**Multiple Independent Identification Decisions:
A Method of Calibrating Eyewitness Identifications**

by

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in conformity with the requirements for
the degree of Doctor of Philosophy**

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Abstract

Identification error is a leading cause of wrongful conviction. The studies presented here examined an alternative lineup procedure. In these studies a series of lineups were given to the witnesses in order to give them multiple independent opportunities to identify the same suspect or articles associated with the suspect. The more times the suspect or suspect related items are selected the less likely it is due to chance and the more likely that the suspect is the criminal. The first experiment presented 3 lineups comprised of different parts of the suspect to 148 witnesses. It demonstrated that multiple identifications made from lineups that used different parts of a suspect could be highly diagnostic of accuracy. Those witnesses who chose the same person out of the facial lineup and the body lineup were at least 13 times more likely to have picked a guilty person than an innocent one. Selections from the voice lineup and either the facial or body lineups were much less diagnostic of accuracy. A second experiment designed to reduce incorrect selections and utilize lineups with varying degrees of individual diagnosticity exposed 90 witnesses to facial, body, voice, and clothing lineups. It was found that individual diagnosticity affected the percentage of witnesses that made multiple identifications involving that lineup but did not affect the likelihood that a multiple identification involving that lineup was correct when it occurred. One promising application of multiple decisions is to use them as a way of augmenting facial identifications. That way the courts would have a much more promising method of calibrating eyewitness accuracy than post hoc methods such as confidence ratings.

Introduction

Over the centuries many different systems of establishing identity have been used by criminal justice departments. For example blood and bodily fluids have been used when the identity of a perpetrator is in doubt. Traditionally, the group type of blood or secretion has been used to try to exclude a potential suspect as being part of that group related to the substance (Johnston & Hageman, 1999). Until recently, blood or secretion evidence was not able to prove that one individual was the provider of that substance. However, DNA typing has changed this situation, individualizing blood or secretion evidence (Waye, 1999). The technology of DNA testing has evolved at a very quick pace. By 1996, the National Research council decided that the technology for DNA identification had progressed to such a point that the reliability and validity of adequately collected and analysed DNA data is irrefutable (National Research Council, 1996)

Another way of trying to establish the identity of a perpetrator has been by hair analysis. Bisbing (1982) found that the first documented forensic hair comparison was in 1861. However at that time and since then, forensic hair examiners generally have come to the conclusion it is difficult to assert with any certainty that the hairs in question came from any particular person. Accordingly DNA analysis has now supplanted hair analysis, to the point where the R. C. M. P. have trained most of their hair examiners in DNA analysis (Crocker, 1999).

Fingerprints have been a common way of establishing identity, these techniques when undertaken by a well trained forensic identification specialist are generally

considered very reliable (Durand, 1999). Often when a crime is committed there is a witness or witnesses to the event. In these cases the most common method for establishing the identity of the criminal has been eyewitness identification. That is some kind of recognition response has been asked for, when witnesses were shown a picture of the perpetrator. Criticism of eyewitness identification is not new, for example Hugo Munsterberg felt that psychology had a role in pointing out errors in eyewitness accounts to the criminal justice system. More specifically, Munsterberg (1908) felt that psychology could help the legal system with the “chaos and confusion” (p. 33) related to eyewitnesses.

Starting with Wigmore (1909) the attempt to introduce psychological findings to the legal community were met with considerable resistance. In fact despite a substantial amount of psychological work devoted to legal issues over the next decade, lawyers remained largely ignorant of and/or hostile to the efforts of psychologists to involve themselves in these legal matters (Lindsay, 1999). Psychologists continued to study these issues and beginning in the late 1970's, they began to focus on trying to prevent eyewitness errors from occurring (Wells, 1978).

This approach specifically differentiated between system variables and estimator variables. Wells et al. (2000) described system variables as those variables that are under the control of the justice system. While estimator variables were outside of the control of the justice system.

System variables are divided into two classifications. Event memory refers to the ability of a witness to describe an event such as how the perpetrator held the gun, or what

he or she wore during the commission of the crime. Identification memory describes the ability of eyewitnesses to select the criminal from a photo or live lineup. Researchers have discovered several variables that are related to the ability of a witness to give complete and accurate accounts of an event (Wells et. al., 2000).

One of the most important variables affecting an eyewitness' account of an event is the way in which that witness is subsequently questioned about it. Loftus (1979) found that exposure to misleading questions can affect the account of an event given by that witness. She described eyewitness memory as being malleable and affected by what happens to the witness after they have seen the crime. This effect also had significant theoretical implications that ran beyond its potential concern for the criminal justice system (Wells et al., 2000).

For example the effect of misleading questions on witnesses raised the question of whether long term memories are stored permanently in the brain or can be altered or replaced afterwards (Loftus & Loftus, 1980). Other theories were proffered to explain how misleading questions affect a witness' ability to give an accurate account of the events. One theory included the possibility that the witness is attempting to comply with the wishes of the investigator by giving them the account of events that the witness thinks that the investigator wants to hear (Berkerian & Bowers, 1983). Another theory suggests that the witness has stored more than one account of the event. One account is the original one formed by witnessing the event and the other is the account formed by the inference that the witness draws after hearing the misleading question (McCloskey & Zaragoza, 1985).

The theoretical explanation for the affect of misleading questions on eyewitness accounts has still not been completely resolved. However, it is clearly resolved that eyewitnesses will make predictable errors in their reports of events when asked misleading questions or when given some other incorrect postevent information (Wells et al., 2000). That is, post event interactions between the witness and others will lead the witness to incorporate new information into their account of the witnessed event and testify about the events as if they had actually happened.

The notion that the amount or type of information extracted from witnesses could be affected by those who interact with them was more extensively studied by Ronald Fisher and Ed Geiselman. They found that American police made systematic, avoidable errors that reduced the amount of information they received from witnesses (Fisher, Geiselman, & Raymond). That is, the police often asked too many specific questions and not enough open ended ones, frequently interrupted eyewitnesses in the middle of their account of events and asked questions in a predetermined somewhat arbitrary fashion. Fisher and Geiselman responded by setting out a set of interview guidelines based on cognitive and applied psychology and called this new procedure the cognitive interview.

The cognitive interview is an attempt to increase the amount of correct eyewitness testimony rather to reduce erroneous testimony. The cognitive interview focusses on trying to improve three elements of the interview. These are: the social dynamics between a witness and his or her interviewer; the eyewitness's memory of the event; and the communication that goes on between the interviewer and a witness.

Social dynamics are largely improved by establishing rapport between the

interviewer and the eyewitness. This is done by allowing them to talk about their experience openly and easily. This can be assisted by using a lot of open ended questions and giving them sufficient time to answer. Typically police interviews were conducted by giving the witnesses a very quick series of questions (Fisher, Geiselman & Raymond). This generally led to the witness being very passive rather than actively volunteering information. Fisher, Mello and McCauley (1999) found that typical police interviewers were considered to be more manipulative in their questioning than those interviewers who used the cognitive interview.

The cognitive interview's emphasis on memory processes takes the form of helping the eyewitness to concentrate on the witnessed events. Typically police deflect the witness's attention by interrupting them with questions. In contrast the slow paced open ended style of the cognitive interview encourages the eyewitness to concentrate. The cognitive interviewer also provided mnemonic instructions intended to facilitate memory of the event. For example they will reinstate the context of the original event because research has found that this can provide a fuller recollection of the event (Godden & Baddeley, 1975). Cognitive interviewers encourage the eyewitness to recall the event from different perspectives (Anderson & Pichert, 1978). The interviewer also needs to communicate the needs of the investigation to the witness and the witness needs to communicate his or her knowledge to the interviewer (Fisher, Geiselman & Raymond, 1987). Sometimes the witness has difficulty expressing the necessary knowledge. In these cases the interviewer may suggest to the witness that they use non verbal ways of expressing the knowledge.

The cognitive interview has been tested in many laboratory experiments. Typically these experiments consist of the subject seeing a videotape or a live simulation of a crime and later being interviewed about those events. Fisher and McCauley (1995) reviewed these types of studies and found that the cognitive interview continually elicited between 35% and 75% more information than is found in the typical police interview. These findings were confirmed in field studies that used real victims and eyewitnesses of crimes committed in the United States (Fisher, Geiselman & Amador, 1989) or in England (George & Clifford, 1992). So it can be said that police interviewers would benefit from taking the advice of psychological interviewers on how to elicit more event information from eyewitnesses. It now time to turn to the literature which examines identification memory system variables in order determine whether researchers have any knowledge which might help members of the criminal justice system to improve lineup identification accuracy.

Identification decisions by eyewitnesses are obtained in a number of different ways including mug shots, show-ups , in situ identifications, photo arrays, and simultaneous and sequential lineups. Photo arrays can be considered to be a lineup of photos and the term lineup can be taken to mean either a lineup of photos or a lineup of live persons for the purposes of the dissertation. A central issue throughout the empirical investigations of these various methods has been to determine whether there is a central principle which appears to influence the accuracy of an identification. In fact a central principle seems to be present throughout these studies, which is the tendency of witnesses to employ a relative judgement versus an absolute judgement strategy when

making an identification decision (Wells, 1984).

A relative judgement strategy is one which occurs when a witness selects a face that is more like the face the witness saw than any other face which was made available to the witness. An absolute judgement strategy is one which occurs when the witness makes a decision for each face as to whether it is or is not the face of the perpetrator that they saw at the time of the crime. Research results indicate that relative judgements are inferior because they lead to inflated rates of false identification of innocent people but do not increase correct identifications. In other words relative judgements lead to eyewitness identification decisions that are less reliable as an indication of guilt than are the identification decisions of witnesses who make their decisions based on absolute judgement. As a result, a relative judgement reduces the probative value of identification evidence.

Probative value is a legal term that attempts to determine the potential usefulness of any particular piece of evidence to a court of law. In the case of eyewitness testimony, a piece of evidence is considered more probative when the witness' assertions are more likely to be correct than incorrect. More specifically, assigning a probative value to an eyewitness identification is an attempt to determine the likelihood that the witness has identified the perpetrator of a crime compared to the likelihood that the witness has identified an innocent suspect.

Often, probative value reflects the degree to which a piece of evidence (identification of a suspect in this case) is useful for discriminating if the suspect is guilty or innocent. Eyewitness researchers have attempted to determine aspects of identification

procedures that increase or decrease the value of identification decisions for making the determination of guilt or innocence. In this regard, they study the probative value of identification evidence. Throughout the last 20 years researchers have made substantial efforts to study accuracy of eyewitness identifications in varying conditions (Wells et al., 1998).

Using mostly controlled experiments often involving staged crimes, the researchers have manipulated both the structure of a lineup (e.g., Lindsay & Wells, 1980) and the procedure related to administering it (e.g. Lindsay & Wells, 1985; Wells, 1984). The experiments usually include a lineup that contains the perpetrator of the staged event as well as a lineup that contains someone who has at least some physical resemblance to the perpetrator but who is not the person who the participants originally saw. Comparisons are often made across these conditions to determine whether the participants of that particular study were more likely to make correct identifications or false identifications.

Correct identifications are identifications that have occurred when the witness chooses the person who they saw in the original staged event. False identifications are identifications that have occurred when the witness chooses the person who served as a replacement for the person previously seen in the staged event. Not all incorrect identifications are false identifications. An identification of a lineup member who was not the police suspect is a foil identification. Foil identifications discredit the witness but do not lead to prosecution of the misidentified person. False identifications occur only when innocent suspects are identified. Identification procedures will now be discussed

and critiqued on the basis of their comparative ability to maximize correct identifications and minimize false identifications.

Identification Procedures

In Situ Identification

An in situ identification involves the police placing a suspect among a crowd in a public place and asking an eyewitness to look for the suspect. A problem with this procedure is that too many aspects of the procedure are uncontrolled. The number and appearance of those involved in the situation is normally not recorded so the quality of the foils is difficult to accurately assess. Also everyone but the suspect may be relaxed or acting naturally compared to the suspect who may seem nervous and stands out. Subtle or less than subtle cues might bias the procedure by communicating to the witness who the suspect is. These difficulties combine to make in situ identifications unreliable.

Showups

A showup is an identification procedure which involves asking the witness to look at only the suspect and decide whether he or she is the criminal. The use of this procedure has been discouraged by the Law Reform Commission guidelines (Brooks, 1983). The showup has been considered suggestive because the identity of the suspect is obvious. Nonetheless recent research has shown that adults are reluctant to choose people from showups (Lindsay, 1999). Therefore false identifications are not necessarily more likely to occur from showups. However, this reluctance to choose similarly reduces correct identification rates. So with correct identification rates that are generally not much higher than false identification rates, there does not appear to be very much

probative value to the showup procedure.

Mug Shots

Mug shot procedures provide a very large pool of faces from which witnesses are given the opportunity to select the perpetrator. For example, the R.C.M.P. files currently have over one million photographs. Three major problems exist with such a large group of faces. First, eyewitnesses who are required to examine a large number of faces may become tired and frustrated. Lindsay, Nosworthy, Martin and Martynuck (1994) found that as people examined an increasingly large number of pictures they became less likely to identify any particular picture from the mug shots. A second problem demonstrated by this study involves the witnesses ability to identify the original face after being exposed to so many faces during the task. Lindsay et al. (1994) found that the likelihood of correctly identifying the face of a criminal declines as the number of faces searched increases.

