A Thorough Examination of the Multiple-Choice, Sequential, Large Lineup

by

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A thesis submitted to the Department of Psychology

in conformity of the requirements for

the degree of Master of Arts

Queen's University

Kingston, Ontario, Canada

August 2004

Your file Votre référence
ISBN: 0-612-99697-2
Our file Notre référence
ISBN: 0-612-99697-2

Abstract

A major focus of eyewitness research is to improve police lineup procedures by increasing or maintaining the likelihood that the witness will make a correct identification while reducing the likelihood that an innocent person will be identified. This study (*N* = 280) examined the potential of achieving these goals using a recently proposed lineup procedure – the 40-person Multiple-choice, Sequential, Large (MSL) lineup (Levi, 1998, 2002). The results indicated that this procedure produced a lower rate of correct identifications overall compared to the simultaneous lineup. Furthermore, accuracy decreased as the guilty person was presented later in the 40-person lineup. However, the chance that any individual lineup member would be selected when innocent was lower with the MSL lineup than with traditional lineup procedures. The MSL procedure may be effective if restricted to 20 members; however, further research is recommended.

Acknowledgments

Rod, I am indebted to you for your time and dedication to this project, and to me. You always had time – more than enough time, really – to "hammer out the issues" and these chats have turned out to be invaluable!

Marilyn, I appreciate your efforts to keep the lab, and Rod, running as smoothly as possible. Your patience, persistence, and pleasantness are an important part of our lab setting! In addition, I would also like to thank you both for keeping this starving student satiated with the best food in Kingston!

Finally, I am forever grateful to my biggest fans – Duane, Mom, & Dad. Duane, I loved celebrating every little (and not so little) step with you! Mom, this wouldn't have been possible without your tireless support and encouragement. Dad, what can I say? I obviously got my brains from you (haha)!

Table of Contents

List of Tables

List of Figures

List of Appendices

Introduction

A common piece of evidence in criminal investigations is the identification of the suspect by an eyewitness. Most often, if an eyewitness identifies a suspect from a lineup, that suspect is arrested, charged, and may be tried in a court of law. The testimony of the eyewitness then is presented in the courtroom, sometimes as the only evidence, and may lead to the conviction of the suspect. Undoubtedly, eyewitness identifications have real-world consequences; the question is: How accurate are they?

The disturbing part of eyewitness identification evidence is that it is relied upon heavily to make decisions about the guilt or innocence of a person, but it is not infallible. This fact has been acknowledged in both legal and psychological circles for some time (e.g., Borchard, 1932; Whipple, 1909). In Britain in the early 1970s, several cases of false identification were discovered. As a result, the Devlin Commission formed to examine eyewitness procedures and subsequently analyzed over 2 000 lineups conducted in England in 1973 (Devlin, 1976). The committee found that a suspect was selected from 45% of the lineups, and this evidence contributed to conviction in 82% of the cases. In over 300 cases, an eyewitness identification was the only evidence against the defendant. The suspect was convicted in 75% of those cases. Based on these findings, the Devlin Report made several recommendations to improve police lineup procedures.

At the time, the Devlin Report was revolutionary but inconclusive. While it is surprising that eyewitness evidence alone resulted in the conviction of over 225 people, the actual guilt or innocence of those individuals cannot be known. With the advent of Deoxyribonucleic Acid (DNA) evidence, we now have indisputable proof that eyewitness identification evidence has led to miscarriages of justice. DNA exonerations –

predominantly rape cases – have confirmed the wrongful conviction of at least 140 individuals based on eyewitness evidence (Connors, Lundregan, Miller, & McEwen, 1996; Scheck, Neufield, & Dwyer, 2003; Innocence Project, 2004). Thus, many individuals spent numerous years in jail for crimes they did not commit.

For the majority of innocent people, it may be too late once they are on trial. Extensive research has revealed that people, and thus jurors, cannot discern the accuracy of an eyewitness identification by listening to the witness testify (e.g., Lindsay, Wells, & O'Connor, 1989; Lindsay, Wells, & Rumpel, 1981; Wells, Ferguson, & Lindsay, 1981; Wells, Lindsay, & Ferguson, 1979). Even with the assistance of expert testimony, people cannot discriminate between correct and mistaken eyewitness identifications (Wells, Lindsay, & Tousignant, 1980). The inability to detect identification errors in court increases the need for procedures that will prevent the occurrence of incorrect identifications rather than discovering them years after the fact. To this end, police lineup procedures must be improved to decrease the likelihood that an innocent suspect will be identified.

Improvements have been made since the time of the Devlin Report (Lindsay & Wells, 1985). Nonetheless, even the best current procedures cannot eliminate the problem of false identification (Lindsay, 2003). The continued threat of wrongful conviction has led researchers to create and investigate new and radical lineup procedures (e.g., Pryke, Lindsay, Dysart, & Dupuis, 2004). The purpose of this study is to examine one such procedure, the 40-person Multiple-choice, Sequential, Large lineup (Levi, 1998, 2002).

Literature Review

Lineup Theory

Wells (1978) separated the factors that occur in every eyewitness situation into two categories, estimator and system variables. Estimator variables refer to the conditions of the crime that are beyond the control of the criminal justice system (e.g., viewing conditions or age of the witness). Conversely, system variables are under the control of the police and/or courts (e.g., lineup procedures and instructions). Unlike the police, researchers have been able to investigate the effects of estimator variables by systematically manipulating such factors as the race of the witness and suspect (e.g., Meissner & Brigham, 2001), the age of the witness (e.g., Lindsay, Pozzulo, Craig, Lee, & Corber, 1997), and the delay between the crime and identification task (e.g., Dysart & Lindsay, in press; Shepherd, 1983). Nonetheless, a major focus of eyewitness research, and this study, is the improvement of lineup procedures, specifically because the police can control these variables and reduce the probability of prosecuting an innocent person.

Typically, a lineup is composed of a suspect and several foils who act as distracters for the suspect and are known to be innocent of the crime. If a witness chooses a foil, the witness is considered unreliable, and the foil will not be prosecuted. However, if identified, the suspect generally is assumed to have committed the offence. Without physical evidence, the guilt or innocence of the real-world suspect may be decided in court based largely on the credibility of the identification evidence.

The laboratory provides an opportunity to examine the impact of various lineup techniques and procedures on the accuracy of eyewitness decisions with full knowledge of the “criminal’s” presence by using target-present and target-absent lineups. That is, target-present lineups include the person who actually committed the crime, known as the target, and target-absent lineups include only people never before seen by the witness. In some studies, target-absent lineups include a person that particularly resembles the target, and this person may be designated as the "innocent suspect." Alternatively, target-absent lineups simply may consist of never before seen lineup members, without a particular individual designated as the innocent suspect.

Several outcomes, correct and incorrect, emerge from the target-present and -absent lineups. The correct decisions consist of the identification of the target in the target-present lineup and the rejection of the target-absent lineup (choosing no one). A decision is incorrect for the target-present lineup if the witness rejects the lineup (claims that the target is not present) or selects a foil (known as a foil identification). A decision is incorrect for the target-absent lineup if the witness selects any lineup member as the target. In studies where one lineup member is designated as the innocent suspect, selection of that person is treated differently from choices of other lineup members. Both are errors, but in the real-world only mistaken suspect selections may lead to wrongful conviction (because foil identifications are "known errors," Wells, 1984). A major goal of eyewitness research is to prevent the occurrence of innocent suspect selections while maintaining a high rate of correct identifications.

Research has identified the influence of several variables on eyewitness decisions (e.g., instructions provided to the witness; method used to select foils; etc.). The instructions used in a lineup procedure can be either biased (e.g., "We got the guy, all you have to do is pick him out") or unbiased (e.g., "He may or may not be in the lineup"). Biased instructions increase the pressure on witnesses to choose someone from the lineup and result in higher rates of incorrect choices from target-absent lineups (e.g., Malpass & Devine, 1981; see Steblay, 1997 for a review of this literature). Likewise, the foils used in the lineup can look considerably different from the suspect (biased) or resemble him (unbiased). Foil bias makes it easy for the witness to choose the person that most resembles their memory of the target, regardless of whether they were actually present at the scene of the crime, and again increases incorrect selections from target-absent lineups (e.g., Doob & Kirschenbaum, 1973; Wells, 1993). Obviously, biased lineups produce a dangerous situation, and the recommendations of researchers, lawyers, and judges alike are that biased lineup procedures be avoided completely (e.g., Brooks, 1983; Devlin, 1976; Technical Working Group for Eyewitness Evidence, 1999; Wells, 1988; Wells, Small, Penrod, Malpass, Fulero, & Brimacombe, 1998).

Innocent Suspect

The selection of an innocent suspect by the eyewitness is used to calculate false identification rates. However, in the research context the innocent suspect can be designated in several ways, and this designation influences the reported false identification rates. To estimate the maximum false identification rate, or worst-case scenario, the person that was chosen most often from the target-absent lineup should be designated as the innocent suspect. For the minimum false identification rate, or best-case scenario, the person that was chosen the least should be designated as the innocent suspect. These methods of designating an innocent suspect could be misleading, either overestimating or underestimating the dangers of misidentification. Another alternative is to arbitrarily designate one individual as the innocent suspect; however, with such a procedure, whether the obtained results resemble a best- or worst-case scenario or something in between is unclear.

Another alternative completely avoids the issue by declining to specify any individual as the innocent suspect. Instead, the expected false identification rate is calculated based on lineup size and the number of selections made by witnesses from target-absent lineups. Specifically, the expected false identification rate is obtained by dividing the average number of choices made in the target-absent lineup condition by the number of lineup members. This provides an estimate of the likelihood of any individual lineup member being selected.

Simultaneous vs. Sequential Presentation

The typical police lineup contains from 6 to 12 lineup members (varying by country and jurisdiction) that are presented to the witness all at one time, conducted live or in a photoarray (Cutler & Fisher, 1990). This procedure is known as a simultaneous lineup, and even when presented in an unbiased fashion, it leads to a rather large false identification rate of about 27% (Steblay, Dysart, Fulero, & Lindsay, 2001).

In an attempt to minimize this rate, Lindsay and Wells (1985) produced the sequential lineup. The key elements of this procedure are: (a) the lineup is conducted by an independent investigator (blind testing); (b) the eyewitness is shown the lineup members one at a time; (c) the witness must make a decision before viewing the next photograph; (d) the witness can view each photograph only once; and (e) the eyewitness does not know how many pictures they will view. When conducted properly, this procedure dramatically reduces the rate of false identification while producing a much smaller decline in the rate of correct identification (Steblay et al., 2001). As demonstrated in a recent meta-analysis, the false identification rate for sequential lineups is approximately 9% (Steblay et al., 2001).

The Multiple-choice, Sequential, Large Lineup

The sequential lineup has proven to be superior to the simultaneous lineup; however, a false identification rate of 9% is still quite high. In North America alone, this false identification rate could expose thousands of innocent people to potential prosecution and wrongful conviction. To further reduce this risk, researchers are attempting to create new procedures that would reduce the rate of mistaken suspect choices to a much lower level. One such procedure is the Multiple-choice, Sequential, Large (MSL) lineup (Levi, 1998, 2002).

