GOT PERP?
EYEWITNESS ACCURACY, DECISION PROCESSES, AND PRESENTATION PROCEDURES USING SEQUENTIAL LIENUPS

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EYEWITNESS ACCURACY, DECISION PROCESSES

AND PRESENTATION PROCEDURES

USING SEQUENTIAL LIENUPS

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It was my objective to understand whether accurate and inaccurate eyewitnesses could be distinguished by their decision-making during a sequential-lineup. All eyewitnesses, except in Study 6, were shown a video-taped crime and presented with sequential lineups.

Study 1 was designed to identify the decision processes of eyewitnesses. While viewing a culprit-present lineup, witnesses were asked to "think aloud" and later describe in writing their thoughts as they reached a decision for each photograph; five decision process statements were then created or selected from previous research. In Study 2, the main dependent measure asked eyewitnesses to endorse all applicable decision process statements from Study 1. Factor analysis revealed a simple matching strategy containing three decision processes and a deliberative strategy with four decision processes. Accurate eyewitnesses were significantly associated with the simple matching strategy, and inaccurate eyewitnesses with the deliberative strategy.

An automatic recognition statement was added to the decision process statements. Study 3 looked at inaccurate identifications in culprit-absent lineups and found that the decision processes of inaccurate eyewitnesses did not differ regardless of having selected an innocent suspect replacement or a known

innocent picture. Study 4a and 4b successfully replicated previous findings using a new set of experimental materials with different witness viewing conditions.

Study 5 demonstrated that accuracy rates could not be predictably influenced via the manipulation of witness decision processes. Witnesses forced to use deliberative decision processes were not subsequently less accurate. Witnesses forced to use simple matching and automatic processes were also not subsequently more accurate. Study 6 participants were asked to postdict witness accuracy. They were given previous eyewitness identification judgment forms and some were informed about the decision strategies found to be indicative of accuracy and some were not. Unexpectedly, informed participants did not outperform the uninformed or perform better than chance.

Studies 7 and 8 tested whether logical modifications to the sequential procedure would affect accuracy. In Study 7, only culprit-present lineups were conducted and seeing it twice before making any identification (no-ID-first-view) presentation produced significantly greater accuracy than the traditional presentation. Study 8 served as a replication and extension, using both culprit-present and culprit-absent lineups. The superiority of the no-ID-first view condition did not reach significance. The implications of Studies 1-8 for memory, face recognition and the legal system are discussed.

BIOGRAPHICAL SKETCH

Deanna Dace Caputo, born August 31st, 1977 in Santa Monica, California, grew up in Canyon Country, California, the daughter of John and Michelle Caputo, with one older brother, John, who has a five year old daughter Dylana and received a Bachelor's Degree in Information Technology. Deanna graduated from Canyon High in 1995, as one of the top 10 students in her class, and was very active in Concert Choir and Madrigals. She obtained her Bachelors of Science Degree, Magna Cum Laude, from Santa Clara University in June 1999, majoring in Psychology with a minor in Spanish. Deanna did active psychological research for all four years at Santa Clara under the direction of Dr. Thomas Plante. In her senior year, she took a Social Psychology course from Dr. Jerry Burger, which drew her interest away from clinical psychology and toward understanding the "average" person. In 1999, Deanna entered the Ph.D. program in the Department of Psychology at Cornell University, where she began her studies of human judgment and decision-making. In her second year, she began conducting research in psychology and law with Dr. David Dunning. Deanna had found her "niche" in studying the applied aspects of social psychology in legal settings, and began extensive research on eyewitness identifications. She received her Ph.D. in Social and Personality Psychology in August of 2004.

When not in the lab, Deanna was most passionate about her singing. She sang as a soprano in a local community choir, the Out Loud Chorus, for four great years. In October 2002, she began vocal training with Brother Shawn Benedict, the musical director of Out Loud Chorus. Deanna made her solo debut on March, 19th, 2003, in Festival of Voices 2003, at the Historic State Theatre in downtown Ithaca. She also soloed in Festival of Voices 2004. When not singing, she enjoyed spending time at Stewart Park, Ithaca Falls, or O'Leary's Irish Pub with friends.

this is dedicated to my family:

Mom, Dad, John, Dylana, Grams, Grandpa, Binky, Wende, & Michelle

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CHAPTER ONE:
INTRODUCTION

"A lineup is a legally recognized police investigation procedure in which a suspect is embedded among distractors. The eyewitness's task is to decide whether or not the culprit in question is in the lineup and, if so, which person is the culprit" (Wells & Luus, 1990, p.107). The process seems simple and the outcome convincing. Eyewitness evidence is "direct" evidence of guilt. Even fingerprints are only given status as circumstantial (indirect) evidence because they do not tell the story of what exactly someone was doing or more importantly when. Therefore, eyewitness evidence is given a powerful status in criminal justice proceedings. According to a survey of district attorneys nationwide, it was estimated that over 77,000 Americans become criminal defendants each year after being identified from lineups or photospreads. That is 200 people per day (Goldstein, Chance, & Schneller, 1989).

However, with each new publication eyewitness identification researchers point out that what appears to be a simple identification is, in fact, the result of a series of complex and potentially unreliable social and cognitive events that began several months earlier when the event was originally witnessed and an identification was made (Wells, Seelau, Rydell & Luus, 1994). Lineup procedures play an important role in the identification experience, and the decision processes of eyewitnesses viewing simultaneous lineups (i.e., seeing all six lineup pictures at one time) has been the topic of an entire field of research. These data show that the simultaneous lineup can produce a false identification rate of up to 30% and that people making these false identifications tend to use a "process of elimination" strategy in determining which photograph to select (Lindsay & Wells, 1985; Dunning & Stern, 1994). In

order to improve the situation, eyewitness researchers Lindsay and Wells designed a lineup procedure that would make it virtually impossible for witnesses to make an identification through a process of elimination strategy (Lindsay & Wells, 1985). This sequential lineup (i.e., viewing one lineup photograph at a time) reduces false identifications to approximately 17%, and is used by the entire State of New Jersey, jurisdictions in many other States, and in parts of Canada.

To date, there is very little known about the decision processes of eyewitnesses viewing sequential lineup procedures. Can accurate and inaccurate eyewitnesses viewing sequential lineups be distinguished by their decision-making strategies? If so, can this information be used to decrease false identification while maintaining accuracy? Or, can decision processes be used to predict witness accuracy after the fact? This series of experiments intended to explore these and related questions concerning eyewitness accuracy and police lineup procedures, and thereby add to a growing body of knowledge that will help the criminal justice system better protect innocent suspects.

The Eyewitness Problem

Eyewitness researchers function under the assumption that there is an "eyewitness identification problem" (Wells, 1993). In their eyes, this makes the legal system's dependence on eyewitnesses problematic. There are a number of observations that warrant such an assumption. First, many experimental studies using crime simulations have found high rates of false identifications (e.g., Brigham & Cairns, 1988; Culter, Penrod, & Martens, 1987a; Leippe, Wells, & Ostrom, 1978; Lindsay, 1986; Lindsay & Wells, 1980, 1985; Loftus & Greene, 1980; Malpass & Devine, 1981; Wells, 1984; Wells, Ferguson, & Lindsay, 1986; Wells & Leippe, 1981; Wells, Lindsay, & Ferguson, 1979; and many more).

These studies can range from a 12% false identification rate (Leippe, Wells, & Ostrom, 1978) to a 70% false identification rate (Lindsay and Wells, 1980). Indeed, "after years of experiments, most of us [researchers] must admit that we are still impressed with the extent to which eyewitness reliability is well below what we intuitively expected it to be" (Wells, 1980, p. 238). The situation has not improved much since this statement in 1980; experiments continue to produce low numbers of total identifications and high rates of false identifications even using crime simulations with clear and extended views of the perpetrator.

A second reason to assume a problem with identifications is that there is 'sincerity' to most of the false identifications observed in experiments; eyewitnesses actually seem to believe that their false identifications are in fact accurate identifications. This is evidenced by the fact that eyewitness participants often have high subjective confidence in their identifications even when they are inaccurate (Luus & Wells, 1994; Wells & Murray, 1983).

The third observation warranting the study of the eyewitness identification problem is that analyses of documented cases of wrongful conviction have shown that the single largest factor leading to false convictions has been eyewitness error. For example, in 1986 Huff and colleagues estimated that 60% of 500 eyewitness identification cases they had documented were wrongful convictions (convictions later set aside because of confession or new evidence) (Huff, Ratner, & Sagarin, 1986). If this type of archival analysis was done today, the numbers would not likely look more encouraging since virtually no changes have been made to how police handle eyewitness identification evidence.

The most compelling evidence for a problem comes from a closer look at recent DNA exonerations. As of the time of this writing, postconviction DNA

testing has freed 143 people who were convicted by juries of their peers of crimes that they did not commit (The Innocence Project, 2004). A study of the first 62 DNA exoneration cases revealed that mistaken eyewitness identifications were the primary evidence in 52 of 62 (84%) cases involving a total of 77 confident but mistaken eyewitnesses (Scheck, Neufeld, & Dwyer, 2000). Those who were exonerated had served an average of 10 years in prison, and 8 people were sentenced to death before being found innocent. The difficulty in relying on DNA evidence to "catch" human mistakes is that the vast majority of perpetrators in assaults and murders, and virtually all robberies, drive by shootings, and other major crimes do not leave behind definitive biological trace evidence that can show that an eyewitness was mistaken. "Misidentifications create a double horror: the wrong person is devastated by this personal tragedy, and the real criminal is still out on the streets, probably committing further crimes" (Loftus, 1993, p. 550). DNA exonerations do not solve the problem; they only prove its existence and illuminate the need for reform.

These observations seem to verify the existence of an eyewitness problem and in the course of a criminal trial eyewitness identification testimony can provide compelling evidence against a defendant. However, it is not appropriate to conclude from the experimental findings and DNA revelations that eyewitnesses are inherently unreliable. What these data internally reveal is that *critical variables affect the rise and fall of eyewitness errors* (Wells, Wright, & Bradfield, 1999). Eyewitness researchers have identified multiple sources of error, three of which are the inherent limits of the cognitive system (memory), the motives and assumptions that eyewitnesses bring to the process, and the methods of the legal system used to obtain eyewitness evidence (Seelau & Wells, 1995). These will be discussed in detail in later sections of this chapter.

The Guide for Eyewitness Evidence

The DNA-based exonerations were revealed in tandem with the maturation of the eyewitness literature, which was prepared with policy statements and practical solutions to the problems exposed. A set of recommendations put together by a collaboration of active eyewitness researchers, often referred to as "the white paper," made some specific recommendations for how to improve lineup processes to decrease inaccuracies (Wells, Small, Penrod, Malpass, Fulero, & Brimacombe, 1998). This pivotal paper highlighted the DNA findings and displayed a large amount of research evidence in support of practical police modifications, so much so that it caught the eye of Attorney General Janet Reno. Over a one-year period 34 police officers, defense lawyers, prosecutors, and psychologists met at the National Institute of Justice to put together *The Guide* for law enforcement with recommendations for how to properly handle all elements of eyewitness evidence, particularly identifications (Technical Working Group for Eyewitness Evidence, 1999). Because a multi-disciplinary group created the handbook, compromises had to be made, and not all of the researchers' recommendations were included in the final product, mostly due to legal policy concerns of prosecutors. These concerns will be discussed in later sections.

One of the main underlying rationales for distributing *The Guide* was to reduce inaccuracies in eyewitness identification at the front line (i.e., in police stations), instead of relying on the rest of the judicial system to identify bad identifications after the fact. Is this not one of the central jobs of the criminal justice system, protecting innocent suspects? Jurors are heavily persuaded by eyewitness evidence, and they are unable to distinguish between accuracy and inaccuracy. By the time an eyewitness testifies at trial, after being positively reinforced and coached by police and lawyers, he or she is so confident in the

identification that jurors have difficulty taking into consideration more valuable indicators of eyewitness accuracy (i.e., details of viewing conditions, decision processes, etc.). In addition, even when the most egregiously biased lineup procedures are used, judges almost never suppress identification evidence (Foxhall, 2000). A nationwide survey of prosecutors and law officers found that they were content with the current status quo, with respect to judges' handling of eyewitness evidence (Brigham & WolfsKeil, 1983). For example, 68% of officers and 87% of prosecutors declared that judges place the "right amount" of emphasis on eyewitness evidence. In an adversarial judicial process it is no surprise that 89% of defense attorneys disagreed with the amount of power an identification carries in the courtroom. Thus, with jurors' inability to distinguish eyewitness accuracy and the courts simultaneous emphasis on it, there might be a better chance of changing police practices than there is of preventing injustice in the courtroom.

Police seek to convict the guilty but not the innocent. From a best-practices perspective, anything that could improve that outcome should be recommended (Levi & Lindsay, 200). A "best practice" conceptualization or framework was born out of a response to the fact that *The Guide,* put out by the US Department of Justice, did not include all of the recommended lineup procedures that researchers have studied and offered as improvements. One recommendation made by psychologists that was discussed but not adequately endorsed was the sequential lineup procedure. At the time that *The Guide* was published, the police officers, lawyers, and policy makers in the working group felt that not enough was known about the sequential lineup to make it a central recommendation. Instead, *The Guide* focused lineup recommendations on issues surrounding the simultaneous lineup procedure, an area where we do know a lot about eyewitness behavior.

Face Recognition, Face Encoding, and Decision Processes

The face recognition research contributes the best theoretical foundation for better understanding eyewitness decision processes. Humans are exceptionally good when it comes to recognizing faces. However, a distinction has been made in the literature between "recognizing" and "identifying" (Mandler, 1980). *Recognizing* that something is familiar is a relatively quick process that involves determining whether there is a match between a stimulus and a memory trace or representation. Thus, when a face is seen it has to surpass a "familiarity" threshold before it is categorized by witnesses as "old." On the other hand, *identifying* is a slow and analytical process; contextual information regarding the perception and encoding of the stimulus is important. Consequently, it is more deliberative than recognizing.

An eyewitness in a lineup task has to determine whether a face was seen at the crime or somewhere else. Mandler's research shows that the critical difference between a recognition response and an identification response in this situation is the recall and analysis of the contextual information that is necessary for an identification response. Confusion on the part of an eyewitness between recognition and identification may explain why some witnesses make inaccurate identifications. This suggests that police officers are really looking for eyewitnesses to recognize someone out of a lineup as "familiar" by matching their memory of the culprit with each suspects' photograph. In a relevant extension of his discussion of recognition and identification, Mandler (1991) proposed a "dual process theory" that identified two routes of facial recognition. The automatic route, where one can recognize a face via an automatic experience of familiarity. And the controlled route, where recognition results from a more analytical and deliberate process that requires significant cognitive effort. This theory suggests that the task of identifying may

lead to greater inaccuracy if there is incorrect recall of the contextual information and these eyewitnesses will behave more analytically in trying to identify someone from the lineup.

The face recognition research suggested to eyewitness researchers that they needed to force eyewitnesses away from using controlled processing, such as deductive reasoning, to determine who the police suspect. Instead, researchers needed to ensure that lineups were a test of automatic recognition memory and not a test of recall. In other words, the goal of the researchers was to learn something from the witness's memory that they were not able to articulate in verbal recall of a description. This required an understanding of how faces are encoded and stored.

It has been empirically shown that faces are stored in memory primarily as whole configural images, even though they are encoded in terms of their constituent features (Davies, 1981; Klatzky, 1986). If faces are stored in a holistic manner, then good recognition would involve a one-to-one match between the entire stored image and the external stimulus. Thus, eyewitness researchers concurred that recognition is likely to be a basically automatic and effortless process requiring a holistic image, whereas an analytic representation would be best for recall (Wells & Turtle 1986). However, what happens when the stored image is incomplete or not clear enough? The matching between the stored image and the target would be unsuccessful. Would this lead the memory to try to rebuild the holistic image? The memory could access the encoded constituent features but would need more information to fill in the gaps. This may be where some eyewitnesses encounter difficulties. No longer able to "recognize" the culprit, they strive to "identify" him somehow. When looking at the photographs in a lineup, witnesses with incomplete memories might extract the missing facial features from the other lineup pictures. The

difficulty of trying to identify someone out of a lineup when the memory trace is not complete is likely to lead to relative judgment processing (i.e., a comparison of photographs in order to fill in the gaps). This process would require significant cognitive effort and would be very deliberative.

The face recognition and encoding literature made clear predictions for what good recognitions should look like and the process for poor identifications was inferred. Do these differences (i.e., automatic "recognizing" versus controlled "identifying") clearly differentiate accurate and inaccurate eyewitnesses viewing simultaneous lineups? And will these same theoretical predictions apply to the newer sequential lineup procedure?

What We Know About Eyewitness Decision Making

Once a lineup is fairly composed, the eyewitness is called to the police station, given instructions, and either shown a photospread of pictures or is taken into a room with a one-way mirror and shown a corporeal (i.e., live) lineup. The lineup presentation traditionally used in photospreads or live lineups is a simultaneous lineup procedure that presents the eyewitnesses with all lineup members (usually 6 or 8) at once. Understanding the limitations of the traditional simultaneous lineup procedure necessitates a discussion of eyewitness motivations.