Finally, the effects of examining other faces before being exposed to a photo array that contains a picture of the perpetrator of a staged event has been examined. Even though the number of faces that have been examined in these studies has been small compared to the number of photos found in real mug shot files, recognition of perpetrators from subsequent lineups has been shown to be adversely affected (Lindsay, 1999). Therefore identification accuracy from these other procedures may be less reliable if the witness has been exposed to mug shots.

Lineups

A lineup is a group of people or a group of pictures of people that is shown to the

witness of a crime for the purpose of identifying a person who committed that crime. For the most part lineups contain one person who is suspected of the crime and several others who are considered to be innocent and are called foils, fillers, or distractors. The logic of constructing the lineup in this manner is that by including people who are known to be innocent in the procedure it allows the eyewitnesses an opportunity to impeach their credibility as a witness (Lindsay, 1999).

This dissertation will review experiments that examine both the structural and procedural properties of lineups, with a view towards suggesting an alternative to current methods. Briefly stated the intent is to examine a number of factors that have been shown to affect the probative value of a lineup and then to suggest a method which will utilize a series of independent lineups of different features in an attempt to produce evidence with superior probative value.

System Variables Known to Affect the Accuracy of Identification Decisions

Structural Lineup Fairness

One factor that dramatically affects the probative value of a lineup is the degree to which the suspect stands out as the most plausible alternative. A popular method of looking for a lack of structural fairness (or presence of structural bias) has been to give the eyewitnesses' description of the criminal to "mock witnesses" (Doob & Kirschenbaum, 1973; Wells, Leippe & Ostrom, 1979; Malpass, 1981). The mock witnesses have not seen the crime or the criminal. The lineup and description are given to the mock witnesses who are required to choose a line-up member based entirely on the description provided by the actual eyewitness. If the lineup is structurally fair, the

selection by the mock witness should be a complete guess and the suspect should be selected no more frequently than anyone else in the lineup. The procedure is designed to measure the adequacy of the lineup foils. For example, Wells, Leippe and Ostrom (1979) proposed using mock witnesses to determine the functional size of a lineup by calculating the number of plausible members. This is done by dividing the total number of mock witnesses by the number of witnesses who chose the suspect.

Theoretically, the functional size indicates the number of line-up members who are a good fit to the description. To take a ridiculously simple example: If the description was of a tall black man, a lineup with 4 white persons, a six foot black man, and a black Dwarf would have a functional size of 1.0. If the other black man was also tall then the functional size would be 2.0.

A lineup member can be made easy to identify as the suspect in a number of different ways. For example a suspect who has features that no other lineup member has, but has features that are included in the description of the criminal, is at risk for being the only logical lineup member. Research has examined the effect of including foils more or less similar in appearance to the suspect on both correct and incorrect identification rates. Lindsay and Wells (1980) staged a crime for individual undergraduates and then asked them to make identifications from various photographic arrays. The line-ups contained either the guilty party or a replacement who was similar in appearance. The foils were chosen either to be similar to or dissimilar from the suspects. That is, there was a fair and a biased lineup for both of these suspects.

The rate of correct identifications was not substantially affected by the quality of

the line-ups. However, the innocent suspect was far more likely to be identified from the biased line-up than from the fair line-up. As line-up procedures become fairer, correct identifications do not increase or decrease but false identification rates decline dramatically (Lindsay, 1999). The witnesses in the biased condition were almost as likely to identify a guilty suspect as an innocent one. That is the rates of identification for the culprit and the similar looking replacement were virtually identical (71% versus 70%). These results led to the development of the idea of a diagnosticity ratio for identification procedures (Wells & Lindsay, 1980).

In an experimental situation, the researcher is able to compare the quality of two or more lineup procedures by forming a ratio of correct to false identifications for each procedure, a "diagnosticity ratio" (Wells & Lindsay, 1980). Wells and Lindsay (1980) argued that when the diagnosticity ratio is 1, the procedure does not provide any evidence about whether the accused is guilty or innocent. That is, because the decision of the witness to either identify the suspect or not is equally likely for either a guilty or innocent suspect, the identification procedure has no probative value.

Decisions of a witness can provide evidence about whether the accused is guilty or innocent. As correct identification rates increase, false identification rates decrease or the false identification rates decrease at a faster rate than correct identifications, the diagnosticity ratio increases and the probative value of the lineup improves accordingly. In the case of the Wells and Lindsay (1980) study, diagnosticity ratios were useful in shedding light on these two different ways of selecting foils. The high foil similarity lineup produced a diagnosticity ratio of 1.87, while the low foil similarity lineup

produced a diagnosticity ratio of 1.01.

Lindsay (1999) concludes that lineup foils should match the description of the criminal that was given by the witness on all of the features that match the suspect. On the features where the suspect and the description differ, the lineup members should resemble the suspect.

It is important however that the lineup members not be too similar to each other. Luus and Wells (1992) believe that the purpose of a lineup is to show that the witness remembers more about the criminal's appearance than was given in the description. They recommend selecting lineup foils to match the witness' description of the criminal rather than trying to form a lineup with only foils that look like the suspect. It is considered unnecessary to match the foils to the suspect unless the suspect does not match on one or more of the features included in the description. In that case all the lineup members should match the suspect on those features.

Lineup Attire

Lineup attire also may affect the probative value of a lineup. Some suspects are arrested because they are wearing clothes that were part of the description of the perpetrator given by the witness to a crime. There is a risk that the suspect may be placed in the lineup still wearing the same clothing that led to the arrest. In a series of experiments Lindsay, Wallbridge and Drennan (1987) explored the possibility that this practice could reduce the diagnosticity of the witnesses' decisions.

Students were exposed to a staged theft and then attempted to make

identifications from lineups that contained either a guilty or innocent suspect. Some lineups were biased because only the suspects (guilty or innocent) were dressed in clothing that was similar or identical to the clothing worn during the crime. Other lineups were presented in the usual manner with everyone dressed differently but with no one wearing the clothing worn by the criminal. Finally other lineups had all lineup members dressed alike.

Variations among the lineup attires did not significantly affect the accurate identification rate but did influence the rate of false identifications. False identifications were most common when the innocent suspect wore clothing that was similar to the clothing that was worn by the criminal (38%), less common from the typical type of lineups where no one wore clothing that was similar to that worn during the crime (21%), and least frequent when all lineup members were dressed alike (10%).

Since correct identifications remained constant across the 3 conditions while false identifications fell, the diagnosticity ratios rose accordingly. In the condition where the innocent suspect wore clothing that was similar to the clothing that was worn by the criminal, the diagnosticity ratio was the lowest (1.84). In the condition where no one wore clothing that was similar to that worn during the crime, the diagnosticity ratio was 3.10 when lineup members wore different attire and in the condition where everyone was dressed alike the diagnosticity ratio was 6.90. Dressing all the lineup members alike led to the lineup with the most probative value.

Lineup Instructions

Judgement strategies can also be affected by the instructions given by police to an

eyewitness. Statements which indicate that the police have caught the perpetrator strongly encourage the witnesses to use a relative strategy. In addition witnesses are usually expecting the criminal to be in the lineup so it is important to specifically tell the witnesses that the guilty person may or may not be in the lineup.

Malpass and Devine (1981) exposed students to a staged crime and then asked them to attempt identifications from lineups that contained either the guilty party or an innocent replacement. Before the lineup was presented, the witnesses were exposed to either instructions that indicated the perpetrator was definitely present in the lineup or instructions that were unbiased. The biased lineup procedure had no significant effect on the correct identification rates, but resulted in more false identifications than a fair procedure. Biased instructions produced a diagnosticity ratio of 4.81, while fair instructions resulted in a diagnosticity ratio of 12.58.

A meta-analysis determined that instructing witnesses that the perpetrator may or may not be in the lineup reduced false identifications without reducing correct identifications (Steblay, 1997). It seems that the eyewitnesses are more likely to pick the person in the lineup who they think is relatively more similar to the perpetrator than other lineup members if they attempt the lineup assuming that the perpetrator is among them (Wells et al., 1998).

Type of line-up presentation

There are two ways to present the line-up members, simultaneously and sequentially. With a simultaneous line-up the witnesses see all the members at once. A simultaneous line-up often leads to a relative judgement strategy, which means

identifying the line-up member who most looks like the witness' image of the criminal compared to other members in the lineup (Lindsay & Wells, 1985). In the case of target-present lineups, the relative judgement strategy may be a successful one because the guilty suspect usually looks most like the perpetrator. The relative judgement strategy is a problem with target-absent lineups because the person who most closely resembles the witness' memory of the person committing the crime is not the criminal.

In order to reduce a witness' reliance on a relative judgement strategy, a sequential method of presentation has been investigated (Lindsay & Wells, 1985). The sequential lineup involves showing photographs to a witness one at a time. Witnesses are required to make a decision about the guilt or innocence of each person that is shown to them. The witnesses are told that once they have made a decision about a photograph they will not be allowed to reexamine it or to change their decision. Witnesses are not aware of how many photos they will be shown.

Lindsay and Wells (1985) suggest that a sequential lineup encourages the witness to use an absolute judgement strategy, in which the witness compares his or her memory of the perpetrator with the photo only and decides if it is the person they saw. Witnesses can compare photographs to previously seen ones but are unsure about whether a better match is still to be shown, the witnesses continue to reject photos until they find a sufficient match

between the memory they have of the criminal and the photo they are viewing.

Sequential lineups consistently produce similar correct identification rates and significantly lower false identification rates when compared to simultaneous lineups

(Lindsay, Lea, & Fulford, 1991; Cutler & Penrod, 1988).

An example of a study which provided diagnosticity ratios for the simultaneous and sequential lineup is Lindsay and Wells (1985). In this design, a crime was staged for 240 unsuspecting students individually or with another witness. Identifications were attempted equally from one of four lineups. Six pictures were presented either simultaneously or sequentially. Each procedure either contained a picture of the person who had staged the crime or a picture of a similar looking replacement. The two procedures did not produce significantly different correct identification rates, but did produce significantly lower false identification rates for the sequential lineup. Understandably this led to a much lower diagnosticity ratio for the simultaneous lineup (1.35) than for the sequential lineup (3.06).

Further studies have been conducted comparing the sequential and simultaneous lineups. A recent meta-analysis (Stebly et al., 2001), examined 24 articles involving 4,243 subjects. Results indicated that sequential lineups led to a third of the false identifications that were found with simultaneous lineups (9% vs. 27%). The identification rate of perpetrators from target-present simultaneous lineups was 51%. Results showed that the correct identification rate of sequential lineups was affected by the moderator variable of verbal overshadowing.

Verbal overshadowing occurs when an eyewitness gives a description of the perpetrator prior to undertaking the identification task. When overshadowing was not present simultaneous lineups were found to produce higher correct identification rates than sequential lineups. However when the studies replicated the real world condition of

asking the witness to give a description of the perpetrator, they found a consistent and superior effect for sequential lineups in both target present and target absent lineups (Stebley et al., 2001).

Limitations of Sequential Lineups

Despite this improvement in lineup procedure it may be possible to develop a lineup procedure that produces even stronger evidence of guilt. It is hoped that by finding a lineup procedure that leads to more accurate identification evidence that the incidence of wrongful convictions could be reduced. Sequential lineups have been shown to be an improvement over simultaneous lineups in some situations. However there are still limitations. For example sequential lineups have not been successful at reducing false identifications of children (Lindsay et al, 1997). Sequential lineups also have not been successful in cases where the appearance of the suspect has been changed (Pozzulo & Lindsay, 1995). Nor have sequential lineups been successful in cross racial situations (Lindsay & Smith, 2001). The sequential lineup also does not provide any calibration. Even with same race adult suspects who have not changed their appearance, the average false identification rate is 9% (Stebley et al., 2001) So approximately one in ten sequential identification decisions will be wrong and the courts are without any method of determining which particular identification decision is that one in ten.

Confidence and Accuracy

In order to understand how wrongful convictions might be reduced, it is important to understand how fact triers (ie., judges or jurors) are influenced by eyewitness identification. In order to try to understand how false identifications have led

to wrongful convictions, the literature related to a fact trier's perception of eyewitness testimony will be reviewed. When it is said that jurors or judges are greatly influenced by an eyewitness' testimony (Brigham, Wasserman, & Meissner, 1999), it may be more accurate to say that jurors or judges are influenced by the outward confidence of the witness (Wells, Lindsay, & Ferguson, 1979; Cutler, Penrod, & Stuve, 1988).

Wells (1984) asked subjects whether a witness had made a correct or an incorrect identification of someone that they had seen previously. One set of subjects were told that the eyewitness was "completely certain" about making a correct identification and the other set of subjects were told that the eyewitness was "somewhat uncertain". Although witness confidence had been found to be unrelated to actual identification accuracy, the subjects exposed to the witnesses who said that they were "completely certain" of their identification predicted a .83 probability of a correct identification compared to a .28 probability for the subjects who were asked about the "somewhat uncertain" witnesses.