Levi modified the traditional sequential lineup by increasing the size to 40 lineup members, explicitly allowing multiple choices (i.e., witnesses were expressly told that they could choose more than one person from the lineup), and altering the conventional definition of an identification. The increase in lineup size was intended to decrease the rate of false identification by reducing the likelihood that any individual lineup member would be selected from the target-absent lineup. Unfortunately, mug shot research has indicated that correct choices of a previously seen target decline as the witness examines more faces before encountering the target (e.g., Laughery, Alexander, & Lane, 1971; Lindsay, Nosworthy, Martin, & Martynuck, 1994). The use of multiple selections was intended to compensate for the increased lineup size by maintaining or increasing the rate of target selections. The variations in identification definitions are discussed later.

Levi's (1998) first study of the Multiple-choice Sequential Large lineup used 20-person lineups with the target (or designated innocent suspect) placed in the 4^{th}, 9^{th}, 14^{th}, or 18th position. He considered a selection of the target an identification only if the witness chose no other lineup member. This definition resulted in a correct identification rate of 42.62% and an expected false identification rate of 0.86%. To create a smaller comparison lineup, Levi examined only the choices made in the first 10 positions, and he found that the correct identification rate was similar (54.84%) while the expected false identification rate increased to 1.74%.

Levi's (2002) second study of the MSL lineup consisted of an increase in lineup size to 40 people with the target in the 10th, 20th, or 40th position. He also used a 40-person sequential lineup with the target in the 20th position, as well as 40-person target-absent MSL and sequential lineups. Levi altered his identification definition from sole selection of the target to choosing the target with a higher level of confidence than any other lineup member selected. This definition resulted in a correct identification rate of 16.22%, which did not vary significantly according to the position of the target. If this definition was disregarded and the witness simply was required to choose the target, the overall correct identification rate was 28.82%. Levi's sequential lineup with the target in the 20th position resulted in a correct identification rate of 13.16%. Finally, for the target-absent conditions, the correct rejection rates decreased as the lineup size increased from 10 to 40 members, which resulted in an overall expected false identification rate of 2.22%. As anticipated, this rate decreased to 1.73% when the highest confidence definition was applied.

Overall, Levi was encouraged by these results. The multiple-choice instructions appeared to result in a higher rate of selection of the target than did the original sequential lineup while the larger lineup size reduced the expected false identification rate (Levi, 2002). This lineup procedure appears to be promising; however, certain methodological and interpretation issues must be addressed before the MSL can be endorsed.

Methodological and Interpretation Issues of the MSL Lineup Studies

Methodological issues exist with the two published studies of the MSL lineup. Levi's 1998 study contained only the MSL lineups, but he manipulated the data to create a comparison sequential lineup. To that end, Levi presented the results of only the first choice made by the witnesses. Yet, every sequential lineup study published to date allows the witness to examine all lineup members, even after a choice is made (e.g., Lindsay & Bellinger, 1999; Lindsay & Wells, 1985). Another problem with his "sequential lineup" is that all participants were presented with the multiple-choice instructions that specifically are designed to encourage selection of more than one lineup member. For these reasons Levi's "sequential lineup" did not provide a valid comparison lineup. As well, Levi did not measure the witnesses' level of confidence and was unable to address this issue.

The final problem with this study was the designation of the innocent suspect. As mentioned, a lineup member often is assigned to be the innocent suspect in the target-absent lineup to represent the situation in which the police's suspect did not commit the crime. Levi randomly assigned lineup members to be the innocent suspect. This resulted in zero sole identifications of the designated innocent suspect. Although such a result represents a best-case scenario and can occur in the real world (e.g., when the innocent suspect is not particularly similar to the true offender), suggesting that the MSL lineup produced a false identification rate of zero is misleading. This result is specious because witnesses selected 16 other lineup members – by chance, not designated as the innocent suspect – as their only choice. One way to avoid a spurious conclusion based on inappropriate designation of an innocent suspect is to calculate the expected false identification rate, which is the likelihood that any individual lineup member would be chosen in a target-absent lineup. This figure can be calculated from the information provided in Levi's paper, and it should be the focus of the target-absent lineup, not the selection of the designated innocent suspect. Using this value, the false identification rate rises from 0.00% to an expected rate of 0.86% (as reported earlier).

Levi's 2002 study did address some of the concerns mentioned but created additional issues. The expected false identification rates were presented instead of the identification of a designated innocent suspect. As well, Levi attempted to create a valid sequential lineup by providing some participants with somewhat appropriate sequential lineup instructions. Unfortunately, Levi stopped the lineup once a choice was made, and he had informed the witnesses that this would occur. In addition, Levi's sequential lineup had the target in the 20th position, while traditional lineup sizes range from 6 to 12 members. As well, Levi estimated the correct and false identification rates for a 40-person sequential lineup from the results with the target in the 20th position. As a result, the comparison of the MSL to the "sequential lineup" was not applicable. The final problem in this study is that he changed the definition of an identification – from sole selection of the suspect to selection of the suspect with a higher confidence level than any other lineup member – without addressing this alteration or comparing it to the previous definition.

Objectives

The main objective of the current study is to investigate the 40-person MSL lineup in the absence of these methodological and interpretation issues. Several elements of this lineup procedure must be examined: (a) the instructions presented, (b) the lineup size, (c) the position of the target, and (d) the various correct identification definitions. First, to establish that the instructions used have an effect on correct identification rates participants were presented with either multiple-choice or traditional sequential lineup instructions. In opposition to Levi's "sequential lineup," the participants were presented the traditional lineup in every aspect except the size. Second, 40-person target-absent lineups were used to measure the expected false identification rate with large lineups. Third, the target was placed in various positions within the 40-person lineups to demonstrate the effect on correct identifications. Fourth, the effect of various identification definitions on accuracy rates was compared.

The second major objective of this study was to examine the confidence levels reported by participants. Researchers have addressed the confidence issue in three main ways: mean confidence levels, confidence-accuracy correlation, and calibration of confidence and accuracy. First, the mean confidence levels can be calculated for the correct and false identifications to determine whether participants were more confident when they made a correct choice (Lindsay, 1986). I expect that the witnesses would be more confident when they chose the target compared to other lineup members. Second, the correlation between the accuracy and confidence of the choices can be considered; ideally, the relationship between the participant's confidence and the accuracy of their choice is positive (Cutler & Penrod, 1989). However, Lindsay (1986) emphasized that a valid comparison of means or confidence-accuracy correlations requires that confidence of suspect selections be compared from the target-present and -absent lineups. Unfortunately, such a comparison requires that an innocent suspect be designated, which was not done in this study. Third, a recent practice is to mathematically calculate the relationship between confidence and accuracy to demonstrate the likelihood that a witness is correct based on their confidence level (Brewer, Keast, & Rishworth, 2002). The degree of match between confidence on a per cent scale and the percentage of witness selections that are correct is referred to as a measure of the calibration of the two variables.

The final objective of this study was to compare the 40-person Multiple-choice, Sequential, Large lineup and the 40-person sequential lineup to the results obtained from traditional 6-person simultaneous and sequential lineups that utilized the same stimuli. To deserve endorsement, the MSL procedure must surpass the results produced by the traditional techniques. This study provided the first valid, direct comparison of the MSL lineup to more established procedures.

Method

Participants

Targets. Seven white males, in their late teens to early twenties with short hair, blonde to brown in colour, and of average height and build were recruited during the 2002/2003 school year and during the summer of 2003. The targets did not wear glasses and had no visible tattoos or facial hair. The targets were videotaped individually while completing a staged crime, changed their clothing twice, had several pictures taken of their face and bodies, and spoke into a microphone for 60 s to produce an audio recording of their voice. Many forms of stimuli were gathered from the targets; however, for the purposes of this study, only the videotaped staged crime and a picture of each target's face, neck, and shoulders were used. The targets were paid $10 for their involvement in this study.

Witnesses. The participants who served as eyewitnesses were 293 Introductory Psychology students (72 men and 221 women) obtained from the Subject Pool at Queen's University in accordance with the regulations of the Department of Psychology and the General Research Ethics Board of the university. The data from 13 participants was discarded due to computer difficulties. As a result, the final sample consisted of 280 participants (70 men and 210 women, *M* age = 18.63 years, *SD* = 2.44). The participants identified their ethnic backgrounds as follows: 239 White, 19 East Indian, 4 African American, 3 Middle Eastern, 1 Asian, and 14 participants who responded "Other." Participants received 0.5 course credits in exchange for their participation in this half-hour study.

Design

A factorial 2 (instruction: sequential vs. multiple-choice) x 5 (target position: 6th, 10th, 20th, 40th, or never) design was used. With the restriction that each condition included 7 males and 21 females, the participants were randomly assigned to each of the 10 conditions.

Materials

Targets. As previously discussed, the "criminals" in the videotaped staged crimes were the targets in the target-present lineups. Seven targets were used to reduce the chances that the results would be specific to a single target or lineup. Likewise, the use of multiple targets provides researchers with a more legitimate estimate of the efficacy of the procedures in the real world where the appearance of criminals varies widely.

Videotaped staged crime. The videotaped staged crime consisted of the target walking into an office toward the video camera, turning to their left, and talking to a woman. The target stated, "I am here to pick up the VCR and take it back to the shop," and the woman replied, "Okay, I just have to go into the back to look for it." The sound of a closing door was heard, at which point the target faced the camera and visibly scanned the room, presumably to determine whether anyone else was present. He reached into a purse on the desk, removed a $20 bill, and put it in his pocket. The woman returned to the room, stated that she could not find the VCR, and asked that he return at a later time. The target agreed, turned away, and walked out of the office. This crime was completed in an identical fashion by each target. The videotaped staged crimes for the seven targets lasted an average of 35.3 s.

Lineup size. All participants were presented with a 41-person lineup, regardless of the position of the target within the lineup. The relevant data to be used for this study are the identification decisions made within the first 40 positions. The data for the 41^{st} position in the lineup will not be discussed.

Lineup foils. A foil is a person that is included in the lineup as a distracter for the suspect. The author and a fellow graduate student searched through over 800 pictures of men's faces and selected 40 foils for each target based on their similarity to the targets. All foils matched the general description of the targets, and a separate lineup was created for each of the targets. Due to the similarity of the targets, the pictures used as foils overlapped – a total of 129 pictures were used to create the lineups. The pictures of all lineup members were digitally edited to create identical backgrounds and measured 17.78 cm x 12.70 cm (7" x 5") when presented on the computer screen.

Target Position. The target position was manipulated in the target-present lineups to determine the effect of various positions on correct identification rates. In addition, the target was omitted from the lineup creating a target-absent lineup to examine false identification rates. In the target-present conditions, the target was placed in the 6^{th}, 10^{th}, 20^{th}, or 40^{th} position. In the target-absent conditions, the target was presented in the 41st position. Notably all participants viewed the entire lineup regardless of the position of the target.