Eyewitnesses often conclude or presume that if police have gone through all the trouble to put together a lineup, then one of the lineup members must be the culprit (Sporer, 1993). This can result in a response bias, such that witnesses feel they must make a choice from a lineup regardless of the quality of their recollections of the offender, or their ability to distinguish the offender from the lineup distractors. Support for a response bias has been found by looking at "choosing" as a decision problem which is influenced by factors

related to witnesses' decision criterion (Malpass & Devine, 1981). Studies have found choosing rates to be quite high. One study found that 82% of participants identified a lineup member, and they concluded that this high rate might reflect an "a priori belief" that the lineup contains the perpetrator (Culter, Penrod, & Martens, 1987b). This assumption incites the use of a judgmental strategy in which witnesses identify the lineup member who best resembles their memory of the perpetrator. This has been called a "relative judgment process" (Lindsay & Wells, 1985).

The *relative judgment process*, or assumption, is when eyewitnesses choose the lineup member who most looks like the culprit *relative to the other lineup members*. Of course, this decision criterion works well and produces a high rate of identifications when the culprit is in the lineup; however, when the culprit is absent any decision is an error and could put an innocent suspect in jeopardy. The problem is more evident with the realization that there is always someone who looks more like the offender than the other members in a lineup situation, and if an innocent suspect is brought in for a lineup it is extremely likely that he will most resemble the actual culprit (otherwise he might never have been brought into the investigation). Thus, eyewitnesses who do not entertain the possibility that the culprit is not in the lineup will always make a choice and this assumption will demand that eyewitnesses use deliberative cognitive processes, controlled processing.

The use of relative judgments has been contrasted to *absolute judgments* in which the eyewitnesses compare each lineup member to their memory of the culprit and use a certain criterion threshold that determines whether the match is close enough to warrant selecting a lineup member (Wells, et al., 1998; Dunning & Stern, 1994; Lindsay & Wells, 1985). This judgment strategy differs from the relative judgment strategy in that even if the assumption of the culprit

being present is maintained, the strategy entails that the person has set a threshold of recognition that is required before a selection will be made. Therefore, an identification will only be made if the absolute criterion is met between memory and an individual photograph; no comparison of lineup photographs to each other is required or necessary for the absolute judgment strategy. There is also no "closest match," the only match is a picture that reaches the identification threshold. This is consistent with a one-to-one face recognition match, automatic processing.

The easiest way to think about the difference between the two decision criteria is to understand the question that is asked as an eyewitness approaches the lineup pictures. The absolute judgment criterion answers the question "Is this the perpetrator or not?" for each lineup photograph. In contrast, the relative judgment process stipulates the question "Is this person more similar to the perpetrator than the other lineup members?" for each lineup photograph.

The real question then remained, could relative or absolute judgment processing explain eyewitness accuracy differences? In 1994, Dunning and Stern conducted studies looking at the decision processes of witnesses as they looked at simultaneous lineups. They found that inaccurate eyewitnesses viewing simultaneous lineups were most likely to use relative judgment processes, and more particularly, a process of elimination strategy of comparing the photos to each other, narrowing down the choices, and selecting a photo from those remaining. In contrast, they found that accurate eyewitnesses were most likely to indicate that it was difficult to explain why, but that the culprit's photograph just "popped out" at them, or that they just "recognized" him. These descriptions mapped onto a more absolute judgment, in which one lineup photograph is the correct one without further explanation of why.

Dunning and Stern (1994) also predicted and demonstrated that these indicators of accuracy and inaccuracy directly reflected the amount of cognitive effort expended by eyewitnesses. They found that eyewitnesses who described their decision-making as absolute and automatic (e.g., the photograph "popped out" at me) were more likely to make accurate identifications. In contrast, they found that eyewitnesses who reported using a "process of elimination strategy," indicated having difficulty picking the exact person, and depended heavily on the other lineup photographs were clearly using relative judgment and controlled processing. Indeed, people using these strategies were significantly more likely to make false identifications. Although these witnesses felt certain that the culprit must be in the lineup, they were just not sure which one he was. This more deliberative and thoughtful process did not improve their chances of selecting the correct photograph.

This type of decision processes research answered many questions about witness decision-making in simultaneous lineup situations. In addition, the findings were consistent with face recognition and face encoding theories. Eyewitness accuracy was determined by whether witnesses used automatic or controlled processes, and this dichotomy was evident in witnesses' descriptions of their own thought processes. Would this dichotomy also be true for sequential lineup eyewitnesses? If not, would the race recognition research shed light onto any deviations from simultaneous lineup decision-making?

The Sequential Lineup

In 1985, almost 20 years ago, Lindsay and Wells devised an alternative lineup format using the relative judgment conceptualization that would reduce the ability of eyewitnesses to rely on relative judgments. In the *sequential lineup presentation*, the eyewitness is presented with one lineup member (photo or live)

at a time, and she must decide for each person whether or not that person is the perpetrator before being allowed to view the next person. Although the eyewitness could decide when viewing one person that they are a relatively better match to the perpetrator than the previous person, the eyewitness cannot be sure that the next person (not yet viewed) will not look even more like the perpetrator. Researchers reasoned that a sequential procedure would disable the ease of relative judgments and induce eyewitness to use a more absolute criterion. Lindsay and Wells (1985) designed a study comparing sequential and simultaneous presentations and found that both produced almost identical correct identification rates (i.e., culprit present lineup). Yet the false identification rate (i.e., culprit absent lineup) with the simultaneous procedure (43%) was significantly reduced using the sequential procedure (17%).

The significant decrease in false identification rates has been replicated, although with small decreases in correct identifications (Cutler & Penrod, 1988; Melara, Dewitt-Rickards, & O'Brien, 1989; Lindsay, Lea, Nosworthy, Fulford, Hector, LeVan, & Seabrook, 1991; Sporer, 1993; Lindsay, Pozzulo, Craig, Lee, & Corber, 1997). In one replication, researchers also manipulated whether eyewitnesses knew the total number of lineup members that they were going to see (Cutler & Penrod, 1988). They found the sequential procedure to be superior regardless of the additional manipulation but they also found that the sequential presentation was significantly better if witnesses were not aware of the number of lineup members to be viewed. It was thought that if eyewitnesses know they are coming close to the end of the sequence, they may fall back into making guesses as to the likelihood that the remaining members will show greater resemblance to the perpetrator than the ones being viewed. Thus, in the standard sequential procedure, witnesses should not be told how many photographs they will be seeing in total.

The small decrease in correct identification rates using the sequential lineup presentation is a huge concern to the criminal justice system. However, results from a recent meta-analysis ease some of this concern (Steblay, Dysart, Fulero, & Lindsay, 2001). Although they found that correct identification rates were higher from simultaneous (50%) vs. sequential (35%) procedures, this difference largely disappeared and became nonsignificant when methodological moderator variables that model the most realistic simulations of crimes and police procedures were controlled for across experiments (e.g., live staged events, cautionary instructions, single perpetrators, and adult witnesses asked to describe the perpetrator). The correct identifications that are lost using sequential presentations could be conceived of as calculated guesses produced by a relative judgment strategy used in simultaneous lineup decisions. In the meta-analysis, Steblay and colleagues also found the superiority of the sequential procedure for decreasing false identifications of innocents, and this effect was increased when the same methodological moderators (e.g., live staged events, cautionary instructions, single perpetrators, and adult witnesses asked to describe the perpetrator) were considered. Overall, they found that the odds of actual guilt associated with identification from a sequential procedure will be twice that of the simultaneous lineup—even considering the slight decrease in correct identifications.

Two caveats must be made to the previous claims about the sequential lineup procedure. If sequential procedures are used without the use of blind administration (i.e., someone who does not know which lineup member is the suspect), it is a concern that lineup instructors will be better able to "communicate" the identity of the suspect with sequential procedures, as opposed to the simultaneous, due to the attention paid to one picture at a time

(Wells, Seelau, Rydell, & Luus, 1994). Secondly, it is important that eyewitnesses continue through the entire sequential procedure, even after an identification has been made. A central concern of prosecutors in determining recommendations for *The Guide* was that if an eyewitness selected a lineup distractor photo early in the sequential procedure, before getting to the actual suspect, then the witness' recognition for the suspect would not be tested. These modifications to lineups, the sequential procedure and double blind administration have already been made in Canada. The State of New Jersey is leading the way by imposing "attorney general guidelines for preparing and conducting photo and live lineup identifications," that include double blind procedures and sequential presentation (Farmer, 2001).

Considering the potential the sequential lineup has for reducing the eyewitness problem, one would expect to find a vast literature investigating all the parameters that are affected by such a lineup change. Unfortunately, this literature is minimal. A recent study showed that the sequential procedure advantage in maintaining accuracy while reducing false identifications was eliminated when there was the slightest change in the appearance of the perpetrator between encoding and the lineup procedure (i.e., the female perpetrator had her hair up and in a pony tail when committing the crime but had her hair down in the lineup) (Memon & Gabbert, 2003). They found that witnesses became reluctant to choose anyone and accuracy decreased to significantly less than the simultaneous lineup. There is, however, a large concern with this study, the placement of hair, up or down, is simple to address in real lineup situations, the suspect could be told to put her hair up in a pony tail. A better appearance manipulation would have been hair color or cut for women or facial hair alterations such as a beard or no beard for men. However, it is true that recognition is easier the more the retrieval conditions match the

encoding conditions. An unpublished study by Rod Lindsay and colleagues, looking at another aspect of lineup situations, found the cross-race effect (i.e., poorer accuracy rates when a witness tries to identify someone from a different race than their own) was worse in the sequential lineup compared to a simultaneous lineup (Lindsay, 2003).

In addition to these studies, there are also a few scattered studies looking at how to best diagnose eyewitness accuracy when sequential lineups are used. Sporer (1993), for example, found that witnesses accurately choosing the culprit from sequential lineups took less time viewing his face than did those who chose an incorrect face; witnesses viewing a sequential lineup made their identifications more slowly when they were inaccurate. Another study also found that accurate choices were made much faster than inaccurate choices using the sequential procedure and thus replicated Sporer's findings (Kneller, Memon, & Stevenage, 2001). In addition, this study found that inaccurate choosers took more time to select a foil (1.06 s) than they did to reject the target (0.69 s).

Most related to the studies presented here are three studies that looked at the cognitive processes and decision-making strategies of eyewitnesses' viewing sequential versus simultaneous lineups. In the first study, Lindsay and his colleagues compared simultaneous and sequential lineups when the culprit was either present or absent and asked participants to indicate on a 7-point scale whether they used a relative or absolute decision process when making their decisions (Lindsay, Lea & Fulford, 1991). They found that participants given a sequential lineup relied on "absolute" judgments significantly more often than those given simultaneous lineups. These findings were uninfluenced by whether the culprit was present or not. A second, more recent, study provided direct evidence using signal detection analyses that witnesses viewing

sequential lineups enhance discriminability because they elicit the use of an absolute decision-strategy (Gronlund, 2004). This was in contrast to a few researchers who argue that the sequential lineup simply leads witnesses to adopt a more conservative response criterion (Ebbesen & Flowe, 2002).

In the third study, researchers presented choosers (witnesses who selected a photograph, whether accurate or not) from a sequential lineup with the decision process statements from Dunning & Stern's (1994) analysis of witnesses viewing simultaneous lineups (Kneller, Memon, & Stevenage, 2001). Participants were asked which statements best described their decision-making strategy. The first two statements "I just recognized him, I cannot explain why," and "His face just 'popped out' at me" were considered to be indicative of an absolute and automatic recognition strategy. The second two: "I compared the photographs to each other in order to narrow the choices," and "I first eliminated the ones definitely not him, then chose among the rest" were considered representative of a relative judgment strategy. The last two statements included were not found to differentiate witness accuracy in Dunning and Stern: "I matched the image in my head to the picture in front of me," and "I based the judgment on specific facial features." The researchers reported findings looking at absolute versus relative decision strategies but did not report response rates to the actual individual statements. The researchers found using sequential lineups that only one witness reported the use of a relative strategy and 67% of the witnesses reported using an absolute strategy. Of the 67% of witnesses using an absolute strategy, 47% were accurate and 20% were inaccurate.

The findings from these studies support the notion that the sequential procedure reduces eyewitnesses' ability to use relative judgment strategies, and suggest that it is the use of absolute judgment strategies that influence whether

a witness is accurate, rather than the lineup presentation used or whether the culprit was present or absent. Although the data reveal interesting information about inaccurate eyewitnesses viewing sequential lineups, they do not tell us anything about the specific decision strategies inaccurate witnesses are using. In the last study described above, Kneller and colleagues found that the majority of eyewitnesses were using absolute decision strategies, but this only included 20% of the inaccurate witnesses. There must be something different about inaccurate witness decision-making in sequential lineups that thwarts total accuracy, if they are not using a relative or absolute decision strategy.

Research has clearly demonstrated that in sequential lineup situations, eyewitnesses are no longer able to use relative judgment processes and they can no longer use a process of elimination to narrow down the choices. What decision-making processes would the general face recognition research predict are used in sequential lineup procedures, particularly by those who select the innocent suspect? Indeed, accurate eyewitnesses should still be able to match their memory to each photograph in an absolute judgment, ensuring automatic processing. However, it will be more difficult for them to experience a "pop out" if there is no simultaneous array of photographs for the culprit's photo to stand out from. Thus, in the sequential lineup, accurate eyewitnesses may be more likely to only find that they just recognize the culprit.

In looking to the facial recognition literature to assist with concrete predictions for decision strategies of inaccurate witnesses in sequential lineup situations, a significant pattern was noted. The face recognition literature is primarily concerned with understanding why people are as good as they are at recognizing faces. The questions posed by these researchers neglect to ask about what happens when people are wrong. What are people thinking and doing when reaching wrong face recognitions? There is no virtually no

literature on "bad" face recognition. Thus, the only way to derive predictions is to look at the "good" recognition literature and try to extract how that might explain inaccuracy.

This series of studies asks: In the sequential lineup situation, what do inaccurate eyewitnesses think or do differently? If we assume, as discussed previously, that inaccurate eyewitnesses are people who stored incomplete images of the perpetrator, the matching between the stored image and the target would be unsuccessful. When looking at the photographs in a lineup, witnesses with incomplete memories could extract the missing facial features from the other lineup choices, which has been shown to be the case with inaccurate eyewitnesses viewing simultaneous lineups. However, eyewitnesses viewing sequential lineups no longer have the luxury of using the other lineup photographs to fill in the gaps in memory because they are only allowed to see one picture at a time and short term memory cannot hold that many photographs simultaneously. Could it be that, although faces are encoded by their constituent parts and then stored as whole images, the memory still has access to most of the constituent parts used to create the holistic image? If the holistic image is incomplete and additional information is not accessible from the other lineup pictures, the memory could access the encoded constituent features to try to identify the correct face. Inaccurate eyewitnesses could then use the facial features that were encoded and retained to identify a photograph by comparing those specific features to each photograph in the lineup and looking for the closest match. This would be in some sense, a modified relative judgment strategy. Although witnesses cannot use a process of elimination strategy, they may still be able to use one or two specific features to eliminate photographs and narrow the pool. If this is not the case, these witnesses will need to fill in the gaps in the incomplete memorial representation using

information gathered somewhere in the witness experience. A systematic exploration of eyewitness decision-making in sequential lineup situations would improve our understanding of the approximately 17% of eyewitnesses who continue to select innocent suspects.

"The simplicity of the sequential technique, along with many promising research outcomes, has made it one of the most important of all the practical contributions of eyewitness research to actual eyewitness evidence collection procedures" (Steblay, et al., 2001, p. 460). If the sequential lineup has been shown to significantly reduce the kinds of false identifications that DNA exonerations highlight, why did the working group that created *The Guide* not put sequential lineup procedures at the forefront of its recommendations? There were a number of reasons for this outcome. In 1999, the working group felt that there just was not enough research published and reported on the impact of sequential procedures, and that the research had come primarily from two eyewitness research laboratories. Thus, although there is much promise for the sequential procedure to reduce eyewitness error, the breadth and volume of research was not great enough to warrant it as a central recommendation in 1999 (Wells, Malpass, Lindsay, Fisher, Turtle, & Fulero, 2000). Since that time, there has been more published research examining different facets of the sequential lineup. However, researchers need to continue exploring the parameters of sequential lineups and the postdictive factors that will be useful to triers of fact (i.e., lawyers, judges, and jurors). We need to know more about the decision processes of witnesses, particularly inaccurate ones, as they view sequential lineups and make identifications. This series of studies seeks to fill that void. Before discussing the present studies, it is necessary to address the methodologies and terminologies commonly used in eyewitness research.

Methods and Terminology for Studying Eyewitness Identifications

In the eyewitness literature an important distinction has been made between the types of variables that can be studied. Some variables can be under the control of the police investigators like sequential lineup procedures and other have to be measured after the fact like witness decision processes.