A fact trier's inability to correctly distinguish accurate from inaccurate witnesses extends to situations that include cross-examination. Wells, Lindsay and Ferguson (1979) provided simulated cross-examination of eyewitnesses who had seen a staged crime and had attempted identifications for mock jurors. The fact triers inability to correctly distinguish accurate from inaccurate witnesses was related to the tendency for them to rely on witness confidence when determining the accuracy of a witness' identification decision. The mock jurors were able to infer the witness' confidence from the witness's testimony style. This inference proved to have a dramatic impact on the

mock jurors. Juror's beliefs about the accuracy of the witness' testimony correlated significantly ($r=.53$) with witness confidence, but nonsignificantly with the accuracy of the witness' identification decision ($r=.07$).

In a similar study Lindsay, Wells, and O'Connor (1989) examined whether using actual attorneys to cross-examine the witnesses would help mock jurors in discriminating between accurate and inaccurate witnesses. In fact it did not. Mock juror's beliefs were unrelated to the accuracy of the witness' identification decisions, while witness confidence as assessed by the mock jurors was once again found to be significantly correlated with the mock jurors' judgement about the witnesses' accuracy or inaccuracy ($r=.29$).

A number of studies have examined the relationship between the confidence of a witness and his or her accuracy. For example, Lindsay, Wells, and Rumpel (1981) staged thefts for 108 witnesses who were later given a photo lineup in order to attempt an identification of the thief. The thefts were staged under conditions that would generate either low (33%), moderate (50%) or high (74%) percentages of correct identifications of the thief. Lindsay, Wells and Rumpel (1981) replicated previous findings (Brown, Deffenbacher, & Sturgill, 1977; Leippe, Wells, & Ostrom, 1978) that indicated a relatively small relationship between the confidence of a witness and his or her accuracy. This finding has been confirmed by an exhaustive review of the area. Bothwell, Deffenbacher, and Brigham (1987) conducted a meta-analysis of 35 studies involving staged scenes. They found an average post identification accuracy correlation of $r=.25$. It was concluded that witnesses who express great confidence in their identifications are

slightly more likely to be correct than witnesses who express low amounts of confidence.

So confidence has a very strong influence on a fact triers judgement about the witness' accuracy despite a relatively low correlation between actual accuracy and confidence. In fact it may be the strongest influence. In a test of a number of possible influences, on the fact trier's assessment of eyewitness testimony, Cutler, Penrod, and Dexter (1990) asked 129 eligible and experienced jurors to observe a videotaped trial involving eyewitness testimony. Ten different factors generally associated with a crime and identification were manipulated. The results of the mock-jury study were combined with the same type of design but one using undergraduates as subjects. The analysis of the combined results showed that the confidence of the eyewitness was the best predictor of mock juror's decisions for both undergraduates and eligible jurors.

In order to understand the lack of correspondence between a juror or judge's belief of confident witnesses versus non confident witnesses and the actual accuracy rates of confident and non confident witnesses it may be useful to try to give an explanation for the amount of correlation between a witness' confidence and accuracy.

Factors that influence the confidence of an eyewitness

Smith, Lindsay, and Pryke (2000) suggest that the primary factor that may account for the poor ability of eyewitness confidence to postdict accuracy may be that confidence can change after the event but it is unlikely that accuracy will change (Leippe, 1980). For example, Hastie, Landsman, and Loftus (1978) determined that when witnesses were repeatedly questioned after an event had occurred, they grew more confident about the accuracy of the details in their statements.

Wells, Ferguson, and Lindsay (1981) found that witness confidence could be increased just by telling witnesses what kind of questions they might encounter in a future cross-examination. Giving this kind of advance notice to witnesses led to increased confidence among the inaccurate witnesses with confidence levels staying constant with the accurate witnesses. The increased degree of confidence held by the inaccurate witnesses led to more incorrect than correct witnesses being believed by the subjects.

Another study examined the effect of co-witness information on a witness' level of confidence. Luus and Wells (1994) used a staged crime paradigm designed to secure false identification decisions from 136 eyewitnesses. The eyewitnesses viewed a theft with another witness and were separated soon after the crime. After this separation the eyewitnesses unknowingly made false identifications from a photospread. In one condition the witnesses were not told anything about the identification decision of the person who had seen the crime with them (their co-witness). In other conditions the eyewitness was told that the co-witness had identified the same person, that the co-witness had identified someone else or that the co-witness had decided that the perpetrator was not in the lineup. Following this information the eyewitnesses were interviewed by one of the experimenters who asked for the witness' confidence in their decision on a 10 point scale.

The results indicated that the statements given to the witnesses significantly affected the witnesses level of confidence in their decision. When Luus and Wells had mock jurors examine the witness' level of confidence, the mock juror's ratings mirrored

the witness confidence levels. This is a concern since the statements given to the witnesses did not affect the accuracy of the decision of course.

Even stronger effects were found by Wells and Bradfield (1998) who studied the impact of positive and negative feedback given to witnesses after they had made their identification decision. Participants saw a portion of a videotape of a man walking into a store. They were then given target-absent lineups and asked to try to identify the perpetrator. Participants were either told that their decision was correct or that their decision was incorrect or were given no feedback at all. Wells and Bradfield (1988) found that positive feedback rather than negative feedback or no feedback led to increased self ratings of certainty as well as to increased indications of quality of view of the incident, the extent of attention paid to the perpetrator, and their ability to come to a decision.

There is further evidence that events following the original incident lead to a reduction in the confidence-accuracy correlation (Shaw, 1996; Shaw & McClure, 1996). After presenting a video of a supposed crime scene, Shaw asked the witnesses to identify items that had been shown in the crime scene. Several of the questions about the crime scene asked about some items that were not in the video, so some of the affirmative responses were known to be wrong. Shaw found that post-event questioning consistently led to increases in the witnesses degree of confidence in their incorrect choices but not necessarily in their correct choices. Shaw illustrated that questioning the witness after the event can lead to increases in their confidence without a similar increase in accuracy. For this reason and others already presented, confidence is not a particularly good postdictor

of identification accuracy. But are there any postdictors that are better?

Postdicting Variables

A postdictor is something that is measured after the witness has identified the criminal to determine if the witness is less or more likely to be correct in his or her identification decision. For example Sporer (1993) investigated the possibility that response latency (decision time) would provide a good indication of the strength of the eyewitness' memory trace. Sporer suggested that an alternative to asking the witness for a verbal indication about their own memory processes might be to take an objective measure of the witness' behavior. Various studies found that the time that witnesses take to make an identification decision could be used as a nonverbal predictor for accuracy (Hosch et al., 1989; Sporer, 1992).

Sporer (1993) investigated whether eyewitnesses who choose an individual from a lineup produce decision times that are better predictors of accuracy than eyewitnesses who do not choose anyone from an identification lineup. Sporer suggests that correctly finding a match between a face in the lineup task and a stored representation of the observed person should happen faster than deciding that the two images did not both come from the same stimulus. That is, for choosers, matching the face should occur quickly while failing to make a match should take a longer period of time.

In order to test this notion Sporer (1993) asked 72 subjects to watch a film of a robbery prior to being given questions about the film. More specifically the witnesses were timed while they made their identification decision. Sporer did in fact find a significant difference between choosers and non choosers. For choosers, faster choices

were significantly more likely to be correct than choices that were made more slowly. Decision times did not correlate with accuracy for non choosers. So for those witnesses who choose someone from a lineup, response latency may be a useful way to distinguish accurate from inaccurate witnesses. Other researchers attempted to use a different method of postdicting the accuracy of a witness.

Dunning and Stern (1994) investigated the notion that accurate and inaccurate witnesses can be differentiated by how they described the way that they made their identification decision. In their studies, Dunning and Stern arranged for the participants to view a videotaped staged crime and then asked them to identify the perpetrator from a five person lineup of photos. Following the identification decision the participants were asked to describe the processes that they had used in reaching their decisions.

Dunning and Stern's hypothesis was that a relative judgement strategy would require more effort than an absolute judgement. They feel that comparing each photograph to the other photographs would take more effort than just determining whether the photograph was the culprit or not. Absolute judgements involve more automatic yes or no answers, which should occur relatively quickly and easily.

Dunning and Stern felt that an accurate witness would be more likely to use an absolute judgement strategy which means that an accurate eyewitness would be more likely to make a decision quickly, easily and with out a lot of thought. In fact people who agreed with statements that indicated the use of a relative judgement strategy were less likely to accurately identify the culprit than those people who indicated using absolute judgement strategies.

One set of researchers looked at the influence of various postdicting variables within one study. Smith, Lindsay and Pryke (2000) staged 3 separate, videotaped, staged crimes for 321 participants. After showing one of the videotapes to a participant they were then presented with a lineup and asked to make an identification decision. The experimenter timed the identification decision of the participant. Some participants were given positive feedback about their decision and some were not. All participants then filled out a form which asked them to indicate their certainty in the decision, then an item was presented to them that asked about whether they used a relative or absolute judgement. Then the participants were given a mock-witness task to complete. The goal of the study was to determine how well various postdictor variables such as eyewitness confidence, response latency, self-reported relative versus absolute decision strategies, feedback, and lineup fairness postdict accuracy both by themselves and when combined with other variables.

By relying on all variables in combination it is possible to correctly classify 76.3% of the choosers as accurate or inaccurate. However, almost one quarter of the cases using these variables would still produce mistaken decisions. This level of error could result in false imprisonment for many innocent suspects brought to trial. This highlights the need to reduce false identification in the first place. Rather than attempting to identify choosers who have made mistakes it is better to target the methods used by the justice system in order to provide a way of minimizing false identifications. To put it another way, it is better to prevent false positive decisions rather than permitting them to occur and then trying to postdict them (Lindsay, Smith & Pryke, 1999).

All in all, the eyewitness research of the 1980's and 1990's managed to become both extensive and sophisticated (Wells, et al., 2000). Through this great proliferation of findings, researchers have been able to establish that eyewitness testimony could be more accurate if the justice system adopted the appropriate procedural improvements. It is now necessary to look at whether these findings have had any affect on the procedures that are typically used by members of the criminal justice system.

It is important to stress that the mere presence of these research findings was not sufficient to cause the justice system to alter procedures for obtaining eyewitness evidence. (Wells et. al., 2000). In order to bring change to such a large and independent system as the criminal justice system it was necessary to apply pressure (Wells, et. al., 2000). Eyewitness researchers set out to apply this pressure mostly by giving expert testimony and providing the media with information that could be sent out to a mass audience.

One of the first audiences outside of psychologists to notice the research findings were defence attorneys. For example, Woocher (1977) described the developing scientific work on the reliability of eyewitnesses. At the same time defense attorneys increasingly asked psychologists to give expert testimony. There was some controversy among researchers about the appropriateness of giving expert testimony (e.g., Egeth & McCloskey, 1984; Konechni & Ebbesen, 1986; Leippe, 1995; Loftus, 1983). At this time some courts in the United States and Canada accept expert testimony while others do not. However the frequency with which courts accept expert testimony continues to increase (Wells, et al., 2000).

In fact the researchers, methods, and findings related to eyewitness issues stand up well to the latest legal standards for determining if a research area is sufficiently scientific to support expert testimony (Penrod, Fulero, & Cutler, 1995). As a result of expert testimony, law enforcement officers have received increased scrutiny on the way they collect eyewitness evidence (Wells, et al., 2000). So expert testimony has been used to pressure the system to improve its procedures. For example, expert testimony has been used to evaluate biased lineups, police failures to give proper lineup related instructions to the witnesses, and other biased methods of collecting eyewitness evidence.

The effect of expert testimony on the procedures used by the justice system has been somewhat limited (Wells, et al., 2000). Typically U. S. courts have ruled that eyewitness identification evidence should be evaluated by the jury or trial judge and that any indication of biased methods in gathering eyewitness evidence could be effectively neutralized by the cross-examination of an eyewitness. However there are substantial empirical findings that establish that cross examination does not reveal these kinds of errors and that neither lay persons nor judges adequately understand the affect of biased lineups (eg. Cutler, Penrod, & Stuve, 1988; Wells, Lindsay, & Ferguson, 1979). Out of over 13,000 police departments in the United States, expert testimony on eyewitness issues has led only a few of these departments to change their practices.

Another method of pressuring the criminal justice system has been to use the media in order to publicise the research findings and actual cases of mistaken identifications. Despite increasing the salience of these issues for the general public, media coverage has not had a substantial affect on police practices. This is most likely

because the public is often left with the impression that eyewitnesses are generally unreliable and changes in police practices would make little difference (Wells, et al., 2000).

A very significant event for eyewitness researchers occurred in the 1990's when forensic DNA was introduced to the American courts. DNA turned out to have powerful exonerating power for a select group of convicted defendants. Those defendants who were convicted of crimes prior to the invention of forensic DNA, were convicted of a crime that resulted in DNA evidence, and had that evidence preserved by the police were in a position to have DNA tests conducted in order to prove their innocence. An analysis of these exoneration cases found that mistaken identifications were a prominent part of these wrongful convictions (Wells et al., 2000). For example, Wells et al. (1998) analysed 40 exoneration cases and found that mistaken identification was a part of 36 of them. Scheck et al. (2000) analysed 62 cases and found that 52 of those involved mistaken identifications.

Eyewitness researchers generally do not perceive DNA exoneration cases to be good scientific evidence (Wells, et al., 2000). All of the exoneration cases taken together still only represent a small number of case studies. Although eyewitness researchers consider experimental studies to be more important than exoneration case studies, the exact opposite is true of the media and those in the criminal justice system. For example the Public Broadcasting Systems company aired an entire Frontline episode on a single DNA exoneration case, even though PBS had not made any mention of the scientific literature in any previous shows. Similarly it was the DNA exoneration cases that caught

the notice of the U.S. Department of Justice.