Instructions. Two sets of instructions informed the participants of their role in the identification task. The critical difference between sets was that the sequential instructions did not address the issue of allowing the participants to make multiple selections from the lineup, while the multiple-choice instructions explicitly stated that the participants were able to make multiple selections. The following instructions were adapted from Levi (2002) to accommodate the method of lineup presentation. The instructions for the sequential and multiple-choice conditions are identical except for the italicized statements that addressed multiple choices:

> You are going to be presented with a lineup. The "criminal" is the person you saw on the video stealing money. The instructions below are important:
> 1. The criminal may or may not actually be in the lineup.
> 2. The lineup will consist of individual photographs presented to you one at a time on the computer screen. A number representing your progress through the photos will be displayed at the top.
> 3. You may take as much time as you need, however, once you make a decision you will not see that person again.
> 4. If you believe the person you are viewing is the criminal, press the "yes" button. You will then be asked to rate how confident you are in your decision on a scale from 1% to 100%. If you do not believe the person you are viewing is the criminal, press the "no" button and the next photo will appear.
> 5. *You may choose more than one person. However, the more people a witness selects, the less weight their testimony would have in court.*
> 6. The lineup procedure will continue until you have made a decision about each photo in the lineup (sequential condition); OR *The entire lineup will be presented to you regardless of whether or not you choose someone or how many people you choose* (MSL condition).
>
> If you have any questions, please ask the experimenter now.

Computer program. The entire lineup procedure was presented on a 43 cm (17") computer screen with a resolution of 1024 x 786 pixels. Audio recordings were made of the instructions, consent, and debriefing forms, which were played to the participants while presented simultaneously on the screen. The participants were unable to advance until the audio recording had finished. For the target-present conditions, the computer was programmed to present the target in the 6th, 10th, 20th, or 40th position (depending on the condition) while the other lineup members were placed randomly in the remaining 40 positions. For the target-absent conditions, the target was presented in the 41st position, and the computer randomly displayed the other 40 lineup members. Recall, that for these target-absent lineups, only the first 40 choices – before the participant saw the target – will be considered. In all conditions, the lineup members were presented sequentially. An important aspect of the sequential lineup is that the witness does not know how many pictures are going to be presented to reduce any pressure they may feel to choose (Lindsay et al., 1991). To accomplish this, "*n* out of 96" was shown in the right hand corner of the computer screen to indicate that they would be looking at 96 photographs, when in reality, they would only view 41 lineup members. The program recorded demographic and description information provided by the participants, as well as the order of the pictures presented, their decisions for each picture, the response time of the decisions, and the participants' confidence level for lineup members selected.

Procedure

The participants entered the laboratory and sat at a private computer terminal with headphones. They were instructed to report their demographic characteristics (sex, age, and ethnicity), and were immediately shown the videotaped staged crime. The consent form was presented (Appendix A), and the participants were asked to provide their consent electronically. Once consent was given, the participants answered questions regarding the target's hair colour and length, body type, weight, height, ethnicity, and sex. Upon completion of the target description, the participants received the lineup instructions (either sequential or multiple-choice) and began the identification task. The photographs appeared on the computer screen one at a time, and the participants were required to indicate "yes" or "no" to the question, "Is this a picture of the face of the person you saw?" If the participant responded "yes," they were asked to report their level of confidence in their decision on a scale from 1% to 100%. Following the presentation of the 41 photographs, the debriefing form (Appendix B) was presented on the computer and participants were instructed to contact the experimenter to sign a hard copy of the consent form. The participants were instructed to not discuss the nature of this study with other students because they could be future participants and the validity of the results could be jeopardized. Once they agreed not to discuss the study and all questions were answered, the participants were thanked for their involvement.

Results

The *Z* test for a difference between two percentages or proportions is mathematically identical to an independent chi-square test of the frequencies: $Z^2 = \chi^2(1)$ (Ferguson, 1981). Because the results are reported as percentages, *Z* tests are reported for tests of statistical significance of differences between pairs of percentages.

Targets

The seven targets were presented four times in each of the 10 conditions. Although this factor is completely crossed with the other manipulated variables, the data is not sufficient to examine target effects and all analyses are collapsed over targets.

Sex

With an alpha level of .05, the difference between male (27.14%) and female (22.86%) participants in their ability to identify the target was not significant, $Z = 0.54$, $p > .05$, $r = .03$;[1] therefore all results are collapsed over this variable.

Lineup Rejections

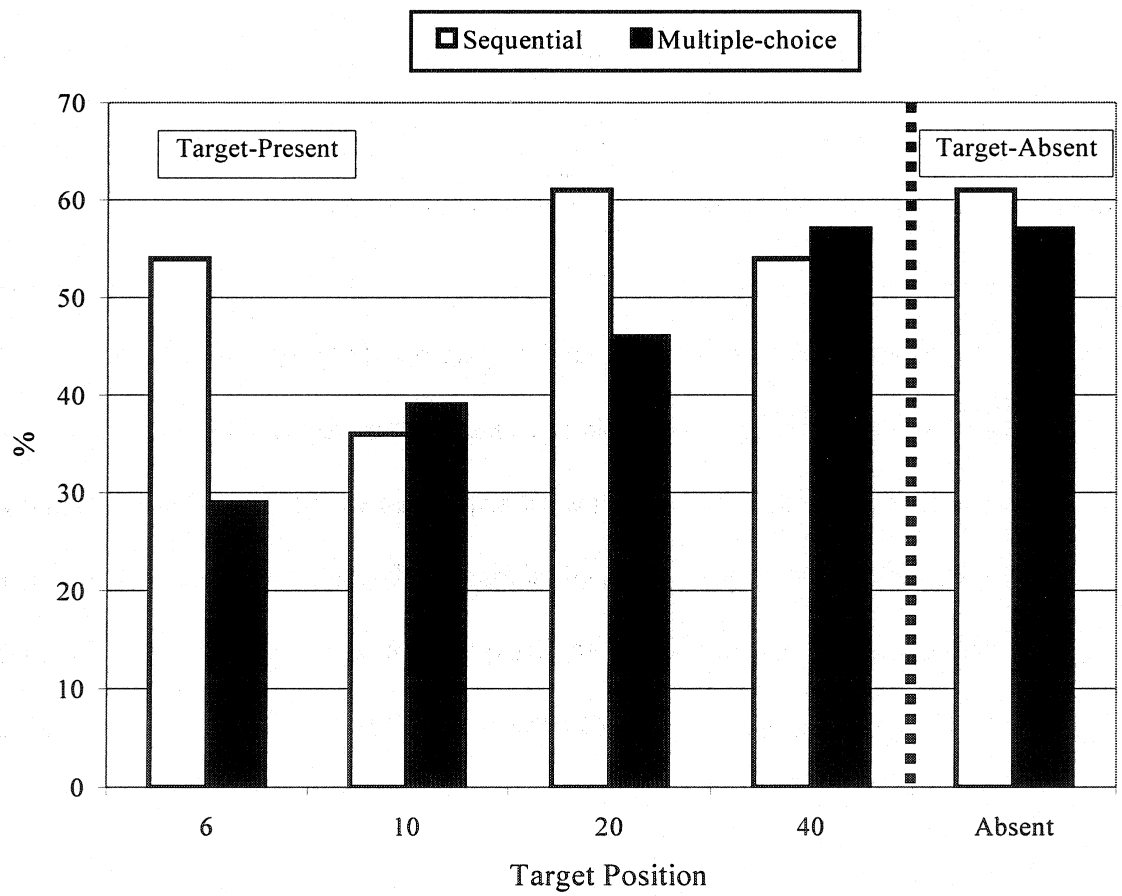
In the target-present conditions ($n = 224$) the overall rate of choosing was low, with slightly over half ($n = 115$) of the participants making no choice. Participants were more likely to incorrectly reject the target-present lineup (i.e., to select no one) when presented with sequential (59.82%) as compared to multiple-choice instructions (42.86%), $Z = 2.54$, $p < .05$, $r = .17$. The rate of incorrect rejections was unaffected by the position of the target in the lineup, χ^2 (3, $n = 224$) = 3.20, $p > .05$, $r = .12$. Figure 1 illustrates an interesting pattern for the participants that received multiple-choice instructions. When the target was in the earlier positions (6th and 10th) the rate of incorrect rejections was low, and this rate increased monotonically as the target was placed in the later positions (20th and 40th). This suggests that participants, even when allowed to make multiple choices, are less likely to choose anyone when the target is presented later in the

[1] The effect size is reported as r as suggested by Rosenthal (1991). Another commonly used measure of effect size for tests of proportions and χ^2 is Cramer's V; these measures are significantly correlated, $r(14) = .99$.

lineup. The incorrect rejection rate for sequential instruction participants did not display a consistent pattern.

When the target is present, the rejection of the lineup is an incorrect decision; conversely, when the target is absent, it is the correct judgment. As illustrated in the right-hand panel of Figure 1, participants were equally likely to correctly reject the target-absent lineup if they received sequential (60.71%) or multiple-choice (57.14%) instructions, $Z = 0.27$, $p > .05$, $r = .04$.

Figure 1. Lineup Rejections. Percentage of people presented with sequential or multiple-choice instructions that rejected the lineup (chose no one) when the target was in the 6th, 10th, 20th, or 40th position in a target-present 40-person lineup, or when the target was absent from the lineup ($N = 280$).



Choices

The difference in the number of choices made by the choosers in the sequential ($M = 1.55$, $SD = 1.01$) and multiple-choice conditions ($M = 1.46$, $SD = .86$) was not significant, $t(130) = .57$, $p > .05$, $r = .05$.[2]

Correct Identifications

One objective of this study was to examine various identification definitions, which will be addressed later in this section. For the purposes of the following results, an identification decision is considered correct if the participant identified the target, despite the number of other lineup members selected or the confidence of those decisions. The percentage of correct identifications made by participants in the sequential condition (19.64%) was slightly lower than the multiple-choice instruction condition (28.57%), however it was not significant, $Z = 1.56$, $p > .05$, $r = .10$.

The placement of the target within the 40-person lineup did result in a decrease in correct identification rates as the target appeared later in the lineup, $\chi^2(3, n = 224) = 14.54$, $p < .01$, $r = .25$. Specifically, the percentages of correct identifications for the 6^{th}, 10^{th}, 20^{th}, and 40^{th} positions were 39.29%, 21.43%, 26.79%, and 8.93%, respectively. Post-hoc tests determined that the 6^{th} position resulted in a significantly higher correct identification rate as compared to the 10^{th} ($Z = 2.05$, $p < .05$, $r = .19$) and the 40^{th} positions ($Z = 3.75$, $p < .01$, $r = .35$), as did the 20^{th} position when compared to the 40^{th} position ($Z = 2.47$, $p < .01$, $r = .23$). All other comparisons resulted in *p*s > .05.

As shown in Figure 2, when presented with sequential instructions, the participants were as likely to identify the target regardless of whether he was in the 6^{th}

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[2] A commonly used measure of effect size for *t*-tests is Cohen's *d*. Cohen's *d* and *r* are significantly correlated, $r(11) = .98$.

