1996	Dekle et al.	18	5/6	.39	66	.41	Sim	2	+	.16	.02	.02	.00	.03
		18	5/6	.66	50	.62	Sho	2	—	-.35	-.04	-.04	.00	-.09
1991	Leippe et al.	12	5/6	.67	12	.92	Sim	1	+	1.51	.32	.31	.10	.65
		15	9/10	.87			Sim	1	+	.41	.08	.08	.00	.16
1995	Lindsay et al.	12	10	.25	12	.33	Sim	2	+	.45	.09	.09	.01	.18
		12	10	.08	12	.92	Seq	2	+	4.08	1.19	.83	.69	3.01
1997 Exp 1	Lindsay et al.	25	9/10	.28	29	.66	Sim	1	+	2.75	.39	.37	.14	.81
		21	12/13	.33			Sim	1	+	2.25	.33	.32	.10	.67
		14	9/10	.21	36	.75	Seq	1	+	3.47	.54	.49	.24	1.13
		15	12/13	.20			Seq	1	+	3.63	.56	.51	.26	1.18
		25	9/10	.60	119	.93	Sho	1	+	4.57	.40	.38	.15	.82
		20	12/13	.60			Sho	1	+	4.32	.38	.37	.13	.79
Exp 2		9	4	.56	20	1.00	Sho	1	+	4.06	.98	.75	.57	2.29
		9	4	.22	20	.95	Seq	1	+	3.19	.68	.59	.35	1.47
1989	Parker & Carranza	12	9/10	.42	12	.67	Sim	2	+	1.23	.26	.25	.06	.52
1993	Parker & Ryan	12	9/10	.17	12	.42	Sim	2	+	.93	.19	.19	.03	.39
		12	9/10	.33	12	.75	Seq	2	+	2.05	.45	.42	.17	.92
In press	Pozzulo & Lindsay	37	10/11	.38	28	.43	Sim	1	+	.41	.05	.05	.00	.10
		65	12/13	.45			Sim	1	—	-.16	-.02	-.02	.00	-.04
1997	Pozzulo & Lindsay	14	10/11	.86	28	.93	Sim	1	+	.74	.12	.11	.01	.23

Year	Author	Nch	Agech	Prgc	Nad	Prga	LT	Tg	Dir	Z	Fz	r	r^2	d
		44	12/13	.81			Sim	1	+	1.32	.16	.16	.02	.32

Note. Nch = total number of children in test. Agech = mean age of child participants. Prgc = proportion of correct rejections for children. Nad = total number of adults in test. Prga = proportion of correct rejections for adults. LT = lineup type; Sim = simultaneous, Seq = sequential, Sho = show up. Tg = type of target exposure; 1= live, 2 = slides. Dir = direction of effect. Fz = Fisher's Z.

Are older children and adolescents more likely to make correct identifications than correct rejections compared to adults - testing the interaction by a meta-analytic contrast (Mullen, 1989).

We compared the effect sizes for hypothesis tests of older children and adults given a target-present lineup and the effect sizes for hypothesis tests of older children and adults given a target-absent lineup. The effect sizes for these two sets of conditions were significantly different from each other, $Z = 4.54, p < .001$. Older children were less likely to make correct rejections than adults but were as likely as adults to make correct identifications. This also was true for adolescents, $Z = 4.96, p < .001$.

Can sequential lineup presentation increase accuracy on target-absent lineups?

Sequential lineups have been found to increase correct rejections for adults without altering their correct identification rates. We examined whether this also was the case for older children. With simultaneous lineup presentation (seven hypothesis tests), older children (.46) were less likely than adults (.62) to correctly reject a target-absent lineup, $Z = 2.63, p < .01$, mean $Z_{FISHER} = .17$; mean Cohen's $d = .34$. However, the FSN(11) was not sufficiently tolerant for future null results. Older children (.21) also were less likely to reject target-absent sequential lineups than adults (.81), three hypothesis tests, $Z = 5.31, p < .001$, mean $Z_{FISHER} = .68$; mean Cohen's $d = 1.46$. The FSN (31) was tolerant for future null results.

We went on to examine whether the mean effect sizes for simultaneous and sequential lineups were significantly different from each other (interaction of age with lineup procedure). Although children were less likely than adults to correctly reject a target-absent simultaneous lineup, the child-adult difference was even greater when a sequential lineup was used, $Z = 4.17, p < .001$. With sequential presentation, children made fewer correct rejections and adults made more correct rejections compared to simultaneous lineup presentation.

We were unable to test simultaneous versus sequential lineup presentation effects for adolescents because there was only one hypothesis test that used a sequential lineup with this age group. In addition, we were unable to examine differences in lineups versus showups because only one hypothesis test with older children and one hypothesis test with adolescents used a showup procedure.

Does mode of target exposure alter the correct rejection rate?

We examined older children's correct rejection rates to adults' when a live target was used and when a target was presented by slides. With a live target presentation (six hypothesis tests), children (.53) rejected target-absent lineups significantly less often than adults (.77), $Z = 5.79, p < .001$, mean $Z_{FISHER} = .30$; mean Cohen's $d = .62$. The FSN (50) was sufficiently tolerant for future null results. Older children were also less likely to make correct rejections (.25) than adults (.62) when the target was presented by slides, five hypothesis tests, $Z = 3.91, p < .001$, mean $Z_{FISHER} = .44$; mean Cohen's $d = .90$. The FSN (23) was not quite tolerant for future null results. A focused contrast between these two mean effect sizes revealed a smaller child-adult gap for correct rejections when a live exposure was used than a slide exposure, $Z = 1.52$, $p < .001$. Thus, studies using a slide exposure may be underestimating all witnesses, but especially older children's ability to correctly reject target-absent lineups. Note however, that four out of the five hypothesis tests using a slide paradigm used the same stimulus. It is not clear whether this differential effect size in correct rejections for mode of target exposure would replicate with other slide stimuli. There may have been something peculiar about this particular set of slides leading to lower correct rejection rates for children.

It was not possible to conduct an analysis on mode of target exposure for the adolescent data set because no hypothesis tests with this age group used a slide paradigm.

Does training improve children's correct rejection rates and/or correct identification rates?

Across six hypothesis tests, older children receiving training were not significantly more likely to reject target-absent lineups (.41) than older children without training, (.35) $Z = .48$, $p = .32$ (see Table 3). Also, correct rejection rates of adolescents with training (.60) were not higher than those of adolescents without training (.63), two hypothesis tests, $Z = -.10$, $p = .54$. The effect sizes for these two groups of hypothesis tests did not differ significantly from each other, $Z = 1.05$, $p = .15$.

Across six hypothesis tests, older children receiving training were more likely to correctly identify the target (.45) than older children without training, (.33) $Z = 2.46$, $p < .01$, $Z_{FISHER} = .14$; Cohen's $d = .29$. (see Table 4). Note the FSN(3) was not sufficiently tolerant for future null results. We examined the correct identification rates of trained children and adults. Trained children (.45) made comparable correct identifications to the adults in these studies (adults without training, .41), $Z = -.27$, $p = .61$. For this particular data set, older children without training made marginally fewer correct identifications than adults, $Z = 1.39$, $p = .08$. Hence, training sufficiently increased correct identifications for older children to reach adult level. The benefits of training on correct identification for older children may be small. Yet, training may help older children reach an adult level of correct identification. Older children were not more likely to identify the target with training than they were to correctly reject target-absent lineups with training, $Z = .52$, $p = .30$. Training did not increase the correct identification rate of adolescents (.56) compared to adolescents without training (.50), two hypothesis tests, $Z = .59$, $p = .28$.

Table 3. Target-Absent Hypothesis Tests: Testing Whether Training Increases Children's Correct Rejection Rate

											Effect Sizes			
Year	Author	Age	Ncc	Prgtc	Ntc	Prgcc	LT	Tg	Dir	Z	Fz	r	r2	d
1995	Lindsay et al.	9/10	12	.25	12	.00	Sim	2	-	-1.6	-.35	-.33	.11	-.71
		9/10	12	.08	12	.42	Seq	2	+	1.88	.41	.39	.15	.83
1993	Parker & Ryan	9/10	12	.17	12	.50	Sim	2	+	1.73	.37	.35	.13	.76
		9/10	12	.33	12	.25	Seq	2	-	-.45	-.09	-.09	.01	-.18
1997	Pozzulo & Lindsay	9/10	14	.86	23	.87	Sim	1	+	.11	.02	.02	.01	.04
		12/13	34	.81	28	.71	Sim	1	-	-1.03	-.13	-.13	.02	-.27
In press	Pozzulo & Lindsay	10/11	37	.38	133	.40	Sim	1	+	.22	.02	.02	.00	.04
		12/13	65	.45	158	.48	Sim	1	+	.10	.02	.02	.00	.04

Note. Age = mean age of children. Ncc = number of children in control condition. Prgtc = proportion of correct rejections for trained children. Ntc = number of children trained. Prgcc = proportion of correct rejections for children without training. LT = lineup type; simultaneous = Sim; sequential = Seq. Tg = type of target exposure; 1 = live; 2 = slides. Dir = direction of effect. Fz = Fisher's Z.

Table 4. Target-Present Hypothesis Tests: Testing Whether Training Increases Children's Correct Identification Rate

Year	Author	Age	Ncc	Pidtc	Ntc	Pidcc	LT	Tg	Dir	Z	Effect Sizes Fz	r	r2	d
1995	Lindsay et al.	9/10	12	.25	12	.42	Sim	2	+	.87	.18	.18	.03	.36
		9/10	12	.17	12	.33	Seq	2	+	.94	.20	.19	.04	.39
1993	Parker & Ryan	9/10	12	.42	12	.42	Sim	2	-	.00	.00	.00	.00	.00
		9/10	12	.25	12	.33	Seq	2	+	.45	.09	.09	.01	.18
1997	Pozzulo & Lindsay	10/11	18	.67	23	.74	Sim	1	+	.51	.08	.08	.01	.16
		12/13	39	.64	31	.74	Sim	1	+	.90	.11	.11	.01	.22
In press	Pozzulo & Lindsay	9/10	27	.24	122	.45	Sim	1	+	2.17	.18	.18	.03	.36
		12/13	54	.35	149	.38	Sim	1	+	.31	.02	.02	.00	.04

Note. Age = mean age of children. Ncc = number of children in control condition. Pidtc = proportion of correct identifications for trained children. Ntc = number of children trained. Pidcc = proportion of correct identifications for children without training. LT = lineup type; simultaneous = Sim; sequential = Seq. Tg = type of target exposure; 1 = live; 2 = slides. Dir = direction of effect. Fz = Fisher's *Z*.

Discussion

Are children as likely as adults to correctly identify a criminal? Shown a target-present lineup, children over 5 years of age produced a correct identification rate comparable to adults. Preschoolers (M = 4 years), however, were less likely than adults to make a correct identification when shown a target-present lineup.

Facial recognition studies suggest an adult hit rate is reached by children around 12 years of age (Chance & Goldstein, 1984). We found children, in the eyewitness studies examined, reached an adult correct identification rate at a much earlier age. The later onset of adult-like hit rates in facial recognition studies compared to eyewitness studies may be due to the greater number of targets in facial recognition studies than eyewitness studies. Hence, facial recognition studies may be demonstrating increases in memory load capacity with age rather than identification ability per se. With memory load relatively low in eyewitness studies and possibly in actual cases, difficulties in encoding, storage, and retrieval that are relevant in laboratory facial memory studies may not be a concern in the applied context for witnesses over 5 years of age. These conclusions should be tempered with the fact that the present data set with preschoolers (versus adults) and young children (M = 5 to 6 years versus adults) was small (five and six hypothesis tests, respectively).

A less optimistic picture emerged when children's correct rejection rates were compared to those of adults. Shown a target-absent lineup, older children (M = 9 to 10 years) and adolescents (M = 12 to 13 years) produced a significantly lower correct rejection rate than adults. The rate of correct rejection did not appear to increase substantially from the time children were 9 and 10 years to the time they were 12 to 13 years. Chance and Goldstein (1979; 1984) suggest the rates of false positives in facial recognition studies between adolescents (13 years and older) and adults differed little. It is not clear at what age adolescents reach an adult-like correct rejection rate in eyewitness studies but this age may differ from that found in facial recognition studies.

Furthermore, the age at which correct identifications are made at an adult rate is not the same age adult level performance is reached with regards to correct rejections. This finding may suggest that correct identification and correct rejection rates in the eyewitness context may be driven by different processes. Correct identification rates may be predominantly determined by cognitive memory processes while correct rejection rates (and thus false positive rates) may be highly influenced by social as well as cognitive factors (Wells

& Luus, 1990).