In 1995, the National Institute of Justice, the arm of the Department of Justice that is responsible for research and development reviewed the cases of persons who had been released from prison following a posttrial DNA testing of evidence. This review showed that 80% of these innocent people had been mistakenly identified by eyewitnesses (Connors et al, 1996). As a result of that report, U.S. Attorney General Janet Reno ordered that a panel be formed to develop national guidelines for the collection of eyewitness evidence by police.

The final guidelines were not ideal from the perspective of the eyewitness researcher. Specifically the guidelines did not include a demand for double blind testing so that the person who is conducting the lineup would not know which person in the lineup is the suspect. The guidelines also did not state that sequential lineups are the best available lineup procedure. However there were significant features to the guide (Wells, et al., 2000). The sections on identification methods included guidelines stating: that only one suspect should be used in a lineup; how fillers (foils) should be selected for a lineup; how to instruct a witness prior to the administration of a lineup; that making suggestions should be avoided; and how to conduct the sequential lineup procedure (Wells et. al., 2000).

Even if all of the suggestions included in the guidelines are followed, eyewitnesses will still make errors and courts will be faced with the task of deciding if the individual witness before them has made an accurate or mistaken identification. One important improvement to the situation would be to develop an identification procedure

that assists with the assessment of an individual witness's reliability. Sequential lineups still produce approximately one false identification out of every 10 attempts. At this point there is no way to determine if any particular witness' identification is that one.

Alternative Lineup Method

This dissertation will explore an identification procedure designed to "calibrate" the likely accuracy of eyewitnesses based solely on the results of their identification decisions. Accordingly it is suggested that exposing witnesses to more than one lineup might be a way of getting corroborating evidence. More specifically it is suggested that it may be possible for witnesses to identify different features of a person. Literatures will be reviewed to determine if unbiased lineups for any feature will be more likely to produce a correct identification than a false one. This suggested path follows from a strictly mathematical perspective, it would seem useful to combine independent identifications from features such as body, voice, and clothing in order to increase the probability that the person who is selected is guilty.

For example if a person is selected out of an unbiased facial lineup the probability that the person is innocent is less than .5. Selection of a person from an unbiased lineup of any feature (face, body, clothing, etc) also will likely lead to a probability of innocence that is less than .5. Accordingly when a person is selected independently from 2 lineups the probability that the person is innocent will likely be less than .25. However the reality is that the probability of innocence for someone chosen from an unbiased lineup of any feature will likely be much less than .5 greatly reducing the probability of innocence for anyone selected from more than one lineup.

Simply put, multiple consistent identification decisions could be highly informative about the guilt and innocence of the chosen member of these lineups.

That a combination of independent decisions is likely to be more informative than one decision that combines various features in one lineup is amply demonstrated by a series of studies. The majority of experiments have examined variables that affect one kind of cue. That is, these experiments have looked at how a variable affects face, clothing, or voice lineups on an individual basis. However the following set of studies manipulated the quantity of cues simultaneously available to the witness. Cutler and Penrod (1988) used video taped lineups to manipulate which cues were made available to witnesses. In the moving lineup the witnesses had access to gait, voice, and posture cues while those who saw videotaped stills did not. In this case the presence of additional lineup cues only had a significant impact on identification performance if the lineup was not presented sequentially.

In other experiments (Cutler & Fisher, 1990; Egan, Pittner, & Goldstein, 1977) appreciable effects were found across cue conditions. In Cutler and Fisher (1990) subjects witnessed a staged theft and were shown, live, videotaped or photo array lineups. The live and videotaped lineup were shown walking, moving, and speaking. The witnesses who were shown the lineups with these additional cues provided significantly more accurate identifications than those witnesses who were shown photo arrays. Egan, Pittner, and Goldstein (1977) had subjects witness two targets perform a robbery scene. Live lineups produced significantly more accurate identifications than did photo arrays. Melara, Dewitt-Rickards and, O'Brien (1989) aimed to improve identification accuracy

by comparing conventional single modality lineups to a bimodal lineup that provided both auditory and visual information. Subjects viewed videotaped scenes and then were tested in 4 sequential lineups. Bimodal lineups were in fact more diagnostic than either visual or auditory lineups.

A recent update of the Shapiro and Penrod (1986) meta analysis disputes the argument that additional cues produce a significant effect on identification accuracy. Cutler et al. (1994) merged the results of Shapiro and Penrod (1986) with recent experiments. They found that when results were averaged across experiments, additional cues in lineups produced a trivial effect on identification. They found that the experiments that did find a significant effect for cue conditions were met with sufficient null results from other studies to bring about an equivocal overall effect.

This led Cutler et al (1994) to conclude there is no reason to believe that live lineups, video-taped lineups, or photo arrays produce substantial differences in identification accuracy. These findings may be due to a ceiling effect. Witnesses given lineups without additional cues can show correct identification rates of over 80%. The lack of improvement in false identifications may be due to the face overwhelming other features. In this case the witness may pick a certain person even though the voice does not sound right. That is, they may not have the same confidence in their memory for other features that they have for faces.

It seems that if the features were presented independently then no feature could overwhelm another. It makes sense to develop a procedure that gives witnesses the chance to pick various features out of separate lineups. This procedure will separate

parts of an individual's appearance for the purposes of using multiple lineups. Instead of simply giving a witness an opportunity to identify a person the witness will be given multiple opportunities to identify various parts of the person one at a time. Each witness will be given a lineup for various features of the suspect. Obvious features are the face, the body from the shoulders down, and the voice. The basic premise being tested in this dissertation is that multiple independent identifications of various features of the same person increases the likelihood of that person being the one who was previously seen by the witness.

To test this basic premise, witnesses were offered the opportunity to identify a previously seen person's face, then a separate opportunity to identify that same person's voice and finally that person's body from the shoulder down. If the basic premise is confirmed by finding a significant increase in accuracy for multiple independent identifications compared to single face identifications, then the premise can be extended to involve various other features related to the appearance of the person in question. Another issue is the frequency of multiple independent identifications. Even if multiple identifications are highly diagnostic of guilt, this will not matter if they rarely occur.

The underlying presumption of this technique is that multiple pieces of independent evidence are more indicative of the truth of something than a single piece of evidence. The primary test during this dissertation will be to determine whether giving a witness multiple lineups will produce multiple pieces of independent evidence regarding whether the witness has accurately recognized the person that he or she saw. In order to determine whether or not this is likely, the identification literatures for voice and

clothing will now be reviewed.

Voice Recognition Literature

Even though many studies have been conducted on voice recognition, they have often involved electro-mechanical, spectrographic analysis of speech (Bull, 1978). Briefly stated, recognition by spectrographic voice analysis occurs by an electronic scan of a speech sample which produces a visible amplitude/frequency/time display (Bull, 1981). This spectrogram is then compared with other spectrograms to determine if they are similar. These studies will be ignored in the review because spectrographic analysis is irrelevant to the issue of whether a live lineup of voices will produce independent evidence as to the guilt or innocence of a suspect. A tape recording of the voice is necessary in order to be able to use a spectrographic analysis and those situations that have photos or tape recordings of the criminal available raise an entirely different set of issues than are being considered in the dissertation.

Cross nationality effects on voice recognition

One issue that could impact voice recognition as a source of evidence is that of cross race or cross nationality identifications. In almost every published study (Shepherd & Deregoski, 1981), subjects were found to be less accurate in recognizing faces of someone of a race that is different than that of the witness. In a study designed to examine the effect of nationality on earwitnesses, Doty (1998) tested sixty English and American citizens to determine the effect of nationality on the ability of witnesses to recognize previously encountered faces and voices. Subjects saw a picture of a face and were asked to select that face from a set of 10 pictures. Subjects also listened to a

recorded voice and were then asked to choose that voice from a set of 10 voice recordings. Subjects were better able to recognize the faces of their own nationality rather than another one (91% versus 37%, respectively). Subjects also recognized native voices with greater accuracy (88%) than those of a different nationality (13%). It was speculated that each individual develops a recognition paradigm that operates by detecting subtle differences in appearance and speech that exist within their culture (Doty, 1998).

Development of recognition abilities

Groups of twenty children aged 6, 8, 10, 11, 12, 13, 14, and 16 were asked to try to identify a previously encountered face and voice (Mann, Diamond, & Carey, 1979). Performance changed at each developmental stage. The child's ability improved dramatically from age 6 to 10. After the age of 10, performance declined significantly but rose to adult level by age of 14. The course of voice recognition development was found to mirror that of the ability to encode and recognize unfamiliar faces. More specifically the improvement in the encoding of unfamiliar faces between ages 6 and 10 is attributed to a movement away from relying on relatively isolated distinguishing features and towards using more configural information.

The length of the voice sample

Another relevant issue is the amount of perpetrator's speech that is heard by the witness. Viewing time has been covered occasionally in the eyewitnessing area (eg. Laughery, Alexander, & Lane, 1971; Clifford & Richards, 1977) but listening time has been examined more extensively in the earwitnessing area (Bull & Clifford, 1984). For

example Pöllack, Pickett, and Sumby (1954) found that longer speech samples led to more accurate identifications. It was believed that this effect was due to a greater repertoire of speech rather than the repetition of a short sample.

Murray and Cort (1971) investigated the length of voice sample issue with children and found that the mere repetition of speech samples did not lead to any increase in identification accuracy. While increasing the variety of speech to 15 syllables was found to provide sufficient cues for identification. However other experiments were inconsistent (Haggard, 1973; Rousey & Holzman, 1967; Williams, 1964).

In order to determine whether speaker identification varies as a function of speech sample duration, Bull and Clifford (1984) conducted three experiments on sample length. In an experiment conducted with adults, there was no significant difference in accuracy between samples of one, two and four sentences. A second experiment was conducted, this time with adolescents and again no significant difference was found in accuracy between half, one and two sentence samples. Bull and Clifford (1984) concluded that the length of a speech sample made very little difference in identification rates. So it would appear that the length of the speech sample used in a lineup will not likely have a dramatic effect on accuracy rates.

The number of voices in the test array

In order to test the effect of voice number in a test array, Clifford and Bull (1984) varied the number of foils in a test array from five to eleven voices. No significant difference in accuracy was found between any of the different arrays. In a second study Clifford and Bull (1984) examined lineups of 4, 6, and, 8 voices. There was a significant

difference in accuracy between the 4 and 6 distracter lineups (68% and 48% respectively). There was no difference between the 6 and 8 distracter conditions (48% for each).

Effect of voice alteration

One difference between identification of faces and voices is that a perpetrator can alter his or her voice in a way that is not possible for his or her face. For example the perpetrator can use an atypical voice during the crime without being detected. It may be possible for the perpetrator to fool the police about their true voice. A change in facial appearance is far easier to detect from description of the criminal than a change in voice. This is because it is often very difficult to describe a voice and therefore very hard to compare what was heard by the witness and what is being offered by the perpetrator. It is possible for the perpetrator to provide a sample for the lineup that is not typical for him or her. For these reasons it is important to review the effects of voice change on accuracy.

McGlone, Hollien, and Hollien (1977) have shown by spectral analysis that the acoustical parts of speech can be significantly changed by a person choosing to speak with an altered voice. Reich, Moll, and Curtis (1976) compared the identification of normal voices with the identification of a disguised voice. Identification went from 56.6% accuracy with those voices that had a spectral print indicating a normal voice to 21.6% accuracy with voices having a spectral print indicating a disguised voice.

Saslove and Yarmey (1980) altered the tone of the voice that was originally heard when it was later given again for identification. This manipulation was found to have a

significant affect on correct identifications with an average of 86% correct identifications for the unchanged tone conditions and 39% correct identifications under tone changed conditions. In this case it is speculated that the correct identifications were higher than would be normally expected after a tone change because of the highly distinctive nature of the voices.

In order to further investigate these issues, Orchard and Yarmey (1995) asked introductory psychology students to listen to a taped voice of a mock kidnapper for either 30 seconds or 8 minutes. The kidnapper either spoke with a distinctive voice or a non distinctive voice and either used a whisper or a normal tone of voice. The participants were then asked to listen to a six-person tape recorded lineup 2 days later. These alterations in the voices heard by the witnesses significantly affected identification accuracy.

The effects of delay on earwitnessing

McGehee (1937) manipulated time intervals from 1 day to 5 months. McGehee found 83%, 83%, 81%, and 81% correct identification rates for time intervals of 1, 2, 3, and 7 days, respectively. After an interval of 2 weeks, accuracy dropped to 69% and after another week it dropped to 51%. Intervals of 3 and 5 months led to correct identification rates of 35% and 13% respectively. McGehee (1937) concluded that as intervals increase there is a general decrease in the percentage of witnesses who are able to correctly recognize a voice when it is heard again. In McGehee (1944), similar results were reported, this time with a design that used taped voices rather than live ones. With a 2-day interval, recognition accuracy was found to be 85%. After 2 weeks, accuracy

dropped to 48%, then to 47% after 4 weeks and 45% after 8 weeks.