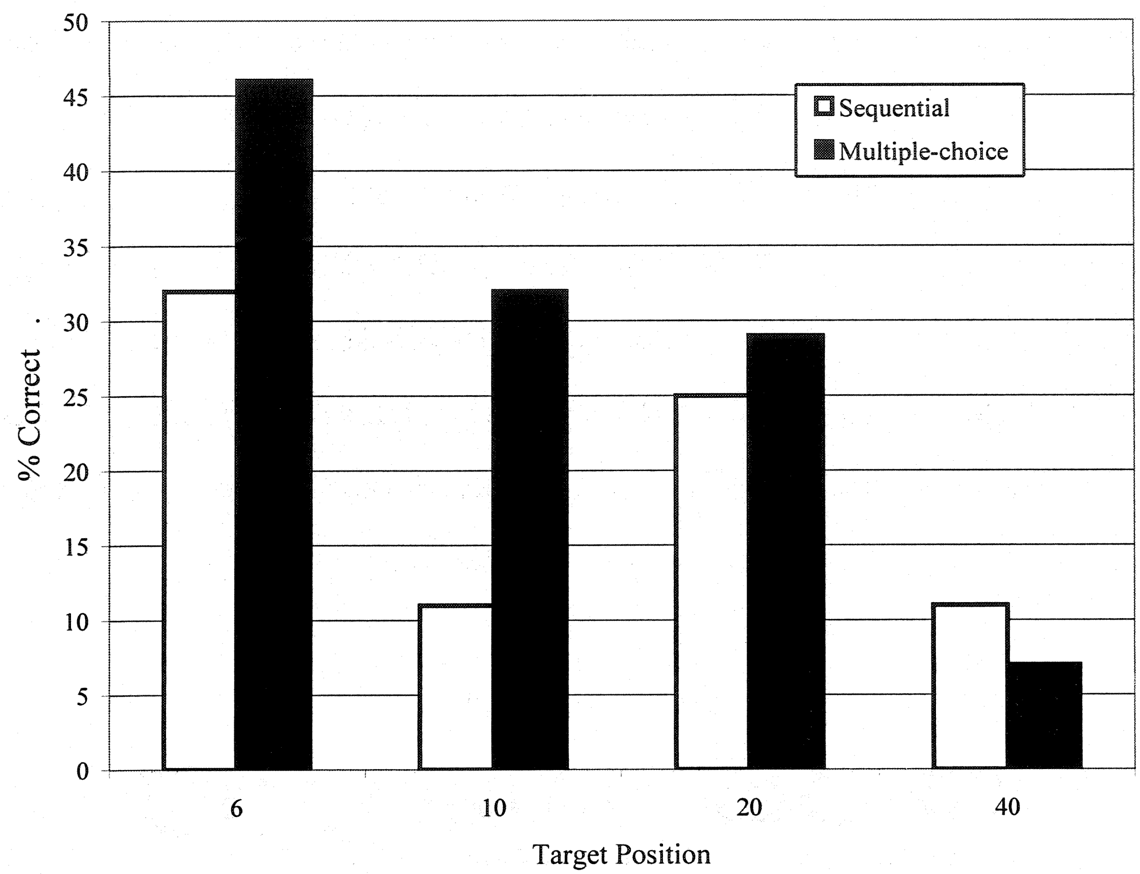
(32.14%), 10^{th} (10.71%), 20^{th} (25.00%), or 40^{th} (10.71%) position, $\chi^2(3, n = 112) = 6.11$, $p > .05$, $r = .23$. Alternatively, when presented with multiple-choice instructions, the correct identification rate decreased monotonically as the target was placed later in the lineup, $\chi^2(3, n = 112) = 10.85$, $p < .05$, $r = .31$. Post-hoc tests established that the percentage of people who chose the target in the 40^{th} position (7.14%) was significantly lower compared to the 6^{th} (46.43%; $Z = 3.32$, $p < .01$, $r = .44$), 10^{th} (32.14%; $Z = 2.36$, $p < .05$, $r = .32$), and 20^{th} positions (28.57%, $Z = 2.09$, $p < .05$, $r = .28$). All other comparisons resulted in *p*s > .05. The sequential condition did not produce this gradual decrease due to the low correct identification rate when the target was in the 10^{th} position; nevertheless, the rates for the other positions did mimic this downward slope.

Correct identification Definitions

In a traditional lineup procedure, regardless of sequential or simultaneous presentation, an identification is said to be accurate if the witness selects the target. However, if the witnesses are allowed, or even encouraged, to make multiple choices, simply choosing the suspect may not be convincing evidence. For example, think of the situation in which the witness chose 20 people, including the suspect, from a 40-person lineup. Certainly, this identification should not be given equal weight as one in which the witness selected only the suspect.

The question of when the selection of a suspect should be considered an identification can be addressed in several ways and has resulted in the following five definitions: (a) the witness simply selected the target (target selection); (b) once the witness selected the target they chose no other lineup member (final selection); (c) the witness selected *only* the target (only selection); (d) the witness reported a higher level of

Figure 2. Correct Identifications. Percentage of correct identifications of the target in the 6th, 10th, 20th, and 40th positions when participants were presented with sequential or multiple-choice instructions (n = 224).



selection); and (e) the witness selected the target with an arbitrarily high confidence level (i.e., over 90%; highly confident selection). Of course, any arbitrarily high value could have been used for the last definition. Figure 3 illustrates the effect of the various definitions on the overall correct identification rates. The more stringent criteria (i.e., target as the only selection, highly confident selection, etc.) reduced the number of decisions that would be considered accurate. However, the correct identification rate was maintained when the criterion required that the target was the most confident selection. This pattern of results was similar for both conditions, although the participants encouraged to make multiple choices obtained slightly higher correct identification rates than did the participants presented with sequential instructions, regardless of the definition.

Figure 3. Correct Identification Definitions. The percentage of correct identification rates according to the five identification definitions for the sequential and multiple-choice instruction conditions collapsed across target positions (*n* = 224).

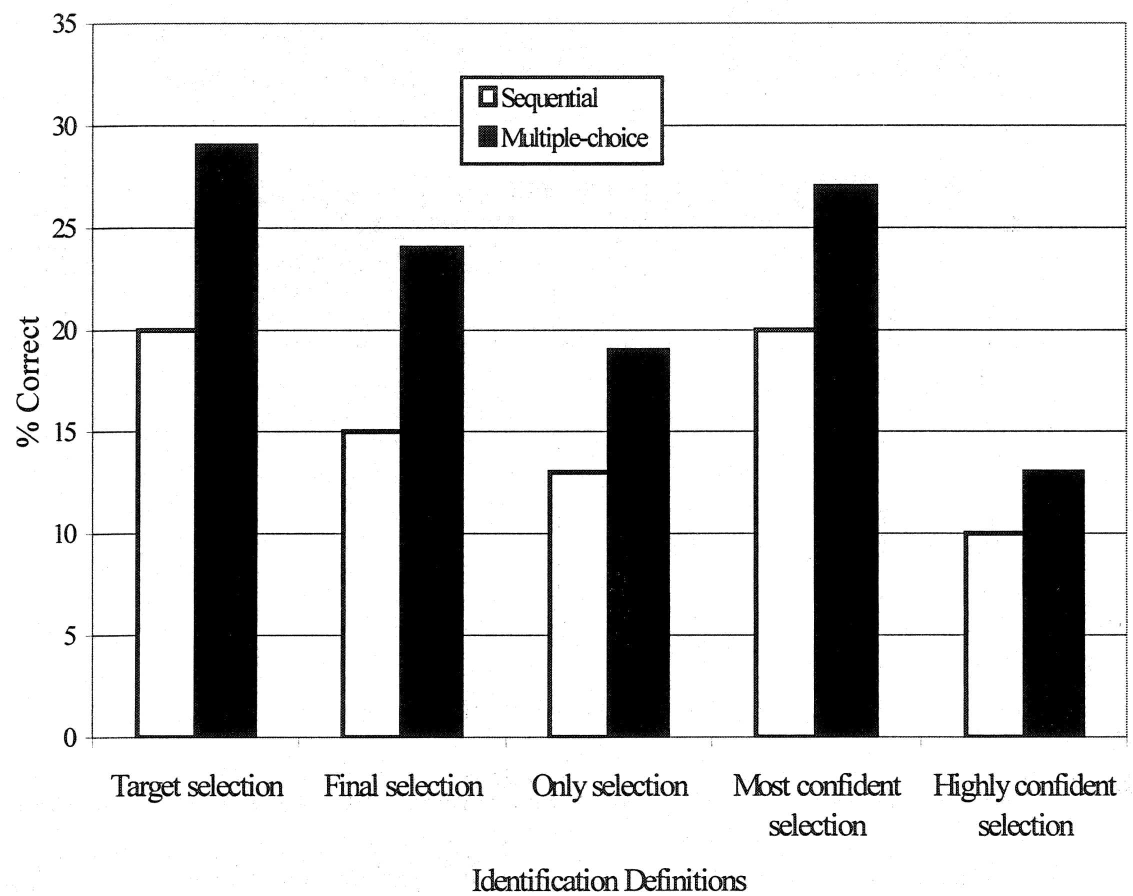


Table 1 contains the correct identification rates across each of the target positions for the sequential and multiple-choice instruction participants (*n* = 28, for each condition). While examining the situation in its totality is useful, as each definition is discussed the relevant information will be presented in an individual table.

The first definition is the most lax and, as a result, produced the highest possible correct identification rates from this study (see Table 2). However, because the witness is required simply to pick the target, this evidence is weak if the witness chose even one

Table 1. Correct Identification Definitions. The correct identification rates (with frequencies in parentheses) according to the five identification definitions for sequential and multiple-choice instruction conditions when the position of the target is varied in the lineup ($n = 224$).

	Correct Identification Definitions	Position of Target in Target-Present Lineups 6	10	20	40
Sequential Instructions	Target Selection	32.14% (9)	10.71% (3)	25.00% (7)	10.71% (3)
	Final Selection	21.43% (6)	10.71% (3)	17.86% (5)	10.71% (3)
	Only Selection	21.43% (6)	7.14% (2)	14.29% (4)	7.14% (2)
	Most Confident Selection	32.14% (9)	10.71% (3)	25.00% (7)	7.14% (2)
	Highly Confident Selection	17.86% (5)	7.14% (2)	10.71% (3)	3.57% (1)
Multiple-choice Instructions	Target Selection	46.43% (13)	32.14% (9)	28.57% (8)	7.14% (2)
	Final Selection	35.71% (10)	32.14% (9)	21.43% (6)	7.14% (2)
	Only Selection	35.71% (10)	32.14% (9)	3.57% (1)	3.57% (1)
	Most Confident Selection	42.86% (12)	32.14% (9)	21.43% (6)	7.14% (2)
	Highly Confident Selection	21.43% (6)	14.29% (4)	14.29% (4)	3.57% (1)

other person from the lineup. These are the base rates against which all other definitions will be contrasted.

Table 2. First Correct Identification Definition. What percentage of participants selected the target?