The sequential lineup, a procedure that aids adults to correctly reject target-absent lineups, did not help children. Compared to simultaneous lineups, the gap between children's (*M* = 9 to 10 years) and adults' correct rejection rates widened rather than decreased with the use of a sequential lineup. Children made fewer correct rejections and adults made more correct rejections with a sequential lineup compared to a simultaneous lineup. However, the method of sequential lineup presentation in the data set examined differed from the recommended practice suggested by Lindsay and Wells (1985) and that has been used in studies with adult participants finding a higher correct rejection rate than with simultaneous presentation. The participant should be unaware of the number of photographs to be shown. Being unaware of how many photographs will be shown can be critical to sequential lineup presentation because witnesses aware they are running out of photographs to view increase their likelihood of selecting someone (Lindsay, Lea, & Fulford, 1991). Sequential lineups in this particular data set did not conceal the number of photographs to be presented. Although this practice did not seem to hinder adult performance, it may have had a greater impact on child performance. For instance, assuming children perceive a greater demand than adults that they should make a selection (Ceci, Toglia, & Ross, 1987), knowing there are few photographs left from which to select may heighten this demand and thus increase choosing. The sequential lineup, as conducted in these studies, did not solve children's problem of failing to reject target-absent lineups.

Although children were significantly less likely to correctly reject target-absent simultaneous lineups than adults, it should be noted that the fail-safe number was not sufficiently tolerant for future null results. Even if children reach a correct rejection rate comparable to adults presented with a simultaneous lineup, correct rejection rates are significantly improved for adults with a sequential lineup (e.g., Lindsay & Wells, 1985; Lindsay, Lea, Nosworthy, Fulford, Hector, LeVan, & Seabrook, 1991). An identification procedure is needed that increases children's correct rejection rates, ideally to a level reached by adults when a sequential lineup is used, and maintains a high level of correct identification.

One potential guide for increasing children's correct rejection rates is to determine why accuracy differs in target-present versus -absent lineups. We speculate on various possibilities for differential identification performance between children and adults across target-present versus -absent lineups.

Demand. The mere presentation of a lineup may exert an implicit demand to select someone (Ceci, Toglia, & Ross, 1987). Children may be more susceptible than adults to adults' questions. Children may provide the answers they think experimenters or police officers want. Once an adult asks if the target is among the photographs shown, the child may infer that the task is to select a photograph[5]. A target-present lineup elicits a correct response because the child sees the target and makes an identification. A target-absent lineup elicits an incorrect response because the child thinks she needs to make an identification and selects the

[5] Evidence for children perceiving a greater demand to select someone from a lineup is obtained from examining the types of errors children make on target-present lineups compared to adults. Based on the foil identification data available from the studies in the current meta-analysis, we examined the rate of foil identifications made by older children versus adults given a target-present lineup. Across 6 hypothesis tests, older children made significantly more foil identifications (.34) than adults (.11), $Z = 3.24$, $p < .001$. The FSN (18) however was not sufficiently tolerant for future null results.

lineup member who looks most like the target. The perceived pressure to pick someone may be lower for adults or adults may be better able to resist such pressure. Thus, adults are less likely to make an identification than children given a target-absent lineup. On the other hand, the success of sequential lineups with adults suggests that adults are not immune to the demand to choose someone from a lineup, as seen with higher choosing behavior from simultaneous lineups.

A demand explanation for differential identification between children and adults suggests identification procedures should be designed such that a child's perceived need to select someone is decreased. With this goal in mind, some studies have attempted to increase children's correct rejection rates with the use of practice lineup trials given prior to the actual lineup (Davies, Stevenson-Robb, & Flin, 1988; Lindsay et al., 1995; Parker & Ryan, 1993; Pozzulo & Lindsay, in press)[6]. In our meta-analysis, training did not significantly increase correct rejections for older children or adolescents. Training, however, did have a small positive effect on correct identification for older children. Perhaps demand may need to be combatted by other means in order to increase correct rejections for children.

Memory Trace. Developmental differences in attending to or encoding a target's face may exist such that memory trace strength for faces increases with age (Diamond & Carey, 1977; Nelson & Kosslyn, 1976). Although a child's memory trace may be weaker than an adult's, the target in a target-present lineup is the source of the memory and thus the lineup member who most closely matches the child's memory. This match between the memory and target often leads to a correct identification. Presented with a target-absent lineup, a weaker memory trace may allow a lower criterion for a "match" to be made, thus an innocent lineup member is more readily identified.

Processing Strategy. Facial recognition studies provide evidence of higher identification accuracy when a holistic strategy (i.e., configural processing) is used to encode the face rather than if individual features are focused on (i.e., featural processing; Bower & Karlin, 1974; Wells & Hryciw, 1984; Winograd, 1976). Studies of facial recognition have claimed that children under the age of 10 years represent faces in memory primarily on the basis of featural information (Carey & Diamond, 1977; Diamond & Carey, 1977). Conversely, it is believed that adults represent faces in memory primarily on the basis of configural information (e.g., spatial layout of elements within a face).

With a target-present lineup, gross discrimination based on features (e.g., featural processing of hair color and shape) may be sufficient to produce a correct identification; e.g., the lineup member with the hair style similar to the witness' memory may be the guilty party. With a target-absent lineup, holistic processing is necessary for identification accuracy (i.e., correct rejection). Even if there is a lineup member with a hair style similar to the witness' memory, he/she is not the guilty party and other information must be employed to reach a correct decision. If children do not have access to or are not using holistic information to make identification decisions with target-absent lineups in particular, more incorrect identification decisions may be made compared to adults.

Future Directions

A variety of directions exist for future research. From a theoretical perspective, we need to delineate the processes engaged by children and adults when making an identification. We need to understand how these processes differ or are similar across target-present and target-absent identification tasks. What cognitive and social factors are involved in making an identification? Does the importance of these factors differ across age? Are the processes engaged in by adults who make incorrect identification decisions different than those engaged in by children who make incorrect identification decisions? Why do developmental patterns differ for accuracy using facial recognition paradigms compared to eyewitness paradigms?

Methodologically, it may also be prudent to use live exposure of targets in some future studies. Although children (M = 9 to 10 years) were less likely than adults to correctly reject target-absent lineups whether a live target or slide exposure was used, the gap was larger using a slide paradigm. Slide events may underestimate children's ability to make correct rejections compared to adults. Furthermore, a slide paradigm may obscure the age at which children produce adult-like correct rejection rates.

If courts are to accept child identification evidence, it is imperative to know at what age children's performance approximates that of adults and to be able to estimate accuracy rates for children of all ages. The age at which children provide adult-like identification evidence is unclear because adolescents (14 years of age to adulthood) have been neglected by eyewitness researchers. When are teenagers effectively adults? At the other end of the scale, too little data have been collected on the identification performance of younger children. At what age are children simply too young to provide reliable identifications? From an applied perspective, we need to modify current identification procedures to increase identification accuracy with children of all ages. But such procedures should be designed to increase correct rejections rather than hits because it is with target-absent lineups that children perform less well than adults.

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*indicates studies used in the meta-analysis

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CHAPTER 3

INCREASING CORRECT IDENTIFICATIONS BY CHILDREN

Foreword

Chapter 3 consists of a manuscript to be published in *Expert Evidence*. The manuscript that appears in this chapter has been slightly altered from the version that will be published to increase readability for the general reader. The manuscript was co-authored with Dr. R.C.L. Lindsay who also served as thesis supervisor. This chapter was a collaborative effort with the first author taking primary responsibility for the concepts, data, and interpretation of results (APA, 1994).

Pozzulo, J.D., & Lindsay, R.C.L. (In press). Increasing correct identifications by children. *Expert Evidence*.

Abstract

Four new lineup procedures were examined with the goal of increasing children's identification accuracy. Participants (*N* = 329 children aged 10 to 11 years, *N* = 426 children aged 12 to 14 years, and *N* = 265 adults) were presented with either a target-present or -absent lineup. Procedural modifications included providing a salient "I don't know" response option, extending 'standard' instructions, and modeling correct responses by either using an identification demonstration video or a handout. These conditions were compared to a 'standard' (control) simultaneous lineup procedure. Extending 'standard' instructions increased correct identifications for 10 and 11 year-old children. Presenting a salient "I don't know" response increased overall choosing for both target-present and -absent lineups. Experimental procedures did not influence correct rejection rates. These data demonstrate a variety of techniques that may be useful for improving the correct identification rate of child witnesses. Future directions are discussed.

Introduction

Police stations and court rooms are increasingly encountering child eyewitnesses. An integral component of being an eyewitness is providing an identification from a lineup if a suspect is arrested. Children's identification abilities have garnered much less attention than adults' abilities. With target-present lineups (i.e., the person to be identified is present in the lineup), children over the age of 5 years usually are found to be as accurate as adults (Goodman & Reed, 1986; Lindsay, et al. 1997; Marin, et al., 1979; Parker & Carranza, 1989; Parker, Haverfield, & Baker-Thomas, 1986; Parker & Ryan, 1993). However, some researchers have reported age effects for correct identifications. For example, Goodman and Reed (1986) found 3 year-olds (38%) were less likely to make correct identifications than 6 year-olds (95%) or adults (74%). Brigham, Van Verst, and Bothwell (1986) reported 9 year-olds (68%) were less likely to make correct identifications than 14 year-olds (93%) or 16 year olds (88%, see Davies, 1993 for a review).

A different pattern of results occur when children are presented with target-absent lineups. Since the person to be identified is not present in the lineup, the correct decision is to reject the lineup. King and Yuille (1987) found a 26% correct rejection rate for 8 to 11 year-olds, whereas, 13 and 14 year-olds rejected a target-absent lineup 64% of the time. Davies, Stevenson-Robb, and Flin (1988) reported 12% correct rejections by 7 and 8 year-olds but 53% by 9 to 12 year-olds. Other studies reveal age effects when comparing correct rejection rates of 8 to 14 year-old children and adults. Parker and Carranza (1989) found a lower correct rejection rate for children (42%) than adults (67%). Parker and Ryan (1993) found 17% of children and 42% of adults correctly rejected target-absent lineups. Lindsay, Pozzulo, Craig, Lee, and Corber (1997, Exp. 1) also found that children made fewer correct rejections (30%) than adults (66%). The conclusion that emerges from this literature is that children are less likely than adults to correctly reject target-absent lineups.

The low correct rejection rate for children generally has been described as due to a propensity for children to guess in identification situations. Researchers have argued that the mere presentation of a lineup places implicit pressure on the witness to select someone and that children are less likely than adults to resist such demands (Beal, Schmitt, & Dekle, 1995; Ceci, Toglia, & Ross, 1987; Raskin & Yuille, 1989). Speer (1984) claimed that children engage two ordered strategies to interpret ambiguous instructions. Children initially rely on context (e.g., saliency of a referent). Failing to find contextual cues, children guess. Lineup instructions may seem ambiguous to children because it is unclear if they are expected to choose someone. The presentation of a target-present lineup elicits a correct response because the context provides a referent (the target). When children are shown a target-absent lineup they are unable to recognize any of the presented faces, thus, they exercise their second strategy, and guess.

Identification performance by children may be improved either by procedures that increase correct identification (particularly for young children) or reduce the tendency to guess (for all ages of children). A method of increasing target-absent lineup rejections, the sequential lineup, has been demonstrated to work with adults. A sequential lineup entails showing a witness one lineup member (e.g., one photograph) at a time. Witnesses are instructed to make a decision each time a photograph (i.e., a lineup member) is presented (i.e., "yes, this is the criminal" versus "no, this is not the criminal"). In addition, witnesses are informed that once a photograph is shown and a decision made, they will not be permitted to return to the photograph, to reexamine it, or to change the decision made. Furthermore, witnesses are unaware of the number of photographs to be presented. Compared to simultaneous lineup presentation (i.e., a witness views all of the lineup members at the same time), sequential lineups do not significantly influence correct identification rates but significantly increase correct rejection rates, presumably by reducing guessing (e.g., Cutler & Penrod, 1988; Lindsay, et al., 1991; Lindsay & Wells, 1985). It is believed that with a sequential lineup, witnesses simply keep rejecting photographs, expecting the criminal's photograph will subsequently be presented. This strategy is successful because when the criminal is not presented the lineup is eventually rejected (i.e., a correct rejection with a target-absent lineup ensues). However, if the criminal is shown, the witness correctly states it is the criminal (i.e., a correct identification with a target-present lineup). Parker and Ryan (1993) found sequential lineup presentation increased correct rejections of target-absent lineups by children (9 to 12 year-olds) from 17% with a simultaneous lineup to 33% with a sequential lineup, but the difference was not statistically significant. Lindsay, Craig, Lee, Pozzulo, Rombough, and Smyth (1995, Exp. 1) also found that children produced a nonsignificant increase in the correct rejection rate from 12% for a simultaneous lineup to 25% for a sequential lineup. However, Lindsay, Pozzulo, Craig, Lee, and Corber (1997) found a nonsignificant difference in the opposite direction with children correctly rejecting a target absent lineup 30% of the time when presented simultaneously but only 20% of the time when presented sequentially. Apparently, sequential lineups produce inconsistent effects with children and can not be counted on to produce a reliable improvement in correct rejections of target-absent lineups by children.

Another alternative to increasing identification accuracy is to train witnesses in identification by giving them practice and feedback prior to exposure to the actual lineup.