Saslove and Yarmey (1980) looked at shorter delay intervals. The listeners were initially asked to listen to a voice sample that lasted 10 seconds and then were asked to attempt to identify that voice from a total of 4 voices, played one at a time. Those who were tested immediately (60% accuracy rate) were found to be non significantly less accurate than those tested 24 hours later (70% accuracy rate). Clifford and Denot (1982) had participants witness a live scene before being tested for their ability to recognize the voice after intervals of either 1, 2, or 3 weeks. Correct identification performance was 50% after 1 week, 43% after 2 weeks, and 9% after 3 weeks.

Clifford, Rathborn, and Bull (1981) examined intervals of 10 minutes, 24 hours, 7 days, and 14 days. The only significant effect was between 10 minutes and any of the other intervals. The mean correct percentages were 55%, 32%, 30%, and 37% respectively. An overview of these results led Bull and Clifford (1984) to conclude that delay does have a negative effect but it is hardly a catastrophic one.

Body Identification Literature

The large increase of research into facial perception and identification since the 1970's has not led to an increase of research into the affect of body shape, dimension, and movement on person perception and recognition. The research that has been done, has largely been in the area body movement. For example, Barclay, Cutting, and Kozlowski (1978) have shown that people are able to discriminate between male and female targets by using moving points on each ankle. This ability was improved when body features such as hips and shoulders were included in point-light displays

(Kozlowski & Cutting, 1977).

Movement information alone was sufficient to recognize oneself and familiar others (Cutting & Kozlowski, 1977). Although the gender of strangers and the identity of familiar others can be recognized by movement information alone, it is unclear that movement can be used to recognize unfamiliar others who do not have unusual gaits or deformities (Macleod, Frowley, & Shepherd, 1994). It is not possible to determine if stationary bodies can be recognized by witnesses because there are not any published studies examining this issue.

Although studies including body movement seem promising, lineups including motion would have to be conducted live or videotaped. The use of still photos is much less expensive or time consuming. A single photograph can be scanned and then edited to show only the face or only the body. Since police routinely use computers to store photos in many jurisdictions, the use of still photographs of the body may be a simple and cost effective substitute.

Clothing Identification Literature

In contrast to the issue of whole body identification there is a study which examined the ability of a witness to identify the clothes of a perpetrator. Lindsay, Wallbridge and Drennan (1987) conducted a series of experiments that involved asking small groups of participants to witness a staged crime. These studies were designed to test the impact of clothing bias on identification accuracy from lineups. Clothing bias exists when only the suspect in the lineup is attired in clothing similar to that described as worn by the criminal during the crime. Collectively, the experiments demonstrated

that clothing bias increased identifications of innocent people but not guilty people.

In the last study of the series, Lindsay et al. suggested that clothing information could be useful if tested differently. They recommended seeking identification of the clothing separately from identification of the face. The participants were asked to identify the face of one of the perpetrators in one lineup and the clothing of that perpetrator in a separate clothing only lineup. Lindsay, Wallbridge, and Drennan (1987) reasoned that the principles of person identification should be equally applicable to clothing identification. They concluded that if the suspect's clothing is embedded in a lineup with other clothes of similar style and colour, then it should be possible to use an independent identification of clothing as an indication of guilt or innocence.

Comparisons were made between the data of those who did and did not identify the suspect's clothing. Of those participants who did not identify the suspect's clothing 21% successfully selected the guilty suspect's face while 11% selected the innocent suspect's face to produce a diagnosticity ratio of 1.91. While among those eyewitnesses who did identify the suspect's clothes, 68% had identified the guilty suspect and 5% identified the innocent suspect to produce a diagnosticity ratio of 13.60.

Lindsay et al (1987) indicate that even one additional identification greatly increases the diagnosticity of the coincidental picks. The diagnosticity ratio improved from 1.91 with one piece of evidence to 13.60 with two. Any individual feature that can produce an independent identification should improve the diagnosticity of the multiple picks. However this is a serious limitation to the study. Lindsay et al. (1987) used clothing as the additional lineup. It will not always be possible nor reasonable to conduct

a clothing lineup. If similar clothing is not found with the suspect at the time of arrest, there may be no clothing to identify. The clothing used in the study was highly distinctive. If the clothing that was described by the witness is too common (eg., jeans and a white t-shirt), then a clothing lineup is less likely to be diagnostic. Also a suspect who is not apprehended wearing that piece of clothing can disavow any knowledge of it.

It would seem more prudent to use features that are part of a person. Independent lineups should be constructed for voice and body because they do not raise the problems related to clothing. The Lindsay et al study also was limited by the fact that it only used one additional lineup. This leaves a number of questions unanswered. Will the addition of further lineups substantially increase the number of witnesses who can successfully pick the target out of more than one lineup? Will the addition of further lineups substantially increase the number of witnesses who make false multiple identifications? That is, will a substantial number of witnesses pick the innocent suspect out of more than one lineup?

It is unclear from the literature how often either the voice or body will be successfully picked out of a lineup and equally unclear as to whether these specific types of lineups will combine in a way that produces a significant number of multiple identifications. Further study may be able to determine whether voices or bodies can be identified sufficiently often to provide a substantial number of multiple identifications. This is particularly important to determine because the multiple identification rate in the Lindsay study was relatively low (29%). It is necessary to see if adding further lineups will substantially increase the correct multiple identification rate while simultaneously

producing a low false multiple identification rate.

Overall the proposed procedure of this dissertation is a test of the general concept of using separate lineups of different features from the accused in a way that the Lindsay et al. study did not. Lindsay et al. used clothing which has the previously indicated problems that voice or body do not. The test of this proposed procedure also will provide data which will allow researchers to generalize in a way that the clothing study did not. If it is possible to generate large numbers of correct multiple identifications by adding voice and body lineups, it is probable that the same will be true with adding additional lineups of items such as scars or tattoos. Although other items such as watches or earrings that are being worn by the accused at the time that they are arrested could be used as well, they would suffer from the same limitations as clothing.

It is important that this study be undertaken because it has been fourteen years since Lindsay et al and no one has attempted to use different features of a person to obtain multiple additional pieces of evidence. The Lindsay study was useful for introducing the notion of using an additional lineup to improve the diagnosticity of identifications. However knowledge of the practicality of using additional lineups is limited by the current state of the literature. Adding one lineup only led to a relatively small number of correct multiple identifications. The potential value of adding further lineups is not known at this time.

Since the most obvious potential additional lineups would come from different features of a person, it is necessary to test lineups made up of features from a person to determine if people can accurately identify individual features of a person from separate

lineups. It is also necessary to test a procedure which uses more than two lineups to determine the affect of a plurality of lineups on correct and false multiple identification rates. If it can be established that witnesses can pick a feature of a person out of an individual lineup and it also can be established that the presentation of more than two lineups to the witness greatly increases correct multiple identification rates without greatly increasing false multiple identification rates, then this procedure will be worth pursuing further.

Review of Eyewitness Literature

The eyewitness literature indicates that confidence is often used by those who evaluate eyewitness identifications in order to decide the likely accuracy of that identification. However a search of the vast literature on the relationship between these two variables found confidence to be only weakly diagnostic of accuracy. Other literature amply demonstrates that witness confidence in court may have been substantially altered since the time the identification was made. As a result it is suggested that there may be a superior way of judging the accuracy of a facial identification, such as by using information about the presence or absence of corroborating evidence.

A good way of producing corroborating evidence was suggested in Lindsay, Wallbridge, and Drennan (1987). In this case, the presentation of two different modalities in separate lineups provided a dramatic increase in diagnosticity when they were used as independent sources of evidence. It follows that if more than two modalities are presented in separate lineups, then diagnosticity would continue to increase as witnesses select the same person from more and more lineups. It is also important to

know if features other than clothing are helpful in this manner. Accordingly, the first experiment in this dissertation tested eyewitness accuracy when participants were given separate lineups containing only faces, voices, and then bodies. The second experiment again tested eyewitness accuracy with separate lineups, but this time included a clothing only lineup in addition to the lineups containing face, voice, and body.

Beyond providing the original idea of using different modalities as independent sources of evidence, the literature is useful in suggesting the prospects of success for using the various modalities as independent sources of evidence. An uncontroversial conclusion to be determined from published studies is that face is likely to be an effective independent source of evidence. On the other hand, there is no published study that has examined the ability of eyewitness to accurately identify a previously encountered person from still pictures of his body from shoulders down. So it is less clear whether body identifications will provide a useful source of independent evidence.

The published studies regarding the accuracy of voice identifications are quite encouraging. They seem to indicate that witnesses can make accurate identifications with even a very short sample of voice. The published studies also confirm that a six voice lineup is sufficient to permit reasonable accuracy of the witnesses. Published studies also suggest that delay does not have a dramatic impact on accuracy. As a result delay will not be considered in the dissertation studies.

Based on the review of the appropriate literatures it appears reasonable to use body, voice, and face identifications as independent pieces of evidence. This will be accomplished by creating different lineups for each feature. However an issue that

remains is whether all of the lineups need to be constructed by matching the foils to the suspect. This issue was investigated by McAllister et al. (1993).

In McAllister et al. (1993) the participant witnessed a mock crime either auditorially or both auditorially and visually. Both visual and auditory lineups were administered to the participants. The diagnosticity ratios for the auditory lineups (10.9) were sufficiently high to indicate that a voice identification is a valuable piece of information in determining whether the suspect is more or less likely to be guilty. Part of the reason for the high diagnosticity ratios was the small number of false positive identifications of innocent suspects. In this study, the foils for both lineups were chosen based on their visual similarity to the target without any concern about voice resemblance to the target. So it appears unnecessary to select foils for each feature and the dissertation studies only chose foils based on their facial similarity to the culprit.

Experiment Rationale

The experiment attempted to establish a way of using the voice and body information presumably stored in a witness' memory. This was done by constructing 3 separate lineups. Thus a face lineup, a voice lineup, and a body lineup were presented to the same witness for the purpose of identifying the same suspect. The face lineup was always presented to the witness first, based on the thinking that further evidence should only be collected if the suspect is selected from the face lineup.

The emphasis of face recognition is consistent both with the psychological literature and legal practice. Police and the courts may not be satisfied with identification of other features if the witness was unable to identify the face despite having been

exposed to it. On the other hand, if multiple selections excluding the face are diagnostic of guilt, there is no reason to dismiss such data. Despite this possibility, face identification will likely remain an important factor and the face lineup was presented first to avoid any possible interference of attempting voice or body identification prior to the face lineup. A final advantage of presenting the face lineup first is that the results provide an estimate of the correct identification rate that would have been obtained from standard identification procedures (simultaneous lineup in Experiment 1 and sequential lineup in Experiment 2)

It is hoped that giving additional lineups to those witnesses who select a suspect from a facial lineup will increase our ability to assess the accuracy of an identification of the suspect by an eyewitness. The intent was to compare individual identifications to multiple identifications with the hope that multiple identifications would be far more diagnostic of guilt than individual identifications. This follows because it is more probable that a witness who chooses the same person out of more than one kind of lineup will be accurate than the witness who chooses a different person out of the voice and body lineups. The only opportunity to witness the face, body, and voice together is at the crime scene. If the lineups are independent then the odds of coincidental picks by chance is exponential. That is, the probability of picking the innocent suspect out of one lineup is $1/N$ but picking the innocent suspect out of two lineups is $1/N$ squared. For example, the probability of picking the suspect out of a six person lineup by chance is .167 but the probability of picking the suspect out of two six person lineups is .028. One obvious reason why a suspect selection from even two lineups is much more likely to be probative is because it is so unlikely to occur by chance. Instead it is much more likely to be

because the witness observed these two features while the suspect was committing the crime. Thus, identification of the face would be evidence of guilt, but identification of the face plus one or more other features would be stronger evidence of guilt.

Experiment 1

Methods

Participants

Participants (N=146) were drawn from one second year and one third year psychology course at Queen's University, Ontario, Canada. Students were asked to participate in a 15 minute session following two classes. No consideration was provided for the students participation in either of the sessions.

Materials

The materials consisted of photos of the person's face and neck, photos of the person's body from the shoulder down and 60 second samples of the undisguised voices of the target, replacement for target and foils. Target photos were projected on a screen in the classroom, so that they were easily visible from the back seats. The pictures and voices were of university students between the ages of 19 and 25. Each set of six photos were projected simultaneously.

Recruitment of lineup members

The recruitment process of the five foils and one innocent suspect was largely a function of the decision to stage live scenes for participants as opposed to showing them a videotape of it. Live staged scenes may give the witnesses a better opportunity to witness the confederate's body and voice. To this end a male Queen's Law student was enlisted to

appear in front of two Queen's University classes. Once a student was hired it became necessary to find students who roughly matched his appearance in order to fill out the lineups.

It is important to note that the students chosen to fill out the lineups (foils) were mostly selected on the basis of facial similarity to the accomplice. This was done by the experimenter visually judging all the available pictures for their suitability as foils and choosing the most appropriate. Very little effort was made to select on the basis of similarity to features below the shoulders and no effort was made to select on the basis of voice similarity. The rationale for these decisions was that as an applied experiment, it is important to include practical considerations. It is unlikely that police will be willing to expend a lot of effort or resources finding foils that match the suspect on the basis of more than facial similarity.

Independence Check

A fundamental tenet of the hypothesis in this dissertation is that multiple sources of independent evidence are a more credible indication of guilt or innocence than a single source of evidence. Within that premise is the necessity that the pieces of evidence be independent from each other. There is a possible threat to that independence in the design of the dissertation. If witnesses were able to identify the target's voice or body from seeing a picture of the target's face or vice versa then the independence of a multiple identification of voice, body, and/or face would be compromised.