	Position of Target in Target-Present Lineups			
	6	10	20	40
Sequential Instructions	32.14%	10.71%	25.00%	10.71%
Multiple-choice Instructions	46.43%	32.14%	28.57%	7.14%

The second definition requires that the witness chose no one after they chose the target, and this led to a slight decrease in correct identifications when the target was in the 6th and 20th positions (see Table 3). When the target was in the 40th position, the witness was restricted from making any other choices because there were only 40 lineup members. Determining how this definition would alter the correct identification rates when the target was placed in a later, but not the last, position is not possible from this study.

Table 3. Second Correct Identification Definition. What percentage of participants selected the target as their final choice?

	Position of Target in Target-Present Lineups			
	6	10	20	40
Sequential Instructions	21.43%	10.71%	17.86%	10.71%
Multiple-choice Instructions	35.71%	32.14%	21.43%	7.14%

Likewise, the position of the target in the lineup appeared to have a strong effect when an identification was considered correct if the witness chose only the target. As shown in Table 4, when the target was presented early in the lineup, the decrease in correct identifications was slight; however, when the target was presented in either the 20th or 40th position, the decline was large. Accordingly, this decrease was more pronounced when participants were informed that multiple choices were possible.

Table 4. Third Correct Identification Definition. What percentage of participants selected only the target?

	Position of Target in Target-Present Lineups			
	6	10	20	40
Sequential Instructions	21.43%	7.14%	14.29%	7.14%
Multiple-choice Instructions	35.71%	32.14%	3.57%	3.57%

Another way to address this issue is to consider an identification correct if the witness reported a higher level of confidence for the target than any other lineup member selected. In this case, if the witness chose two other lineup members with 60% confidence it would not matter as long as they chose the target with 61% confidence. This definition maintained the correct identification rates, which suggests that the majority of participants who chose the target were more confident in that choice than any other (see Table 5).

Table 5. Fourth Correct Identification Definition. What percentage of participants selected the target as their most confident choice?

	Position of Target in Target-Present Lineups			
	6	10	20	40
Sequential Instructions	32.14%	10.71%	25.00%	7.14%
Multiple-choice Instructions	42.86%	32.14%	21.43%	7.14%

Lastly, the fifth definition suggests that an identification is considered correct if the witness reported a confidence level of at least 90% when they chose the target. Unlike the most confident definition, requiring 90% confidence did result in a decrease in correct identifications (see Table 6).

Table 6. Fifth Correct Identification Definition. What percentage of participants selected the target with over 90% confidence?

	Position of Target in Target-Present Lineups			
	6	10	20	40
Sequential Instructions	17.86%	7.14%	10.71%	3.57%
Multiple-choice Instructions	21.43%	14.29%	14.29%	3.57%

False Identification Rates

The correct decision in target-present lineups is to choose the target from the lineup, while in target-absent lineups the correct decision is to reject the entire lineup by not selecting any lineup member. The false identification rate results from these choices; however, as previously discussed, these rates can be calculated in various ways. In this study, no particular lineup member was designated as the innocent suspect; however, this issue can be addressed by assigning one lineup member to be the designated innocent suspect post hoc. To represent the best-case scenario, the lineup member that is chosen the least would be designated as the innocent suspect. In this study, the best-case scenario produced a false identification rate of 0.00% because some lineup members were never chosen.

Conversely, to represent the worst-case scenario, the lineup member that was chosen the most would be designated as the innocent suspect. A designated innocent suspect would be assigned to each of the seven targets, and the false identification rate may vary according to the target of a particular lineup. Specifically, in one sequential lineup, one lineup member was chosen twice, which produced a false identification rate of 50.00%, but this rate decreased when averaged with the rates produced by the other lineups. As a result, the average false identification rates from the seven target-absent lineups will be discussed. When presented with sequential instructions, the worst-case scenario resulted in a false identification rate of 25.00%. When presented with multiple-choice instructions, the false identification rate was 21.43%. These high rates may be an artifact of the study design because seven different lineups were used and, as a result, each lineup member was presented only four times in each condition. Therefore, a single choice of a lineup member would create a false identification rate of 25.00% for that lineup.

The designation of the innocent suspect can greatly affect the reported rate of false identifications, as evidenced by the divergent results presented above. If the best-case scenario were reported, the MSL procedure would appear to result in zero false identifications, while the worst-case scenario would suggest that the false identification rate might be as high as 50.00%. Obviously, lineup members should be presented more than four times to provide a reliable estimate of the procedure; therefore the rates should be established across targets. When examined in that fashion, the worst-case scenario for the MSL lineup produced a false identification rate of 21.43%. This rate is a slight decrease from the false identification rate for the simultaneous lineup (27%) and is much higher than the rate for the sequential lineup (9%; Steblay et al., 2001).

False Identification Definitions

An alternative to the designated innocent suspect is to calculate the expected false identification rate, which is the likelihood that any particular lineup member would be selected. This rate is calculated by dividing the percentage of people that failed to reject the lineup (the false positive rate) by the number of lineup members. Similar to the correct identification rate, the expected false identification rate will vary according to the identification definitions.

Unfortunately, the identification definitions do not translate directly from the target-present to the target-absent lineup. In the target-present lineup, we are interested in the witness' choice of a specific person, whereas in the target-absent lineup, we are concerned with whether they chose anyone at all. This variation negates the need for two of the five definitions: (a) the suspect chosen as the final choice, and (b) the suspect as the most confident choice. These definitions are redundant in that they only indicate whether a foil was chosen. For example, if a participant chose three people, the last one chosen always will be the final choice, and one of these people will be chosen with the highest confidence.

One piece of information that is not captured by the previous definitions is the situation in which a participant chose several lineup members. Recall that the false positive rate is the percentage of people that made a choice. Yet, this does not take into account the participants that made several choices, which would result in a higher expected false identification rate. As a result, both the number of people that made choices and the number of choices made must be considered.

These alterations result in four target-absent identification definitions: (a) the number of people that made a choice (lineup not rejected); (b) the total number of choices made (lineup members selected); (c) the number of participants that chose only one lineup member (single selection); and (d) the number of participants that chose a lineup member with confidence over 90% (highly confident selection). See Table 7 for the frequencies, the false positive rates, and the expected false identification rates according to the various identification definitions for the two instruction conditions.

When considering the number of participants that made a choice, the chance that any individual lineup member would be chosen when presented with sequential and multiple-choice instructions is 0.98% and 1.07%, respectively. The expected false identification rates increase to 1.79% and 1.34% when the number of lineup members chosen is considered. Interestingly, the number of choices made in the sequential condition (20) is higher than in the multiple-choice condition (15), which led to a higher false positive rate of 71.43% as compared to 53.57%, respectively. However, as demonstrated, when these rates are spread across the large lineup size, their effects are minimal and result in similar expected false identification rates. When considering the participants that made only one choice, the false identification rate declines slightly to 0.63% in the sequential condition and 0.80% in the multiple-choice condition. This rate decreases even further when taking into account only choices that were made with over 90% confidence. Particularly, the sequential instructions retained a false identification rate of 0.18%, while the multiple-choice instructions resulted in a rate of 0.00%. That is, when presented with sequential instructions, two lineup members were chosen with over

90% confidence; however, when presented with multiple-choice instructions, no one was chosen with that high level of confidence.

Table 7: False Identification Definitions. For each of the false identification definitions the frequency, false positive, and expected false identification rates are presented, separated by sequential and multiple-choice instructions.

	Identification Definitions	Frequency	False Positive Rate	Expected False Identification Rate
Sequential Instructions (n = 28)	Lineup Not Rejected	11	39.29%	0.98%
	Lineup Members Selected[a]	20	71.43%	1.79%
	Single Selection	7	25.00%	0.63%
	Highly Confident Selection	2	7.14%	0.18%
Multiple-choice Instructions (n = 28)	Lineup Not Rejected	12	42.86%	1.07%
	Lineup Members Selected[a]	15	53.57%	1.34%
	Single Selection	9	32.14%	0.80%
	Highly Confident Selection	0	0.00%	0.00%

[a] This counts all of the lineup members selected, including all multiple choices made by participants.

Mean Confidence Levels

To completely examine the confidence issue, the reported levels must be examined for the correct and incorrect choices within the target-present and target-absent lineups. Unfortunately, the confidence level was not gathered from participants who rejected the lineups; therefore, this issue cannot be addressed fully. However, three confidence levels can be examined: correct and incorrect selections from the target-present lineup, and false identifications from the target-absent lineup. Furthermore, with the allowance of multiple choices, various confidence levels can be considered because some participants chose several lineup members. To provide the clearest picture, the following confidence levels will be reported in this section: (a) correct selection of the target, regardless of the number of people chosen; (b) false identification of a lineup member from the target-absent lineups with the highest confidence reported if multiple choices were made; and (c) incorrect foil selections from the target-present lineups, with the highest confidence reported if multiple choices were made.

Overall the mean confidence levels (with standard deviations in parentheses), regardless of instructions provided, for targets, target-absent lineup members, and target-present foils were 78.31% (22.41), 63.57% (18.61), and 56.32% (23.15), respectively. Of particular interest are the confidence levels reported when participants were presented with either multiple-choice or sequential instructions.

When participants were presented with sequential instructions, the mean confidence levels (with standard deviations in parentheses) for targets, target-absent lineup members, and target-present foils were 80.55% (18.60), 72.09% (16.85), and 53.42% (22.74), respectively. The confidence levels reported for target-absent lineup members were not significantly different from those reported for target choices, $t(31) = 1.27, p > .05, r = .23$; however, the levels were higher than were those reported for target-present foil choices, $t(40) = 2.48, p < .05, r = .37$. The issue of whether participants' confidence levels differed between target and target-present foil choices can be addressed in two ways. First, the confidence levels of participants who chose both the target and a target-present foil can be examined. A paired sample *t*-test indicated that when participants chose the target and a foil the confidence levels for target choices ($M = 66.00\%$, $SD = 20.06$) were significantly higher compared to their target-present foil choices ($M = 36.88\%$, $SD = 20.77$), $t(7) = 3.47, p < .05, r = .80$. Alternatively, the confidence levels of participants who chose a target-present foil but did not choose the target can be examined. An independent samples *t*-test indicated that the confidence levels of participants who chose only a target-present foil ($M = 59.17\%$, $SD = 20.83$) was significantly lower than was the level reported by participants who chose the target ($M = 80.55\%$, $SD = 18.60$), $t(43) = 3.63, p < .05, r = .48$. The final comparison to be made is between the confidence levels reported by participant who chose target-present foils and the target, and those who chose only target-present foils. This comparison resulted in a significant difference such that the participants who chose only target-present foils reported a higher level of confidence for those choices than did the participants who chose target-present foils and the target, $t(29) = 2.61, p < .05, r = .44$. This result suggests that when witnesses recognize and select the target, they are less confident in the other lineup members they chose when compared to the confidence levels reported by participants who failed to identify the target.