Practicing the correct response to a target-present and/or target-absent lineup may help children to make a future correct response. Parker and Ryan (1993) asked participants to identify the experimenter from target-present and -absent lineups prior to the actual lineup task. Feedback was provided to indicate the accuracy of the participant's response and, where necessary, indicate what the correct response should have been. Practice sessions with children (9 to 12 year-olds) increased correct rejections from 17% to 50% with simultaneous, target-absent lineups. The correct identification rate remained consistent from 42% without practice to 42% with practice on simultaneous, target-present lineups. Davies et al. (1988) did not find a significant increase in target-absent lineup rejections by children who did (42%) versus did not (29%) have practice nor was a significant difference found with target-present correct identifications (63% without practice and 67% with practice). Lindsay, et al. (1995) reported a reduction in correct rejections of a simultaneous target-absent lineup by children from 25% without practice to 0% with practice and a nonsignificant increase in correct identifications from 25% without practice to 42% with practice.

Overall, both sequential lineups and practice show some but, inconsistent, promise as methods of increasing identification accuracy by children. Alternative identification methods that may be explored will need to boost the effectiveness and enhance the reliability of practice or training. Such procedures could alter the lineup task itself, alter the instructions provided to witnesses prior to the lineup, or provide different types of training or practice prior to the lineup.

We considered and tested four procedures previously untested with children:

1) *"I don't know" response option.* Typically, two response options are presented to witnesses: to select someone or to state that the criminal is not there (i.e., to reject the lineup).

Limiting the witness to these options implies that the witness knows the correct answer. Adult witnesses may be aware that they may respond by stating that they do not know or are uncertain if the target is present in the lineup. Child witnesses may be less cognizant of this option and less likely to exercise it due to status and power differentials between them and the police officer (or experimenter). The addition of a salient "I don't know" option to the identification task may provide a congruent answer for witnesses who do not know if the target is or is not present (possibly because they were not paying attention). Incorrect choosing may be channeled into "I don't know" decisions which produce the same legal consequence as a lineup rejection; i.e., no one is prosecuted unless other evidence is available and the credibility of the witness is not damaged if he or she identifies a different suspect from a subsequent lineup. Witnesses who would otherwise guess may now choose the "I don't know" option leading to an increase in accuracy.

2) *Extending lineup instructions.* Witnesses may be prone to thinking only of the negative consequences of failing to identify criminals. Correct lineup rejections may be increased simply by making participants explicitly aware of the undesirability of making a selection if they do not see the target and the importance and appropriateness of rejecting the lineup in the target-absent situation. For instance, making the witness aware that an incorrect identification may lead to wrongful prosecution. Illuminating identification consequences to witnesses may make them more careful overall with their decisions and thus more accurate with target-present and/or target-absent lineups.

3) *Training as an alternative to practice.* Responses made on practice identification trials may find their way into the courtroom and be used by legal professionals to influence the

credibility of the witness. For example, if a witness incorrectly selected someone in a practice trial, this may be taken as an indication of their lack of ability to provide a valid response with the actual lineup. To avoid this possibility, witnesses could be exposed to demonstrations of appropriate identification decisions in both the target-present and target-absent situations. Such exposure could be accomplished in a variety of ways but a brief videotape may be effective because of children's affinity for television programs or a paper version may be useful because it would be inexpensive and simple. We provide an example of each with the goal of decreasing the ambiguity of lineup instructions and clarifying the appropriate responses with target-present and target-absent lineups:

3a) A training video could be shown to witnesses to familiarize them with the identification procedure. Feedback explaining the identification decisions that were made clarify the appropriate responses with a target-present (correct identification of the target because the target is present) and target-absent lineup (lineup rejection because the target is absent).

3b) Supplementing the identification task with a 'handout' that illustrates examples of target-present and target-absent lineups and the appropriate responses to be made with each may prevent children from guessing. An easily identifiable target (e.g., farm animal) on the handout may allow young children to better understand the actual task.

The present research explored four alternative identification procedures, comparing each with a 'standard' simultaneous lineup in an attempt to increase identification accuracy: i.e., either correct identifications or correct rejections with children (10 to 14 year-olds).

Method

Participants

The participants were 265 adults (M = 19 years-old; range = 17 to 45 years; 61 males and 204 females) from Queen's University in Kingston, Ontario and 329 "younger" children aged 10 and 11 years (M = 10.3 years; 165 males and 164 females) and 426 "older" children aged 12 to 14 years (M = 12.5 years; 191 males and 235 females) from elementary schools in Toronto, Ontario.

Procedure

At the start of each session in the elementary schools, a general introduction to a study of bullying that was also being conducted in the schools was delivered by the confederate (Jerry). Undergraduates also were presented with a similar length introduction by Jerry about recruiting participants. Jerry left immediately after the introduction. The experimenter then explained that the study being conducted was to examine identification abilities and that all participants would be asked to identify Jerry from a set of photos. Prior to the lineup procedure, the adults were informed that the research involved testing modified identification procedures for use with children and were informed of the bullying context of the study with the children. This was necessary because the extended instructions were presented with reference to bullying and the training procedures were clearly designed for use with children. The lineup procedure was then conducted. Following the lineup task, each participant rated their confidence on a three point scale ("just guessing", "think I'm correct", "certain I'm correct"). Children and adults participated in groups of up to 20. Participants were debriefed and thanked following the identification task.

Lineups

The lineups were photocopies of black-and-white, head-and-shoulder photographs of males similar in appearance to the target. Target-present lineups contained a photograph of the target. For the target-absent lineups the target's photograph was replaced. Each of the six photographs contained a box to check if the participant thought it was a picture of Jerry (i.e., target). In addition, each lineup included a box for participants to check if they thought the target was not present. Five versions of each of the target-present and target-absent lineups were used:

1) *Control condition.* Participants in the control condition were given a 'standard' set of lineup instructions followed with the simultaneous lineup identification task. The following passage constituted the 'standard' (control) instructions: "I want you to think back to what Jerry looked like. He was the man who came in here a few minutes ago and spoke to you about the study. I am going to give each of you a piece of paper with some pictures on it. Jerry's picture might be there, or Jerry's picture might not be there. Please look at the pictures and decide if you see Jerry's picture or if you do not see Jerry's picture. If you do see Jerry's picture place a check mark in that picture. If Jerry's picture is not there, place a check mark in the box beside the sentence that reads, 'Jerry's picture is not here.' At the bottom of the page there is a question that asks, 'How sure are you that you made the correct decision.' Please circle how sure you are with the decision you made".

2) *"I don't know" condition.* Participants in this condition were given the 'standard' instructions and lineup but with the additional option, indicated both in the instructions and on the identification form, to place a check mark beside the sentence that read, "I don't know if Jerry's picture is here" if that was what they believed.

3) *Extended instructions condition.* Extended instructions were provided within a bullying context. The following constituted the extended instructions. "A teacher or police officer might show someone a set of photographs and ask if they see the Bully. In this case if they see Jerry. Being able to pick out the right person is very important because, if the wrong person is picked out, he or she will get in trouble for something they did not do. For example, they might get suspended from school or in extreme cases be put in a detention home by police. The most important thing to remember is that sometimes the person's picture is not in the set of photographs shown to you. So if you do not see Jerry's picture in the photographs shown to you, you should not pick someone out. If you do not see Jerry's picture you should answer by checking 'Jerry's picture is not here.' For today's experiment, I would like you to pretend that Jerry was the bully you saw on the schoolyard." The reader should note that an emphasis was placed on the response of not picking someone if the target is not present because children appear to have the most difficulty with this type of lineup and appropriate response (see introduction for a review). The 'standard' instructions used in the control procedure were then presented to participants followed by the lineup.

4) *Video demonstration condition.* Two actors attempting a lineup task were videotaped. The actors were exposed to a female confederate who stated her name and then left the room. An experimenter then presented the 'standard' lineup instructions to the actors. One actor was given a target-present lineup and the other a target-absent lineup. A correct decision was made with the target-present lineup and an incorrect selection was made from the target-absent lineup. These decisions were illustrated to demonstrate that a selection is not always the correct response (i.e., when the target is not in the lineup). On tape, the experimenter then explained why each decision

was correct or incorrect and what the correct decision should be when the participant does see the target (i.e., place a check mark in the box indicating that person) or does not see the target (i.e., place a check mark inside the box indicating the person is not present). Once the video was viewed, participants were given the 'standard' instructions and attempted the identification task.

5) *Reference handout condition.* Two lineups were constructed (target-present and target-absent) using black and white drawings of animals (cow, pig, raccoon, rabbit, lamb, horse, and dog). The drawing of a dog ("Daisy") was used as the target and the lamb drawing was used as the substitute in the target-absent condition. Participants received an 8 ½ inch by 14 inch sheet of paper with the drawing of the target (Daisy) at the top of the page and a target-absent and target-present animal lineup. The question above each lineup read, "Is Daisy's picture in this set of pictures? Place a check mark in the correct box". Underneath each lineup was a sentence stating the correct response to that particular lineup. Thus, "The correct answer is to place a check mark in the box beside 'Daisy's picture is not here', because Daisy's picture is not present" was printed below the target-absent lineup; and "The correct answer is to place a check mark in Daisy's picture because Daisy's picture is present" was printed below the target-present lineup. The experimenter went through each example with the participants stating the question for the task ("Is Daisy's picture in this set of pictures?"), how one should respond to the question (examine the photographs and decide whether or not Daisy's picture is present), and the correct answer for each animal lineup. It was reiterated that participants were now going to attempt a similar task on their own where the target was Jerry. The 'standard' instructions and lineup then followed.

Results

Target-Absent Lineup. In the control condition (i.e., presenting 'standard' instructions with a simultaneous, target-absent lineup), 10 and 11 year-old (younger) children (.38), 12 to 14 year-old children (older) children (.45), and adults (.43) were equally likely to correctly reject the target-absent lineup. "I don't know" responses were considered lineup rejections since in an applied context police would treat a lineup nonidentification as a rejection. All experimental lineup procedures (i.e., extended instructions condition, demonstration video condition, and reference handout condition) with the exception of the "I don't know" condition produced data in the expected direction (i.e., an increase in correct rejections) for all three age groups (refer to Table 1). The increases, however, were neither statistically significant nor large enough to suggest that the individual procedures would be useful as currently employed.

Table 1. Proportion (*n*) of Target-absent Decisions as a Function of Age and Procedure

		Age		
Procedure	Decision	Younger (10-11 year-olds)	Older (12-14 year-olds)	Adult
Control	Correct Rejection	.38 (14)	.45 (29)	.43 (12)
	Selection	.62 (23)	.55 (36)	.57 (16)
I Don't Know	Correct Rejection	.28 (8)	.32 (16)	.42 (11)
	Selection	.72 (21)	.68 (34)	.58 (15)
Extended Instructions	Correct Rejection	.41 (12)	.56 (24)	.48 (11)
	Selection	.59 (17)	.44 (19)	.52 (12)
Demonstration Video	Correct Rejection	.50 (17)	.52 (15)	.52 (15)
	Selection	.50 (17)	.48 (14)	.48 (14)

Table 1 (continued)

Handout	Correct Rejection	.39 (16)	.53 (19)	.50 (14)
	Selection	.61 (25)	.47 (17)	.50 (14)
Overall	Correct Rejection	.39 (67)	.46 (103)	.47 (63)
	Selection	.61 (103)	.54 (120)	.53 (71)

Power Analysis. Cohen (1988) defines the power of a statistical test as the "probability that it will yield statistically significant results" (p. 1). Given our results were nonsignificant, it is possible that we did not have sufficient power to detect a difference between groups (i.e., control condition versus experimental conditions) even though a difference existed. That is, it is possible that one or more of our experimental conditions does increase identification accuracy, in this case correct rejections, but because our test was not powerful enough (possible with small sample sizes) we were unable to detect the success of the experimental condition(s). In order to gain a better understanding of the likelihood we had to determine differences between groups (i.e., control condition versus experimental conditions), if in fact differences existed, we conducted a post hoc power analysis.

In order to determine the power (i.e., the likelihood of finding an effect) of an experiment it is necessary to estimate the magnitude (or strength) of the expected effect. Given the exploratory nature of the experimental conditions, we used Cohen's (1988) conventional definitions of effect size with a small effect size: $h = .20$, medium effect size: $h = .50$, and large effect size: $h = .80$. A significance criterion of .05 was employed. The present study had a power of .20, .64, and .94 for the 10 and 11 year-old children (younger group, $n \simeq 32$); .23, .72, and .97

for the 12 to 14 year-old children (older group. $n \simeq 40$); and .18, .59, and .91 for the adult group ($n \simeq 28$) for finding a possible small, medium, and large effect, respectively. A power level of about .80 represents a reasonable and realistic value for research in the behavioral sciences (Kirk, 1982). The present study provided a moderate opportunity for the experimental lineup procedures to influence correct rejections by children given a medium effect size and a good opportunity given a large effect size.

Target-Present Lineup. Correct identifications in the control conditions were made significantly less often by 10 and 11 year-old (younger) children (.24) than by adults (.52), $Z = 2.06$, $p < .05$ (refer to Table 2). The correct identification rate of 12 to 14 year-old (older) children (.35) did not differ significantly from the rate of either 10 and 11 year-old children ($Z = 0.67$) or adults ($Z = 1.40$). Compared to the control condition (.24), every experimental procedure produced more correct identifications for the 10 and 11 year-old children (.43, .57, .31, and .47 for the don't know, extended instructions, video, and handout conditions, respectively). For 10 and 11 year-old children, the combined experimental conditions produced a significantly higher correct identification rate than the control condition (.44 versus .24), $Z = 2.24$, $p < .05$. However, the only significant difference found was between the control and the extended instructions condition (.24 versus .57), $Z = 2.52$, $p < .01$. Higher correct identification rates in experimental conditions also were found for the 12 to 14 year-old children with the exception of the extended instructions condition (.35, .44, .24, .42, and .43 for the control, don't know, extended instructions, video, and handout conditions, respectively), although none of the experimental conditions were significantly different from the control condition. The combined experimental conditions also did not result in a significantly higher correct identification rate in comparison to the control condition (.50 versus .35), $Z = 0.31$. Similarly, adults were equally likely to make correct identifications in the control and experimental conditions (.52 versus .47), $Z = 0.60$.