This distinction is between estimator-variable research and system-variable research (Wells, 1978). *Estimator variables* are factors that affect eyewitness accuracy, but are not under the control of the criminal justice system. These variables can be manipulated in research but one can only estimate the role of factors such as stress, weapon focus, perceived time viewing culprit, crime seriousness, attention paid by witness, and demographic variables (i.e., age, race, and sex). The challenges to the forensic utility of estimator variables is that their levels must be assessed after the fact, and objective verification of the variables is often impossible. They probably interact with one another to affect eyewitness recall and recognition. (Wells, 1978), and they demonstrate inconsistent patterns of results across studies (McCloskey & Egeth, 1983). Thus, estimator-variable research will never be able to help alter the accuracy of a witness's account, but it can affect prosecutors', judges', and jurors' reliance on a witness's testimony.

On the other hand, system variable research looks at factors that are under the direct control of the judicial system, particularly by police who interview witnesses and conduct lineups. *System variables* include interviews, question structure, mugshots, and lineup instructions and procedures. The concept of a system variable is considered to be synonymous with the concept of a "preventable error" (Wells, 1993). If a system variable is affecting accuracy, then changes to the system will change eyewitness accuracy. Accordingly, this paper looks at witness decision-making as both a system variable and an

estimator variable. The findings from this series of studies could be important to either changing lineup procedures to make it difficult for inaccurate eyewitness to make a decision and/or helping the criminal justice system be better able to identify witness accuracy, or more importantly inaccuracy, after the fact by knowing which types of decisions processes to look for when deciding how confident to be in a given witness' choice.

In order to produce a valid and reliable body of research that policy makers will trust, eyewitness researchers consistently use the same experimental procedures. Eyewitness identification studies usually have three stages: 1) participants are shown a simulated crime via slide shows, film scenarios, or live stagings, and are typically unaware that they are going to see a crime occur and be asked identify the perpetrator or recall information, 2) a manipulation of either information, instructions, lineup composition, or lineup presentation are presented and there is an appropriate control condition for comparison, and 3) participants are asked to select the perpetrator from a show-up, photo-lineup, or live-lineup, and confidence in decision is requested. Staged crimes have the advantage of being meticulously pre-planned and recorded so that the eyewitness's identifications and other testimony can be compared and contrasted with fact (i.e., what really happened in the crime and who did it). Usually only one variable is manipulated at a time and all other factors are held constant so main effects can be determined.

When reviewing eyewitness identification experimental findings it is important to understand what is considered an eyewitness error. In one sense an error could be any identification of a lineup member who is not the culprit. However, forensically, most lineups include one suspect and a number of other "fillers" or "distractors." In addition, researchers use either target-present or target-absent lineups, and the most complete studies have both conditions. In a

target-present lineup the criminal seen in the simulated crime is a suspect in the lineup surrounded by other fillers. In a *target-absent* lineup the criminal is replaced with a similar looking suspect. It is important to always differentiate between a "suspect" and a "culprit." A suspect is someone the police believe might be the culprit, but people are supposed to be innocent until proven guilty. In practice the police are unable to differentiate between suspects and culprits until trials are complete (and often not even then), but in laboratories researches can model the two possible lineup situations. Thus, in eyewitness research, in a target-present lineup the suspect *is* the culprit, and in a target-absent lineup the suspect is *not* the culprit. The problem in actual police lineups is that nobody really knows how often the suspect is or is not the culprit in most lineups, unless further evidence is revealed or somebody else confesses to the crime (Wells, 1993).

Accordingly, there are four responses possible as a function of a single suspect, target present or absent lineup. The witness could identify the guilty suspect, which would occur only in the target-present lineup (a *hit*), or the witness could identify the innocent suspect, which would occur in a target-absent lineup (a *false identification*). In addition, the witness could select a distractor in either a target-present or absent lineup and that would be an error, but not a false identification, for no charges would be brought up against that person. Lastly, the witness could make no choice, which would be an error only in the target-present lineup (a *miss*). Therefore, the most harmful "error" is a false identification of an innocent suspect, who presumably looks similar to the real criminal. The goal then should be increasing the ratio of the frequencies of hits to false identifications by eliminating harmful influences on the identification process (Lindsay & Wells, 1980). However, previous research with simultaneous lineups showed that inaccurate witnesses in target absent

situations did not look differently in their decision processes than inaccurate witnesses in target present situations (i.e., selecting a distractor photograph).

The Present Studies

Following the model of Dunning and Stern (1994), the series of studies presented here is interested in providing a detailed analysis of eyewitness accuracy as a function of different decision-making processes using sequential lineups. The face recognition literature and previous eyewitness identification research support the belief that accurate and inaccurate eyewitnesses can be distinguished by the decision processes they use in lineup situations. The goal of the studies was to discover the types of automatic or controlled processes that eyewitnesses might use in sequential lineup situations, and then to test those processes.

Recall that the sequential lineup procedure was specifically designed to reduce the ability of witnesses to use process of elimination and relative judgment strategies. Thus, even with sequential lineups, greater accuracy should continue to be associated with automatic processing. These identifications should seem effortless and inexplicable by eyewitnesses. Due to the design of the sequential procedure and the inability of witnesses to see all of the photographs at one time, a "pop out" feature was not predicted. There would be no background for a "pop out" to reveal itself, although an automatic "Aha, that's him!" reaction could still occur.

Inaccurate eyewitnesses viewing the sequential procedure would no longer be able to make an identification through relative judgments. What other strategies might witnesses use instead? It was predicted that their decision-making would still be very deliberative. They are likely to search out additional sources of information in attempting to fill in their incomplete memorial

representation of the perpetrator. However, no clear predictions were made as to how they would go about extracting additional information from the lineup experience and photographs. It was hypothesized, based on the facial encoding research, that they might use the specific features retained in memory to compare photographs and narrow the choices. Having a better understanding of what decision-making processes eyewitnesses pursue when faced with sequential lineups may help us to better understand the false identifications still being made. In addition, these studies aimed to lend more empirical evidence and support for recommending the sequential lineup procedure to police departments in future guides or national recommendations.

Study 1 investigated the decision-making of eyewitnesses using the "think aloud" procedure from Dunning & Stern (1994). Participants had the opportunity to share their decision processes, both verbally during the lineup procedure and in an open-ended question after seeing a video-taped crime and making an identification judgment. After qualitatively analyzing eyewitness processes, the findings of this study were translated into concrete decision-making statements that could be tested in later studies.

The decision process statements of Study 1 were then tested in Study 2, to determine if they could differentiate accurate and inaccurate eyewitnesses in a meaningful way. To test this, participants became eyewitnesses after seeing a video-taped crime and were put through the same target present sequential lineup procedure as in Study 1. After the identification task was completed, these witnesses were then asked to select which decision process statements best described the strategies they used when faced with the lineup task. They were also asked, in an open-ended question, what strategies they used to select the photograph they had selected.

Studies 3 and 4 were designed to expand the sequential line-up findings to target absent situations and rule out the possibility that the decision-making findings were exclusive to one set of crime materials. Target absent situations allow researchers to identify eyewitnesses that would be making consequential false identifications in real world conditions. These studies also sought to determine if there is a significant difference between the decision-making strategies of target absent and target present inaccurate identifications, even though this was not the case with simultaneous lineups. Essentially, this study investigated whether when an eyewitness selects a photograph that is not the actual suspect, were they thinking differently before they selected an innocent suspect or a lineup distractor? In addition, Study 4 was a necessary replication of the findings using an entirely different set of materials: a new crime video created to be easier and produce more identification, a new perpetrator, and a new set of lineup distractors. It is important to show that the eyewitness decisions in Studies 1-3 were not somehow an artifact of the sequential lineup procedure they experienced.

Expecting to find some differences between accurate and inaccurate eyewitness decision-making, Study 5 was designed to manipulate those differences. If accurate eyewitnesses follow a successful decision-making strategy, then perhaps forcing all eyewitnesses to adhere to that strategy could decrease false identifications. In a similar vein, forcing all eyewitnesses to endorse strategies of inaccurate eyewitnesses should decrease witness accuracy. This would demonstrate the impact of the different decision strategies, and if successful this study would show that decision processes directly affect accuracy.

Study 6 asked participants to assume the role of police officer, lawyer, judge, or juror, and to determine the accuracy of eyewitnesses by looking solely

at the decision strategies eyewitnesses endorsed in the final questionnaire in previous experiments. This study was designed to test whether observers could intuitively determine accuracy while only having access to eyewitness decision-making processes, which is more information than jurors receive during trial. Perhaps giving jurors access to eyewitness decision strategies would aid them in better determining the accuracy or weight of witness testimony, instead of having the sole emphasis be placed on witness confidence.

Lastly, Studies 7 and 8, were interested in whether logical modifications to the traditional sequential lineup procedure would affect accuracy rates. Police officers seek to acquire as much information as possible from eyewitnesses and it is possible that witnesses who do not make an identification from the sequential lineup will be offered a second opportunity to see the lineup. Would this second opportunity significantly impact sequential lineup accuracy rates? In addition, eyewitnesses have previously mentioned their hesitation to select too early from the sequential lineup procedure for fear that a later picture will be a closer match to the culprit. Would giving eyewitnesses a preview of the lineup photographs in a sequential fashion reduce their concern for selecting in a second viewing? These two modifications to the sequential lineup procedure were contrasted with the traditional, one time view of the sequential lineup. In Study 7, only target present lineups were conducted across conditions. Study 8 served as a replication and extension, using both target present and target absent lineups.

Very few moments are more dramatic than when, prompted by a lawyer, a courtroom witness outstretches an arm, finger extended, and declares with rock-solid certainty that the accused is the person she saw fleeing the crime scene. The defense lawyer instructs the jury that the witness only got a 10 second view in the dark, took 30 minutes to pick him from the lineup, and at one time said that she

thought he was the closest looking guy. However, the jury, overwhelmed with the witness's confidence in her identification, returns a verdict of guilty, transforming the innocently accused into a criminal. The following studies address ways in which this situation could have been prevented.

CHAPTER TWO:
EXPLORING DECISION PROCESSES

Overview

Study 1 was a pilot experiment designed to explore and identify any themes or decision processes that might differentiate accurate and inaccurate eyewitnesses viewing sequential lineups. Previous work with simultaneous lineups demonstrated significant differences in eyewitness decision processes (Dunning & Stern, 1994). Study 1 sought to discover whether accurate and inaccurate eyewitnesses used different strategies for identifying a perpetrator out of a sequential lineup. I predicted that accurate eyewitness would report using more automatic recognition processes. I did not make clear predictions for how the remaining inaccurate eyewitnesses would process the sequential lineup; most previous studies on simultaneous lineups show that inaccurate eyewitnesses used a process of elimination strategy, and since the sequential lineup was designed to prevent the use of such a strategy, it was not clear which strategy inaccurate eyewitnesses would use.

Mock witnesses viewed a video-taped staged crime and then were asked to identify the culprit from a target present, eight person, sequential lineup procedure. While making their identifications all eyewitnesses were asked to share out loud their thought processes. In addition, after completing the lineup procedure, all witnesses were asked about the decision processes they had followed in reaching their decision. I was interested in identifying themes or patterns in the decision processes of witnesses who made positive identifications, meaning they identified a specific photograph as that of the perpetrator, whether correct or incorrect.

Participants

Participants were 129 Cornell University undergraduates from a variety of courses in psychology and human development who earned extra credit for their participation.

Procedure

Participants were brought into the lab individually to participate in a study called "Sponsoring Cornell." They were told that the study was focused on recruiting corporations to sponsor Cornell with monetary funds and that they were being asked to watch some partially edited video made by the Cornell Development Office and the Cornell Communications Department. Participants were informed that no sound had been added yet because we wanted them to focus on the footage taken. They were also told that the video would be turned into a recruitment piece aimed at soliciting large corporations to donate money to Cornell for campus improvements. The experimenter highlighted that it was important that participants pay close attention because we wanted their comments concerning the content and quality of the video, as well as its potential effects. Then participants signed a consent form.

Next, participants viewed the 4.5 minute video, which contained footage of all campus buildings and facilities that had been recently built, remodeled, or renovated. About three quarters of the way into the video, footage was shown of the most recently renovated location, the campus bookstore. The video focused on the renovated areas in the bookstore. The participants saw the inside of the bookstore, including random students shopping for supplies. Near the end of the footage of the bookstore, the camera panned toward the music section. The camera focused on a woman looking at greeting cards and then panned the entire compact disc music section, finally focusing in on a man

looking at a CD. The man was of European descent, early 20's, had an average build, very short brown hair, brown eyes, and was wearing a black winter jacket. The man was looking at a CD and then slipped it into the front of his partically zipped up coat and walked way. The perpetrator was visible for approximately 45 seconds and then the video concluded. The video was shown on a 27 inch flat screen television monitor.

At this point, participants were informed that the real interest of the experiment was eyewitness identifications and the experimenter had a few questions for the participant to answer. Participants then completed an approximately 10-15 minute questionnaire about events leading up to but not including the crime scene in the video. This was used as a time filler. For example, participants were asked to identify the time on the clock tower and the name of the building currently under construction.

After participants had completed the video questions, the experimenter told them that they would be participating in a lineup procedure and that we wanted them to identify the person who stole the CD from the campus bookstore. They were given the option to identify one of the photographs, refuse to make any decision, or decide that the perpetrator was not in the lineup. The experimenter read the sequential lineup instructions: "You will be shown a sequence of individual photographs and you must decide for each photograph whether or not it is a picture of the criminal you saw in the video. You can take as long as you wish to make a decision for each photograph but you will only be shown each photograph once." The experimenter also told them to "remember that the perpetrator may or may not be one of the photos presented to you."

Finally, the experimenter explained the "think aloud" procedures used in Dunning and Stern (1994). Participants were instructed to "say out loud what

you are thinking or doing, what sorts of things are going on in your head as you look at each photograph and try to make a decision." The experimenter then asked for consent to tape-record the participants' out loud thinking while they reached their judgments. The experimenter turned the tape-recorder on and began the sequential lineup procedure.

Next, the participant was handed an identification sheet that was numbered from 1 to 12 and had a "yes" or "no" option as well as a confidence scale (1=not certain, 7=very certain) for each number (See Appendix A). At the top of the identification sheet it reiterated the warning, "remember that the perpetrator may or may not be one of the photos presented to you." The experimenter held in her hand a shuffled "deck" of 12 photographs face down and read aloud the warning on the top of the participant identification sheet. Participants were not informed of the number of photos to be seen, but the identification form had places to respond to 12 photos. She then asked, "Is number one the person you saw?" At that time she turned up the deck of photographs with the first photograph in front of the witness and waited for the witness to circle either yes or no and indicate how certain he or she was of that decision. The experimenter was instructed to look at the answer sheet and not the photographs, and was blind to who the perpetrator was. After both the identification and confidence measure responses were circled, the experimenter placed the first photo behind the second photo in the deck and revealed the second photograph, repeating the procedure for all 8 photographs. After photograph #8, participants were told that there would be no more photographs. Participants were led to believe that there were 12 photographs in the lineup, so as to prevent a response bias toward the end of the lineup. In the real world, some witnesses might feel the need to select a photograph, if they think they are coming to the end of the options. Then, the identification form

was removed from the participant and he or she was asked, "Would you be willing to testify as a witness in a mock trial later this semester?" This was a second measure of the witnesses' confidence in their identification. The experimenter marked the response on the bottom of the identification form.

Materials

The "think aloud" protocol was used for two of the same reasons it was used in Dunning and Stern (1994). First, having to verbally share thought processes would make it easier for participants to answer questions about their decision processes after the lineup was completed; these dependent measures are discussed below. Secondly, tape-recording participants' thoughts as they were making their decisions could prove to be a rich source of data.

The lineup foils were selected from a collection of 50 photographs of college-aged men who possessed the same coloring and facial descriptors as the perpetrator. The similarity of these photographs to the photograph of the offender, as well as their ranking within the collection of photographs were rated and ranked by 30 student participants. In addition, the similarity of these photographs to a composite description of the offender, as well as their ranking within the collection were rated and ranked by 35 different student participants. The eight photographs selected were in the top ten ranked list both by photograph similarity and match to description and the highest ranked picture was used as the suspect replacement in subsequent culprit absent lineups. In the lineup, the perpetrator and all foils wore identical navy blue sweatshirts and gazed into the camera without emotion.

A quantitative index of lineup fairness, *functional size*, was used to measure the number of foils functionally present in the line-up that represented effective distractors (i.e., lineup foils that would protect innocent suspects while

at the same time allowing the culprit to stand out) (Wells, Leippe, & Ostrom, 1979). In order to determine functional size, mockwitnesses (people unaware of the crime) were given the description of the culprit, shown the lineup, and asked to select the culprit using only the description. Thus, functional size is the total number of mockwitnesses divided by the number of mockwitnesses who chose the suspect (or 1 over the proportion of mockwitnesses choosing the suspect). The functional sizes were 4.57 and 5.02 for the culprit present and culprit absent sequential lineups, respectively (McQuiston & Malpass, 2002). Therefore, there were approximately five good lineup distractors in each lineup.