In order to ensure that the assumption of independence was reasonable, twelve Queen's University students were asked to try to match up the voice, body, and face of the

target. These participants were a mixture of graduate and undergraduate students from various disciplines with the only requirement being that they had not been nor would they be a member of the Queen's University psychology participant pool. This was done because the confederate was working in research both before and after this experiment so it was important to ensure that none of these subjects had previously been involved in an eyewitness experiment at Queen's University nor would be in such an experiment in the future.

The study was very simple, each of the participants was brought into the laboratory individually and asked to compare six voices to six faces and then six bodies to the same six faces. The materials consisted of two placards and one set of recorded voices. One placard had a set of faces numbered from 1 to 6 and one placard had a set of bodies from the shoulders down numbered from 1 to 6. The participants were asked to compare the two placards and then to compare the placard of faces to the voices one at a time. These tasks were given in one order to one participant and the opposite order to the next on an alternating basis.

The response forms also were very simple in nature. When faced with the face/voice comparison task the participants were given forms that said "Please circle a number for each face depending on how much you think it matches the voice you have just heard". They were given six forms labelled Voice #1 through Voice #6 and all containing a listing of faces from 1 to 6. The numbers next to each face were placed in ascending order from 1 to 5, permitting the participant to rate the degree of match between the face and voice or face and body.

When confronted with the face/ body comparison task the participants were given forms that said “Please circle a number for each face depending on how much you think it matches the shoulders down picture for this page”. Similar to the voice/face comparison task participants were given six forms labelled Picture #1 through Picture #6 and all containing a listing of faces from 1 to 6.

The computation of these results was done in a very simple manner. The forms for the target’s voice/face comparison and the forms for the target’s body/face comparison were counted by a highest number criterion. That is the face that had the highest number circled on that form was considered to be the face chosen to match that particular picture or voice.

In the case of the forms filled out for the target, 91% of these responses did not show a match. That is, only one of these forms indicated that the target face was the highest degree of match to the target body in one set of cases or was the highest degree of match to the target voice in the other. Nine percent of the responses showed that the target face was tied for the highest degree of match to the target’s voice along with three other faces. So within this relatively small sample of responses (N=12) there is no support for the notion that witnesses are able to successfully match the target’s body with the target’s face or successfully match the target’s voice with the target’s face.

Procedure

Two classes of undergraduate students at Queen’s University were greeted by the previously described accomplice who spoke for approximately one minute. During this time he gave statements to the effect that the students participation was needed in a

memory experiment. Following this statement, the confederate left the room and the experimenter entered. One class responded to lineups including the man who initially greeted the class (Target Present) while the other class responded to lineups with a replacement for the target (Target Absent).

Each class first responded to a simultaneous lineup of faces. Next each class was then played 6 voices and asked to make a decision about each one at a time. The target absent condition included the voices of the six people used as the target-absent face lineup. Finally each class was shown a simultaneous lineup of body shots from the shoulder down.

Methods of identification

The actual identifications were made by participants indicating their choices on a preprinted form that was handed to them after they witnessed the accomplice speak. The preprinted form was two sided and included a face identification task, a voice identification task and a body identification task. Each task carried its own set of written instructions. The tasks were introduced by a written paragraph that stated that they would be asked whether it was possible for them to identify the man who originally spoke to the class and then excused himself.

Face Identification Task. Under the heading "FACE IDENTIFICATION TASK", the participants were informed that as in a real police procedure the person they were trying to identify, may or may not be present in the lineup. They were also told "If you think you recognize the face of the man, please circle the number corresponding to the face otherwise circle 'none of them'."

Body Identification Task. Under the heading "BODY IDENTIFICATION TASK", the participants were informed that as in a real police procedure the body of the person they were trying to identify may or may not be among the bodies they were being shown. They were also told "if you think you recognize the body of the man you saw please circle the number corresponding to the body. Otherwise circle 'none of them'."

Voice Identification Task. Under the heading "VOICE IDENTIFICATION TASK", the participants were informed that as in a real police procedure the guilty person's voice may or may not be among the voices they were to hear. They were then told "You will be played a series of voices. Circle "yes" if the voice being played matches the voice of the person you are trying to identify and "no" if it does not match the voice of the person you are trying to identify. Previous studies have shown that people can easily make the decision within a minute. So you are not required to wait until the end of a voice sample to make your decision

Results

Before addressing the data for multiple identifications, the overall diagnosticity of each of the three lineups is presented independently. Although this study did not include a staged crime, terminology which is typical of the eyewitness literature will be used. Thus, the confederate will be referred to as the perpetrator. Correct facial identifications of the perpetrator were obtained from .74 of participants in the present condition while the most selected innocent face was chosen by .20 of participants in the absent condition resulting in an overall diagnosticity ratio of 3.70 for the face lineup. Comparable figures for the voice lineup are .39 correct identification, .33 false identifications and a diagnosticity

ratio of 1.18. For the body lineup, the figures are .52, .81, and .64.

Thus the face lineup was reasonably diagnostic while performance on the voice lineup was poor and one innocent lineup member's body was more likely to be selected than the perpetrator's. If the lineups were used by themselves there would be large numbers of false identifications for the most frequently selected voice or body compared to the number of false identifications for the most frequently selected face.

The combined number of choices made by participants from all the lineups in the present condition and how many of those choices were of the perpetrator is presented in Table 1.

Table 1 Total Participant Choices in the Present Condition

All Choices	0	1	2	3	4 or more
Total	6 (.09)	10 (.14)	17 (.25)	34 (.49)	2 (.03)
0 Suspects	6	7	3	2	0
1 Suspect		3	5	5	0
2 Suspects			9	18	2
3 Suspects				9	0

* 4 or more choices could occur as 5 people selected two voices and one person selected three voices.

A count of just foil choices found that 11% of the witnesses in the present condition made face foil choices totally, 25% made body foil choices totally, and 40% made voice foil choices totally. More specifically it was found that 4 % of the witnesses selected a foil from just the facial lineup, 13% chose a foil from just the body lineup and 25% chose a

foil from just the voice lineup. It was further found that 10% of the witnesses chose foils from the body and voice lineups, 5% chose foils from the face and voice lineups, and 2% chose foils from the face and body lineup. No participant selected a foil a from all three lineups.

The combined number of choices made by participants from all the lineups in the absent condition and how many of those choices were of the innocent suspect is presented in Table 2.

Table 2 Total Participant Choices in the Absent Condition

All Choices	0	1	2	3	4 or more
Total	2 (.03)	24 (.30)	31 (.39)	16 (.20)	6 (.08)
0 Suspects	2	24	28	7	2
1 Suspect		0	3	6	2
2 Suspects			0	3	1
3 Suspects				0	1

* 4 or more choices could occur as 9 persons selected two voices and 3 persons selected three voices

A count of just foil selections found that 17% of the witnesses in the absent condition made face foil choices totally, 59% made voice foil choices totally, and 86% made body foil choices totally. More specifically it was found that none of the witnesses selected a foil from just a facial lineup, 33% of the witnesses chose a foil from just the body lineup and 6% chose a foil from just the voice lineup. It was further found that 42% of the witnesses chose foils from the body and voice lineups, 6% chose foils from the face

and voice lineups, 6% chose foils from the face and body lineups and 5% chose foils from all three lineups. The following table gives the total number of foil picks made by the participants collapsed into three categories.

Table 3. Foil Choice Rates			
	Zero	One	Two or More
Present	.40 (28)	.42 (29)	.18 (12)
Absent	.03 (2)	.39 (31)	.58 (46)

In order to determine if there was an association between the total number of foil picks and innocence, a chi square test was used and found to be significant ($X^2(2, N = 146) = 57.2, p < .001$). So as a participant made more choices of someone other than the suspect, he or she was significantly more likely to be viewing perpetrator absent lineups.

However, the real question in this study is whether people who make multiple lineup selections of the same person are more likely to be accurate than those people who choose only one person or different persons from the lineups. The number of lineups that the perpetrator was selected from in the perpetrator present condition and the number of lineups that the most frequently selected foil (innocent suspect) was selected from in the perpetrator absent condition have been described in Table 4.

The identity of the "innocent suspect" was determined by counting the number of times that each lineup member was picked from the facial lineup in the Absent Condition. False multiple identifications become more likely as false facial identifications increase. In order to give the new procedure as stringent a test as possible, the person who attracted the most facial selections was arbitrarily designated as the innocent suspect.

Table 4. Selection Rates for the Designated Perpetrator or Innocent Suspect			
	Face not selected	Face only selected	Multiple Selection*
Present	.26 (18)	.19 (13)	.55 (38)
Absent	.80 (63)	.14 (11)	.06 (5)

*This category refers to those witnesses who chose the perpetrator or innocent suspect out of the face lineup and also either or both of the voice and body lineups.

In this experiment, 26% of the participants failed to pick the perpetrator out of the facial lineup, while 19% of the participants picked the perpetrator out of only the facial lineup, and 55% of the participants picked the actual perpetrator out of the facial lineup as well as from either or both of the voice and body lineups. However, 80% of the participants did not pick the innocent suspect from the facial lineup, while 14% of the participants picked the innocent suspect only from the facial lineup, and 6% of the participants picked the innocent suspect from the facial lineup as well as from either or both of the voice and body lineups.

In order to determine if there was an association between selection rate and accuracy a chi square test was employed and found to be significant ($X^2(2, N = 146) = 38.65, p < .01$). Accuracy improved as the participant selected the perpetrator from more lineups. It was then important to analyse just the choosers to determine if there was a difference in accuracy among those participants who chose the perpetrator or most frequently selected foil out of just the facial lineup compared to those who chose the perpetrator or most frequently selected foil out of the facial lineup and at least one of the other lineups. A chi square test was employed and found to be significant ($X^2(1, N = 146) = 9.92, p < .01$).

Table 5 gives the percentages of choices made by the witnesses of the perpetrator in the present condition and the most frequently selected face in the absent condition for every individual lineup and every possible combination of lineups. The percentages from the perpetrator present and absent lineups of each type are used to create a diagnosticity ratio for each of these individual and combined rates of choices from lineups. This table is particularly informative because it provides a more specific breakdown of the general category of multiple selections.

Table 5 shows that not all multiple selections are equally diagnostic. Those witnesses who picked the target out of just the face and the body lineups were always accurate. Those

Table 5. Diagnosticity Ratios for Experiment 1						
	Face		Voice		Body	
Individually	1.28	.18/.14	0.18	.04/.22	6.00	.12/.02
In Pairs	Face		Voice		Body	
Face with	---		3.00	.15/.05	Infinite	.27/.00
Voice with	---		---		4.00	.04/.01
All Three Features			13.00 .13/.01			

witnesses who picked the target out of the face, body, and voice lineups were 13 times more likely to be accurate than inaccurate. Those witnesses who picked the target out of the face and the voice lineups were only 3 times more likely to be accurate than inaccurate. While those witnesses who picked the target out of the body and voice lineups

were 4 times more likely to be accurate than inaccurate.

The data were further examined to determine what percentage of those witnesses who made a multiple selection also made a foil choice. It was found that 25% of the witnesses picked the target out of a face lineup and at least one other lineup while also making a foil selection, 6% of the witnesses picked the innocent suspect out of a face lineup and at least one other lineup while also making a foil selection, this led to a diagnosticity ratio of 4.17.

Examination of the data also determined what percentage of those witnesses who made a multiple selection did or did not make a foil choice. It was found that 30% of the witnesses picked the target out of a face lineup and at least one other lineup while not making a foil selection. However only 1.26% of the witnesses picked the innocent suspect out of a face lineup and at least one other lineup while not making a foil selection. This led to a diagnosticity ratio of 23.80.

Discussion

Exposing witnesses to additional lineups comprised of parts of the suspect clearly increased our ability to assess the reliability of an eyewitness identification of the suspect. The number of lineup choices for the perpetrator was compared to the number of lineup choices for the innocent suspect. The innocent suspect was determined by using the lineup member from the absent condition who attracted the most choices in the facial lineup, thus the person most at risk of misidentification using traditional lineup procedures.

The data was analysed by determining the following: How many participants did not choose the perpetrator in the facial lineup compared to the number of participants who

did not pick the innocent suspect in the facial lineup? How many participants chose the perpetrator in only the facial lineup compared to the number of participants who chose the innocent suspect in only the facial lineup? How many participants picked the perpetrator in the facial lineup as well as in either or both of the body and voice lineups compared to the number of participants that picked the innocent suspect in the facial lineup as well as in either or both of the body and voice lineups? The results indicated a dramatic increase in probability of accuracy as the number of times that the suspect was selected in different lineups by a single witness increased.

There were two possible problems with the results from the first study. First, 75% of witnesses successfully chose the perpetrator out of the facial lineup. However only 55% of witnesses picked the perpetrator out of the facial lineup and either or both of the voice and body lineups. This is important if a correct multiple identification is suggested as an alternative to correct identification .