Overall, participants were more likely to choose a lineup member when explicitly given an "I don't know" response option (.80) compared to the control condition (.66), $Z = 2.02$, $p < .05$, (refer to Table 2). The "don't know" option was rarely used. Adults made 2 and 1, 10 and 11 year-old children made 0 and 1, and 12 to 14 year-old children made 4 and 2 "don't know" responses in the target-absent and target-present conditions, respectively. No other experimental condition significantly increased choosing. Thus, the gains in correct identifications were not the result of an overall increase in guessing. Comparing the control condition (.24) with the combined experimental conditions omitting the "don't know" condition (.45) still produced a significant increase in correct identification for the 10 and 11 year-old children, $Z = 2.19$, $p < .05$.

Table 2. Proportion (*n*) of Target-present Decisions as a Function of Age and Procedure

		Age		
Procedure	Decision	Younger (10-11 year-olds)	Older (12-14 year-olds)	Adult
Control	Correct Identification	.24 (9)	.35 (19)	.52 (13)
	Foil Selection	.38 (14)	.37 (20)	.08 (2)
	False Rejection	.38 (14)	.28 (15)	.40 (10)
I Don't Know	Correct Identification	.43 (13)	.44 (21)	.52 (13)
	Foil Selection	.37 (11)	.39 (19)	.24 (6)
	False Rejection	.20 (6)	.17 (8)	.24 (6)
Extended Instructions	Correct Identification	.57 (16)	.24 (11)	.40 (10)
	Foil Selection	.29 (8)	.38 (17)	.28 (7)
	False Rejection	.14 (4)	.38 (17)	.32 (8)

Table 2 (continued)

Demonstration Video	Correct Identification	.31 (10)	.42 (8)	.55 (16)
	Foil Selection	.25 (8)	.26 (5)	.14 (4)
	False Rejection	.44 (14)	.32 (6)	.31 (9)
Handout	Correct Identification	.47 (15)	.43 (16)	.33 (9)
	Foil Selection	.44 (14)	.32 (12)	.37 (10)
	False Rejection	.09 (3)	.24 (9)	.30 (8)
Overall	Correct Identification	.44	.38	.45
	Foil Selection	.34	.34	.26
	False Rejection	.22	.28	.29

Power Analysis. For the target-present conditions, a post hoc power analysis was conducted as was done for the target-absent conditions. Power was estimated at .20, .61, and .93 for the 10 and 11 year-old children ($n \simeq 31$); .18, .59, and .91 for the 12 to 14 year-old children ($n \simeq 28$); and .17, .55, and .88 for the adults ($n \simeq 25$) with a small, medium, and large effect size, respectively. The present study provided an adequate level of power to detect a successful, target-present lineup procedure for children presuming a larger effect size.

Confidence. The most often selected foil from the target-absent lineups was used for the analysis. The foil in position six (not the substitute for the target) was the choice of 93% and 94% of subjects making false positive selections in the target-present and target-absent conditions, respectively. It was not possible to conduct meaningful analyses using the mean confidence ratings received by any lineup members other than the target and foil six. The few participants who made an "I don't know" decision were not included in these analyses since confidence ratings from these decisions are uninformative. Regardless of age, participants who identified the confederate were no more confident in their decision ($M = 2.20$) than participants who chose the most often selected foil from the target-absent lineup ($M = 2.26$), $F(1, 414) = 1.23$, *n.s.* Regardless of age group, participants were significantly but, on average, trivially more confident in rejecting a target-absent lineup ($M = 2.33$) than a target-present lineup ($M = 2.14$), $F(1, 336) = 7.42, p < .01$.

Discussion

The present research investigated the identification abilities of children (10 to 14 year-olds) and adults with various lineup identification procedures (i.e., providing a salient "I don't know" response, elaborating on lineup instructions, showing a demonstration video, and providing a lineup response reference handout) to determine if the accuracy of children's identification decisions could be increased. Although not all procedures produced statistically significant increases in correct identifications, all identification procedures did increase correct identifications of the target somewhat by younger children (10 and 11 years-old). Elaborating on lineup identification instructions increased 10 and 11 year-old children's correct identifications not only significantly compared to 'standard' instructions (control condition) but also to a level comparable to adult's correct identification rates. These instructions highlighted for children the importance of picking out the correct person by presenting consequences that might occur if the wrong person is selected (i.e., the wrong person may get put in a detention home by police). Children may have been more careful when examining the lineup and as a result were more likely to correctly identify the target when his photo was among those presented.

Except for elaborating on standard instructions, all experimental procedures also increased correct identification for older children (12 to 14 year-olds). However, these increases were not statistically significant. None of the procedures were designed to increase adult identification accuracy and not surprisingly the procedures did not do so. The increase in correct identification by 10 and 11 year-old children was not merely an artifact of an overall increase in choosing (or guessing) which suggests that the modified procedures provide promising directions for developing superior identification procedures for use with children and younger children in particular.

In keeping with past confidence literature, mean confidence ratings were not found to differ across age groups (e.g., Lindsay et al., in press; Parker & Ryan, 1993). Participants were no more confident when identifying the target compared to identifying the most often selected foil from target-absent lineups. Participants did reject target-absent lineups with greater confidence than target-present lineups.

Turning to children's ability to correctly reject a target-absent lineup, the modified procedures were less successful in increasing correct rejection rates than correct identification rates. Except for the condition of providing a salient "I don't know", the modified lineup procedures produced slight, nonsignificant increases in correct rejections for both children and adults. These increases in correct rejections, however, are too trivial to suggest a possible solution to increasing correct rejection rates. Given the power of the experiment, it is unlikely the procedures examined would ultimately be successful.

One impetus of this study was to explore alternative identification procedures that may increase children's correct rejection rates. Future studies may be directed at investigating the process children are utilizing when making an identification. Evidence suggesting processes differ between children and adults is obtained from studies examining sequential lineup presentation. Children are more likely than adults to identify an innocent person and also more likely than adults to choose more than one person from a sequential lineup (Lindsay, et al., 1997). A mechanism producing such differences may be children's lack of inhibition to respond. A sequential lineup fails with children because they cannot resist the tendency to select someone long enough for the lineup to be completed, resulting in false positive choices from target-absent lineups. Children also may consider a sequential lineup as a series of one person lineups, where saying "yes" to one photograph does not prohibit saying "yes" to other photographs, resulting in multiple choices. Exploring a child's thought processes during the identification process may provide direction for increasing correct rejections with simultaneous or sequential lineups and present a successful alternative to the current methods. If children's performance on target-absent lineups cannot be improved, their identification evidence will continue to be suspect and the credibility of child eyewitnesses in identification cases may be challenged.

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CHAPTER 4

ELIMINATION LINEUPS:

AN IMPROVED IDENTIFICATION PROCEDURE FOR CHILD EYEWITNESSES

Foreword

Chapter 4 consists of a revised manuscript that has been re-submitted for publication in February 1998. The manuscript that appears in this chapter has been slightly altered from the version that was submitted to increase readability for the general reader. The manuscript was co-authored with Dr. R.C.L. Lindsay who also served as thesis supervisor. This chapter was a collaborative effort with the first author taking primary responsibility for the concepts, data, and interpretation of results (APA, 1994).

Pozzulo, J.D., & Lindsay, R.C.L. (1998). *Elimination lineups: An improved identification procedure for child eyewitnesses.* Manuscript submitted for publication.

Abstract

"Elimination" lineup procedures were proposed which required the witness to eliminate all but one lineup member before being asked if the remaining lineup member was the criminal. Elimination lineups were designed and tested with the aim of reducing false positive choices by child eyewitnesses (N = 587 children, 10 to 14 years, M = 12; 185 adults). Compared to 'standard' simultaneous lineup presentation, Elimination lineups decreased false positive responding in children without significantly reducing correct identifications. An Elimination lineup with modified instructions emphasizing the negative consequences of identifying an innocent person and explaining how to make an identification decision, significantly decreased children's false positive rate to a level comparable to adults shown a simultaneous lineup. The potential benefits of Elimination lineup procedures for child eyewitnesses are discussed.

Introduction

In some cases, for example sexual assaults by pedophiles, child eyewitnesses may be the only source of information available to law enforcement officials. The child may be asked to recount what occurred during the crime and eventually the child witness may be asked to examine a lineup and provide an identification of the criminal. Shown a criminal-present lineup, children over the age of 5 typically produce comparable correct identification rates to adults (Pozzulo & Lindsay, in press a). Shown a criminal-absent lineup however, children consistently produce more false positives than adults (Pozzulo & Lindsay, in press a). For example, Parker and Ryan (1993) found 83% of children but 58% of adults incorrectly selected someone from target-absent lineups. Similarly, Lindsay, Pozzulo, Craig, Lee, and Corber (1997, Exp. 1), found children made more false positives (70%) than adults (34%). Thus, children are prone to making false positive choices from lineups which discourages police from seeking and prosecutors from using the identification evidence of child witnesses.

An identification procedure for children is needed that sustains identification accuracy when the criminal is present and decreases false positive choices when the criminal is absent in comparison with currently used procedures. Two types of false positive decisions from lineups are possible with varying consequences for the person identified and the witness (Wells & Turtle, 1986). A false positive may be an identification of an innocent suspect (false identification) or a foil identification (a known to be innocent lineup member). An innocent suspect who is identified may be prosecuted while the criminal remains at large to commit further crimes. Although foils are not prosecuted because such identifications are "known errors", foil identifications damage the credibility of the witness. Maintaining witness credibility can be important for two reasons: First, other testimony by the witness may be less credible following a known error because such errors suggest both that the witness' memory is faulty and that she is willing to report inaccurate memories. Second, if the suspect is actually innocent, preserving the credibility of the witness will allow her to examine a subsequent lineup if another suspect is arrested. It is unlikely that an identification of a subsequent suspect would carry much weight if the witness had made a known error in a previous identification situation, particularly when the prior error was a misidentification of the purported perpetrator of the same crime.

Identification procedures. Typically, witnesses are presented with a simultaneous lineup from which to make an identification. With this type of lineup, the witness views all of the lineup members at the same time. Simultaneous lineups permit, perhaps even encourage, the use of a relative judgment or best choice strategy; that is, the person who looks most like the criminal may be identified (Wells, 1984; 1993). In a lineup where the criminal is present, a relative judgment may be effective. However, in a lineup where the criminal is absent, and thus the suspect is innocent, the relative judgment strategy leads to high rates of false or foil identification (Lindsay, 1997).

Presenting photographs sequentially has been investigated to reduce reliance on a relative judgment strategy and replace it with an absolute judgment strategy (comparing a photograph with one's memory of the criminal rather than comparing it to other photographs used in the identification procedure, Lindsay & Wells, 1985). For adult witnesses, compared to simultaneous lineups, sequential lineups do not influence correct identification rates but reduce false identification rates by increasing the probability that the criminal-absent lineup will be correctly rejected (Cutler & Penrod, 1988; Lindsay, Lea, & Fulford, 1991; Lindsay, Lea, Nosworthy, Fulford, Hector, LeVan, & Seabrook, 1991; Lindsay & Wells, 1985). Lindsay (1997) found sequential lineups not only led to a lower rate of reported use of relative as compared to absolute judgments, but also that false positive choices were substantially more likely to be made by witnesses who reported using relative judgments than those who reported using absolute judgments. The increase in false positives by those who reported using relative judgements occurred regardless of the method of lineup presentation. Unfortunately, children do not respond to sequential lineups in a similar manner to adults (Pozzulo & Lindsay, in press a). Children will frequently make false or foil identifications resulting in high false positive identification rates even with the use of sequential lineups (Lindsay et al., 1997; Parker & Ryan 1993).

Child witnesses could be forced to make absolute judgments by showing them only the suspect. The presentation of a single person, the suspect, is called a showup. The witness states whether the suspect is or is not the criminal without viewing any other individuals or making any other judgments. Clearly, such a procedure requires an absolute judgment and eliminates any potential for foil identifications. On the other hand, since there are no foils, every identification made with a showup when the suspect is innocent is a false identification. To clarify, the false identification rate for an identification procedure can be estimated as the proportion of false positive selections divided by the nominal size of the identification procedure. The nominal size of a show up is one; therefore, the false positive selection rate and the false identification rate are the same. Previous research using this notion of estimated false identification rate indicates that showups produce much higher rates of false identification than simultaneous or sequential lineups with child witnesses (Lindsay et al., 1997). Foil choices cannot be made from showups so the child witness will not be discredited but showups lead to high rates of false identification and possible wrongful conviction.