Dependent Measures

After reaching an identification judgment (i.e., selecting a photograph, making no decision, or deciding he is not there), all participants completed a follow-up questionnaire containing similar dependent measures to those used with the simultaneous lineup procedure in Dunning & Stern (1994). First, participants were asked to reiterate their identification decision and express their confidence in their identification decision on a scale from 0% to 100%. They then were given an open-ended question asking them to describe, in their own words, their decision process or what made them choose the picture that they chose.

Next, participants were asked "How much influence did the other (nonchosen) pictures have on your decision." There were four response alternatives: "They had little influence on my decision," "As I looked at more pictures, they all began to look the same," "They confused me; they made the task more difficult," and "They were all so similar that they made me less confident." Participants could select as many responses as applied. Lastly,

participants were asked "What would you say had a greater influence on your decision, the pictures in the lineup, your memory of the culprit or both?" After completing the final questionnaire, due to experimenter blindness, participants were not told which photograph in the lineup was the perpetrator. However, they were given the researcher's email address and were told they could be emailed the identity of the perpetrator if they were interested. Participants were then debriefed by the experimenter, who shared with them the general rationale of the study and thanked them for their participation. Participants, in all studies, were explicitly asked not to share the real purposes of this study with other students.

Results

Of the 129 participants in the study, 63 (49%) made positive identifications. Of these, 19 (30%) were accurate and selected the culprit, and 44 (70%) were inaccurate and selected a distractor photograph. Inaccurate identifications did include eyewitnesses making multiple identifications from the lineup, usually two; although these witnesses are clearly uncertain, their decision processes may be useful for the qualitative analyses. Of the remaining 66 witnesses, 26 (39%) marked "no decision" and 40 (61%) insisted that the perpetrator's photograph was not in the lineup.

Decision Processes of Accurate and Inaccurate Eyewitnesses

Accurate eyewitnesses were significantly more confident in their identifications than inaccurate eyewitness (M's= 69% versus 46%), $t(56) = 3.87$, $p < .001$. The main interest was in whether accurate and inaccurate eyewitnesses described their decision processes differently. There were two measures I could use to look for decision process patterns: the "think aloud" recordings and

participants' open-ended written descriptions of their decision processes. In order to evaluate these measures, a two part coding process was conducted by the researchers for both the "think aloud" tapes and the written responses. First, both coders independently examined all of the responses to determine whether or not themes or categories emerged across participants. Then, they agreed upon categories. In the second part of the coding strategy, the raters individually re-examined each of the responses and coded them according to the outlined categories. There was 90% agreement between coders for both the verbatim think aloud tapes and the written responses. All discrepancies were resolved through discussion.

The responses were all coded according to whether participant eyewitnesses mentioned any of 6 processes or potential themes identified by the researchers: 1) they made their identification due to familiarity or being struck by a particular photograph; 2) they noticed specific features of the perpetrator and looked for those features in the photographs; 3) they said that the photo they selected looked the closest to the culprit; 4) they compared the photos to their memory of the guy; 5) they thought back to the image in the video; and 6) they had difficulty making an identification due to poor attention and poor retained image of perpetrator.

Although I expected the verbatim think aloud tapes to be most fruitful, they proved to be least interesting. Approximately 50% of both accurate and inaccurate eyewitnesses only mentioned the physical characteristics of the culprit in the video and discussed how they used those characteristics to compare each photograph. Beyond that there were sparse mentions of familiarity and comparisons to memory, but nothing was mentioned in a consistent way in relation to accuracy. The written responses proved to be much more detailed and often included decision strategies (Table 1). Potential

indicators of accuracy, from the coding, included primarily a sense of familiarity or being "struck" by a certain photograph. Indicators of inaccuracy that were mentioned included looking for specific or distinctive features and using those features to identify the culprit's photograph, selecting the photograph that looked closest to the culprit, and admitting having difficulty making an identification due to a lack of attention or image retained from the crime.

Table 1. Percent of Written Decision Processes Statements made by Accurate and Inaccurate Eyewitnesses in Open-Ended Question

	Witness Type	
Coding Category	Accurate	Inaccurate
1. Familiarity [a]	26	11
2. Looked for specific facial features [i]	74	86
3. Selected photo that looked closest to culprit [i]	26	36
4. Compared memory to photograph	21	25
5. Thought back to the image in the video	5	5
6. Difficulty making identification due to attention or image retained [i]	11	27

[a] Potential Indicator of accuracy [i] Potential Indicator of inaccuracy

Based on the qualitative analysis of participants' verbal and written responses, five decision process statements were either carried over from Dunning & Stern (1994) or extracted from the coding process and written to encompass the possible decision processes of accurate and inaccurate eyewitnesses for further exploration (Table 2). The first statement aimed to describe a sense of familiarity, "I just recognized him, I cannot explain why." The second statement was important to include, to describe attention to specific physical features, "I focused on his most distinctive feature." The third statement was chosen because many inaccurate eyewitnesses indicated that the selected photograph was more like the culprit than the other photographs, "He was the closest to what I remember but not exact." And although there was not a consistent pattern in statements about memory, many witnesses mentioned in different ways the use of some image in making their decision which led me to include the Dunning and Stern statement, "I matched the image in my head to the picture in front of me." Lastly, a number of eyewitnesses did mention thinking back to the video when looking at the photograph, so I was interested in whether the video image was what they used to make an identification and wrote the statement, "While I looked at each photograph, I tried to think back to the video and compare." No decision statement was specifically written to encompass the sixth coding category, general difficulty making an identification, because I felt that these issues were addressed in the other decision processes questions concerning attention to pictures or memory (described below). These five decision processes statements will be experimentally evaluated in Studies 2-5 and I expect that further data will confirm them as useful in discriminating between accurate and inaccurate eyewitnesses.

Table 2. Final Statements Designed or Selected to Capture Eyewitness Decision Processes when Viewing Sequential Lineups

1. I just recognized him, I cannot explain why*
2. I focused on his most distinctive feature.
3. He was the closest person to what I remember, but not exact.*
4. I matched the image in my head to the picture in front of me.*
5. While I looked at each photograph, I tried to think back to the video and compare.

* Decision process statements selected from Dunning and Stern (1994)

The other dependent measures looked at whether eyewitnesses' identifications were impacted by the other photographs in the lineup, as well as whether their memory or the pictures had a greater impact on their identification decisions. Accurate witnesses or inaccurate witnesses were not more likely to endorse any of the four items (Table 3). In addition, when asked, "What would you say had a greater influence on your decision, the pictures in the line-up, or your memory of the culprit [or both]?", accurate eyewitness were moderately more likely to say their memory (z = 1.90, p < .06, while inaccurate eyewitness were moderately more likely to say both their memory and the photographs (z = -1.79, p < .07.

Table 3. Mean Percentages of Accurate and Inaccurate Eyewitnesses Endorsing Photograph Influence Statements

Individual Item	Witness Type: Accurate (n = 63)	Witness Type: Inaccurate (n = 19)	z	p
1. The other photos had little influence on my decision.	32	20	.95	*ns*
2. As I looked at more pictures, they all began to look the same.	32	16	1.41	*ns*
3. They [other photos] confused me; made the task more difficult.	42	64	-1.59	*ns*
4. They [other photos] were all so similar that they made me less confident.	16	27	- .98	*ns*

Summary

Study 1 revealed that participant eyewitnesses who accurately identified the perpetrator in a sequential lineup came to that decision in a manner different from those who selected a photograph of an innocent person from the lineup. Accurate eyewitnesses in their written descriptions of their thought processes frequently mentioned that the culprit's photograph just looked 'familiar' to them or "struck them." Accurate witnesses moderately indicated that the other pictures had little influence on their decision. In contrast, inaccurate eyewitnesses tended to have a weak image of the perpetrator, so they selected the closest photograph and tried to use distinctive features to

identify the culprit. They also felt that the other photographs in the lineups made the task more difficult by confusing them and making them less confident. Inaccurate eyewitnesses moderately indicated that the pictures and their memory had equal impact on their lineup decision.

Some readers may note that few statistical tests were conducted in Study 1, and no tests were done on the frequencies of decision process responses of accurate and inaccurate eyewitnesses. The aim of this study was to look for common patterns or themes in eyewitnesses self-reported descriptions of their decision processes. Formal statistical tests were not appropriate because the methods were not controlled (i.e., dependent measures were open-ended) nor were they equivalent to actual eyewitness situations; real world eyewitnesses are never asked to verbalize their thought processes. Therefore, Study 2 was designed to test the qualitative findings from this study in a more controlled procedure and environment that would be ecologically valid.

Taken together, these findings suggest that there may be differences in the decision processes that accurate and inaccurate eyewitnesses use when they are faced with a sequential lineup. Further studies explored these differences and determined whether they significantly differentiate these important eyewitness groups in predictable ways.

CHAPTER 3:
DEFINING DECISION PROCESSES

Overview

Study 2 was designed to determine whether the decision processes that were qualitatively extracted from Study 1 would significantly distinguish the decision processes of accurate and inaccurate eyewitnesses viewing sequential lineup procedures. In Study 1, I identified five decision processes themes that were consistently mentioned by accurate and inaccurate eyewitnesses when describing their identification decisions and created or selected decision processes statements to reflect these themes. In this study I predicted that accurate eyewitnesses viewing a sequential lineup would be most likely to endorse decision processes statements like: "I just recognized him, I cannot explain why" and "I matched the image in my head to the person in front of me," as well as indicate that the other photographs in the lineup had little influence on their decision. In contrast, I predicted that inaccurate eyewitnesses would endorse statements like: "I focused on his most distinctive feature," "He was the closest person to what I remember but not exact," and "While I looked at each photograph, I tried to think back to the video and compare," as well as state that the other pictures in the lineup all began to look the same, confused them and made them less confident.

In this study, after seeing the same videotaped staged crime as in Study 1, eyewitnesses were shown the same eight person sequential lineup, were asked to identify the perpetrator, and were then asked to describe their decision processes by endorsing strategies presented to them, as well as describing their processes in an open-ended format. In all studies, I was interested in the

decision processes of witnesses who made positive identifications, whether correct or incorrect.

Participants

Participants were 139 Cornell University undergraduates from a variety of courses in psychology and human development who earned extra credit for their participation.

Procedure

The procedures were exactly the same as they were in Study 1, except that witnesses were not asked to "think aloud" because this proved less useful than asking for open-ended descriptions of decision processes.

Dependent Measures

After reaching an identification judgment, all participants completed a follow up questionnaire containing similar dependent measures to those used in Study 1, but with the addition of a closed-ended decision processes question using the final statements from Study 1 (See Appendix B). First, participants were asked to reiterate their identification decision and express their confidence in their decision on a scale from 0% to 100%. The main dependent measure asked, "How would you best describe your decision process." There were five responses listed and participants were told to select as many as applied. The response options included the processes statements identified in Study 1: "I just recognized him, I cannot explain why," "I focused on his most distinctive feature," "He was the closest person to what I remember, but not exact," "I matched the image in my head to the picture in front of me," and "While I

looked at each photograph, I tried to think back to the video and compare." Participants could also endorse "other" and write in their response.

Participants were then asked "How much influence did the other (nonchosen) pictures have on your decision?" The same four response alternatives were used: "They had little influence on my decision," "As I looked at more pictures, they all began to look the same, "They confused me; they made the task more difficult," and "They were all so similar that they made me less confident." Participants could, again, select as many as applied. Next, participants were asked "What would you say had a greater influence on your decision, the pictures in the lineup, your memory of the culprit or both." Finally, the last question was open-ended and asked participants to describe, in their own words, their decision process or what made them choose the picture that they chose.

After completing the final questionnaire, participants were not told which photograph in the lineup was the perpetrator due to experimenter blindness. However, they were given the researcher's email address and told they could request to be emailed the identity of the perpetrator if they were interested. Participants were then debriefed by the experimenter, who shared with them the general rationale of the study and thanked them for their participation.

Results

Of the 139 participants in the study, 56 (40%) made positive identifications, meaning they identified a specific photograph as that of the perpetrator. Of these, 31 (55%) were accurate and 25 (45%) were inaccurate. Of the remaining 83 witnesses, 55 (66%) marked "no decision," 9 (11%) insisted that the perpetrator's photograph was not in the lineup, and 19 (23%) marked

more than one photograph and thus were not included in the positive identifications.

Decision Processes of Accurate and Inaccurate Eyewitnesses

Analyses focused on witnesses who made positive identifications, whether correct or incorrect. Accurate witnesses had marginally greater confidence than inaccurate witnesses (74% vs. 42%, $t(52) = 1.90$, $p < .06$). I was most interested in finding out whether there was differential selection of decision process statements by accurate and inaccurate witnesses. The mean responses of accurate and inaccurate eyewitnesses can be seen in Table 4. Accurate eyewitnesses endorsed multiple statements such as "I matched the image in my head to the picture in front of me" (65% versus 40%, $z = 1.83$, $p < .06$) and "the other photographs had little influence on my decision" (77% versus 40%, $z = 2.85$, $p < .004$). Inaccurate eyewitnesses, as was partially predicted, were significantly more likely to endorse "While I looked at each photograph, I tried to think back to the video and compare" (76% versus 36%, $z = 3.02$, $p < .002$), and indicate that the other pictures confused them and made the task more difficult (40% versus 10%, $z = 2.67$, $p < .008$). As was not predicted, they also were marginally more likely to endorse "I just recognized him, I cannot explain why" (24% versus 7%, $z = 1.86$, $p < .06$).

In addition, when asked which had a greater influence on their decision, their memory of the perpetrator or the pictures in the lineup, three times as many inaccurate participants responded that the pictures were more influential than their memories ($z = -1.65$, $p < .10$). There was a non significant trend that accurate witnesses were more likely to indicate that their memories were more influential than the photographs in their decision making ($z = 1.22$, *ns*).

Table 4. Mean Percentages of Accurate and Inaccurate Eyewitnesses Endorsing Individual Decision Processes Statements

Individual Item	Witness Type: Accurate (n = 31)	Witness Type: Inaccurate (n = 25)	z	p
1. I just recognized him, I cannot explain why. [i]	7	24	-1.86	.06
2. I focused on his most distinctive feature.	16	16	.15	*ns*
3. He was the closest person to what I remember but not exact.	29	36	-.55	*ns*
4. I matched the image in my head to the picture in front on me. [a]	65	40	1.83	.06
5. While I looked at each photograph, I tried to think back to the video and compare. [i]	36	76	-3.02	.002
6. The other photos had little influence on my decision. [a]	77	40	2.85	.004
7. As I looked at more pictures, they all began to look the same.	13	20	-.72	*ns*
8. They [other photos] confused me; made the task more difficult. [i]	10	40	-2.67	.008
9. They [other photos] were all so similar that they made me less confident.	13	20	-.72	*ns*

[a] Indicator of accuracy [i] Indicator of inaccuracy

Next, broader, more thematic, differences in decision processes for eyewitnesses viewing sequential lineups were explored using principal components factor analysis. The factor analysis using a varimax rotation on the 5-item question of "how would you best describe your decision process," and the four item question of "how much influence did the other pictures have on your decision," revealed two clear 4-item factors, and a 1-item factor (Tables 5a & 5b). The first 4-item factor contained responses revealing a more deliberative and thoughtful strategy: "He was the closest person to what I remember, but not exact," "While I looked at each photograph, I tried to think back to the video and compare," "As I looked at more pictures, they all began to look the same," and "They [the other pictures] were all so similar they made me less confident." The second 4-item factor contained responses attuned to a simple matching strategy: "I focused on his most distinct feature," "I matched the image in my head to the picture in front of me," "They [the other pictures] had little influence on my decision," and "They [the other pictures] did not confuse me; they did not make the task more difficult." The last factor included the response most indicative of an automatic recognition strategy: "I just recognized him, I cannot explain why."

Table 5a. Factor Analysis Loadings

Individual Item	Component 1	Component 2	Component 3
1. I just recognized him, I cannot explain why.	.051	-.072	.827
2. I focused on his most distinctive feature.	.099	.672	.200
3. He was the closest person to what I remember but not exact.	.571	.105	-.497
4. I matched the image in my head to the picture in front on me.	-.193	.541	-.163
5. While I looked at each photograph, I tried to think back to the video and compare.	.458	-.417	-.277
6. The other photos had little influence on my decision.	-.596	.617	-.093
7. As I looked at more pictures, they all began to look the same.	.694	-.228	.189
8. They [other photos] confused me; made the task more difficult.	.078	-.781	.259
9. They [other photos] were all so similar that they made me less confident.	.854	.016	-.044

Table 5b. Factor Analysis Components

Factor 1: Deliberative Thought Strategy Statements
He was the closest person to what I remember but not exact.
While I looked at each photograph, I tried to think back to the video and compare
As I looked at more pictures, they all began to look the same.
The other pictures were all so similar they made me less confident.
Factor 2: Simple Matching Strategy Statements
I focused on his most distinct feature.
I matched the image in my head to the picture in front of me.
The other pictures had little influence on my decision.
The other pictures confused me; made the task more difficult (reverse scored).
Factor 3: Automatic Recognition Statement
I recognized him, I cannot explain why

After running reliability analyses two significant factors remained: the four item deliberative and thoughtful strategy ($\alpha > .63$) and a three item simple matching strategy that did not include "I focused on his most distinct feature" ($\alpha > .66$). It was not surprising that the distinct feature statement did not remain significantly tied to the other accurate statements; it was included because both accurate and inaccurate eyewitnesses in Study 1 described using a distinct feature like hair and nose to compare lineup photographs. Therefore, the data on this decision process replicate the findings in Study 1.