When participants were presented with multiple-choice instructions, the mean confidence levels (with standard deviations in parentheses) for targets, target-absent lineup members, and target-present foils were 76.78% (24.87), 55.75% (17.17), 58.42% (23.49), respectively. The confidence levels reported for target-absent lineup members were significantly lower from those reported for target choices, $t(42) = 2.69$, $p < .05$, $r = .38$; however, the levels were not significantly different from the target-present foil choices, $t(53) = 0.37$, $p > .05$, $r = .05$. A paired sample *t*-test indicated that when participants chose the target and a target-present foil the confidence levels for target choices ($M = 73.91\%$, $SD = 26.70$) were significantly higher compared to their foil choices ($M = 55.55\%$, $SD = 27.29$), $t(10) = 2.45$, $p < .05$, $r = .61$. An independent samples *t*-test indicated that the confidence levels of participants who chose only a target-present foil ($M = 59.41\%$, $SD = 22.43$) were significantly lower than were the confidence levels reported by participants who chose the target ($M = 76.78\%$, $SD = 24.87$), $t(62) = 2.94$, $p < .05$, $r = .35$. Unlike the sequential instruction condition, the confidence levels reported by participants who chose foils and the target, and those who chose only target-present foils were not significantly different, $t(41) = 0.47$, $p > .05$, $r = .07$. This result suggests that when provided with multiple-choice instructions the witnesses are likely to select foils with a similar level of confidence, regardless of whether they recognized and selected the target.

Confidence Correlations

In addition to examining mean confidence levels, the relationship between the confidence and accuracy of an identification should be determined. Eyewitness studies generally have found a positive, but weak, relationship between confidence and accuracy (see Leippe & Eisenstadt, in press). Sporer, Penrod, Read, & Cutler's 1995 meta-analysis concluded that the confidence-accuracy correlation of choosers was .41. In this study, the overall correlation between the confidence levels reported for the accurate (target identification) and inaccurate (all foil selections from target-present and highest confidence false identifications from target-absent lineups) choices was $r_{pb}(186) = .44$, $p < .01$.

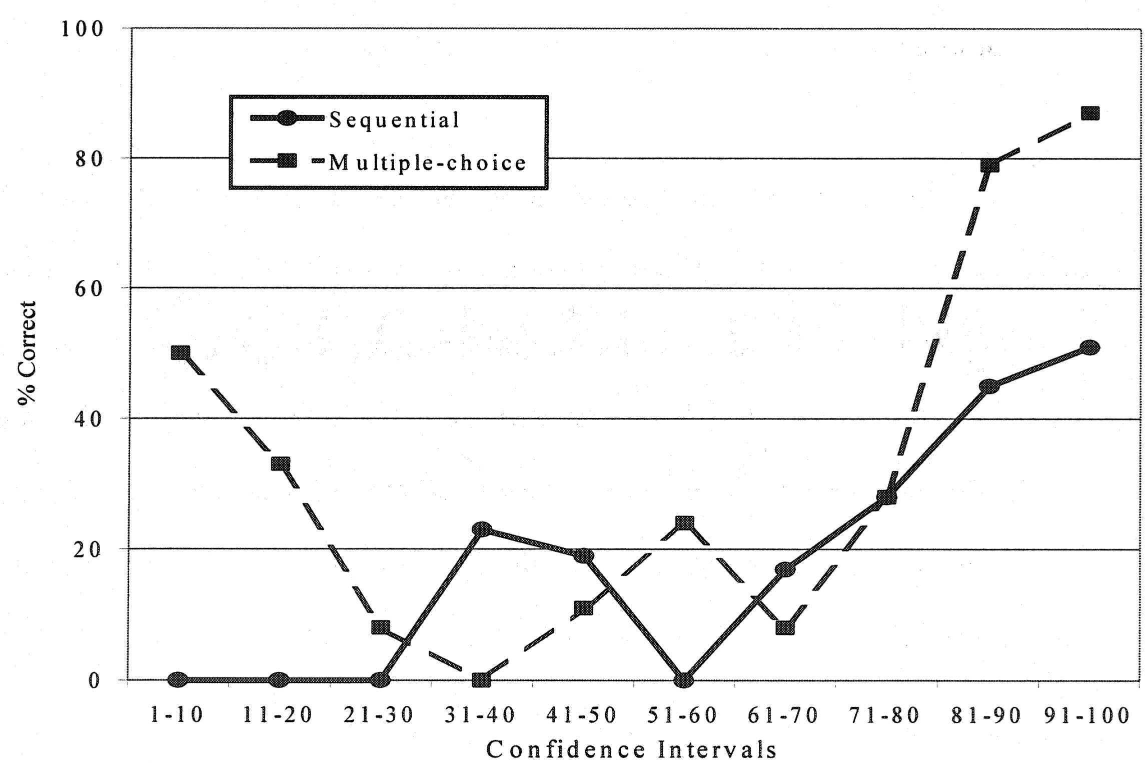
Another way to examine this relationship is to correlate only the accurate choices in the target-present condition and the false identifications from the target-absent condition, because the foil selections are known to be wrong (Wells & Lindsay, 1985). As reported in the meta-analysis, this method produced a correlation of .39 (Sporer et al., 1995). In this study this analysis resulted in slightly smaller, but significant, correlation of $r_{pb}(77) = .31$, $p < .01$. These correlations suggest that the level of reported confidence is positively, but not strongly, related to the accuracy of identification.

Confidence Calibration

Other researchers have argued that the correlation between confidence and accuracy is not as important as the calibration of these variables (Weber & Brewer, in press). Calibration is designed to explicitly demonstrate that as the confidence of the identification increases so does the likelihood of accuracy. To date, these studies use a very large number of data points to systematically calibrate confidence and accuracy. Due to the small sample size in the current study, calculation of the parameters involved in calibration is not appropriate. However, examining the accuracy of choices made at various confidence levels is possible. To do so, for each confidence interval (1 to 10%, 11 to 20%, etc.), the proportion of target choices was divided by the proportion of total choices, and this figure was multiplied by 100 to provide the percentage of correct choices. Calibration can address only single choices made by participants, so included in this are the confidence levels for the all target choices, the first foil choice from the target-present lineups, and the first false identifications from target-absent lineups.

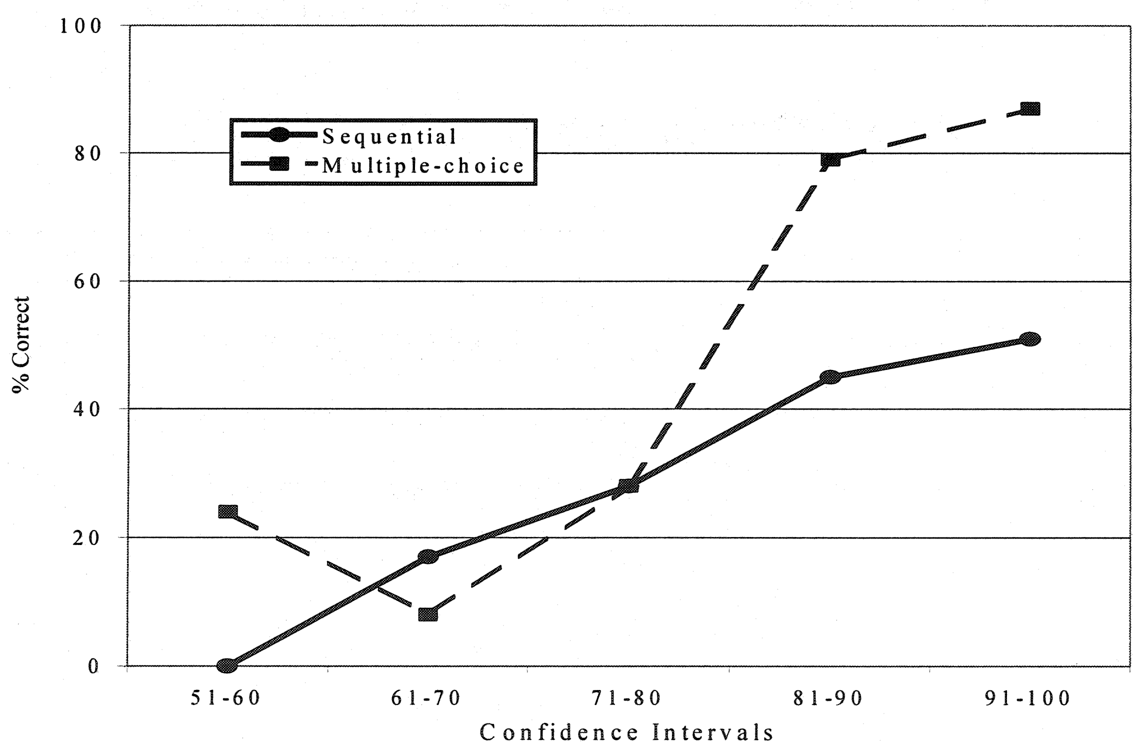
Perfect calibration results in a 45° line when confidence is plotted on the abscissa and percentage correct on the ordinate. As a result, at the lowest confidence level 0% of choices would be correct, while at the highest confidence level 100% of choices would be correct. As demonstrated in Figure 4, perfect calibration was not produced in this study. At the lowest levels of confidence (under 10%), 50.00% of choices in the multiple-choice condition were correct.

Figure 4. Full-scale Confidence Calibration. Percentage of correct choices across confidence intervals from 1 to 100% for sequential and multiple-choice instruction conditions ($N = 280$).



Nevertheless, when examining calibration it has been argued that only confidence levels above 50% should be considered (Weber & Brewer, 2003). This circumstance leads to improved calibration for both sequential and multiple-choice instructions. As shown in Figure 5, for the sequential instructions, the accuracy increases monotonically with the confidence. The participants were overconfident in their decisions because they were correct only 50.00% of the time at the highest confidence interval. The multiple-choice instructions appeared to improve the calibration because at the highest confidence level, 87.00% of their choices were accurate; however, the clean monotonic slope was not produced.

Figure 5. Half-scale Confidence Calibration. Percentage of correct choices made with over 50% confidence for sequential and multiple instructions across confidence intervals from 51 to 100% ($N = 280$).



Recall that the main goal of lineup procedures is to increase, or maintain, correct identifications while decreasing false identifications. Calibration does not address this issue directly because it is based on false identification from the target-absent lineups as well as incorrect selections of foils from the target-present lineups. An important issue to examine is whether witnesses reported equivalent confidence levels for correct selections of the target and incorrect selections of lineup members from target-absent lineups. This issue does not apply to foils in the target-present lineup because they are known to be innocent by the police and would not face prosecution if identified by a witness.

Confidence should be considered an important indicator of the accuracy of an identification only if the targets are chosen with a higher level of confidence than are innocent suspects. To examine this, the proportions of correct and false identifications[3] were calculated for each confidence interval. As demonstrated in Figure 6, when presented with sequential instructions participants made very few choices with less than 50.00% confidence. Unfortunately, more false, as opposed to correct, identifications were made with confidence levels ranging from 50.00 to 90.00%. The proportion of correct identifications surpassed false identifications, by a mere 0.02, only at the highest confidence level.

The multiple-choice instructions produced a wider range of confidence scores for both correct and false identifications (see Figure 7). At the lowest confidence levels, there were a small number of correct identifications and no false identifications. All false identifications were produced within the range of 30.00 to 80.00% confidence, accompanied by a few correct identifications. Only correct identifications were made with confidence over 81.00%, which is in stark contrast to the sequential condition.