Child witnesses could be given special training or instructions prior to attempting identifications to reduce their false positive rates. To date, attempts to find training tasks or instructions that reduce children's false positive decisions from lineups have faired poorly (Davies, Stevenson-Robb, & Flin, 1988; Parker & Ryan, 1993; Pozzulo & Lindsay, in press a). Researchers have emphasized the risk of false identification and the importance of choosing no one rather than making a false identification but, ironically, such instructions have led to small increases in correct identification rates rather than reductions in false positive choices (Pozzulo & Lindsay, in press b). Thus, none of the techniques currently available (sequential lineup, showup, special instructions) solve the problem of high false positive selection rates by child witnesses.

Two-Judgment Theory of Lineup Identification. In an attempt to develop a superior identification procedure for children, we addressed a basic question: Why do children fail at a higher rate than adults to correctly reject target-absent lineups? One possibility is that children have more difficulty than adults with the decision process. A simultaneous identification task can be viewed as involving a Two-Judgment process. Judgment one: Determine which lineup member is most similar to the criminal. Judgment two: Determine whether the most similar lineup member is the criminal. Judgment one is a relative judgment while Judgment two is an absolute judgment. Shown a criminal-present lineup, a relative judgment leading the witness to select the most similar lineup member often produces a correct identification. An absolute judgment (Judgment two) is not necessary for accuracy, provided the lineup foils are not overly similar to the criminal (see Luus & Wells, 1991; Wells, Rydell, & Seelau, 1993 re the issue of selecting lineup distractors). Shown a criminal-absent lineup, an absolute judgment is necessary for identification accuracy (correct rejection) because the most similar lineup member is not the criminal. In the absence of Judgment two, a witness employing a relative judgment will frequently identify an innocent lineup member (Wells, 1993).

One explanation for high rates of false positive identifications would be the failure of the witness to exercise the second judgment in this two judgment process. There is some evidence consistent with this hypothesis in previous eyewitness studies. As mentioned above, sequential lineups reduce false positive choices, perhaps by forcing witnesses to use Judgment two for each person in the lineup (Lindsay & Wells, 1985; Wells, 1993). Lindsay (1997) found that adults who use relative judgments are responsible for disproportionate numbers of false positive choices, also consistent with failing to engage Judgment two of the identification process. Similarly, biased lineup instructions may increase false positive identifications by discouraging the use of Judgment two (Malpass & Devine, 1981).

There are a variety of potential reasons why children may not be conducting the second judgment in the identification process when presented with a simultaneous lineup. Children may succumb to the demands of the situation and assume that the experimenter or police officer expects an identification (Ceci, Toglia, & Ross, 1987). Once the most similar lineup member is selected, they have complied with the experimenter's (police officer's) instructions and made an identification. Alternatively, children may be unaware they should make an absolute judgment, and that they should only make an identification if the most similar lineup member is actually the criminal. Furthermore, children may not know how to make an absolute judgment.

Given children's ability to identify the target from target-present lineups, it would appear they can successfully complete Judgment one. However, any positive evaluation of children's identification evidence resulting from their ability to correctly identify targets is countered by the high rate of false positives with target-absent lineups. A two-Judgment identification procedure that requires responses be provided separately for each judgment, rather than given as one response to the entire process, may provide an opportunity for children's correct identification ability to be maintained while their false positive rate is lowered.

Elimination lineup procedures. The standard or traditional simultaneous identification task can be partitioned into two steps corresponding to the Two-Judgment Identification Theory. First, witnesses could narrow the multi-person, simultaneous lineup to the single person most similar in appearance to their memory for the criminal (Judgment one). Once a single lineup member remains, the witness could be asked to make an identification (Judgment two). For Judgment two, the witness decides if the "surviving" lineup member is or is not the criminal. The first step *eliminates* all but one lineup member (most similar to the criminal; relative judgment) while the second step asks the witness to compare the surviving lineup member to his or her memory of the criminal (absolute judgment).

Two procedures (Fast and Slow Elimination lineups) varying how Judgment one is achieved were designed. Using a Fast Elimination lineup, the witness is asked to select the lineup member that looks most like the target (Judgment one). Because it was not clear that children would make a distinction between selecting the most similar lineup member to the criminal and stating that the person so selected is the criminal, a second elimination procedure was designed. In a Slow Elimination lineup the witness is asked to eliminate lineup members one at a time by selecting the (remaining) lineup member who looks least like the criminal until only one remains

(Judgment one). Two additional lineup procedures (Fast-Modified and Slow-Modified Elimination lineups) were generated by modifying the instructions presented with the elimination procedures to highlight the undesirability of identifying an innocent person and how the witness may go about making an absolute judgment. The modified instructions had previously been demonstrated to slightly increase children's correct identification rates from simultaneous lineups (Pozzulo & Lindsay, in press b). All Elimination procedures (i.e., Fast, Fast-Modified, Slow, and Slow-Modified) were tested to examine their impact on the rate of correct identification and false positive selections. These Elimination procedures were compared to a traditional simultaneous lineup and a simultaneous lineup with the same modified instructions used for the Elimination procedures.

The Elimination procedures, by design, can eliminate all foil identifications. That is, any witness who has eliminated the suspect during Judgment one need not be asked to make Judgment two because an identification of a survivor in this case would be a known error (i.e., foil identification) and jeopardize the witness' credibility. Elimination of the suspect during Judgment one is a nonidentification of the suspect. Because Judgment two may only be requested if the suspect survives Judgment one, foil identifications need not occur with an Elimination procedure. Thus, the foil identification rate can always be 0% with the Elimination procedures if police decided not to ask for an identification whenever the suspect was eliminated during the Judgment one process. The preservation of witness credibility will be most valuable if witnesses who eliminate the suspect at Judgment one and are not asked to make an identification can be shown to provide useful evidence on a subsequent identification task. We examined the correct identification and false positive selection rates of a subsequent lineup after stopping a prior

Elimination lineup after Judgment one. Preserving the witness' credibility is less useful if having participated in an Elimination lineup dramatically reduces the ability to identify the guilty party from a subsequent lineup.

Predictions. We expected children's correct identification rates would be comparable to those obtained with adults, regardless of identification procedure used. We expected children to produce comparable correct identification rates across all identification procedures examined. We did not expect adult correct or false positive identification rates to be influenced by identification procedure. Presented with a target-absent simultaneous (or modified simultaneous) lineup, we expected children to have a higher false positive rate than adults. We expected the Elimination procedures would decrease children's false positive responding, ideally to a level comparable to adults shown a simultaneous lineup.

Method

Participants

Children in grades 5 through 8 ($N = 587$, $M = 12$ years; range 10 to 14 years of age)[1] were recruited from elementary schools in southern Ontario. Adults ($N = 185$) were recruited from the introductory psychology subject pool of Queen's University and received additional marks for their participation.

Procedure

Each testing session for the children was conducted in their classroom and commenced with

[1]In Chapter 2, a meta-analysis of eyewitness studies compared the identification performance of children and adults. Children with a mean age of 9 years (range from 8 to 11 years) compared to adults and children with a mean age of 12 years (range from 12 to 15 years) compared to adults produced similar differences in correct rejection rates. Also, correct identification rates were comparable for children from 5 to 14 years of age compared to adults. Thus, it seemed appropriate to group children between 10 and 14 years for the present study.

a brief introduction to the study by the experimenter. The study was presented as a project on Street Proofing. Following the introduction, children were shown a videotape of a male confederate (Mike) discussing how to stay safe. The videotape allowed children to be exposed to a stranger/target they would later have to identify. After viewing the videotape, children were informed that we were concerned with their ability to describe and recall people and events they had seen. Children were asked to describe Mike and to respond to a set of questions probing what they saw on the videotape. These were filler tasks to occupy children until they were shown a lineup. Lastly, children were shown either a target-present, a target-absent lineup, or both. The session lasted approximately 35 minutes.

Adults (small groups of 5) were shown the same videotape as the child participants. Once the video was viewed, adults were informed we were interested in comparing children and adults' eyewitness abilities. This information was necessary because the videotape was clearly for children. The procedure as described with children was then conducted.

Design

Children were shown either a target-present or -absent lineup using one of the procedures described below. Adults[2] were shown either a target-present or -absent lineup using the standard

[2]We collected and examined the adult data from the simultaneous, Fast Elimination, and Slow Elimination procedures prior to collecting any further data with adults. We chose not to collect data from adults using the modified lineup procedures for a variety of reasons. The simultaneous, Fast, and Slow Elimination procedures all produced extremely low false positive rates (.13 - .06). Given a possible floor effect, it was unlikely that we could demonstrate that the modified conditions would produce lower false positive rates with adults. Also, published data suggest instructions similar to those we were testing with the modified conditions do not influence adult correct identification or false positive rates (Lindsay, 1997; Pozzulo & Lindsay, in press b). Furthermore, regardless of the effect on identification accuracy with the modified lineup procedures for adults, we are not arguing that any of these procedures be used with adults but rather that the Elimination lineups decrease children's false positive rates when compared with the standard simultaneous lineup and decrease children's false positive rates to a level comparable to adults given a standard simultaneous lineup. Hence, we did not investigate the modified conditions with adults. For improvement in adults' false positive rates, the sequential lineup has been demonstrated to be effective (e.g., Lindsay & Wells, 1985). Also, with the use of a sequential lineup, maintaining adult credibility is not a serious issue, thus the two-lineup condition was not tested with adults.

simultaneous lineup (i.e., control condition), the Fast Elimination procedure or the Slow Elimination procedure.

Lineups

Six-person, target-present and target-absent lineups were constructed using head and shoulder, color photos of the target and six other white males who resembled the target. All photos were approximately 3 x 5 inches (7.5 x 13 cm). In front of the participant, the experimenter appeared to select photos from a stack of 13 and laid six photos (either target-present or target-absent) out in front of the participant in two rows of three photos[3]. The photos were placed on a board numbered from 1 - 6 (simultaneous conditions only). Participants were given an identification form. The instructions and identification form varied with condition.

a) *Control condition (standard simultaneous lineup).* In the control conditions participants received the following instructions:

"Now, I'm going to show you some pictures. I want you to think back to what Mike looks like. Mike's picture might be here or Mike's picture might not be here. Please look at the pictures and decide if you see Mike's picture. If you see Mike's picture, I would like you to place a check mark in the box that has the same number as Mike's picture. If Mike's picture is not here, I would like you to place a check mark in the box that says 'Not here'."

b) *Fast Elimination.* In the Fast Elimination conditions participants were given the following instructions:

"Now, I'm going to show you some pictures. Mike's picture might be here or Mike's picture

[3]To dissuade children from discussing which photos they saw/picked, the children were told they would see different photos from each other. To provide credence to this, the experimenter had more photos in her hand than would be shown to the participant.

might not be here. To start, I would like you to think back to what Mike looks like. Please look at the pictures and pick out the person who looks most like Mike." This constituted Judgment one of the identification procedure.

Once a picture was selected, the remaining pictures were removed. The experimenter then provided an identification form and stated the following:

"This might be a picture of Mike or it might be a picture of somebody else. Think back to what Mike looks like. I want you to compare your memory of Mike to this picture. I would like you to tell me if this is a picture of Mike or a picture of somebody else. If you think this is a picture of Mike, place a check mark beside, Yes, this is a picture of Mike'. If you think this is not a picture of Mike, place a check mark beside, No, this is not a picture of Mike'." This constituted Judgment two of the identification procedure.

c) *Slow Elimination.* In the Slow Elimination conditions participants were then given the following instructions:

"Now, I'm going to show you some pictures. Mike's picture might be here or Mike's picture might not be here. To start, I would like you to think back to what Mike looks like. Please look at the pictures and pick out the person who looks the least like Mike." Once a photo was chosen it was removed. The experimenter then stated, "From the photos remaining, pick out the person who looks the least like Mike." That photo was then removed. This procedure continued until there was one photo remaining. Once one photo remained, this constituted the end of Judgment one. The procedure for Judgment two was identical to that used with the Fast Elimination procedure.

Given our concern that children may be making identifications because they believed that was what was expected and that we were unsure children knew how to make an absolute judgment we modified the instructions for all three lineup procedures (Simultaneous, Fast, and Slow). In addition, this would also allow for a replication of the results across the three lineup procedures. How the lineup procedures were conducted remained the same, however the instructions were changed.

Simultaneous-M condition (standard simultaneous lineup with modified instructions). Once the photos were laid out, the experimenter stated:

"If Mike was a criminal, the police would want to know if one of these pictures is of Mike or if these pictures are of other people. Making the right decision is very important because if the wrong person is picked out, he will get into trouble for something he did not do. For example, he might be put in a detention home or even go to jail. Sometimes police arrest the wrong person. When the wrong person is arrested the criminal's picture will not be in the set of pictures shown to you. I want you to pretend that you are the only witness to this case and you now have to decide if Mike's picture is here or if these are pictures of other people. Just like in real cases, Mike's picture might be here or it might not be here. To help with your decision, I would like you to think back to what Mike looks like. Try to remember what Mike looks like. Think about what his face looks like. I want you to compare your memory of Mike's face to these pictures (children were given time to do this). If you see Mike's picture I would like you to place a check mark in the box that has the same number as Mike's picture. If you don't see Mike's picture, I would like you to place a check mark in the box that says, 'Not here'."