Further, to see if these two decision strategies could be mapped specifically onto the accuracy of the eyewitness, I averaged the items in Factor 1 together creating a deliberative thought variable and did the same with the items in Factor 2, creating a simple matching variable. Using these two new composite variables, a 2 (accurate vs. inaccurate) X 2 (simple match statements vs. deliberative statements) repeated measures ANOVA revealed a significant interaction between the type of strategy used and the accuracy of the participant witness, F (1 , 54) = 10.21, p < .002). In order to ensure that the strategies represented unique decision processes and not just witness confidence, the within-subjects 2 x 2 ANOVA was done again, controlling for confidence as a covariate, F (1 , 51) = 5.41, p < .02, the interaction was still significant. Then, I performed an independent samples t-test and found that accurate eyewitnesses (n=31) were significantly more likely to report their decision process using the simple matching strategy, t(54) = -2.98, p< .004, and inaccurate eyewitnesses (n=25) were significantly more likely to report that they reached their decision through a more deliberative and thoughtful strategy, t(54) = 2.35, p< .022 (Table 6).

Table 6. Mean Number of Simple Matching and Deliberative Thought Responses Endorsed by Accurate and Inaccurate Eyewitnesses

	Witness Type	
	Accurate (n = 31)	Inaccurate (n = 25)
Decision Strategy		
Simple Matching	2.3*	1.6
Deliberative	0.9	1.7**

*$p < .02$, *accurate witnesses significantly more likely than inaccurate witnesses to endorse simple matching strategy.*

**$p < .004$, *inaccurate witnesses significantly more likely than accurate witnesses to endorse deliberative strategy.*

Discussion

This study supports the hypothesis that there are significant differences between how accurate and inaccurate eyewitnesses process sequential lineups. I have demonstrated that the decision process of accurate eyewitnesses is a simple strategy of matching the lineup pictures to the image of the perpetrator in memory, and this process is not influenced by the other pictures in the lineup. I had predicted that automatic recognition would be a prominent technique for accurate eyewitnesses in this study, since research on the simultaneous lineup revealed such a process. However, it became evident early

in this research project that the sequential lineup makes the "pop out" of any one photograph impossible since the photos are never seen simultaneously. Therefore, accurate eyewitnesses use the picture in their memory to create recognition of the perpetrator, in the sequential lineup. This is a matching strategy that does not require the lineup photos to be presented next to each other, and yet maintains accuracy.

Inaccurate eyewitnesses proved to use a more deliberative strategy in which they appeared not to have a clear image in their head of the perpetrator, but instead relied on their ability to think back to the crime scene. These eyewitnesses tried to use the other photos in the lineup as a guide, but found the task to be difficult because all of the photos began to look the same when they were not presented all at once. Therefore, inaccurate eyewitnesses were no longer able to compare the photographs (as in a simultaneous lineup), instead they tried to think back to the crime, compare, and select the closest person. This indicates a similar pattern of inaccurate eyewitnesses trying to pick the closest person, instead of the "certain" perpetrator.

Summary

Study 2 was the experimental test of the qualitative and untested findings from Study 1. As predicted, there were significant differences in how accurate and inaccurate eyewitnesses processed the sequential lineup. By better understanding the decision-making strategies of eyewitnesses using the sequential lineup, researchers can try to design procedures making it even more difficult for inaccurate eyewitness to come to a decision, and we may even be able to successfully determine the accuracy of eyewitnesses after they have chosen a photograph. The further exploration and replication of the simple

matching strategy and the deliberative thought strategy in situations most similar to those witnesses encounter in police stations was the intent of Study 3.

CHAPTER 4:
DECISION STRATEGIES AND TARGET ABSENT LINEUPS

Overview

In Studies 1 and 2, only target present lineups were conducted. In target present lineups, accurate identifications indicate that the witness chose the correct perpetrator, and inaccurate eyewitnesses chose a foil or filler lineup photograph. In actual police lineup situations, the most problematic inaccurate identifications involve witnesses selecting an innocent suspect that is usually brought into the police station as a match to the perpetrator's description. This study will include both target present and target absent conditions and will address two central questions. Do the decision processes accurate eyewitnesses use in target present lineup situations significantly differ from inaccurate eyewitnesses in target absent situations? Is there a difference between inaccurate eyewitnesses who make identifications in target absent vs. target present conditions?

In addition, study 2 analyses did not seem to capture the potential automatic recognition processes of accurate eyewitnesses with the decision statement "I just recognized him, I cannot explain why." Although this statement did significantly differentiate accurate and inaccurate witnesses, it showed no strong connection with the other statements in the factor analyses. Thus, after looking further at accurate eyewitnesses' open-ended responses to studies 1 and 2, I included an additional decision process statement that might further capture the predicted automatic nature of accurate identifications.

After seeing the same videotaped staged crime as in studies 1 and 2, eyewitnesses were either shown an eight person target absent lineup in which the perpetrator photograph was replaced with a similar looking innocent

suspect, or they saw the same eight person target present sequential lineup used in studies 1 and 2. Then, witnesses were asked to identify the perpetrator, and describe their decision processes by endorsing up to six strategies presented to them, as well as describing their processes in an open-ended format. Any positive identification was included in subsequent analyses, regardless of whether it was correct or incorrect.

Participants

Participants were 174 Cornell University undergraduates from a variety of courses in psychology and human development who earned extra credit for their participation.

Procedure

The procedures were exactly the same as Studies 1 and 2, except participants were randomly assigned to see either an eight person target present lineup or a target absent with replacement lineup. Thus, a similar looking suspect photograph was replaced as the perpetrator photograph in the target absent condition.

Dependent Measures

After reaching an identification judgment, all participants completed a follow up questionnaire containing the same dependent measures as those used in Study 2, but with the addition of one new decision processes statement (See Appendix C). Participant witnesses were asked "How would you best describe your decision process?" There were now six responses listed and participants were told to select as many as applied. The response options included the processes identified in Study 1: "I just recognized him, I cannot explain why," I

focused on his most distinctive feature," He was the closest person to what I remember, but not exact, "I matched the image in my head to the picture in front of me," and "While I looked at each photograph, I tried to think back to the video and compare." In addition, participants could endorse "As soon as I saw the picture, I knew that it was the culprit." Participants could also endorse "other" and write in their response.

Results

Of the 174 participants in the study, 68 were in the target present condition and 106 were in the target-absent condition. From the target present condition, 24 (35%) made an accurate identification, 8 (12%) selected an innocent foil, 19 (28%) made no decision at all, and 17(25%) insisted that the perpetrator was not in the lineup. From the target absent condition, 14 (13%) selected the innocent suspect replacement, 14 (13%) selected a lineup foil, 21 (31%) made no decision at all, 54 (51%) correctly indicated that the perpetrator was not in the lineup, and 3 (3%) marked more than one photograph and thus were not included in the positive identifications.

Decision Processes of Accurate and Inaccurate Eyewitnesses

The first question of interest in this study was whether witnesses selecting the innocent replacement from the target absent lineup (i.e., inaccurate, n=14) made decisions differently from witnesses selecting the actual perpetrator in target present lineups (i.e., accurate, n=24). Accurate witnesses had significantly greater confidence than inaccurate witnesses (71% versus 53%, $t(35) = 2.12$, $p < .04$). Was there a differential selection of decision process statements by accurate and inaccurate witnesses in this situation? The mean responses of accurate and inaccurate eyewitnesses can be seen in Table 7.

Accurate eyewitnesses marginally endorsed the statement "I focused on his most distinctive feature" (21% versus 0%, $z = 1.83$, $p < .06$). In addition, they were more likely, but not significantly, to endorse "I just recognized him, I cannot explain why" (38% versus 14%, $z = 1.52$, $p < .12$), , and "As soon as I saw the picture, I knew it was the culprit" (13% versus 0%, $z = 1.38$, $p < .16$. Inaccurate eyewitnesses, selecting the target replacement, were significantly more likely to endorse "He was the closest person to what I remember but not exact" (57% versus 25%, $z = 1.98$, $p < .04$), and indicate that the other pictures were so similar they made them less confident (50% versus 21%, $z = 1.87$, $p < .06$).

When participants were asked which had a greater influence on their decision, their memory of the perpetrator or the pictures in the lineup, accurate witnesses were significantly more likely to say their memory (71% versus 29%, $z = 2.53$, $p < .01$). Inaccurate eyewitnesses were not more likely endorse that the pictures had the greatest impact on their identification ($z = -.58$, *ns)*. Instead, they significantly indicated that both their memory and the pictures impacted their decision making ($z = -2.27$, $p < .02$).

Table 7. Mean Percentages of Accurate and Inaccurate Eyewitnesses Endorsing Individual Decision Processes Statements

Individual Item	Witness Type: Target Present Accurate (n= 24)	Witness Type: Target Absent Inaccurate (n= 14)	z	p
1. I just recognized him, I cannot explain why. [a]	38	14	1.52	.12
2. I focused on his most distinctive feature. [a]	21	0	1.83	.06
3. He was the closest person to what I remember but not exact. [i]	25	57	-1.98	.04
4. I matched the image in my head to the picture in front on me.	50	36	.86	*ns*
5. While I looked at each photograph, I tried to think back to the video and compare.	63	57	.33	*ns*
6. As soon as I saw the picture, I knew that it was the culprit. [a]	13	0	1.38	.16
7. The other photos had little influence on my decision.	54	36	1.10	*ns*
8. As I looked at more pictures, they all began to look the same.	17	29	- .82	*ns*
9. They [other photos] confused me; made the task more difficult.	33	36	-.15	*ns*
10. They [other photos] were all so similar that they made me less confident. [i]	21	50	-1.87	.06

[a] Indicator of accuracy [i] Indicator of inaccuracy

As originally predicted, accurate eyewitnesses, as shown in the analyses above, were significantly more likely to endorse automatic recognition decision processes such as "I just recognized him, I cannot explain why," and the addition "As soon as I saw the picture, I knew it was the culprit." Therefore, I added an automatic recognition factor that averaged responses to "I just recognized him, I cannot explain why" and "As soon as I saw the picture, I knew that it was the culprit." Accurate eyewitnesses were moderately more likely to report using automatic decision processes $t(36) = 10.19$, $p < .07$.

Further, I wanted to see if the simple matching and deliberative processing strategies identified in study 2 would differentiate between accurate and inaccurate witnesses in this study. To test this, I averaged the items into the same two factors and created a simple matching variable and a deliberative variable. I performed an independent samples t-test and found that accurate eyewitnesses (n=24) were not significantly more likely to report their decision process using the simple matching strategy statements, $t(36) = 1.16$, *ns*, and inaccurate eyewitnesses (n=14) were also not more likely to report that they reached their decision through a more deliberative and thoughtful strategy, $t(36) = -1.47$, *ns* (Table 8). As well, a 2 (accurate vs. inaccurate) X 2 (simple match statements vs. deliberative statements) repeated measures ANOVA revealed no significant interaction between the type of strategy used and the accuracy of the participant witness, $F(1, 36) = 2.33$, $p < .14$). Although the analyses were obviously in the predicted direction, probably due to the smaller sample sizes, significance was not reached. Confirmation that Study 3 was on its way to replicating the findings of Study 2 is evidenced in the similar effect sizes from the interaction between witness strategy and accuracy in Study 2 ($\eta = .39$) and Study 3 ($\eta = .25$). Eta (η) is the proportion of variance in the dependent variable that is explained by differences among groups.

Table 8. Mean Number of Simple Matching, Deliberative Thought, and Automatic Responses Endorsed by Accurate and Inaccurate Eyewitnesses

	Witness Type	
	Target Present Accurate (n = 24)	Target Absent Inaccurate (n = 14)
Decision Strategy		
Simple Matching	1.3	1.1
Deliberative	0.9	1.6
Automatic	0.4	0.1*

* $p < .07$, *accurate witnesses were more likely to endorse automatic variable than inaccurate witnesses.*

Inaccurate Witnesses from Target Present and Target Absent Lineups

The second extension of study 3 from studies 1 and 2, was determining if the decision processes inaccurate eyewitnesses use in target absent situations significantly differ, not only from accurate eyewitnesses, but from inaccurate eyewitnesses in target present conditions. Using z scores, I compared target present inaccurate responses (n = 8) to the main dependent measures, to target absent inaccurate (n =14) responses (Table 9). Only one decision process was significantly different for both sets of inaccurate eyewitnesses, "I focused on his most distinctive feature." This decision process was endorsed more often by inaccurate eyewitnesses selecting foil photographs than by witnesses selecting

the innocent suspect in a target absent lineup (z = 1.96, p < .06). A 2 (target present inaccurate vs. target absent inaccurate) X 2 (simple match statements vs. deliberative statements) repeated measures ANOVA revealed no significant interaction between the type of strategy used and the two types of inaccurate witnesses, F (1 , 20) = .93, *ns*). However, I was concerned that there were only eight inaccurate participants in the target present condition.

In order to get a more powerful and comprehensive analyses of these differences, I collapsed the inaccurate witness data from Study 2 and Study 3, in order to determine if inaccurate eyewitnesses in target absent conditions differ significantly from those in target present conditions. By doing this, the analysis included 33 target present inaccurate identifications and 14 target absent inaccurate identifications from this study. Analysis of the collapsed data show that only one out of nine decision processes were significantly different between target present and target absent inaccurate witnesses (Table 10). One was marginally more likely to be endorsed by target present inaccurate witnesses, "I focused on his most distinctive feature" (z = 1.7, p < .08), and the other was more likely to be endorsed by target absent inaccurate witnesses, "the other photos were all so similar they made me less confident" (z = -1.97, p < .04). However, a 2 (target present inaccurate vs. target absent inaccurate) X 2 (simple match statements vs. deliberative statements) repeated measures ANOVA revealed no significant interaction between the type of strategy used and the two types of inaccurate witnesses, F (1 , 45) = .57, *ns*).

Table 9. Mean Percentages of Target Present and Target Absent Inaccurate Eyewitnesses Endorsing Individual Decision Processes Statements

	Inaccurate Witness Type			
Individual Item	Target Present (n = 8)	Target Absent (n = 14)	z	p
1. I just recognized him, I cannot explain why.	13	14	-.12	*ns*
2. I focused on his most distinctive feature.	25	0	1.96	.06
3. He was the closest person to what I remember but not exact.	50	57	-.32	*ns*
4. I matched the image in my head to the picture in front on me.	63	36	1.2	*ns*
5. While I looked at each photograph, I tried to think back to the video and compare.	63	57	.24	*ns*
6. As soon as I saw the picture, I knew that it was the culprit.	13	0	1.36	*ns*
7. The other photos had little influence on my decision.	50	36	.66	*ns*
8. As I looked at more pictures, they all began to look the same.	25	29	-.18	*ns*
9. They [other photos] confused me; made the task more difficult.	13	36	-1.18	*ns*
10. They [other photos] were all so similar that they made me less confident.	25	50	-1.15	*ns*

Table 10. Mean Percentages of Target Present and Target Absent Inaccurate Eyewitnesses from Studies 2 and 3 Endorsing Individual Decision Processes Statements

	Inaccurate Witness Type			
Individual Item	Target Present (n = 33)	Target Absent (n = 14)	z	p
1. I just recognized him, I cannot explain why.	21	14	.55	*ns*
2. I focused on his most distinctive feature.	18	0	1.7	.08
3. He was the closest person to what I remember but not exact.	39	57	-1.12	*ns*
4. I matched the image in my head to the picture in front on me.	45	36	.62	*ns*
5. While I looked at each photograph, I tried to think back to the video and compare.	73	57	1.05	*ns*
6. As soon as I saw the picture, I knew that it was the culprit.	13	0	1.36	*ns*
7. The other photos had little influence on my decision.	42	36	.43	*ns*
8. As I looked at more pictures, they all began to look the same.	21	29	-.54	*ns*
9. They [other photos] confused me; made the task more difficult.	33	36	-.16	*ns*
10. They [other photos] were all so similar that they made me less confident.	21	50	-1.97	04

Analyses of Studies 2 and 3 Collapsed

Due to the fact that most responses were not significantly different between target absent and target present inaccurate identifications, it seemed that collapsing all data from study 2 with data from this study would give the most comprehensive picture of differences between decision processes of accurate and inaccurate eyewitnesses viewing sequential lineups. Collapsing the data, there were 55 accurate witnesses and 47 inaccurate witnesses in the analyses.