[3] If a participant made multiple false identifications, the highest confidence choice was used.

Figure 6. Confidence of Sequential Choices. The proportion of choices of the target from the target-present lineups (correct IDs) and the proportion of choices of target-absent lineup members selected with the highest confidence (false IDs), when participants were presented with sequential instructions (n = 140).

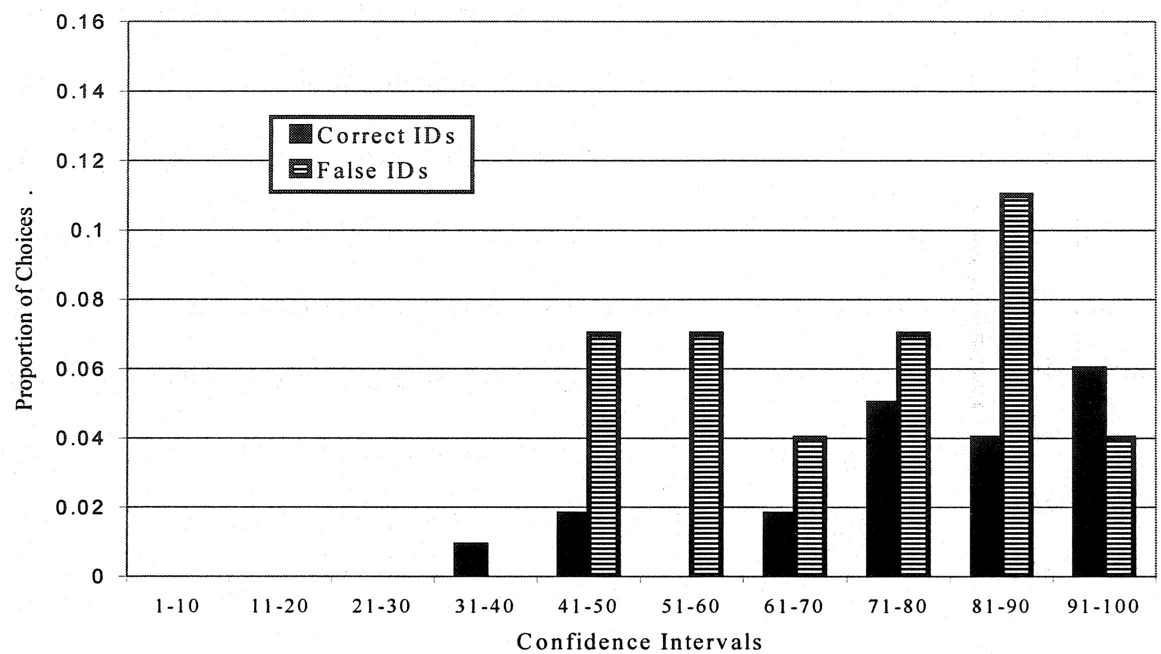
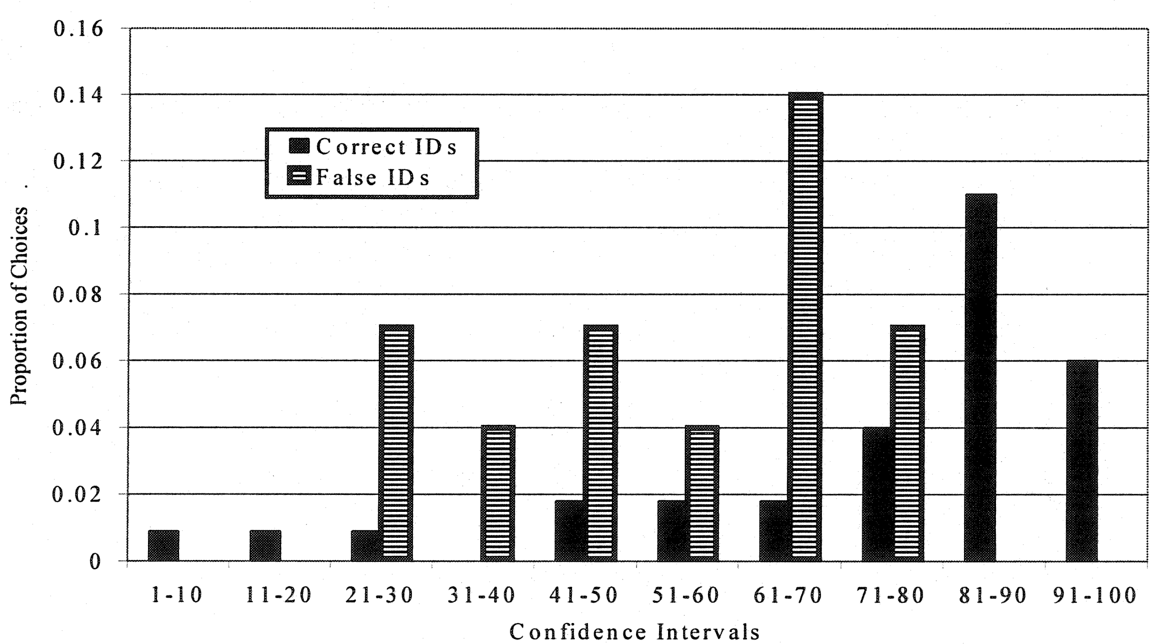


Figure 7. Confidence of Multiple-choice Choices. The proportion of choices of the target from the target-present lineups (correct IDs) and the proportion of choices of target-absent lineup members selected with the highest confidence (false IDs), when participants were presented with multiple-choice instructions (n = 140).



Comparison to Traditional Lineups

When investigating new lineup procedures, comparisons to more traditional techniques are essential to identify the strengths and weaknesses of the new procedure. This study produced a Multiple-choice, Sequential, Large lineup (MSL) and a large sequential lineup by varying the instructions. In addition, truncating certain lineup conditions after the 6th position provided information for the traditional 6-person sequential lineup. Specifically, the 6-person target-present lineup results were based on the decisions of the participants that received sequential instructions and saw the target in the 6th position ($N = 28$). The 6-person target-absent results were based on the decisions of the participants that received sequential instructions and saw the target in the 10th position ($N = 28$). The data for the first six positions are equivalent to a target-absent lineup because the target was not viewed in those positions and the participants were unaware that he would appear later in the lineup. The results from the traditional 6-person simultaneous lineup ($N = 56$) were obtained from other research in our laboratory (Boyce, 2004). All lineups used the same stimuli to ensure valid comparisons.

The rates of correct and incorrect decisions for the four lineup types are presented in Table 8. Evidently, the 6-person simultaneous lineup, compared to the other three procedures, produced the most correct identifications of the target. The rates of correct rejections of the target-absent lineups were equal for the 6-person sequential and simultaneous lineups, yet the 6-person sequential did have a lower rate of correct identifications. The MSL and large sequential lineups produced comparable correct identification and rejection rates; however, these rates were much lower than the simultaneous lineup. Additionally, simultaneous presentation led to fewer incorrect rejections of the target-present lineup compared to the other procedures. The large lineups did produce lower expected false identification rates compared to both 6-person lineups, even though the number of lineup members chosen was higher in the larger lineups. This is a result of the calculation used to produce the expected false identification rate because the false positive rate is divided by the number of lineup members. The larger lineups will lead to a lower expected false identification rate unless false positive choices increase proportionally with the lineup size. Clearly, this did not happen in this research.

Table 8. Comparison Table. The percentage (with frequencies in parentheses) of correct and incorrect decisions for four different target-present and target-absent lineups.

	Correct Decisions		Incorrect Decisions	
	ID of target	Rejection	Rejection	ID of lineup member
Lineup Type	Target-Present	Target-Absent	Target-Present	Target-Absent
MSL	28.57% (32)	57.14% (16)	42.86% (48)	1.07% (12)
Large Sequential	19.64% (22)	60.71% (17)	59.82% (67)	0.98% (11)
6-person Sequential	32.14% (9)	85.71% (24)	64.29% (18)	2.38% (4)
6-person Simultaneous	57.14% (32)	85.71% (48)	35.71% (20)	2.38% (8)

Note: The target-absent identification data is based on the expected false identification rate for each lineup.

Discussion

This study was designed to address three main objectives regarding the Multiple-choice, Sequential, Large lineup. The first main objective was to test the 40-person MSL lineup procedure in a methodologically sound fashion to examine several aspects of this lineup, specifically: (a) the effect of instructions, (b) the lineup size, (c) the position effect, and (d) various correct identification definitions.

First, the multiple-choice instructions were designed to elevate or maintain the correct identification rate by increasing the number of choices made by participants. This hypothesis garnered little support. The multiple-choice participants did correctly identify the target more than did the sequential participants, yet this difference was not significant. As well, the instructions did not result in a greater number of overall choices. This finding initially was surprising since it is in contrast to Levi's results. However, recall that he did not allow the sequential participants to make another choice – this is not the norm with sequential lineups. When traditional sequential lineups are tested, approximately 5% of participants make multiple choices (e.g., Lindsay & Wells, 1985; Lindsay et al., 1991). Therefore, if witnesses have a tendency to make multiple choices in a 6-person lineup logically they would make more choices as the lineup size increased, regardless of the instructions provided. While the instructions did not boost the total number of choices, they did affect the number of participants that made a choice. The rate of incorrect rejections of target-present lineups – 59.82% and 42.86% for sequential and multiple-choice instructions, respectively – may seem high; however, this rate is comparable to that found in traditional sequential lineups (46.00%; Steblay et al., 2001). Furthermore, the multiple-choice instructions significantly reduced this rate, as expected. This discrepancy in incorrect rejections between the conditions was related directly to the slightly higher rate of correct identifications by the multiple-choice participants.

Second, Levi (1998, 2002) claimed that the large lineup size of the MSL procedure would produce a low rate of expected false identifications. This assertion was supported given that the chance of a particular lineup member being chosen when the target was not in the lineup was approximately 1.00%. This is much lower than the rate of 7.00% that would be produced from a 6-person traditional lineup if the same number of participants made choices. The logic is as follows: the probability of one person being selected from a 6-person lineup is .17 or 16.67%, while the probability of one person being selected from a 40-person lineup is .03 or 2.5%. Thus, a larger lineup should result in a lower false identification rate so long as only one suspect appears in the lineup (Wells & Turtle, 1986).

Third, the effect of the position of the target on correct identifications was investigated. While Levi found a consistent rate across positions, this study demonstrated a significant decrease of correct identifications as the target was positioned later in the lineup. The target was chosen most often in the 6^{th} position with a slight decline in the 10^{th} and 20^{th} positions. However, when the target was in the 40^{th} position the reduction in correct identifications was drastic. A large lineup can work only if the target can be placed in any position. Apparently, the target rarely will be identified when in the last position of such a large lineup. At this point, the data suggest that the MSL lineup should consist of no more than 20 lineup members.

The decline in correct identifications as the target is placed later in the lineup is not new. On a greater scale, Laughery et al., (1971) tested mug shot searches and placed the target in either the 40^{th} or 140^{th} position. A decrease in correct identifications resulted when the target was in the 140^{th} compared to the 40^{th} position, and a reasonable speculation is that the target may have been identified more often in the earlier positions. This finding was replicated in another mug shot study with a decline in correct identifications as the target's picture followed 100, 300, 500, or 700 other pictures (Lindsay et al., 1994).