Fast-Modified and Slow-Modified Elimination. For these two procedures, the instructions for Judgment one remained the same as described above for the Fast and Slow Elimination procedures, respectively. The instructions for Judgment two were modified and are the same for these two procedures. Once there is one photo remaining the experimenter stated:

"If Mike was a criminal the police would want to know if this is a picture of Mike or a picture of somebody else. Making the right decision is very important because if the wrong person is picked out, he will get into trouble for something he did not do. For example, he might be put in a detention home or even go to jail. Sometimes police arrest the wrong person. When the wrong person is arrested the criminal's picture will not be in the set of pictures shown to you. I want you to pretend that you are the only witness to this case and you now have to decide if this is a picture of Mike or a picture of somebody else. Just like in real cases, this might be Mike's picture or it might be a picture of somebody else. To help with your decision, I would like you to think back to what Mike looks like. Try to remember what Mike looks like. Think about what his face looks like. I want you to compare your memory of Mike's face to this picture (children are given time to do this). If this is Mike's picture, I would like you to place a check mark beside the sentence, Yes, this is a picture of Mike'. If this is a picture of somebody else, I would like you to place a check mark beside the sentence, No, this is not a picture of Mike'."

Two-lineup condition[4]. To examine any effects Elimination procedures have on subsequent lineup identification, at the beginning of the testing session, some participants were presented with a different, six-person, target-absent lineup (than was used with the Elimination procedures). The experimenter conducted the Slow Elimination procedure with this absent

[4]Due to the limited number of participants we initially had access to, we examined some preliminary identification data using the Elimination lineup procedures. The Slow Elimination procedure appeared more promising than the Fast procedure (i.e., greater correct identifications and similar correct rejections), thus we tested the two-lineup condition only with the Slow Elimination procedure.

lineup, however, the lineup was stopped at the end of Judgment one; that is, prior to asking the participant to make an identification decision. A second lineup was shown to these participants at the end of the testing session (approximately 20 minutes after seeing the first lineup). Using the Slow Elimination procedure, participants were shown either the target-present or -absent lineup shown to the other participants. With this lineup, participants completed the procedure by making an identification decision (Judgment two). These were the only conditions in which participants were presented with both a target-present and a target-absent lineup.

Results

Z tests for differences between proportions were used because the data are reported as proportions. The tests are identical to chi square tests on cell frequencies. The following analyses were conducted using one-tailed testing given our a priori predictions.

Target-present lineups. Table 1 presents the rates at which each lineup member survived Judgment one and was subsequently identified during Judgment two. Presented with a simultaneous lineup, children (.65) produced a lower, although not significantly different, rate of correct identification than adults (.80), $Z = 1.39$, $p = .08$. Children did produce a significantly lower correct identification rate with the modified simultaneous lineup (.56) compared to adults presented with a simultaneous lineup, $Z = 2.10$, $p < .05$. Correct identification rates did not differ for children shown the simultaneous or modified simultaneous lineup. Collapsing across these two conditions, children produced a significantly lower correct identification rate (.61) than adults shown a simultaneous lineup, $Z = 1.90$, $p < .05$. In a meta-analysis examining children's identification accuracy, Pozzulo and Lindsay (in press a) reported that some studies found a significant difference in correct identification rates between children and adults, although this is not the general finding. Note however, in the present study adults produced an anomalously high correct identification rate for simultaneous lineup presentation. This high correct identification rate may have been due to a particularly good exposure to the target not typically employed in other eyewitness studies.

As expected, regardless of the lineup procedure used, none of the children's correct identification rates differed from each other. All of the experimental lineup procedures produced comparable correct identification rates to the children's simultaneous conditions. Compared to the adult correct identification rate with the standard simultaneous lineup (.80), children's correct identification rate was marginally lower with the standard simultaneous lineup (.65) and significantly lower for all other procedures: Fast Elimination procedure (.51), $Z = 2.58$, $p < .01$, Slow Elimination procedure (.62), $Z = 1.64$, $p < .05$, Fast-Modified Elimination procedure (.55), $Z = 2.18$, $p < .05$, Slow-Modified Elimination procedure (.54), $Z = 2.30$, $p < .01$, two-lineup Slow Elimination procedure (.50), $Z = 2.47$, $p < .01$. The adult correct identification rate was also significantly lower using the Fast Elimination procedure (.48), $Z = 2.57$, $p < .01$, and the Slow Elimination procedure (.58), $Z = 1.91$, $p < .05$ compared to their correct identification rate with a standard lineup.

The survival rate of the target was significantly higher than the correct identification rate in each Elimination procedure for children and adults, that is, the target surviving elimination (Judgment one) did not always go on to be identified at Judgment two (see Table 1). For children's Fast Elimination, the survival rate was .80 and the correct identification rate was .51, $Z = 2.92$, $p < 01$. For children's Slow Elimination, the survival rate was .80 and the correct identification rate was .62, $Z = 1.86$, $p < .05$. For children's Fast-Modified Elimination, the survival rate was .83 and the correct identification rate was .55, $Z = 2.65$, $p < .01$. For children's Slow-Modified Elimination, the survival rate was .90 and the correct identification rate was .54, $Z = 3.69$, $p < .01$. For children's two-lineup Slow Elimination, the survival rate was .72 and the correct identification rate was .50, $Z = 1.79$, $p <$ 05. For adult's Fast Elimination, the survival rate was .87 and the correct identification rate was .48, $Z = 3.26$, $p <$ 01. For adult's Slow Elimination, the survival rate was .88 and the correct identification rate was .58, $Z = 2.76$, $p <$ 01. Each Elimination procedure however, produced a survival rate of the target comparable to the adult's correct identification rate (.80) with the simultaneous lineup. This may provide an impetus for courts to consider survival status as evidence that the suspect is the criminal.

Table 1. Survival Rate of Each Lineup Member at Judgment one (identification rate at Judgment two) for Target-Present Lineups as a Function of Procedure and Age

Procedure	Age	*N*	Lineup Member 1	2	3	4	Target	6
Simultaneous								
	Children	46	.04	.02	.02	.02	.65	.00
	Adults	30	.00	.00	.00	.00	.80	.00
Fast Elimination								
	Children	49	.02(.02)	.02(.00)	.04(.02)	.10(.06)	.80(.51)	.02(.02)
	Adults	31	.06(.03)	.03(.00)	.00(.00)	.03(.00)	.87(.48)	.00(.00)
Slow Elimination								
	Children	45	.00(.00)	.02(.02)	.04(.04)	.13(.09)	.80(.62)	.00(.00)
	Adults	33	.09(.00)	.03(.00)	.00(.00)	.00(.00)	.88(.58)	.00(.00)
Simultaneous-M								
	Children	41	.00	.02	.00	.10	.56	.02
Fast-Modified Elimination								
	Children	40	.02(.00)	.02(.02)	.05(.00)	.08(.05)	.83(.55)	.00(.00)
Slow-Modified Elimination								
	Children	41	.00(.00)	.00(.00)	.05(.00)	.05(.00)	.90(.54)	.00(.00)
Two-Lineup Slow								

Table 1 (continued)

Children	32	.00(.00)	.06(.03)	.00(.00)	.19(.09)	.72(.50)	.03(.00)

Note. Survival rate and correct identification rate are identical rates with simultaneous lineups because only one identification decision is requested.

Target-absent lineups. Table 2 presents the rates at which each lineup member survived Judgment one and was subsequently identified during Judgment two. Given all lineup members were selected because they resembled the target and there is no reason an innocent suspect would look more like the criminal than any other lineup member, we treated each lineup member as an innocent suspect. To obtain the total false positive rate for each lineup procedure, we collapsed across the false identification rates (Judgment two) for each lineup member. Consistent with previous literature (e.g., Pozzulo & Lindsay, in press a), presented with a simultaneous lineup, children produced a significantly higher false positive rate (.46) than adults (.13), $Z = 2.93$, $p < .01$. Children also produced a significantly higher false positive rate (.33) with the modified simultaneous lineup compared to adults presented with a simultaneous lineup, $Z = 1.93$, $p < .05$. False positive rates did not differ for children shown the simultaneous versus the modified simultaneous lineup, $Z = 1.18$.

The Fast Elimination procedure (.27), $Z = 1.88$, $p < .05$, and both the modified Fast (.15), $Z = 2.99$, $p < .01$, and modified Slow Elimination (.27), $Z = 1.81$, $p < .05$ procedures produced significantly lower false positive rates for children compared to the simultaneous lineup procedure (.46). These Elimination procedures also allowed children to produce a false positive rate comparable to adults (.13). The Slow Elimination lineup was the only Elimination procedure that produced a nonsignificant decrease in false positives for children (.32) compared to their standard simultaneous lineup false positive rate (.46), $Z = 1.36$. The false positive rate for the Slow Elimination procedure also was significantly higher than that obtained with adults shown a simultaneous lineup, $Z = 1.84$, $p < .05$. Overall, the Slow Elimination procedures (.30) were somewhat, although not significantly, less effective at reducing children's false positive responding than the Fast Elimination procedures (.21), $Z = 1.22$. This may have been due to the greater number of decisions required on the part of the witness with the Slow Elimination procedure. The witness may have become confused. Also, the witness' memory may have been slightly altered with the greater number of relative decisions required in Slow Elimination. Adults made false positive choices at a comparable rate across the simultaneous lineup, Fast Elimination lineup, and Slow Elimination lineup.

Table 2. Survival Rate of Each Lineup Member at Judgment one (false identification rate at Judgment two) for Target-Absent Lineups as a Function of Procedure and Age

Procedure	Age	*N*	Lineup Member					
			1	2	3	4	5	6
Simultaneous								
	Children	46	.02	.15	.02	.17	.06	.02
	Adults	30	.03	.00	.00	.07	.00	.03
Fast Elimination								
	Children	45	.07(.00)	.13(.02)	.11(.00)	.31(.13)	.33(.11)	.04(.00)
	Adults	31	.13(.00)	.19(.00)	.06(.00)	.26(.06)	.29(.00)	.06(.00)
Slow Elimination								
	Children	47	.11(.04)	.15(.06)	.15(.04)	.32(.13)	.28(.04)	.00(.00)
	Adults	30	.07(.00)	.30(.03)	.00(.00)	.33(.07)	.30(.03)	.00(.00)
Simultaneous-M								
	Children	42	.05	.02	.07	.12	.02	.05
Fast-Modified Elimination								
	Children	39	.08(.05)	.18(.00)	.08(.00)	.33(.03)	.31(.08)	.03(.00)
Slow-Modified Elimination								

Table 2 (continued)

Children	41	.07(.02)	.22(.05)	.07(.02)	.37(.12)	.20(.05)	.07(.00)
Two-Lineup Slow							
Children	33	.18(.00)	.09(.00)	.12(.06)	.39(.15)	.15(.06)	.06(.00)

Note. Survival rate and false identification rate are identical rates with simultaneous lineups because only one identification decision is requested.

Maintaining credibility - the Two-lineup Slow Elimination. For children, stopping a Slow Elimination procedure after Judgment one did not significantly influence the correct identification rate from a later Slow Elimination lineup (.50) compared to a simultaneous lineup (.65), $Z = 1.34$. In addition, the false positive rate on the second Slow Elimination lineup (.27) was significantly lower than that obtained with a simultaneous lineup (.46) $Z = 1.66$, $p <.05$, and comparable to the false positive rate of adults shown a simultaneous lineup (.13), $Z = 1.37$. Hence, the Elimination procedure may be used to preserve a witness' credibility by stopping the procedure after Judgment one, if the suspect has not survived, without negatively impacting a witness' identification accuracy on a subsequent lineup.

Diagnosticity ratios. We calculated an estimated diagnosticity ratio based on the overall, estimated false identification rate (i.e., correct identification/[false positive rate/nominal size]) for each lineup procedure examined with children. The standard simultaneous lineup (8.49) and the modified simultaneous lineup (10.18) produced the lowest diagnosticity ratios whereas the modified Fast Elimination procedure produced the highest ratio (22.00). The Fast Elimination (11.33), Slow Elimination (11.69), the modified Slow Elimination lineups (12.00), and the Two-lineup Slow Elimination procedure (11.11) produced similar diagnosticity ratios. A child witness' decision using the modified Fast Elimination procedure produces the most informative identification decision from the procedures examined.

Discussion

Elimination lineups were designed based on a Two-Judgment Theory of Lineup Identification: Judgment one, witnesses are asked to select the lineup member who looks most like the criminal (Fast Elimination) or to eliminate lineup members that look least like the criminal (Slow Elimination); Judgment two, the witness is asked whether or not the "survivor" is actually the criminal; that is, the witness is asked to make an identification decision. A relative judgment is requested for Judgment one and an absolute judgment is requested for Judgment two. Given children's propensity to make false positive selections with criminal-absent lineups (Pozzulo & Lindsay, in press a), our goal was to reduce their rate of false positive identifications.

Using an Elimination procedure resulted in children making fewer false positives than when a simultaneous lineup was used. The modified Elimination procedures produced an even greater reduction in false positive responding in children than the basic Elimination procedures. The modified Fast Elimination procedure, in particular, produced a false positive rate with children comparable to the false positive rate obtained with adults. The child false positive rate with the modified Fast Elimination procedure was comparable to the adult false positive rate with a simultaneous lineup even though the adult false positive rate was unusually low (.13).