Accurate witnesses had significantly greater confidence than inaccurate witnesses (72% vs. 59%, t (97) = 2.85, $p < .005$). The mean responses of accurate and inaccurate eyewitnesses can be seen in Table 11. Accurate eyewitnesses continued to significantly endorse "They [the other photos] had little influence on my decision" (67% versus 44%, $z = 2.72$, $p < .006$) and were more likely to select "I matched the image in my head to the picture in front of me" (58% versus 43%, $z = 1.58$, $p < .12$). Inaccurate eyewitnesses were significantly more likely to endorse "While I looked at each photograph, I tried to think back to the video and compare" (68% versus 47%, $z = 2.11$, $p < .04$), and "He was the closest person to what I remember but not exact" (45% versus 27%, $z = 1.84$, $p < .06$). In addition incorrect eyewitnesses were more likely to say "They [the other photos] confused me; made the task more difficult (34% versus 20%, $z = 1.61$, $p < .10$), and "They [other photos] were all so similar that they made me less confident" (30% versus 16%, $z = 1.62$, $p < .10$). Statements such as "I just recognized him, I cannot explain why" (20% versus 19%, $z = .11$, *ns*), and "I focused on his most distinctive feature" (18% versus 12%, $z = .875$, *ns*) did not distinguish the conditions once the data were collapsed.

Table 11. Mean Percentages of Accurate and Inaccurate Eyewitnesses Endorsing Individual Decision Processes Statements from Study 2 and 3 Collapsed

Individual Item	Witness Type: Accurate (n = 55)	Witness Type: Inaccurate (n = 47)	z	p
1. I just recognized him, I cannot explain why.	20	19	.11	*ns*
2. I focused on his most distinctive feature.	18	12	.75	*ns*
3. He was the closest person to what I remember but not exact. [i]	27	45	-1.84	.06
4. I matched the image in my head to the picture in front on me. [a]	58	43	1.58	.12
5. While I looked at each photograph, I tried to think back to the video and compare. [i]	47	68	-2.11	04
6. As soon as I saw the picture, I knew that it was the culprit.	13	5	.96	*ns*
7. The other photos had little influence on my decision.[a]	67	40	2.72	.006
8. As I looked at more pictures, they all began to look the same.	15	23	-1.14	*ns*
9. They [other photos] confused me; made the task more difficult. [i]	20	34	-1.61	.10
10. They [other photos] were all so similar that they made me less confident. [i]	16	30	-1.62	.10

[a] Indictor of accuracy [i] Indicator of inaccuracy

When asked which had a greater influence on their decision, their memory of the perpetrator or the pictures in the lineup, accurate participants were most likely to say their memory (71% versus 47%, z = 1.65, p < .10) and inaccurate participants were more likely to say the pictures (17% versus 7%, z = 1.53, p < .12) or both memory and pictures equally (36% versus 22%, z = 1.61, p < .10).

Do the simple matching and deliberative processing strategies identified in study 2 differentiate between accurate and inaccurate witnesses in this study? The items were averaged into the same two factors from study 2, creating a simple matching variable and a deliberative variable, in addition to the automatic recognition variable that averaged responses to "I just recognized him, I cannot explain why" and "As soon as I saw the picture, I knew that it was the culprit." A 2 (accurate vs. inaccurate) X 2 (simple match statements vs. deliberative statements) repeated measures ANOVA reveals a significant interaction between the type of strategy used and the accuracy of the participant witness, F (1 , 100) = 10.52, p < .002). The automatic variable was not included in the ANOVA because the second automatic statement was not included as a dependent measure until this study. In order to rule out that the strategies did not represent unique decision processes but were simply indicative of witness confidence, the within-subjects the 2x2 ANOVA was tested again, controlling for confidence as a covariate, F (1 , 96) = 3.77 , p < .06, the interaction maintained moderate significance. Then, performing independent samples t-tests, accurate eyewitnesses (n=55) were significantly more likely to report their decision process using the simple matching strategy statements, t(100) = 2.77, p <.007, and inaccurate eyewitnesses (n=47) were more likely to report that they reached their decision through a more deliberative and thoughtful strategy, t(100) = -2.67, p < .009 (Table 12). In addition, accurate eyewitnesses were significantly more likely to endorse automatic recognition

decision processes $t(100) = 2.10$, $p < .04$. I was not able to capture this process with the one decision statement; the addition of a second automatic processing decision statement proved successful.

Table 12. Mean Number of Simple Matching, Deliberative Thought, and Automatic Responses Endorsed by Accurate and Inaccurate Eyewitnesses from Study 2 and 3 Collapsed

	Witness Type	
	Accurate (n = 55)	Inaccurate (n = 47)
Decision Strategy		
Simple Matching	1.5*	1.1
Deliberative	0.9	1.4*
Automatic	0.4**	0.2

*$p < .009$, *accurate witnesses were significantly more likely than inaccurate witnesses to endorse the simple matching variable and inaccurate witnesses were significantly more likely than inaccurate witnesses to endorse the deliberative variable.*

**$p < .04$, *accurate witnesses were more likely to endorse automatic variable than inaccurate witnesses.*

Discussion

Study 3 was an extension of studies 1 and 2, looking at witness decision processes in target present and target absent situations. This distinction is

important in securing the ecological validity of the research for actual police situations. In this study, I found significant differences in decision-making strategies between accurate witnesses who selected the correct target from the lineup and inaccurate eyewitnesses who selected the perpetrator replacement from the lineup (i.e., innocent suspect). Accurate eyewitnesses were significantly more likely to endorse that they just recognized the culprit without being able to explain why (i.e., automatic), and they focused on his most distinctive feature and used that feature to compare against the lineup photographs. In addition, they were moderately more likely to say that as soon as they saw the picture of culprit, they knew that it was him, further representative of automatic processing. However, the findings did not completely replicate study 2. Participants did not significantly indicate the use of their memory in matching the photographs to the image in their head, although the data are in the right direction. Although approaching significance, accurate participants also did not indicate that the other photographs in the lineup had little influence on their decision. Nevertheless, when asked whether their memory, the pictures, or both had a greater influence on their decision, accurate witnesses were significantly more likely to endorse their memory alone.

Furthermore, the data from inaccurate participants did not replicate study 2. Inaccurate eyewitnesses were more likely to say that they picked the closest match but not the exact culprit, as well as indicate that all the pictures in the lineup were so similar that they were made less confident. These witnesses did not endorse the strategy of looking back to the video to compare each photograph, a large component of the deliberative thought strategy discovered in study 2. However, accurate eyewitnesses did endorse more simple matching strategy statements than inaccurate eyewitness and inaccurate eyewitnesses

selected more deliberative strategy statements. Although these findings were not significant, they did lend support for the themes identified in study 2.

Due to the fact that the target absent inaccurate data did not replicate the target present inaccurate witnesses, further analyses were undertaken to determine if these groups differed significantly in their decision making processes. Only one factor differentiated the processing of these groups, focusing on his most distinctive feature, and thus does not explain the lack of replication. Unfortunately, there were only 8 target present inaccurate identifications. So, to be certain that there was not a larger distinction between these inaccurate groups, the target present and target absent inaccurate data were collapsed across studies 2 and 3. A similar pattern emerged, target present inaccurates were still more likely to endorse using the distinctive feature approach, but target absent inaccurates were also more likely to say that the other photos were so similar they became less confident. These processes, however, were not those that significantly differentiated accurate from inaccurate witnesses in study 2.

In order to get the most complete picture of witness decision processes, and since there was little distinction between target present and target absent inaccurate witnesses, all of the data from studies 2 and 3 were analyzed together. By collapsing the data, the number of participants in each cell increased dramatically, producing enough power to show an effect if it existed. Together the data significantly differentiated the decision-making processes of accurate and inaccurate witnesses and produced what I believe is the most comprehensive analysis of the data. Accurate witnesses used the image in their head to match the pictures in the lineup and indicated that the other photographs in the lineups had little influence on their final decision. Obviously, the other photographs are taken into consideration but accurate

eyewitness did not use them as a tool to decide if the culprit's photograph was a better match. Inaccurate witnesses, on the other hand, chose the photograph that was closest to what they remembered; they thought back to the video and compared each photograph to a less clear, more distant image; and they felt that the other photographs confused them, made the task more difficult, and were so similar they became less confident. Thus, these witnesses were strategically using the other photographs to help them identify the true culprit but found that strategy very difficult with the sequential lineup procedure. When the decision strategies of both groups were broken down into the simple matching and deliberative process strategies, accurate eyewitnesses were significantly more likely to endorse the former and inaccurate witnesses the later. In addition, accurate witnesses were significantly more likely to endorse the two more automatic processes, as was originally predicted.

The primary distinction between the simple matching and deliberative thought strategies is captured in what image of the perpetrator witnesses use when attempting to identify his photograph later. Accurate eyewitnesses continue to state that they have an image in their head of the culprit and they compare that image to every photograph presented to them. On the other hand, inaccurate eyewitnesses need to look back to the video for an image, creating a far less clear image and an image that may deteriorate when more lineup photographs are presented. The ability to have an active image present after seeing a crime would cognitively enable a more accurate recognition of the perpetrator when the images are compared. Thus, I believe that accurate eyewitnesses are better able to identify the correct culprit because they were able to retain a solid image of the perpetrator in memory for later comparison.

Summary

Study 3 demonstrated a simple matching strategy used by accurate eyewitnesses and a deliberative thought strategy used by inaccurate eyewitnesses. In addition, accurate eyewitnesses did show more automatic processing, a pattern consistent throughout the eyewitness literature. This study, combined with the data from study 2, provides evidence that witness accuracy impacts or is impacted by the decision processes witnesses use. The results from Study 3, however, are based on a single crime, perpetrator, and lineup. It is important that the generalizability of the findings be well established. However, to be sure that this effect is not related to the specific quality or type of crime presented to witnesses in studies 1-3, replication of these distinctive strategies with a different set of crime and lineup materials would be more compelling. This was the aim of Study 4, to which we now turn.

CHAPTER FIVE:
REPLICATION OF ACCURACY AND DECISION STRATEGIES USING NEW CRIME STIMULI

Overview

Study 4a and 4b aimed to replicate the findings from Study 3 using a new crime, perpetrator, and lineup. As was obvious from the accuracy rates of Studies 2 and 3, the "Sponsoring Cornell" witness situation was difficult for participants. In this study, I created a new set of materials that was expected to make identifications somewhat easier for witnesses. In real world conditions, there is significant variability in the viewing conditions from crime to crime. When doing laboratory research, it is important to be sure that the decision-making processes found in the previous studies can be replicated in situations where the viewing conditions are different.

In these studies, participant witnesses were asked to identify the culprit from either a target present or target absent, eight person, sequential lineup procedure, after viewing a new video-taped staged crime in which the perpetrator steals a woman's purse. Witnesses were then asked about the decision processes they had followed in reaching their decision, using the same decision statements selected in Study 1. It was predicted that Studies 4a and 4b would replicate the findings of Study 3, distinguishing eyewitnesses by their utilization of either a simple matching strategy or a deliberative thought strategy. Accurate witnesses would also show automatic processing, it was predicted.

Participants

In Study 4a, participants were 139 Cornell University undergraduates recruited from a variety of courses in psychology and human development who earned extra credit for their participation; only *target present lineups* were included.

In Study 4b, another 188 participants, also Cornell University undergraduates from a variety of courses in psychology and human development who earned extra credit for their participation, *target present* or *target absent lineup* conditions were included.

Procedure

In both Study 4a and 4b, all participants were brought into the lab individually to participate in a study called "Objective Film Criteria." They were told by an experimenter that Cornell students over the years have expressed concern over the very subjective nature of grading in artistic courses and that we were interested in objectifying and improving the evaluation criteria used by college professors in artistic fields. Participants were told that they would critique 3 short videos shot by Cornell students in a beginning film course. The experimenter highlighted that it was important that participants pay close attention to the footage taken because after watching the videos we wanted them to evaluate each of them on how well the video was filmed using the most objective film criteria possible, and, finally, that we would be comparing student responses with those of faculty members with the goal of compiling a list of evaluative criteria that are seen as fair from both student and professor perspectives.

Participants actually only viewed two videos. The first video was 3 minutes long and contained winter footage of the city of Ithaca, and the snow,

from artistic angles. The second video, the main manipulation, was 1 minute and 50 seconds long and contained scenes of various storefronts on the Ithaca Commons. At the end of the video, during footage of one storefront, a woman walked up the ATM machine by the storefront entrance, put down her shopping bag and purse by her right foot and proceeded to acquire money from the machine. A man, standing on the other side of the store entrance, looked around, walked up, and quietly took the purse and walked in the other direction while keeping a look-out for witnesses. The perpetrator was a Caucasian male, with brown eyes, straight, short to medium length brown hair (slightly thinning), slightly olive toned skin, high forehead, oval and long face, small mouth and lips, slightly large ears, medium build, and between 5' 8"-5'10'' tall. The perpetrator was visible for approximately 25 seconds. Most of that time the camera was close-up, giving witnesses a clear view of his face, and then the video concluded. The video was shown on a 27 inch flat screen television monitor.

At this point, Study 4a and 4b were slightly different. In Study 4a, participants were all shown the same target present, eight person sequential lineup. In Study 4b, participants were randomly assigned to either a target present condition or a target absent with replacement of innocent suspect condition. The sequential lineup proecdures were exactly the same as those used in Studies 1-3.

Materials

The lineup foils were selected from a collection of 46 photographs of college-age men who possessed the same coloring and facial descriptors as the perpetrator. The similarities of these photographs to the photograph of the offender, as well as their ranking in similarity within the collection of

photographs, were made by 15 student participants. In addition, the similarities of these photographs to a composite description of the offender, as well as their ranking within the collection, were made by 20 different student participants. Five of the photographs selected were in the top ten ranked list both by photograph similarity and match to description, the other two were in the ten ranked list by match to description. The highest rated and ranked photograph was used as the suspect replacement in target absent lineups. In the lineup, the perpetrator and all foils wore identical navy blue sweatshirts and gazed into the camera without emotion.

Using the mockwitness procedure described in Study 1 and 60 total mockwitnesses, the functional sizes were 4.27 and 4.23 for the culprit present and culprit absent sequential lineups, respectively (McQuiston & Malpass, 2002). Therefore, there were approximately four good distractors in each lineup. In addition, using the mockwitness procedure and 60 mockwitnesses the target present lineup was not biased toward the perpetrator and the target absent lineup was not biased toward the suspect replacement (McQuiston & Malpass, 2002). Not biased means that the target photograph was not selected at a rate greater than chance by mockwitness persons unaware of the crime but who were given the description of the suspect and asked to select the culprit from the lineup.

Dependent Measures

The dependent measures were exactly the same as those in Studies 1-3.

Results

Two separate replication experiments were run, one with only a target present condition (Study 4a) and one with both a target absent and target

present conditions (Study 4b). Before data could be collapsed across both studies for increased power, analyses were done to be sure that target present inaccurate and target absent inaccurate witnesses are not significantly different in their decision processes, as was found in Study 3.

Of the 139 participants in Study 4a, 82 (59%) made positive identifications from a target present lineup, meaning they identified a specific photograph as that of the perpetrator. Of these, 63 (77%) were accurate and 19 (23%) were inaccurate. Of the remaining 57 witnesses, 18 (32%) marked "no decision," 19 (33%) insisted that the perpetrator's photograph was not in the lineup, 7 (12%) selected multiple photographs, usually two, and were not included in further analyses, and, unfortunately, 13 (23%) participants had to be excluded due to technical difficulties with the television setup.

Of the 188 participants in Study 4b, 74 were in the target present condition and 114 were in the target-absent condition. From the target present condition, 25 (34%) made an accurate identification, 17 (23%) selected an innocent foil, 9 (12%) made no decision at all, 21 (28%) insisted that the perpetrator was not in the lineup, and 2 (3%) selected two photographs and were not included in further analyses. From the target absent condition, 18 (16%) selected the innocent suspect replacement, 26 (23%) selected a lineup foil, 15 (13%) made no decision at all, 54 (47%) correctly indicated that the perpetrator was not in the lineup, and 1 marked more than one photograph and was not included in the positive identifications.

Inaccurate Witnesses from Target Present and Target Absent Lineups

The inaccurate witness responses from both data sets were collapsed, in order to determine if inaccurate eyewitnesses in target absent conditions differed significantly from those in target present conditions. By doing this, the

analysis included 36 target present inaccurate identifications and 18 target absent inaccurate identifications. Analysis of the collapsed data showed that only three out of nine decision processes were different between target present and target absent inaccurate witnesses, and one of these was the same as that found between studies 2 and 3 (Table 13). "I focused on his most distinctive feature" (z = -1.9, p < .06) was marginally more likely to be endorsed by target present inaccurate witnesses. The other two were more likely to be endorsed by target absent inaccurate witnesses, "The other photos had little influence on my decision (z = 2.17, p < .04)," and "They [other photos] were all so similar that they made me less confident" (z = 1.76, p < .08). Replicating Study 3, a 2 (target present inaccurate vs. target absent inaccurate) X 2 (simple match statements vs. deliberative statements) repeated measures ANOVA revealed no significant interaction between the type of strategy used and the two types of inaccurate witnesses, F (1 , 54) = 1.57, *ns*).