Fourth, the various definitions of a correct identification were examined. The most lax definition – the witness chose the target – provided the maximum rate of correct identifications. The more strict definitions – the witness chose only the target, chose the target with the highest confidence, etc. – could only maintain or decrease this rate. The results illustrated that requiring the witness to choose only the target, choose the target as their final choice, or choose the target with over 90% confidence, decreased the number of identifications. However, the majority of the witnesses that chose the target reported a higher level of confidence for that choice compared to all others. As a result, this slightly stringent criterion increases the potency of this evidence while still maintaining relatively high correct identification rates.

The results of this study suggest that the MSL lineup – with a few alterations – could be a powerful investigative tool. First, multiple choices could be further encouraged in the instructions to potentially produce a greater number of choices by these participants. Second, the lineup should contain approximately 20 lineup members because the target was rarely chosen in the 40th position. Third, the selection of the target should be considered an identification only if no other lineup member is chosen with an equal or higher level of confidence.

The second main objective was to examine the relation of the confidence levels reported by participants to their selection accuracy. The majority of the anticipated results were obtained. Overall, the witnesses were more confident when they identified the target than when they chose other lineup members from either the target-absent or target-present lineups. In addition, the correlation between confidence and accuracy was positive (.31), which was similar to the figure (.39) reported in a meta-analysis on this issue (Sporer et al., 1995).

Furthermore, the calibration graphs demonstrated that generally a witness is more likely to be accurate as their reported confidence level increases, specifically for confidence levels above 50%. Interestingly, the data from the sequential instruction participants produced a gradual but steady increase of accuracy as confidence increased. As well, the majority of these participants reported confidence levels greater than 50%, regardless of whether they correctly identified the target or incorrectly selected another lineup member. As a result, these participants demonstrated overconfidence; that is, when the participants were 91 to100% confident in their choice, they were correct only 50% of the time. Conversely, the data from the multiple-choice participants produced a jagged slope and a wider range of confidence levels. Possibly, the multiple-choice instructions made them more cautious (and less confident) in their choices, except when they correctly identified the target, which resulted in the highest levels of reported confidence. Unlike sequential, the multiple-choice instructions did not create severe overconfidence; when the witnesses were 91 to 100% confident, they were correct 87% of the time.

Confidence is an important issue in lineup research because judges and jurors often are influenced by the confidence of an eyewitness testifying in a court of law (Cutler, Penrod, & Stuve, 1988). Because the triers of fact find confidence convincing, the relationship, if any, that would allow us to predict the accuracy of the witness based on their confidence level needs to be discovered. However, the confidence level must be reported at the time of the identification, before any feedback is provided (Wells &

Bradfield, 1998). This is essential because research has demonstrated that confidence is extremely malleable and a witness who was initially uncertain of their choice could present as overly confident on the witness stand (Bradfield, Wells, & Olson, 2002). The need to record initial confidence of the witness has become dire since a recent survey of judges demonstrated that 80% accepted the statement, "An eyewitness' confidence can be influenced by factors that are unrelated to identification accuracy" (Wise & Safer, 2004, p. 430). However, 68% of the same judges agreed with the statement, "At trial, an eyewitness' confidence is a good predictor of his or her accuracy in identifying the defendant as the perpetrator of the crime" (Wise & Safer, 2004, p. 430). This result adequately illustrates the general confusion regarding confidence and accuracy.

The final main objective was to compare this large lineup procedure – when participants received multiple-choice or sequential instructions – to the traditional sequential and simultaneous lineups. Unfortunately, the data used for the traditional sequential lineup lacked independence from this study, but the data reported are not dramatically different from the average results reported in the meta-analysis of sequential lineup studies (Steblay et al., 2001). One particular limitation in the comparison is that the staged crime was presented via computer. Steblay et al. (2001) argued that sequential lineups perform better when the research has a high level of mundane realism. As a result, staging the crime live may have generated results more favourable to sequential lineups. As such, while the sequential results are of interest, more research is needed before a clear decision can be made concerning the relative merits of the sequential and MSL lineups. Until then, the MSL lineup seems to be as good or better than the original sequential lineup based on the data in this research.

Comparison of the MSL lineup to the simultaneous lineup is less positive. Reductions in false identifications appeared to be purchased at the expense of reductions in the rate of correct identifications. The overall conclusion is that the 40-person MSL lineup is not an effective procedure compared to the simultaneous lineup. This technique did generate a rate of expected false identifications that was half the size of that produced by the traditional simultaneous lineup. However, the crucial factor is that the correct identification rate must be maintained and evidently this was not the case because the MSL rate was half that of the simultaneous rate. As a result, the MSL lineup as studied in this experiment was inferior to the simultaneous lineup and should not be considered an improved procedure.

Future Directions

This study extended Levi's investigations of the MSL lineup and investigated several issues for the first time. However, future research of the MSL lineup should address the limitations of this study. The data used for the 6-person sequential lineup did not provide an independent comparison because the results were obtained from the larger lineups in this study. A traditional sequential lineup experiment should be conducted with the same stimuli to provide an adequate comparison for the MSL lineup. Furthermore, Levi has suggested that his multiple-choice instructions (which were the basis of those used in this study) may have restricted the number of choices made and should be altered for future studies. He proposed that the statement, "However, the more people a witness selects, the less weight their testimony would have in court," should not be used (A. M. Levi, personal communication, October 12, 2003). These instructions should be examined in the future to determine their effect on the number of choices and the correct and false identification rates. More choices by the participants could possibly be detrimental because they may produce a higher rate of false identifications while leaving the correct identification rates unaffected.

Another direction for future research is to administer the 40-person MSL with the target in the 25th, 30th, and 35th position to determine exactly when the correct identification rate declines. Finally, the designation of an innocent suspect in the target-absent lineup also could be used in future research on this topic. Assigning one lineup member in the target-absent lineup to be analogous to the target in the target-present lineup allows for discussion of actual false identification rates, as opposed to expected false identification rates, and may provide a more accurate representation of the likelihood that an innocent person would be selected from a particular lineup. Levi (1998) attempted to use this method, but it simply produced spurious results because the innocent suspect was rarely chosen. One method of designating an innocent suspect could be to conduct a simultaneous target-absent lineup first to determine which lineup member is most at risk of misidentification from traditional procedures. Clearly, more research is needed before any further conclusive statements can be made regarding the 40-person Multiple-choice, Sequential, Large lineup.

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Appendix A

Consent Form

This is a research project being conducted by students and research assistants under the supervision of Dr. R. Lindsay. The purpose of this research is to examine novel approaches to eyewitness identification. You will be asked to describe and attempt to identify the person you just saw commit a crime by making identification judgements about photographs presented on the computer. This entire procedure should take you no longer than 30 minutes.

There are no known physical, psychological, economic, or social risks associated with your participation in this study. Participation is completely voluntary. You are free to withdraw at any time for whatever reason with no effect on your academic standing. You are not obliged to answer any questions that you find objectionable. You will not be identified in any way if the results are published and nothing will connect you to your responses. Please feel free to ask the experimenter any questions you have about participating in this study.

In the event that you have any questions, concerns, or complaints regarding this study, you may address them to Jennifer or Marilyn (rodlab@psyc.queensu.ca), Dr. Lindsay (lindsayr@psyc.queensu.ca), or the Queen's University General Research Ethics Board (533-6081).

Note: The electronic version of the consent form contains the following paragraph, however this is not included on the signed copy.

Having read all of the above material and asked any questions you had, if you wish to continue in the experiment, click on the YES button and when the session is over you will be asked to sign a hard copy of this consent form. Note that you are free to participate at this time and decline to sign the consent form later in which case your data would be deleted from the data file. If you do not wish to participate further, simply click on the NO button, this program will terminate, and you should go to the experimenter. Click "Continue" to see these options.

Appendix B

Debriefing Form

Previous research and real world experience indicate that the leading cause of wrongful conviction is eyewitness identification error. Because of this, psychologists have been studying ways of reducing identification errors by witnesses to crime. This research explores new and somewhat radical lineup procedures. This particular procedure uses a sequential presentation of a large lineup of photographs. Since you do not view the faces together, you are forced to compare each lineup member to your memory of the criminal rather than comparing the lineup members to each other. Previous research indicates that sequential presentation dramatically reduces false choices.

This research also examines an extended definition of identification. Traditionally, an identification was said to be made when a participant selected one person, the suspect, as the criminal. If a witness selected more than one individual, their credibility as a witness was compromised. New arguments suggest alternative definitions of identification. One view is that multiple choices that include the suspect be considered weak evidence of guilt rather than no evidence at all. To test the usefulness of such an approach, in the current study some participants were explicitly told that it was acceptable to select more than one lineup member. By combining sequential presentation with multiple selections, this procedure was designed to increase the correct identification of the guilty party while decreasing the number of incorrect identifications.

Another definition of identification that will be tested is that only the person selected with the highest level of confidence should be considered as "identified."

Data analyses will compare the likelihood of the criminal versus other lineup members being identified using the various procedures (with or without explicit mention of selecting more than one person) and the various definitions of identification. The best procedure is the one that maximizes choices of the guilty party while limiting the number of similar choices of innocent people. If this is achieved, it may be possible to develop new identification procedures that are less prone to error than traditional lineups. Even if we obtain our expected results, it will take many more years of research to establish that any of these techniques are sufficiently reliable to recommend to police.

Thank you for your participation. If you have any further questions feel free to contact Jennifer Beaudry at 1jb25@qlink.queensu.ca.

Appendix C

Co-investigator Letter

To: Dept of Psychology Ethics Committee, GREB, anyone else who may be concerned

Re: Jennifer Beaudry as co-investigator and collaborator

From: Rod Lindsay, Psychology

Date: 9 July, 2004

Jennifer Beaudry is a co-investigator and collaborator on the SSHRC funded research approved by GREB as indicated below.

My graduate students all use research techniques that are variations covered under my SSHRC grants. By variations being "considered covered" I mean that the original application specified that participants experience a range of possible treatments (e.g., would be shown sets of photographs that may vary from as few as one to as many as hundreds). Some students use some of the possible treatments (e.g., show relatively few photos) while others use other treatments (e.g., show many photos) but both are variations covered in the original application. Thus I am not implying variations "from" the approved procedures, only variations allowable or already cleared (whichever phrasing you prefer) when the approved submissions were reviewed by GREB.

My 2001-2004 eyewitness research was approved under three GREB reviews. With one slight exception, all of Jennifer Beaudry's procedures were covered under:

GPSYC-007-01 "Calibrating Eyewitness Identification Accuracy"

The one exception involved pilot testing needed to choose lineup members for her specific study. Because this is a task repeatedly required by my lab, I submitted the application so that future students engaged in the same research could be covered without individual applications for each. That clearance was:

GPSYC-144-03 "Who looks the most like this man"

R. C. L. Lindsay, Professor,

Department of Psychology