Furthermore, all of the Elimination procedures produced comparable correct identification rates to that obtained with the simultaneous lineup shown children. Overall, the modified Fast Elimination procedure produced the highest diagnosticity ratio for children suggesting that with this procedure more informative decisions (about the suspect's guilt) are made by children than with any other procedure examined in this study. The modified Fast Elimination procedure not only partitioned the identification task into two judgments (relative and absolute) but also for the absolute judgment, emphasized the undesirability of identifying an innocent individual and explained how to make an absolute judgment. The combination of the two-judgment identification task and the greater amount of instruction produced the most dramatic reduction in false positive responding for children lowering it to a level comparable to adults without significantly reducing children's correct identification rate. Slow Elimination procedures may have been less effective because of the greater number of judgments required from the witness possibly leading to confusion. Also, the greater number of relative judgments necessary with a Slow Elimination lineup than a Fast Elimination lineup may have slightly distorted the witness' memory.

Although the Elimination procedures were not designed nor expected to influence identification accuracy of adults, the data in the present study are ambiguous given the anomalously high correct identification and correct rejection rate obtained with the standard simultaneous lineup. With adults, the Elimination procedures produced significantly lower correct identification rates than the traditional simultaneous lineup. The two-Judgment process may have violated adults' expectations of how a lineup is conducted (e.g., one decision is made upon viewing the lineup). Adults may have interpreted the request for a second Judgment as an indication that the wrong person was selected, thus, resulting in high rejection rates. The anomalously high correct rejection rate with the standard simultaneous lineup also makes it difficult to determine whether the Elimination procedures produce comparable or higher correct rejection rates for adults. Further research should examine the influence of Elimination procedures on adults' identification accuracy. The sequential lineup however, is currently available and it has been found to decrease adults' false positive responding without negatively influencing correct identification rates (Lindsay & Wells, 1985; Lindsay, Lea, & Fulford, 1991; Lindsay et al., 1991). The difficulty with having different procedures for adults and children is determining when children operate as adults. Further research is needed to determine the age parameters for successful use of the Elimination procedures.

Potential Benefits of Elimination Procedures

The design of the Elimination procedures present an option to further reduce false positive responding by completely eliminating all foil identifications. That is, the Elimination procedures can be stopped after the first judgment has been made, if the suspect is not the survivor. Thus, foil identifications are not possible because children will not be requested to make an identification decision. Eliminating foil identifications helps preserve the child witness' credibility. There are two primary advantages of preserving witness credibility. First, a child's statements regarding other aspects of the crime may be seen as more credible when no identification decision was requested than when a known error was made. Second, in cases where the suspect is innocent, the preservation of a witness' credibility for an attempted identification of a subsequent suspect may be critical. Using the Slow Elimination procedure, children who were shown a subsequent lineup after having stopped after Judgment one on an earlier lineup continued to produce a comparable correct identification rate and significantly lower false positive rate to the standard simultaneous lineup procedure.

There are however some potential negative aspects of stopping the Elimination procedures after Judgment one if the suspect has been eliminated. First, widespread use of the procedure in this manner may lead to "common knowledge" that once a witness is requested to make

Judgment two, the suspect has survived. This knowledge may lead to a prejudicial effect, similar to a showup, resulting in a high rate of false identification (Wagenaar & Veefkind, 1992; Yarmey, Yarmey, & Yarmey, 1996). False identifications are legally more serious than foil identifications. Second, Wells (1988) recommends police officers who administer the lineup should not know which person the suspect is. Although it is possible to keep the lineup agent blind as to who the suspect is until Judgment one is completed, once Judgment one is made the lineup agent will need to know whether or not the survivor is the suspect. This knowledge may lead to prompting of the witness to make an identification which again may lead to high rates of false identifications (Wells, 1988). Third, some may argue that preserving the credibility of a witness who would identify a foil is not a benefit. Perhaps witnesses who would identify foils should not be held to be credible. Identifying a foil at Judgment two may suggest that the witness has a poor memory or exercises poor judgment in identification situations. In contrast, a correct rejection of a foil at Judgment two may suggest the witness has a good memory of the criminal and/or exercises good judgment. Rejecting the lineup survivor may increase the child's credibility by demonstrating to police that she is not willing to identify just any one. Certainly the data presented suggest that identification of a survivor from an Elimination lineup is diagnostic of guilt while nonidentification of a survivor is diagnostic of innocence.

At this time however, it is not clear why children make false positives and what to infer from these decisions. For example, the child witness may go on to make an identification at Judgment two not because he or she has a poor memory of the criminal but rather in response to social pressure (Ceci, Ross, & Toglia, 1987). Furthermore, we should also consider the relationship between identification accuracy and the accuracy of other information recalled about the criminal/crime. If identification accuracy is not related to other relevant crime issues (e.g., description of the criminal, Wells & Murray, 1983) then preserving a witness' credibility by not asking the witness to make a potential known error may be a positive benefit. Currently, it is unclear whether the potential negative aspects of stopping the Elimination procedures after Judgment one are sufficiently negative not to warrant the use of the procedure in this manner. Future research is needed to examine these concerns.

The Elimination procedures also pose a new piece of evidence, survival status, though admittedly weaker evidence than an identification. The criminal survived Judgment one at a significantly higher rate than at Judgment two. The courts may want to consider using survival status as a probabilistic measure of suspect guilt. Such a consideration is consistent with other recent recommendations for radical change in the collection, presentation, and interpretation of (partial) identification evidence (Leippe & Wells, 1995; Levi, & Jungman, 1995).

The modified Fast Elimination lineup produced significantly lower false positive and comparable correct identification rates to traditional simultaneous lineups for children aged 10 to 14 years. In addition, the false positive rate obtained with the modified Fast Elimination lineup for children was comparable to that of adults shown a simultaneous lineup. Given the low false positive rate for adults in this study, it is possible that the rate is comparable to adult false positive rates from sequential lineups as well. Currently, there appears to be no cost or negative consequence of using a Fast Elimination identification procedure with children between the ages of 10 and 14. Research on the effectiveness of Elimination lineups with younger child (and older adolescents) is needed to determine the age parameters for the Elimination lineups. Elimination lineups provide an identification procedure that may eliminate concerns that children's identification decisions are less accurate than the identification decisions of adults.

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CHAPTER 5

GENERAL DISCUSSION

The objectives of this dissertation were twofold; to specify children's identification problem and to investigate potential solutions to improve children's (9 to 14 years of age) identification accuracy (i.e., decrease rate of false positive responding). A meta-analysis (Study 1 - Chapter 2) comparing child and adult identification abilities across potential moderating factors revealed children, over 5 years of age, and adults produce comparable correct identification rates when shown a target-present lineup. However, children, even at 12 years of age, compared to adults produce higher false positive rates when shown a target-absent lineup. The sequential lineup, a procedure that decreases false positive rates with adults (Cutler & Penrod, 1988; Lindsay, Lea, & Fulford, 1991; Lindsay, Lea, Nosworthy, Fulford, Hector, LeVan, & Seabrook, 1991; Lindsay & Wells, 1985), increased false positives for children 9 to 10 years of age compared to simultaneous presentation (insufficient data were available to examine this lineup effect with other aged children). Alternative procedures to the simultaneous lineup were examined in an attempt to decrease children's false positive responding with target-absent lineups. The first set of alternative procedures were designed to alter the social demands of the identification task (Study 2 - Chapter 3). The inadequacy of these methods suggested alternative procedures be directed at changing the task itself to facilitate correct decision processes. The second set of alternative lineup procedures (Elimination procedures) were designed based on a Two-Judgment Theory of Lineup Identification whereby identification accuracy is achieved utilizing relative and absolute judgments (Study 3 - Chapter 4). Elimination procedures (i.e., Fast Elimination, Modified Fast Elimination, and Modified Slow Elimination) were found to produce a similar correct identification rate and a significantly lower false positive rate for children compared to rates obtained with simultaneous lineup presentation. These Elimination procedures also produced false positive rates for children that were comparable to adults shown a simultaneous lineup.

Meta-analysis of Eyewitness Studies - Study 1 (Chapter 2)

Results from the meta-analysis of eyewitness studies found a pattern of identification accuracy not parallel to that found in face recognition studies. More specifically, rather than correct identifications increasing with age, children between 5 and 14 years produced comparable correct identification rates to adults. An explanation for this discrepancy in accuracy between eyewitness studies and face recognition studies may be the number of targets used with each type of paradigm. Eyewitness studies typically use one target whereas face recognition studies almost always use more than one target and typically upwards of 20 targets. Rather than recognition ability per se increasing with age, perhaps it is memory load/capacity that is being shown to increase with age in face recognition studies. Memory capacity has been found to increase with age throughout childhood and reach adult level around adolescence (Kail, 1990).

The meta-analysis also found that false positives (from target-absent lineups) were significantly greater for children (up to 14 years of age) than adults. The facial recognition literature finds false positives decrease with increasing age and that adult's false positive rates are reached by children around 12 or 13 years of age. When comparing the false positives of children around 10 years (versus adults) and children around 12 years (versus adults), a decrease in false positive responding was not found to occur with increasing age in eyewitness studies (see meta-analysis). The discrepancy between children's and adult's false positive rates in eyewitness studies versus face recognition studies may suggest a social phenomena rather than a developmental phenomena is at work. For example, the feeling of having to pick someone is appropriate in face recognition (e.g. the participant is shown sets or series of photos and must pick out the previously seen photos) studies but not always appropriate in lineup identification studies. Children may not realize that in lineup identification tasks, an appropriate response may be not to pick anyone.

Studies 2 and 3

Experiments 2 and 3 were both focused on the social phenomena that may be responsible for higher false positives in children than adults and attempted to alter the identification task to reduce false positive responding in children. The lineup identification procedure has been likened to a social psychological experiment (Wells & Luus, 1990). The demands present in an experiment may also be present in the lineup task. For example, the experimenter has a hypothesis as does a police officer administering a lineup (e..g, number 5 is the criminal). The participant and witness may both attempt to discover the hypothesis. Just as demand may play a role in influencing a participant's behavior so too may it influence a witness' behavior. Conducting a good lineup task may be similar to conducting a good experiment. The identification tasks in Experiment 2 were aimed at altering task demands and language pragmatics and in Experiment 3 identification tasks were aimed at altering task demands, language pragmatics, and facilitating effective facial processing strategies in order to reduce false positive responding in children.

Social Demands of the Identification Task - Study 2 (Chapter 3)

Experiment 2 attempted to reduce false positive responding in children by reducing perceived pressure to select someone. Children were given an explicit "I don't know" option, extended instructions, an identification training video, or a reference handout. These four procedural modifications to the simultaneous lineup followed the work of Siegal (1996) and Speer (1984) on language pragmatics and reducing the ambiguity of the situation by making children explicitly aware of the purpose of the task. Children and adults were tested with four procedural lineup modifications. Although the procedures were not designed to influence adult identification rates, an adult comparison group was included to allow potential increases in accuracy with children to be contrasted to adult performance.

Consistent with the results in the meta-analysis, shown a simultaneous lineup, older children (12 to 14 years) and adults produced comparable correct identification rates. Unexpectedly, younger children (10 to 11 years) produced a significantly lower correct identification rate compared to adults. All lineup modifications however, increased correct identification rates sufficiently for younger children to approximate the adult level. More specifically, elaborating 'standard' lineup instructions significancy increased correct identifications for younger children without negatively influencing false positive rates. These instructions highlighted the importance of making a correct decision and the negative consequences an innocent lineup member may incur if wrongly identified. After hearing these instructions, younger children may have been more careful when choosing; with the target present, the children correctly identified him at a higher rate. Given some other studies (reported in the meta-analysis) have also found a lower correct identification rate for 9 and 10 year-olds compared to adults (Leippe, Romanczyk, & Manion 1991; Lindsay et al., 1995), the alternative procedures tested in this study suggest that a supplement to the identification task (i.e., elaborating standard instructions), may assist children to make comparable correct identifications to adults. The meta-analysis also reports a small positive effect on correct identifications with identification training (similar types of modelling that were examined in this study) for children 9 and 10 years of age. The cost of applying these procedural changes in the real world is negligible and may help younger children make correct identifications.

The differential accuracy rate found between children (10 to 14 years) and adults across target-absent lineups in the meta-analysis did not replicate in the present study. Although the adult rate obtained for false positives (.57) in this study was within the range for simultaneous presentations (.10 - .60), it was at the high end (e.g., Dekle, et al., 1996; Leippe, Romanczyk, & Manion, 1991; Parker & Carranza, 1989; Pozzulo & Lindsay, 1997). This rate may have been due to group testing. Adults' false positive rates (i.e., foil identifications) have been found to be higher with group testing compared to individual testing (.52 versus .23, Lindsay & Harvie, 1988). Both adults and children were tested in groups of approximately 25. Collapsing across the data in the meta-analysis, children (9 to 14 years) did not produce a significantly greater false positive rate in group (.48) than in individual testing (.57). The rates in the meta-analysis however, also did not show a significant difference between group (.33) and individual testing (.41) for adults. It is unclear whether group and individual testing affect children and adults differentially. Future eyewitness studies for all aged witnesses should be conducted at the individual level given actual witnesses are not typically tested in large groups and the potential higher adult false positive rates in large groups compared to individual testing. Furthermore, group testing may contaminate responses leading to conformity in decisions. For example, witnesses may compare and alter their identification decisions to correspond to their neighbour's decision.