Analyses of Collapsed Data

Due to the fact that, again, most responses were not significantly different between target absent and target present inaccurate identifications, it seemed that collapsing all data would give the most comprehensive replication of differences between decision processes of accurate and inaccurate eyewitnesses viewing sequential lineups. Collapsing the data, there were 88 accurate witnesses and 54 inaccurate witnesses in the analyses.

Accurate witnesses had significantly greater confidence than inaccurate witnesses (77% vs.62%, t (140) = 3.50, p < .001). The mean responses of accurate and inaccurate eyewitnesses can be seen in Table 14. Accurate eyewitnesses continued to significantly or marginally endorse multiple statements such as "I focused on his most distinctive features" (28% versus 15%, z = 1.86, p < .06), "I

matched the image in my head to the picture in front of me" (68% versus 50%, $z = 2.16$, $p < .04$), "As soon as I saw the picture, I knew it was the culprit" (26% versus 95, $z = 2.45$, $p < .01$), and "the other photographs had little influence on my decision" (72% versus 52%, $z = 2.38$, $p < .02$).

Inaccurate eyewitnesses were significantly more likely to endorse "He was the closest person to what I remember but not exact" (44% versus 16%, $z = 3.73$, $p < .001$), "As I looked at more pictures, they all began to look the same (17% versus 5%, $z = 2.43$, $p < .02$), and "They [other photos] were all so similar that they made me less confident" (26% versus 13%, $z = 2.04$, $p < .04$). "While I looked at each photograph, I tried to think back to the video and compare," although not significant, was in the right direction (61% versus 52%, $z = 1.02$, *ns*).

Statements that did not distinguish between conditions included, "I just recognized him, I cannot explain why" (26% versus 30%, $z = -.51$, *ns*), and "They [other photos] confused me; made the task more difficult" (28% versus 23%, $z = .68$, *ns*).

When asked which had a greater influence on their decision, their memory of the perpetrator or the pictures in the lineup, accurate and inaccurate participants were most likely to say their memory (70% and 61%, respectively). This did not replicate the finding in previous studies, in which accurate witnesses generally indicate their memory having greater influence, and inaccurate witnesses indicated that the pictures or both had greater influence over their decisions.

Table 13. Mean Percentages of Target Present and Target Absent Inaccurate Eyewitnesses Endorsing Individual Decision Processes Statements

	Inaccurate Witness Type			
Individual Item	Target Present (n = 36)	Target Absent (n = 18)	z	p
1. I just recognized him, I cannot explain why.	25	28	-.22	*ns*
2. I focused on his most distinctive features.	8	28	-1.9	.06
3. He was the closest person to what I remember but not exact.	50	33	1.16	*ns*
4. I matched the image in my head to the picture in front on me.	47	56	-.58	*ns*
5. While I looked at each photograph, I tried to think back to the video and compare.	58	67	-.60	*ns*
6. As soon as I saw the picture, I knew that it was the culprit.	8	11	-.33	*ns*
7. The other photos had little influence on my decision.	42	72	-2.17	04
8. As I looked at more pictures, they all began to look the same.	14	22	-.77	*ns*
9. They [other photos] confused me; made the task more difficult.	33	17	1.29	*ns*
10. They [other photos] were all so similar that they made me less confident.	33	11	1.76	.08

Table 14. Mean Percentages of Accurate and Inaccurate Eyewitnesses Endorsing Individual Decision Processes Statements from Collapsed Data

Individual Item	Witness Type: Accurate (n = 88)	Witness Type: Inaccurate (n = 54)	z	p
1. I just recognized him, I cannot explain why.	30	26	.51	*ns*
2. I focused on his most distinctive features. [a]	28	15	1.86	.06
3. He was the closest person to what I remember but not exact. [i]	16	44	-3.73	001
4. I matched the image in my head to the picture in front on me. [a]	68	50	2.16	.04
5. While I looked at each photograph, I tried to think back to the video and compare.	52	61	-1.02	*ns*
6. As soon as I saw the picture, I knew that it was the culprit. [a]	26	9	2.45	.01
7. The other photos had little influence on my decision. [a]	72	52	2.38	.02
8. As I looked at more pictures, they all began to look the same. [i]	5	17	-2.43	.02
9. They [other photos] confused me; made the task more difficult.	23	28	-.68	*ns*
10. They [other photos] were all so similar that they made me less confident. [i]	13	26	-2.04	04

[a] Indictor of accuracy [i] Indicator of inaccuracy

Most importantly, did the simple matching and deliberative processing strategies identified in studies 2 and 3 differentiate between accurate and inaccurate witnesses in this study? The items were averaged into the same two factors found in Study 2, creating a simple matching variable and a deliberative variable. The automatic recognition factor was also created and it was the average of responses to "I just recognized him, I cannot explain why" and "As soon as I saw the picture, I knew that it was the culprit." A 2 (accurate vs. inaccurate) X 2 (simple match statements vs. deliberative statements) repeated measures ANOVA revealed a significant interaction between the type of strategy used and the accuracy of the participant witness, F (1 , 140) = 18.26, p < .0001). The ANOVA did not include the automatic strategy so as to represent a simple replication of both studies 2 and 3. Performing an independent samples t-test, as predicted, accurate eyewitnesses (n=88) were significantly more likely than inaccurate eyewitnesses to report their decision process using the simple matching strategy statements, t (140) = 3.04, p < .003, and inaccurate eyewitnesses (n=54) were more likely than accurate eyewitnesses to report that they reached their decision through a more deliberative and thoughtful strategy, t (140) = -3.96, p < .001 (Table 15). However, accurate eyewitnesses, as found in Study 3, were not more likely to endorse automatic recognition decision processes t(140) = 1.29, *ns,* although the findings are in the predicted direction. In order to ensure that the strategies represented unique decision processes and not just witness confidence, the within-subjects 2 x 2 ANOVA was done again, controlling for confidence as a covariate, F (1 , 139) = 10.82, p < .01, the interaction was still significant.

Table 15. Mean Number of Simple Matching and Deliberative Thought Responses Endorsed by Accurate and Inaccurate Eyewitnesses from Collapsed Data

	Witness Type	
	Accurate (n = 88)	Inaccurate (n = 54)
Decision Strategy		
Simple Matching	1.7*	1.6
Deliberative	0.8	1.3**
Automatic	0.4	0.3

*$p < .003$, *accurate witnesses significantly more likely than inaccurate witnesses to endorse simple matching strategy.*

** $p < .001$, *inaccurate witnesses significantly more likely than accurate witnesses to endorse deliberative strategy.*

Discussion

This study sought to replicate the findings from the data of Studies 2 and 3 collapsed. Although there was significant overlap, it was not a perfect replication. It successfully replicated the findings that accurate eyewitnesses' decision making is founded on a simple matching strategy, in which they match an image in their head to each picture presented to them in sequential order, and they do not allow the other lineup photographs to influence their identification. In addition, as predicted but not found in Study 3, accurate eyewitnesses in this study felt that as soon as they saw the picture of the culprit, they knew it was him. It was predicted that this automatic strategy would be

more significantly used by accurate witnesses; however, it was not included in the decision processes until Study 3, making it difficult to get significance in the collapsed data from Studies 2 and 3. In this study, the data indicate that accurate witnesses were significantly more likely to focus on a distinctive feature and compare that feature to each photograph. Until now this decision process has been the most inconsistent and even differentiated target present inaccurates from target absent inaccurates in both Study 3 and the present study. Therefore, this decision process will not be considered a reliable source of information for distinguishing witnesses' decision making strategies.

This study also significantly, but imperfectly, replicated the decision processes of inaccurate eyewitnesses in Study 3. The data indicate that inaccurate eyewitnesses are still significantly more likely to use more deliberative thought strategies in selecting a lineup photograph. They are more likely to endorse that they selected the closest photograph even though he was not the exact perpetrator, as well as say that the other pictures in the lineup were so similar that they became less confident in their decisions. The strategy of thinking back to the video to compare that memory with each photograph did reach significance in this study, as it did in Study 2 but not Study 3.

There is, however, a possible explanation for this strategy not reaching significance even though the composite deliberative thought strategy did prove significant. The target absent and target present experiment in this study required a significantly greater number of participants in order to get enough positive identifications to do statistical analyses. This may be due to the fact that the majority of this data were collected in the fall semester, when many participants were taking a psychology and law course. The difficulty with these participants is that they may have become overly cautious eyewitnesses, less likely to make identifications and more likely to say that they just don't know

which picture is him. In the psychology and law course there are multiple lectures on eyewitness evidence, discussing the large number of false identifications made by witnesses in police stations everyday. This information may cause these participants to develop a higher threshold for selecting a photograph. Thus, not only do they select fewer photographs, but those that do chose a photograph may use different processes than the typical inaccurate eyewitness.

Regardless of the circumstances and the above findings, I do believe that inaccurate eyewitnesses have a less clear image of the perpetrator in their mind and deliberatively think back to the video in order to compare the lineup photographs to the culprit. This is supported by the fact that the composite deliberative thought strategy maintained significance regardless of this one decision process not reaching significance.

The simple matching strategy and the deliberative thought strategy have proven successful across multiple studies and hundreds of participants. It is intuitive that having to think back to the crime in the video would produce a much less promising memory trace than having an image retained from the video to use when making an identification. When this memory trace proves less helpful, inaccurate eyewitnesses attempt to use the other photographs in the lineup to narrow their selections. The difficulty lies in their inability to directly compare all of the lineup photographs, the explicit intention of the sequential lineup procedure. Thus, accurate eyewitnesses carry an advantage even before the lineup is presented to them. If this is truly the case, then would forcing accurate eyewitnesses to use a more deliberative and thoughtful strategy decrease accuracy rates? In the same vein, would encouraging inaccurate eyewitnesses to create a clear image of the perpetrator before seeing the lineup improve their accuracy rates?

Summary

Study 4 replicated most of the findings from studies 1-3, using a new crime, perpetrator, and lineup. These materials did prove to be easier for witnesses, increasing the identification rates from Studies 1-3. Even when participants were overly cautious in making identifications, the identification rates did not decrease from those seen in Studies 1-3. The simple matching strategy and the deliberative strategy both proved successful in continuing to differentiate accurate and inaccurate decision-making processes. Although the findings are encouraging, what is more ecologically important is whether these strategies can be used by law enforcement to improve the accuracy of eyewitness, in other words, to decrease false identifications of innocent suspects. The goal of Study 5 was to reveal whether forcing witnesses to use a particular decision strategy would affect witness accuracy rates.

CHAPTER SIX:
ACCURACY AND SIMPLE MATCHING VERUS DELIBERATIVE THOUGHT STRATEGIES

Overview

The data presented thus far have consistently found that accurate eyewitnesses endorse a simple matching strategy and inaccurate eyewitnesses endorse a deliberative thought strategy. This knowledge alone is interesting, but its application to real police concerns is limited unless we know how useful the strategies may be in affecting witness decision strategies. If police officers encourage witnesses to create an image of the perpetrator before seeing the sequential lineup photographs, will that lead to greater accuracy? In contrast, does forcing witnesses to use a more deliberative process lead to greater inaccuracy? These questions are central to understanding the role of decision processes in witness accuracy. It could be that the decision process makes no difference, a witness either knows who the perpetrator is or does not, even before seeing a lineup. I predicted that manipulating witness decision processes would significantly affect accuracy of identifications. Compared to a control group, accuracy would decrease when witnesses are asked to be more deliberative in their processing, and think back to the video and compare for each photograph. Alternately, compared to a control group, inaccuracy would decrease when witnesses are instructed to create an image in their head and use only that image to compare to each lineup photograph.

Study 5 aimed to manipulate witnesses' decision processes in order to experimentally determine the centrality of the two decision strategies to witness accuracy. Participant witnesses were brought into the lab and assigned to either a control condition, a create an image condition, or a think back to the video

condition. Following the procedures and using the materials from Study 4, after seeing the crime participants were instructed as to what processes they were to use in determining which photograph was the perpetrator. They were then presented with the eight person sequential lineup and asked to identify the culprit in a target present or a target absent situation.

Participants

Participants were 167 Cornell University undergraduates recruited from a variety of courses in psychology and human development, who earned extra credit for their participation.

Procedure

Participants were brought into the lab individually to participate in the study called "Objective Film Criteria." They were told the same cover story and viewed the same videos as used in Study 4. After seeing the crime, participants were informed that the study was really interested in eyewitness identifications and were asked to answer some questions about the video in which the crime took place (a filler task). There were three conditions: control (N= 44), "create an image" (N= 73), and "think back" to the video (N= 50). In addition, participants either saw a target present or a target absent lineup in each condition. Thus, this study was a 3 (control, create an image, or think back) X 2 (target present vs. target absent) design.

The control condition participants immediately began the standard sequential lineup procedure. The "create an image" participants were instructed: "Before you view the lineup, we want you to take a few moments to form an image in your head of the perpetrator. Please do so now and indicate to me when you have this image. For each photograph in the lineup, we want you

to match the image you just created to each photograph I will present to you." Then, they were asked if they understood the instructions and immediately began seeing photographs sequentially. The "think back" to the video condition received the following instruction: "Before you view the lineup, we want you to think back to the second video. Please do so now and indicate to me when you have this image. For each photograph in the lineup, we want you to think back to the video and compare that image to each photograph I will present to you." Again, they were asked if they understood the instructions and the experimenter immediately began showing them the first lineup photograph. All procedures from this point on replicated Study 4.

Dependent Measures

The post-identification questionnaire was exactly the same as that used in Studies 3 and 4. The main dependent measure in this study was witness accuracy rates, comparing the control condition to the two experimental conditions (i.e., create an image and think back to the video). The decision-process statements were used as manipulation checks in this study, to make sure that participants followed the experimenters instructions to either create an image or think back to the video.

Results

Of the 167 participants in the study, 83 were in the target present condition and 84 were in the target-absent condition. From the target present condition, 10 (45%) of controls, 21 (58%) of create an image participants, and 14 (56%) of think back participants made accurate identifications. From the target absent condition, 3 (14%) of controls, 4 (11%) of create an image participants, and 4 (16%) of think back participants made false positive identifications.

Think Back to the Video Condition

Did forcing participants to "think back" to video and compare that image to each photograph, the more deliberative strategy, reduce accuracy rates? Looking only at the target present condition (Figure 1), the "think back" instructions produced an accuracy rate (56%) not different from the control condition (45%), $X^2(1) = .521$, *ns*). It was also not even in the predicted direction. Therefore, participants in this condition did not make less accurate identifications but perhaps they made significantly more inaccurate identifications? In the target absent condition, the "think back" condition inaccuracy (16%) rate did not significantly differ from the control condition (14%), $X^2(1) = .05$, *ns*).

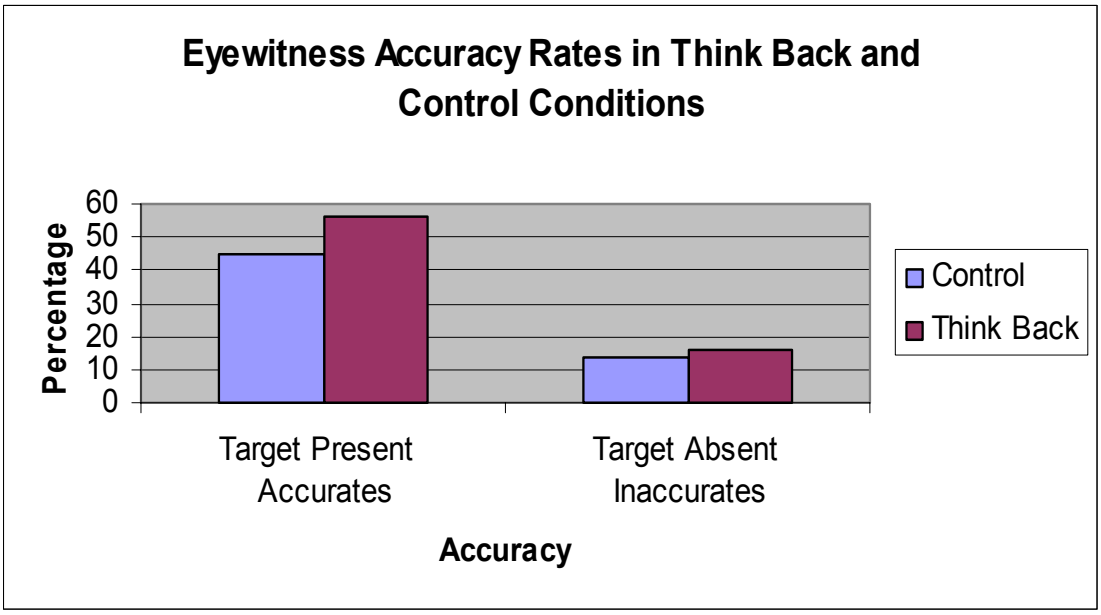

Figure 1. Witness Accuracy Rates (%) between "Think Back" and Control Conditions

Create an Image Condition

Did forcing participants to "create an image" and use only that image to compare with each photograph, the simple matching strategy, increase accuracy rates? Looking only at the target present condition (Figure 2), the "create an image" instructions produced an accuracy rate (58%) not significantly greater than the control condition (45%), $X^2(1) = .91$, *ns*); although the data were in the right direction. Therefore, participants in this condition did not make more accurate identifications but perhaps they made significantly less inaccurate identifications? In the target absent condition, the "create an image" condition inaccuracy (11%) rate did not significantly differ from the control condition (14%), $X^2(1) = .11$, *ns*).