The police may be reluctant to use extra lineups if they are concerned that this will lead to a legal requirement that the witness select the witness from more than one lineup. If the relative rates of correct identifications for this experiment (75% for face only and 55% for multiple identifications) were used, this would lead to a dramatic reduction in the number of witnesses who would be considered to have made correct identifications. An important factor in the acceptance of sequential lineups by police was the generally similar correct identification rates for the two procedures (Lindsay, 1999). However, this need not be the case. As stated earlier, additional selections could be viewed as a way of calibrating the strength of an identification.

The second problem was that not all the diagnosticity ratios for multiple identifications were as high in the first experiment of the dissertation as the diagnosticity ratio found for multiple identifications in the Lindsay et al. (1987) study. That is the diagnosticity ratio for picking both the face and voice of the target was only 3.00 compared to the diagnosticity ratio of 13.60 found for picking both the face and the clothing of the target in Lindsay et al. Similarly the diagnosticity ratio of picking both the voice and body of the target was only 4.00. Only when face and body were identified did the diagnosticity approximate the Lindsay et al. result.

The cause for the lower diagnosticity ratios in Experiment 1 is unknown. It may be that the high rate of choosing overall in the first experiment led to coincidental multiple identifications in the absent condition. Alternatively the diagnosticity ratio for multiple identifications that involve voice might be lower because voice lineups have lower individual diagnosticity than clothing lineups. Accordingly another experiment was run which attempted to reduce the overall choosing rate while simultaneously allowing a direct comparison between the diagnosticity of multiple identifications that involve lineups with poor versus good individual diagnosticity.

Rationale for Experiment 2

One way to reduce false positives is to use sequential lineups because they have been shown to significantly reduce false positives compared to simultaneous lineups (Lindsay & Wells, 1985). Something else which will likely reduce false positives is a warning to the witnesses that they should be careful about making a selection. A warning may reduce selections overall and thus increase the diagnosticity of multiple picks by

decreasing the coincidental selection of a person from more than one absent lineup. In order to compare lineups that have different individual diagnosticity, a clothing lineup was added since clothing alone is known to be diagnostic of accuracy (Lindsay et al., 1987). The new lineup contained pictures of the clothing worn by the perpetrator during

Materials

The materials consisted of photos of faces and bodies and taped voice samples as described for Experiment 1 of the target, replacement for target and foils. Additional target present and target absent clothing lineups presented photos of 6 grey, Queen's University sweatshirts each with the word "Queen's" written on the front. The sweatshirts were displayed on hangers and backgrounds were edited electronically to be the same background as the other photos.

Recruitment of Lineup Members

The recruitment process for the five foils and one innocent suspect for Experiment 2 was similar to that of Experiment 1. In this case a male Queen's Graduate Student in Psychology was enlisted to stage scenes for unprepared participants throughout the 1999-2000 school year. Once this student was enlisted it became necessary to find others who roughly matched his appearance.

It is important to note that the lineup members were again selected mostly on the basis of facial similarity to the accomplice. Very little effort was made to select lineup members on the basis of similarity to features below the shoulders and no effort was made to select members on the basis of voice similarity. The rationale for these decisions was the same as for Experiment 1. That is, as an applied experiment, it is important to include practical considerations. Police may not be willing to expend a lot of effort or resources finding foils that match on the basis of more than facial similarity and the vagueness of witness descriptions suggests it may not be necessary to do so.

Procedure

Upon their arrival at the laboratory, participants were taken to one of the rooms in the lab. The target entered the room and interacted with the participant (for no more than a few minutes), stole a purse that been left in clear sight, then left the room. The experimenter returned immediately. The participants were informed of the purpose of the experiment and asked to sign the consent form (Please see Appendix A). Then the participants were asked to write out a description of the target. After describing the target, the identification procedures were completed on computer. First the face identification task was completed (a standard sequential lineup).

Face Identification Task

The first instructions appearing on the witnesses computer screen were as follows: “In a real police situation, you would be a witness. Witnesses are frequently asked to attempt to identify people they have come in contact with. In this study you will be asked to attempt to identify the man you interacted with (the thief) who took the experimenter’s purse.

Lineup instructions:

1. You will see a sequence of individual pictures of faces.
2. A picture of the criminal may or may not be one of them.
3. For each picture, use the mouse to indicate “No” if you believe it is NOT a picture of
of the criminal OR “yes” if you believe it IS a picture of the criminal.
4. Each picture is of a different person (no person will appear more than once).

5. Take as long as you need for each decision but once you have responded you will not be permitted to see the picture again.

If any aspect of the procedure is not clear to you, Please ask now.

If everything is clear to you click on the "continue" button below".

Body Identification Task

Once the participant completed the facial lineup task, the instructions for the body identification task appeared on their screen. The instructions prior to this lineup were as follows: "Other forms of identification are possible. You are going to be exposed to additional lineups to see if you can select the criminals body, voice, and/or clothing.

Now, you will be asked to attempt to identify the body of the criminal. This procedure is similar to the procedure for the face lineup.

Sequential Body Lineup Instructions:

1. You will see pictures of bodies one at a time..
2. If you believe the picture is NOT of the criminal's body, indicate "NO".
3. If you believe the picture IS of the criminal's body, indicate "Yes" .
4. Each picture will be shown only once.

SPECIAL NOTE; Choosing the wrong body would decrease the credibility of any other evidence you have provided.

REMEMBER, CHOOSING NO ONE IS BETTER THAN AN INCORRECT CHOICE!

Voice Identification Task

Once the participant completed the body lineup task, the instructions for the voice identification task appeared on their screen.

The instructions prior to this lineup were as follows

These instructions are a little different, so read them carefully. You will now be asked to attempt to identify the voice of the criminal.

Sequential Voice Lineup Instructions:

1. You will hear recordings of men's voices one at a time.
2. If the recording ends before you have made your decision, you may replay it.
(Just press the Replay button).
3. If you believe the voice is NOT the voice of the criminal, indicate "No", You may indicate this at any time, you do not need to wait for the voice to stop..
4. If you believe the voice IS the voice of the criminal, indicate "Yes". Again, you may do so at any time.
5. After you have indicated a decision, you can not listen to the voice again.

SPECIAL NOTE: Choosing the wrong voice would decrease the credibility of any other Evidence you have provided.

REMEMBER, CHOOSING NO ONE IS BETTER THAN AN INCORRECT

CHOICE Clothing Lineup Task

Once the participant completed the voice lineup task, the instructions for the clothing lineup task appeared on their screen.

The instructions prior to this lineup were as follows:

"You will now be asked to attempt to identify the clothes worn by the criminal.

The instructions are similar to the instructions for the face lineup.

Sequential Clothing Lineup Instructions:

1. You will see pictures of clothing one at a time.
2. If you believe the picture is NOT of the criminal's clothing, indicate "No".
3. If you believe the picture IS of the criminal's clothing, indicate "Yes".
4. Each picture will be shown only once.

SPECIAL NOTE: Choosing the wrong clothing would decrease the credibility of any other evidence you have provided.

REMEMBER, CHOOSING NO CLOTHING IS BETTER THAN AN
INCORRECT CHOICE!

Once the participant completed the clothing lineup task, they were thanked and debriefed by the experimenter.

Results

Before addressing the data for multiple identifications, the overall diagnosticity of each of the four lineups is presented independently. Correct facial identifications were obtained from .73 of participants in the present condition while the most selected innocent face was chosen by .13 of participants in the absent condition resulting in an overall diagnosticity ratio of 5.61 for the face lineup. Comparable figures for the voice lineup are .13 correct identification, .27 false identifications and a diagnosticity ratio of .48. For the body lineup, the figures are .23, .12, and 2.00. For the clothing lineup, the figures are .50, .17, and 2.94.

Thus the face, body and clothing lineups were reasonably diagnostic while one

innocent lineup member's voice was more likely to be selected than the perpetrator's. If the additional lineups were used by themselves, a larger number of false identifications for the most frequently selected voice, clothing or body compared to the number of false identifications would occur for the most frequently selected face.

The combined number of choices made by participants from all the lineups in the present condition and how many of those choices were of the perpetrator is presented in Table 6.

Table 6. Total Participant Choices in the Present Condition

All choices	0	1	2	3	4	5 or more
Total	1 (.03)	4 (.13)	8 (.27)	6 (.20)	5 (.17)	6 (.20)
0 suspects	1	2	2	0	0	0
1 suspect		2	3	4	0	2
2 suspects			3	1	3	3
3 suspects				1	1	1
4 suspects					1	0

* 5 or more choices is possible because 6 people chose two faces and 3 people chose three faces, 4 people chose two bodies, 2 people chose two voices and 2 people chose three voices, while 1 person chose two pieces of clothing.

Foil choices were common. A count of just foil choices found that 49% of the witnesses in the present condition made face foil choices, 16% made body foil choices, 16% made clothing foil choices, and 40% made voice foil choices. More specifically, it was found that 17% of the witnesses selected a foil from just the facial lineup, 3% chose a foil from just the body lineup, 10% chose a foil from just the voice lineup and 3% chose a

foil from just the clothing lineup. It was further found that 3% of the witnesses chose foils from the body and voice lineups, 16% chose foils from the face and voice lineups, 3% chose foils from the face and body lineups, 3% chose foils from the face and clothing lineups, 7% chose foils from the voice and clothing lineups and none of the witnesses selected foils from the body and clothing lineups. It was also found that 3% of the witnesses chose foils from the face, voice, and clothing lineups, while 7% chose foils from the face, voice, and body lineups. No one selected foils from all four lineups.

The combined number of choices made by participants from all the lineups in the absent condition and how many of those choices were of the innocent suspect is presented in Table 7.

A count of just foil choices found that 29% of the witnesses in the absent condition made face foil choices, 23% made body foil choices, 15% made clothing foil choices, and 48% made voice foil choices. More specifically, it was found that 8 % of the witnesses selected a foil from just the facial lineup, 5% chose a foil from just the body lineup, 28% chose a foil from just the voice lineup and 3% chose a foil from just the clothing lineup. It was further found that 7% of the witnesses chose foils from the body and voice lineups, 7% chose foils from the face and voice lineups, 2% chose foils from the face and body lineups, 3% chose foils from the face and clothing lineups, 3% chose foils from the body and clothing lineups and none of the witnesses selected foils from the voice and clothing lineups. It was also found that 3% of the witnesses chose foils from the face, voice, and clothing lineups, while 3% chose foils from the face, voice, and body lineups and 3% chose foils from the voice, body, and clothing lineups.

Table 7. Total Participant Choices in the Absent Condition

All Choices	0	1	2	3	4	5 or more
Total	9 (.15)	27 (.45)	14 (.23)	7 (.12)	1 (.02)	2 (.03)
0 Suspect	9	23	11	7	1	1
1 Suspect		4	3	0	0	1
2 Suspect			0	0	0	0
3 Suspect				0	0	0
4 Suspect					0	0

No one chose foils from all four lineups. The following table gives the proportion of witnesses picking zero, one, or two or more foils in the present and absent lineups.

Table 8. Foil Choice Rates			
	Zero	One	Two or more
Present	.23 (7)	.33 (10)	.43 (13)
Absent	.25 (15)	.43 (26)	.31 (19)

In order to determine if there was an association between the total number of foil picks and accuracy a chi square test was used and found not to be significant ($X^2(2, N = 90) = 1.14, ns.$).

It is interesting to note that the 58% of the witnesses in the absent condition of Experiment 1 made two or more foil choices compared to 31% of the witnesses in the absent condition of Experiment 2. However only 18% of the witnesses in the present condition of Experiment 1 made two or more foil choices compared to 43% of the

witnesses in the present condition of Experiment 2. It is unclear why the warning against excessive choosing and the use of sequential lineups suppressed foil choice rates for the absent condition of Experiment 2 but not for the present condition.

Another question in this study is whether people who make multiple selections of the same person are more accurate than those people who choose different persons from the lineups. The identity of the “innocent suspect” was determined in the same manner as in the first experiment, by counting the number of times that each lineup member was picked from the facial lineup in the Absent Condition. The person who attracted the most picks was arbitrarily designated as the innocent suspect in order to maximize the number of multiple identifications that would be classified as multiple false identifications rather than multiple foil identifications. The number of lineups that the perpetrator was selected from in the perpetrator present condition and the number of lineups that the innocent suspect was selected from in the perpetrator absent condition have been described in Table 9.

Table 9. Selection Rates for the Designated Perpetrator or Innocent Suspect			
	Face not selected	Face only selected	Multiple Selection*
Present	.27 (8)	.23 (7)	.50 (15)
Absent	.87 (52)	.13 (8)	.00 (0)

*This category refers to those witnesses who chose the perpetrator or innocent suspect out of the face lineup and one or more of the voice, clothing and body lineups.

In this experiment, 27% of the participants failed to pick the actual perpetrator out of the facial lineup, while 23% of the participants picked the actual perpetrator out of only the facial lineup, and 50% of the participants picked the actual perpetrator out of the

facial lineup as well as from one of the voice, clothing, and body lineups. However, 87% of the participants did not pick the innocent suspect from the facial lineup, while 13% of the participants picked the innocent suspect from the absent facial lineup, and none of the participants picked the innocent suspect from the facial lineup as well as from one or more of the voice, clothing, and body lineups.

In order to determine if there was an association between selection rate and accuracy a chi square test was employed and found to be significant ($X^2(2, N = 90) = 42.0, p < .001$). In this case it was found that accuracy improved as the participant selected the perpetrator from more lineups. A Fisher exact test was used to determine if there was a difference in accuracy among those participants who chose the perpetrator or innocent suspect out of just the facial lineup compared to those who chose the perpetrator or innocent suspect out of the facial lineup and at least one of the other lineups. The result of the Fisher exact test was found to be significant ($p = 0.001$).