Most importantly in this study, decreases in false positive responding were not found for target-absent lineups. Three conclusions can be drawn from the failure of these social demand remedies to decrease choosing with target-absent lineups. First, the inadequacy of the manipulations may be suggestive of the powerful influence of demand and how difficult it is to reduce (Ceci, Toglia, & Ross, 1987; see also Davies, Stevenson-Robb, & Flin, 1988; Parker & Ryan, 1993). Second, some factor(s) other than or in addition to the implicit demand to make an identification (e.g., cognitive deficit) may be leading to choosing. Third, children may be having difficulty with the decision process(es) required from the simultaneous lineup identification task. The failure of the lineup modifications to reduce false positive responding may be suggestive that the task itself (i.e., simultaneous lineup presentation) needed to be altered. The simultaneous lineup may be too cognitively demanding for children. Perhaps children cannot conduct the series of steps mentally necessary to provide an accurate response with a target-absent lineup. For example, with a simultaneous lineup, first a mental image of the target needs to be held in memory. Then, children need to determine whether any of the lineup members presented is a sufficient match to their memory of the target to be deemed the target. The simultaneous lineup may be considered a metacognitive task. Metacognitive expertise begins to emerge in adolescence and continues to develop through adolescence and adulthood. It was proposed that a successful lineup procedure for children should reduce the cognitive complexity of the identification task such that an identification decision is reached by altering not only demands and language pragmatics but also facial processing strategies (Experiment 3). These conclusions turned the focus to changing the identification task itself, rather than supplementing the identification task, to reduce false positive responding.

If an identification procedure is to be successful it will need to facilitate decision strategies that increase the probability of identification accuracy. In addition, these decision strategies should be controlled by the procedure not the witness (Lindsay & Wells, 1985; Wells, 1993, Wells & Seelau, 1995). Further evidence to suggest the identification task needed to be altered for greater identification accuracy was obtained from Lindsay (1997). He reported that adults who were provided with instructions to use an absolute judgment and who reported using an absolute judgment when shown a simultaneous lineup produced more false positive choices than witnesses shown a sequential lineup. The sequential lineup may be successful in reducing false positive responding for adults because of its design. Rather than affording the witness control of the decision process (e.g., to make a relative judgment), as with the simultaneous lineup, the sequential lineup constrains the witness to use an absolute judgment for identification (Lindsay & Wells, 1985). The rationale for the procedures designed and tested in Study 3 (Chapter 4) was similar to the sequential lineup's reliance on absolute judgment for identification and removal of control for the decision process from the witness.

Altering the Identification Task- Study 3 (Chapter 4)

In Experiment 3, the simultaneous lineup was partitioned to require two judgements, relative and absolute, that may be necessary for identification accuracy. Fast and Slow Elimination procedures were designed that asked witnesses to first make a relative judgement then once the multi-person simultaneous lineup was reduced to one person most similar to the target (using a relative judgement strategy), the witness was asked to make an absolute judgement. The Elimination procedures simplified the cognitive requirements for a simultaneous identification task. With the Elimination procedures witnesses were given explicit instructions on what to do for each judgement necessary for identification accuracy. Because children may have less expertise at face processing than adults, the Elimination procedures facilitated children's abilities by focusing them on one face (compared to six). By allowing children to concentrate their processing strategy (that may not differ from adults) on one face, this may have helped children reach a level of recognition performance comparable to adults. Adults may able to be produce accurate recognition responses when looking at six faces because of their expertise with face processing but children may find six faces too great of a load (similar to the possible explanation for higher recognition accuracy with increasing age found in face recognition studies).

For additional understanding of the task, participants were provided with greater contextual information via the lineup instructions, that is, participants were informed about the undesirability of identifying an innocent person. Greater contextual information helps children with demand, language pragmatics, and understanding the goal of the task (e.g., the target may not be present and an identification should only be made if the target is present). Although these more explicit instructions were provided with a simultaneous lineup in addition to the Elimination lineups (Modified Fast Elimination and Modified Slow Elimination), the extended instructions may have been less helpful with the simultaneous than the Elimination lineups because children were still having difficulty with the judgement process itself. If the cognitive issues are not addressed (e.g., following through the necessary judgments needed for identification accuracy) extended instructions cannot be effective. More complete instructions may have helped children particularly in conjunction with the two-judgement Elimination procedures. Once the cognitive aspects of the identification task were addressed, the instructions providing contextual information became effective, as demonstrated by the success of the Elimination procedures.

All the Elimination procedures, with the exception of the basic Slow Elimination, produced comparable correct identification rates and significantly lower false positive rates from children compared to simultaneous lineup presentation. Children's false positive rates with these Elimination procedures were comparable to adults' false positive rates with simultaneous lineup presentation. The Slow Elimination procedure may have been less effective than the Fast procedure due to the greater number of relative judgments required from the witness leading to confusion in the witness. The modified instructions with the Slow Elimination procedure seemed to help children produce significantly fewer false positives and comparable correct identifications to simultaneous lineup presentation. The modified Slow Elimination procedure produced non significantly different identification accuracy rates than the other Elimination procedures. Overall, however, the modified Fast Elimination procedure produced the most dramatic decrease (31%) in false positives without negatively influencing correct identifications for children compared to simultaneous presentation and may be the most promising procedure.

The Elimination procedures were not designed nor expected to improve the identification accuracy of adults. The anomalously high identification accuracy obtained with simultaneous lineups with adults makes it difficult to determine any potential effects Elimination procedures may exert on adults. The Elimination procedures did significantly reduce adults' correct identification rates whereas false positive rates remained comparable across simultaneous and Elimination lineups. Provided this effect is stable, the elimination procedures are not an alternative for adults and we will need to address at what age children operate as adults. The difficulty of having effective procedures for people of different ages (e.g., elimination procedures for children and sequential lineups for adults) is determining age parameters for each procedure. Further research is needed to replicate the Elimination results with children and adults, possibly using a live target. We should also attempt to define appropriate ages for the various identification procedures.

It is reasonable to question why Elimination procedures are successful at reducing false positives especially when sequential lineups increase false positives for children and both procedures seem to require absolute judgments. There is an implicit assumption with sequential lineups (and traditional simultaneous lineups) that the witness is aware of how to make an identification decision (i.e., exercise an absolute judgment). With a sequential lineup, children may simply be asked, "Is this the criminal?". Children may not know how to answer this question. The absolute judgment as requested in the sequential lineup may be too complex for children's comprehension. For example, metacognition may be necessary for the complexity of a sequential lineup decision. The development of metacognition may occur in later adolescence (Flavell, 1979). With a sequential lineup, children may be making identifications of similar looking lineup members to the target rather than continuing through the process and asking whether this similar looking person is similar enough to be the target. In contrast, Elimination procedures simplify the identification task by partitioning the task into two judgments and witnesses are given instructions on how to make an absolute judgment.

Sequential lineups may also increase the pressure to make an identification rather than reduce it compared to other procedures. For example, the witness is told she will only be able to look at a photograph once and must make a decision prior to seeing any other photographs. Children, in particular, may feel it is better to make a selection if they are unsure than to risk not identifying the right person (Speer, 1984). Sequential lineups do not express the undesirability of making misidentifications. In contrast, Elimination procedures allow the witness to see all the photographs and to make a relative judgment. This act may reduce children's uncertainty about who will be presented. Once a relative judgment is made, children can focus on whether or not the most similar lineup member is the criminal. The modified elimination procedures also explicitly state the undesirability of identifying an innocent person. These modified procedures further decreased children's false positive responding. Overall, it may be a combination of task difficulty and social demands that lead to ineffective sequential lineup presentation for children and effective Elimination procedures. Further research is needed to clarify why Elimination procedures are successful.

Three conclusions can be drawn from the success of the Elimination procedures. First, the simultaneous task in its 'standard' form is inappropriate, possibly too complex, for children under 14 years of age. Second, children, as young as 10 years, may be able to employ absolute judgments when provided with instruction. Third, reliable identification evidence is possible with children. These conclusions lead to directions for future research in eyewitness identification.

Future Directions

Young children around 4 years of age and adolescents over 14 years of age have been neglected by eyewitness researchers. We need to determine at what age children are too young to provide reliable identifications and at what age children function as adults. These age parameters must be examined across the various lineup identification procedures, given that procedures may interact with age to influence identification accuracy.

We should also turn our attention to better understanding the processes engaged by witnesses (of all ages) when making an identification. It remains unclear whether children and adults use the same information to make identification decisions. For example, do children and adults use the same facial information (featural vs configural) to make identifications. Do identifications have a situational (i.e., perceived expectation to make an identification) component that is more determinant for children than adults? Greater knowledge of how identification decisions are reached may lead to more accurate interpretations of real-world (mis)identifications. This type of research can be extremely important given that misidentification by adults has been reported as the single leading cause of erroneous conviction (Huff, Rattner, & Sagarin, 1986; Wells, 1997). Furthermore, knowledge of process may facilitate the development of more effective identification procedures.

Along similar theoretical lines, further research should be directed at testing the Two-Judgment Theory of Lineup Identification. For example, the Theory predicts that anything interfering with the completion of the absolute judgment process will decrease correct rejections. Studies could be designed to examine the validity of the Two-Judgment Theory of Lineup Identification.

In summary, this dissertation has demonstrated children's difficultly with rejecting target-absent lineups compared to adults and may have found a viable solution, to simultaneous lineup presentation for children between 10 and 14 years of age, the Modified Fast Elimination lineup. Methodologically, the studies conducted suggest future eyewitness research use individual testing and live targets to obtain more generalizable data. A theoretical framework, Two-Judgment Theory to Lineup Identification, has been proposed to start examining identification processes.

Lastly, extending this research, future studies should be directed at comprehending the processes and moderating factors of identification accuracy for witnesses of all ages. This knowledge can then be applied to make identification procedures more effective resulting in more reliable testimony from eyewitnesses.

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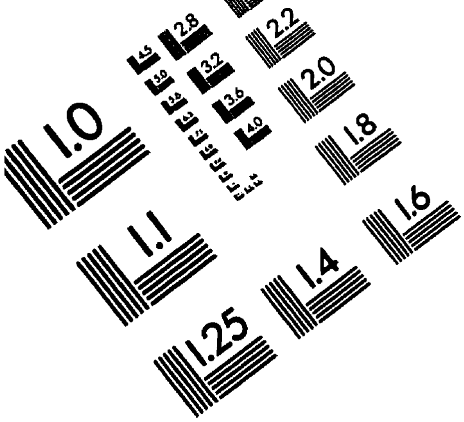
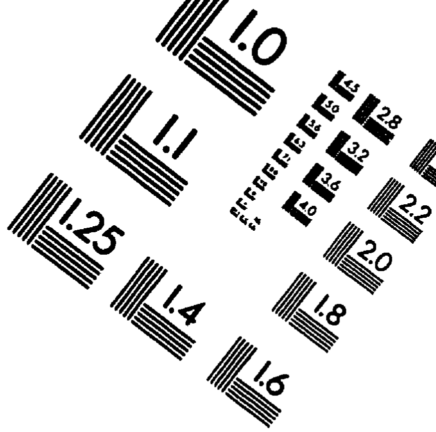
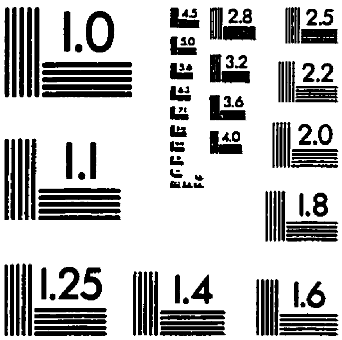
TEST TARGET (QA-3)







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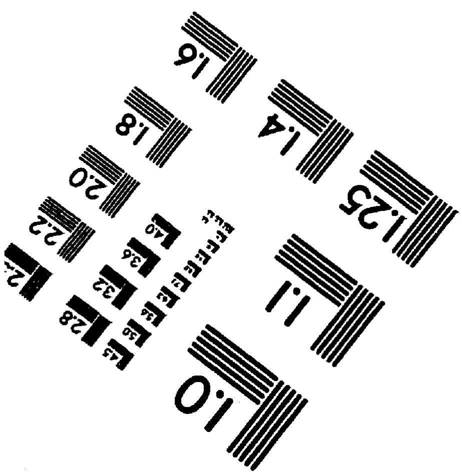

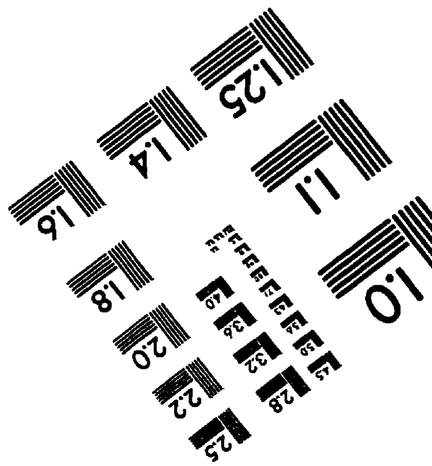

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