Table 10 gives the proportions of choices made by the witnesses in the present and the absent condition for every individual lineup and every possible combination of lineups. The table uses these two proportions to create a diagnosticity ratio for each of these individual and combined choices of lineups. This table is particularly informative because it provides a more specific breakdown of the general category of multiple selections.

Table 10. Diagnosticity Ratios of Experiment 2				
	Face	Voice	Body	Clothing
Individually	1.53 .20/.13	N/A .00/.10	Infinite .03/.00	5.00 .10/.02
In Pairs	Face	Voice	Body	Clothing
Face with	----	Infinite .03/.00	Infinite .07/.00	Infinite .23/.00
Voice with	----	----	N/A .00/.00	N/A .00/.00
Body with	----	----	----	N/A .00/.00
In Trios	Excluding			
	Face	Voice	Body	Clothing
	N/A .00/.00	Infinite .07/.00	Infinite .03/.00	N/A .00/.00
All four features		Infinite .07/.00		

*N/A indicates that a diagnosticity ratio is not available because there were not any selections made in the present condition for that particular cell.

Table 10 demonstrates that any time a witness picked the same person out of more than one lineup his or her decisions were completely diagnostic of guilt. However not every possible multiple pick was made by a witness, none of the witnesses made multiple picks that did not involve the facial lineup. It is also useful to look at the different incremental values of presenting each particular lineup to the witnesses. Just presenting the clothing lineup and the facial lineup to the witnesses would have resulted in a 40% multiple identification rate. Just presenting the body and facial lineups would have resulted in a 21% multiple identification rate. While just presenting the voice and facial lineups would have resulted in a 13% multiple identification rate.

Discussion

The second experiment clearly showed that it was possible to increase the

diagnosticity of multiple identifications by reducing the choosing rate in the absent condition. The diagnosticity of the multiple identifications was calculated in a manner that was similar to the first experiment. The number of lineup choices for the perpetrator was compared to the number of lineup choices for the innocent suspect. The innocent suspect was determined by using the lineup member from the absent condition who attracted the most choices in the facial lineup, thus the person most at risk of misidentification using traditional lineup procedures.

The data was analysed by determining the following: How many participants did not choose the perpetrator in the facial lineup compared to the number of participants who did not pick the innocent suspect in the facial lineup? How many participants chose the suspect in only the facial lineup compared to the number of participants who chose the innocent suspect in only the facial lineup? How many participants picked the suspect in the facial lineup as well as in one or more of the body, clothing, and voice lineups compared to the number of participants that picked the innocent suspect in the facial lineup as well as in one or more of the body, clothing and voice lineups? The results indicated a dramatic increase in degree of accuracy as the number of times that the suspect was selected in different lineups by a single witness increased.

The results of the second experiment are particularly dramatic in that they show that every multiple identification is perfectly diagnostic of guilt. It is interesting to note that this is true even though there is a wide discrepancy among the diagnosticity ratios for each individual lineup. In fact even though the clothing lineup was approximately 6 times more diagnostic than the voice lineup, a multiple pick was still perfectly diagnostic of

guilt when the same person was chosen out of either the face and clothing lineups or the face and voice lineups. More generally, the results of the second experiment suggest that when the overall choosing rate is reduced, multiple identifications that involve a pick from a lineup that has relatively poor individual diagnosticity are as diagnostic of accuracy as multiple identifications that only involve picks from lineups with relatively good individual diagnosticity.

The data was further examined to determine the diagnosticity ratios of individual lineups and their relative incremental value. It was found that the lineups had incremental values comparable to their relative diagnosticity ratios. Voice was the lineup with the lowest diagnosticity ratio (0.48) and also was responsible for the lowest number of multiple identifications (13%). Body was the lineup with the next higher diagnosticity ratio (2.00) and led a slightly higher number of witnesses to make multiple identifications (21%). While Clothing had the highest relative diagnosticity ratio and singularly led 40% of the eyewitnesses to make multiple identifications. So individual diagnosticity affected the percentage of witnesses that made multiple identifications involving that lineup but did not affect the likelihood that a multiple identification involving that lineup was correct once it occurred.

It might seem that when we are looking for lineups that might dramatically increase the percentage of correct multiple identifications we should try to use the lineups which have relatively high individual diagnosticity. However it should be noted that even lineups with poorer individual diagnosticity still led 10% more witnesses to make correct multiple identifications without any increase in the false multiple identification rate.

Further research is required to see whether this trend continues as more and more lineups are presented to the same witness.

General Discussion

Overall it can be said that a lot more is known now about using additional lineups to obtain multiple identifications than was known following Lindsay et al. (1987). That study showed that presenting more than one lineup to a witness would improve the diagnosticity of the witness' identification under certain well defined conditions. For example Lindsay et al. used a lineup which was diagnostic of accuracy on its own (1.91 diagnosticity ratio for the clothing lineup alone). The Lindsay et al. study also used only one additional lineup. It was unclear whether adding more than one lineup would lead to a number of coincidental picks for the most frequently selected person in the facial lineup. The Lindsay et al. study also used a lineup containing something that was only related to the suspect. It was unclear whether the procedure would be effective with a lineup which used different parts of the suspect. In this case witnesses might have been able to spoil the independent nature of these individual pieces of evidence by matching up the voice, body, and face of the lineup members.

The two experiments in this dissertation clarified all of these issues. A pick from a lineup with poor individual diagnosticity could be perfectly diagnostic of accuracy when combined with a pick from another lineup. However lineups with relatively poorer individual diagnosticity tended to lead to less correct identifications for that individual lineup and therefore fewer occasions when the witness picked the target out of both that lineup and another lineup.

The dissertation also was able to determine that more than one additional lineup could be presented to witnesses without leading to a number of coincidental picks for the most frequently selected innocent person in the absent facial lineup. However it was necessary to make certain alterations to the Lindsay et al (1987) procedures in order to achieve this. Specifically it was necessary to present the lineups sequentially rather than simultaneously and to include a statement within the lineup instructions warning the witnesses that making no choice is better than making a wrong choice.

Finally the dissertation proved that lineups which contained different parts of the suspect could be used without violating the assumption of independence. The pilot study demonstrated that witnesses were not able to match up the target's different features. While we can infer from the low rate of coincidental picks for the most frequently selected foil in the absent conditions of both experiments that the witnesses were not able to match the features of the foil who was selected most often from the facial lineup.

It is now necessary to discuss the possible advantages and disadvantages of the proposed alternative method of identification. One disadvantage has already received comment in this dissertation. That is the significant gap between the single and multiple identification rates for both studies. It is worth noting that the multiple identification rate is similar to the overall identification rate found in sequential lineup studies (Stebly et al., 2001); however the correspondence of those rates is a bit misleading. The overall identification rate found in the meta-analysis is brought down by studies that used still photos and did not ask the witnesses to give descriptions of the perpetrator before attempting an identification. When the multiple identification rate is compared to the

sequential lineup rate found in studies which more closely mirror real life, then the sequential correct identification from lineups (Stebay, et al., in press) is higher than the multiple identification rate.

In fact there is no reason to dispute the findings from Experiment 2 of the dissertation. The procedure used in that study involves a sequential lineup and approximates real world conditions enough to suggest that the resulting gap in rates of face and multiple identifications (73% vs. 50%) may be a good indication of what would occur should the procedure be brought into practice. If this were to be the case it would mean that the police would be faced with about a third of the witnesses who would have been able to testify that they made a correct identification under a single identification system now demonstrating that they were unable to make multiple identifications.

The reaction of the courts to face only versus multiple identifications is unknown at this time. If failure to obtain multiple identifications was treated as failure to identify at all, there would be a dramatic reduction in identification evidence available to police and the courts. However, this need not be the case. If multiple identifications are looked upon as stronger evidence than face identifications alone, then face identifications could be presented but should have less weight because they are less diagnostic and thus, in legal terms, have lower probative value. The use and interpretation of face versus multiple identifications by the courts is beyond the scope of this thesis but might be an important factor if police were to consider using multiple independent identification decisions.

There are also some possible advantages. For example, the false identification rate for multiple identifications is much lower than the overall false identification rate found

in sequential lineup studies. The average false identification rate in the sequential lineup literature was 9%. Combining the rates from the two dissertation experiments led to a false multiple identification of only 3%. Using multiple identification would obviously reduce the possibility of a wrongful conviction of an innocent person.

The procedure might be helpful in cases where there is something unusual about the suspect's appearance (a tattoo, earring, scarf, etc) that could be used to create another lineup for the witness to view. The police might also wish to use a weapon lineup. There is evidence of a weapon focus effect (Stebay, 1992) which finds that the existence of a weapon during the occurrence of a crime leads to lower rates of correct person identifications. Loftus et al. (1987) used a corneal reflection apparatus to track the eye movements of a witness during the commission of a crime and found it was eye fixation on the weapon that led to the reduction of accurate identifications compared to those found in crimes that do not involve a weapon. A witness who has fixed their gaze on a weapon might be very good at picking that weapon out of a lineup that contained a weapon found on the suspect along with other similar weapons that were used as foils.

The procedure also may be advantageous because a lot of police departments still do not use sequential lineups. In fact during the deliberations surrounding the creation of United States Justice Department guidelines for lineup procedures, many top ranking police officers stated that they did not want to use sequential lineups because they were not familiar with them. So it is suggested that these police officers use multiple simultaneous lineups instead. It may result in some reduction in correct identifications but it will result in a huge reduction in false identifications. The overall result will be multiple

identifications that are much more diagnostic of guilt than an identification from a single lineup.

Overall then, it is clear that the new procedure has a mixture of possible advantages and one particular disadvantage. It is also clear that the investigations of this procedure are at their very earliest stages. It will be necessary to test a number of variables that may influence the effectiveness of the procedure. Obvious variables would include age, race, and interval of time between the witnessing of the crime and the identification procedure. It also will be useful to determine if other types of lineups are effective in producing corroborative identifications. Some examples would be earrings, scars, tattoos, various types of clothing, or weapons of any sort.

It also could be useful to try to postdict the accuracy of witnesses who have been asked to attempt multiple identifications. A number of questions would exist such as what happens when a witness makes multiple identifications with different types of judgement strategies. It also would be interesting to see whether witnesses who make multiple identifications at varying rates of speed or with varying degrees of confidence have different rates of accuracy than those who make identifications at similar rates of speed.

In conclusion this is clearly a promising procedure. I think that the dissertation has established that a substantial number of witnesses can make multiple identifications of the same person when faced with a series of lineups and that these multiple identifications are extremely diagnostic of guilt. However the courts will need to decide how they are going to respond to the identifications generated by a series of lineups. If they decide that only multiple identifications will be admissible then about 30% of

accurate facial identifications would probably be lost.

So I suggest that unless and until the multiple correct identification rate is found to approximate the correct identification of a single sequential lineup, the courts should continue to admit identifications from a sequential facial lineup into evidence and permit additional identifications to be used as a calibration of the individual identification. The data suggests that using further identifications as a way of judging the accuracy of the facial identification is superior to the typical method of using the expressed confidence of the witness as a method of calibrating the accuracy of a facial identification.

Additional evidence need not come in the form of an additional identification. However this procedure gives the police the opportunity to collect additional independent evidence in a way that is not true presently. It is suggested that a case be considered to be very weak when it presents a witness or witnesses who has made an identification or identifications from just a single lineup with no other corroborating evidence, regardless of the confidence of the witness or witnesses.

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הנהגתו

You have just witnessed a staged event. In this research, students are exposed to unexpected staged events to simulate the conditions experienced by eyewitnesses. During the remainder of the experiment, you may be asked to describe the person and events that you saw. You may also be asked to attempt to identify the person with the clipboard from lineups. All responses that you make will be regarded as strictly confidential and published results will not identify any participants by name. Your participation in this experiment is voluntary as you are free to withdraw from participating at any time.

This research is conducted by students and research assistants under the supervision of Dr. R. C. L. Lindsay. Should you have any concerns or complaints about this study please contact Dr. Lindsay (Cr 320, 533-2880). If still not satisfied, you may contact the Head of the Department of Psychology, room H 238, 533-2492. Your signature below indicates that you have read the information above and freely consent to participate in the remainder of the experiment.

[illegible]

Appendix B

Pictures of the Sequential Face Lineup

Face of target.....	9001F
Face of replaced face in the absent condition.....	9004F
Face of foil.....	9002F
Face of foil.....	9003F
Face of foil.....	9005F
Face of foil.....	9006F
Face of foil.....	9007F

Appendix C

Pictures of the Sequential Body Lineup

Body of target.....	9001B
Body of replaced Body in the absent condition.....	9004B
Body of foil.....	9002B
Body of foil.....	9003B
Body of foil.....	9005B
Body of foil.....	9006B
Body of foil.....	9007B

Appendix D

Pictures of the sequential clothing lineup

Clothing of target.....	9001F
Clothing of replaced clothing in the absent condition.....	9004F
Clothing of foil.....	9002F
Clothing of foil.....	9003F
Clothing of foil.....	9005F
Clothing of foil.....	9006F
Clothing of foil.....	9007F