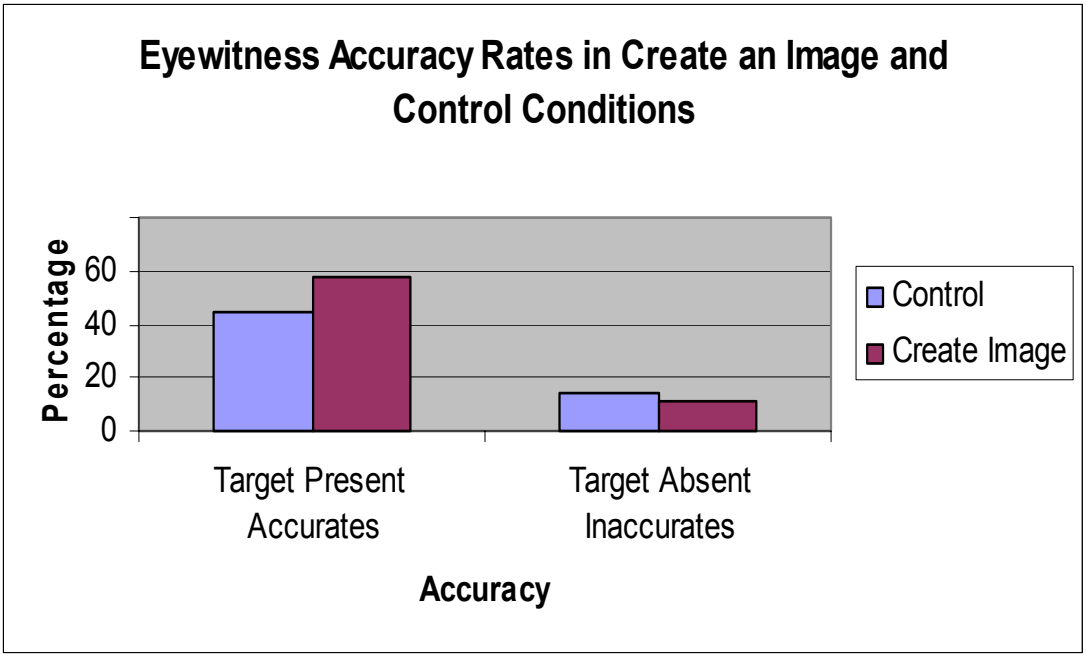

Figure 2. Witness Accuracy Rates (%) between "Create an Image" and Control Conditions

Diagnosticity

Based on the above findings, neither of the decision strategy instructions demonstrated the predicted findings. However, it is important to look at the bigger picture of whether one instruction affected both accuracy and inaccuracy rates in beneficial ways. Eyewitness researchers argue that the diagnosticity ratio is one of the best indicators of the potential value of a lineup technique or instructions as a source of evidence (Wells & Lindsay, 1980, 1985). The diagnosticity ratio is calculated as the ratio of the proportion of correct and false decisions. The higher the diagnosticity ratio, the greater the probative value of identification decisions from such lineup procedures should be. Table 16 shows the findings of all six cells of this experimental design. The diagnosticity ratios were 3.2 for the control condition, 5.3 for the "create an image" condition, and 3.5 for the "think back" condition. The probative value of the sequential procedure was greatest when participants were forced to create an image of the perpetrator and were asked to compare only that image to each lineup photograph to be presented to them. This manipulation of witness decision strategies made the accuracy rates more diagnostic than both the control condition and the "think back" condition.

Manipulation Check

In order to better understand the lack of significant effects in both of the manipulation conditions, it is important to determine if participants followed the decision strategy instructions given to them. Overall, their self-reported decision processes on the dependent measure revealed that participants were not following the specific instructions given to them. In the "create an image" condition, 52% of participants in both target present and target absent conditions reported "I matched the image in my head to the picture in front of

me" as a description of their decision strategy. This was not significantly greater than the control condition (41%), z = 1.17, *ns*. In the "think back" condition, 64% of participants in both target present and target absent conditions reported "While I looked at each photograph, I tried to think back to the video and compare" as one of their decision strategies. However, this also did differ at all from the control condition (61%), z = .26, *ns*. Based on these findings, it doesn't appear that the manipulation was effective enough, although in debriefing participants indicated that they followed the instructions while viewing the lineup photographs.

Table 16. Identification Decisions (%) and Diagnosticity Ratios Resulting from Control, "Create an Image" and "Think Back" Lineup Strategies

	Identification		
Lineup Strategy	Target Present Accurate	Target Absent Inaccurate	Diagnosticity Ratio [a]
Control	45	14	3.2
Create an Image	58	11	5.3
Think Back	56	16	3.5

[a] Proportion of correct identifications: proportion of false identifications

Discussion

The best way to test if identification accuracy and inaccuracy result from different processing strategies is to manipulate the kind of decision-making strategies in question and then note changes in accuracy. Study 5 sought to

demonstrate that promotion of a simple matching strategy of comparing each picture with an image stored in memory could elicit an increase in accuracy rates; whilst the implementation of a very controlled and deliberative strategy, think back to the video for each photograph and compare only that image to make a choice, would decrease accuracy. The data did not support these predictions. In this study, participants forced to "create an image" did not provide significantly greater accuracy and reduced inaccuracy than participants who made their identifications freely. As well, participants forced to "think back" also did not produce significantly greater inaccuracy or decreased accuracy than those who made their identifications freely. The manipulation checks revealed that in both conditions participants did not report following the instructions given to them. Although, careful debriefing of participants in the first few weeks of the experiment had indicated that they understood and were following the decision strategies that they were told to use. However, the manipulation checks of later participants provide a strong explanation for why the findings were not significant.

Although within the target present and target absent conditions the data did not support all of the hypotheses, the diagnosticity ratio of target present accuracy to target absent inaccuracy revealed stronger diagnosticity of the lineup for those told to use the simple matching strategy. This is indicative of a greater proportion of accuracy to inaccuracy, the main goal of all eyewitness research. Thus, Study 5 could be revealing more about eyewitness motivation in the laboratory than the effectiveness of forced decision strategies. However, it could also be that the decision process makes no difference, a witness either knows who the perpetrator is or does not, even before seeing a lineup. Casual direction is discussed in the last chapter.

Summary

Study 5 demonstrated that the manipulation of witness decision strategies was not an easy task and the findings do not give a clear picture of the effectiveness of forcing witnesses to follow simple matching or deliberative thought strategies. I do not believe that the data from this study indicate that these strategies do not map onto witness accuracy and inaccuracy. However, they do discourage the possibility that these decision strategies will be useful as system variables. Whether or not these decision processes can actively be used by police officers to encourage witness accuracy is inconclusive but not hopeful. Further replication would be necessary, perhaps with an increase in motivation for laboratory witnesses.

Although the decision strategies did not prove effective as a system variable, they could prove to be more effective as an estimator variable. Knowing the decision processes of eyewitnesses after the fact, could help triers of fact determine the reliability of a given eyewitness' testimony. The goal of Study 6 was to demonstrate whether the distinction between a simple matching strategy and a deliberative strategy would help potential jurors' postdict witness accuracy.

CHAPTER SEVEN:
POSTDICTING EYEWITNESS ACCURACY

Overview

Every single day police officers, lawyers, judges and jurors all over the country are attempting to postdict eyewitness accuracy, they are trying to determine whether or not the witness was accurate after an identification has been made. How useful is an understanding of the decision-making strategies discovered and illuminated in Studies 1-4 in postdicting witness accuracy? Would explicit information about the decision processes be helpful and aid potential jurors in distinguishing accurate from inaccurate eyewitnesses more successfully?

Study 6 was designed to address these questions using similar procedures as Study 5 in Dunning and Stern (1994). Participants were placed in the role of police officer, lawyer, judge, or juror, and they were asked to decide whether eyewitnesses were accurate or incorrect. Roughly half the participants were informed of the decision processes examined in studies 1-3, being told that accurate witnesses tended to use a simple matching strategy and inaccurate witnesses a more deliberative and thoughtful strategy. The other half were not given any cues about eyewitnesses' decision-making; their findings would indicate whether people can intuitively and effectively use witness decision processes when determining accuracy. All participants were given a set of post-identification questionnaires completed by actual participants in Study 3. They were asked to decide, for each, whether the witness's positive identification had been correct or incorrect. The success rates of the informed and uninformed groups would be compared.

Participants

Participants were 53 Cornell University undergraduates from a variety of courses in psychology and human development who earned extra credit for their participation.

Procedure

Participants arrived and were run in small groups. They were told that we were interested in eyewitness testimony, and what criteria people use to evaluate the accuracy of an eyewitness to a crime. There were given a description of the crime and identification task used in Study 3, and were told that they would be shown post identification questionnaires from witnesses who made positive identifications, meaning they selected a photograph. They were informed that some of the witnesses selected the correct photograph and others selected incorrect photographs and their task was to decide which of the eyewitnesses made accurate identifications and which made inaccurate identifications, as if they were a police officer, judge, or attorney.

All participants completed a consent form and were handed a sheet with further instructions, 40 witness protocols, and a sheet for marking their judgments. In the informed condition (n= 26), the written instructions included helpful hints to be considered when making their judgments. They were told that the hints were to be helpful but not concrete, and to use their best judgment. The helpful hints told participants in the informed condition that accurate eyewitnesses tended to match the image in the head with the pictures in front of them, said that the other picture in the lineup did not influence their decision and did not confuse them, and indicated that their memory had a greater impact on their identifications than the other lineup photographs. In addition, they were informed that inaccurate eyewitnesses chose the picture

that was closest to the culprit but not exact, looked at each photograph and tried to think back to the video and compare, said that as they looked at more pictures they all began to look the same and were so similar they made them feel less confident. As in Dunning and Stern (1994), informed participants were also told that the hints were to be considered "helpful, but not to be compelling," and that they "should use [their] own best judgment in addition to these hints" when making their decisions. In the uninformed condition (n= 25), the written instructions contained no hints or cues but merely reiterated that their task was to decide whether each witness had been accurate or inaccurate.

On the judgment sheet, after participants marked down their judgments for the 40 protocols, they were asked in an open-ended fashion to describe the strategies they followed when completing the task. Then, the protocols and judgment sheet were removed and they were asked to complete a questionnaire asking them to rate which decision process components they found most helpful. The questionnaire presented them with all 14 items contained in the post identification protocols they examined. For each item, using their experience, they were asked whether a witness endorsing that item was more likely to be accurate or inaccurate in his or her identification. They responded on an 11-point scale ranging from -5 (witnesses endorsing this item were definitely inaccurate) to 5 (witnesses endorsing this item were definitely accurate), with 0 indicating that that item had nothing to do with accuracy or error.

Once they completed the final questionnaire, participants were completely debriefed as to the purpose and aims of the study. If they were interested, an answer sheet for the task was available.

Materials

Each protocol packet included questionnaires from 20 accurate and 20 inaccurate participant witnesses in Study 3. The questionnaires were selected at random and placed in random order in the packets, but there were not enough questionnaires to create more than one set of protocols for this study. Questionnaires from Study 2 were not included because the decision process "as soon as I saw the picture, I knew it was the culprit" had not been included yet and proved to play a significant role in Study 3. In addition, participants in this study saw only certain parts of the information provided by witnesses on the post identification questionnaire. They were given information as to how each witness had responded to the three close-ended questions included in all previous studies: "How would you describe your decision processes?" "How much influence did the other pictures have on your decision?" and "What would you say had a greater influence on your decision, the pictures in the lineup, or your memory of the culprit?" Information that was covered up on the questionnaires during photocopying included the specific photograph chosen, witness confidence, and responses to open-ended questions. These items were not included because I wanted to see whether participants would rely on the decision process measures that had successfully differentiated accurate and inaccurate identifications in the previous studies.

Dependent Measures

The main dependent measure was the judgment sheets that participants completed while looking at the 40 protocols. The final questionnaire that included the 14 decision processes was used as a manipulation check as to whether informed participant used the helpful hints cues when determining accuracy or inaccuracy.

Results

Participants did not display any ability to differentiate accurate from inaccurate eyewitness identifications. As seen in Table 17, uninformed participants correctly classified 50.5% of the witness protocols, a rate equivalent to chance. The informed participants performed slightly below chance (47%), and significantly worse than the uninformed participants, t (49) = -2.79, $p < .008$.

Table 17. Accuracy Rates (%) of Informed and Uninformed Conditions

	Condition	
Witness Accuracy	Informed (n = 26)	Uninformed (n = 25)
Accurate	44.6	46.6
Inaccurate	49.4	54.4
Combined	47.0	50.5*

* $p < .008$

Did participants in the informed condition pay attention to the written "helpful hints" given to them? After evaluating the witness protocols, participants were asked about their decision-making processes and whether, overall, witnesses' selection of a particular answer made them more likely to be accurate or inaccurate in their identification (Table 18). On average, both informed and uninformed participants indicated that witnesses citing simple matching strategy responses were more likely to be accurate than inaccurate

(2.8 and 3.0, respectively). However there was no significant difference between conditions, t (49) = -.534, *ns*. In addition, both informed and uninformed were also equally likely to state that witnesses citing deliberative strategy responses were more likely to be inaccurate than accurate (-1.7 and -1.5, respectively; t (49) = .729, *ns*). Therefore, informed participants did not show any indication of having received additional information concerning witness decision-making and did not perform at levels greater than those who only had their intuitions to rely on.

Table 18 . Weight Given to Witness Questionnaire Responses by Judges Assessing Accuracy of Identification

	Condition	
Stated beliefs about relationship of measure to accuracy	Informed	Uninformed
Simple Matching Strategy	2.8	3.0
Deliberative Strategy	-1.7	-1.5

[a] Judges' stated beliefs, responses were made on a scale ranging from -5 (*witness definitely inaccurate when endorsed*) to 0 (*response has no relationship to accuracy)* to 5 *(witness was definitely accurate*).

In order to determine if the "helpful" hints were simply neglected because they were distributed in a written format, an additional 12 participants were run and were instead given the hints in a "mini lecture" format. The

procedures were exactly the same except the experimenter read aloud a summary of the hints before handing them the written instructions with the helpful hints. Table 19 shows the accuracy rates for these verbally informed participants compared to the uninformed, as well as to those that were informed only in writing. There was no significant difference in overall accuracy between the verbally informed and the uninformed, t (35) = .414, *ns*. Although the verbally informed participants did correctly classify 59.6% of inaccurate witness protocols, a rate well above chance, this was not significantly greater than the levels produced by the uninformed participants, t (35) = 1.33, *ns*. In addition, as Table 20 shows, there were no significant differences in reported attention to accurate witnesses citing simple matching strategy responses (3.25 versus 3.0, verbally informed and uninformed respectively, t (35)= .66, ns) or inaccurate witnesses citing deliberative strategy responses (-1.9 versus, -1.5, verbally informed and uninformed respectively, t (35)= .90, ns).

Table 19. Accuracy Rates (%) of Verbally Informed, Written Informed and Uninformed Conditions

	Condition		
	Verbally Informed	Uninformed	Written Informed
Witness Accuracy	(n = 12)	(n = 25)	(n = 26)
Accurate	42.9	46.6	44.6
Inaccurate	59.6	54.4	49.4
Combined	51.3	50.5	47.0

Table 20. Weight Given to Witness Questionnaire Responses by Verbally Informed, Written Informed, and Uninformed Judges Assessing Accuracy of Identification

	Condition		
Stated beliefs about relationship of measure to accuracy	Verbally Informed	Uninformed	Written Informed
Simple Matching Strategy	3.3	3.0	2.8
Deliberative Strategy	-1.9	-1.5	-1.7

[a] Judges' stated beliefs, responses were made on a scale ranging from -5 (*witness definitely inaccurate when endorsed*) to 0 (*response has no relationship to accuracy)* to 5 *(witness was definitely accurate*).

It does not appear that verbalizing the helpful hints improved informed participants' performance at classifying witness accuracy over the uninformed. However, did the "mini lecture" prove to increase participant performance over those only given written information? Overall, the verbally informed participants performed significantly better than the written informed participants, 51.3% versus 47%, t (36)= 2.42, $p < .02$ (Table 19). However, the verbally informed participants outperformed the written informed participants (by 10%) mostly when they judged protocols coming from witnesses making inaccurate identifications, t (36) = 2.57, $p < .02$. Both groups of participants achieved similar performance levels, roughly 43% vs. 44%, when making decisions about accurate witness protocols. Is this increase in performance due

to more attention paid to the strategies presented to the participants as "helpful hints?" On average, verbally informed and written informed participants indicated that witnesses citing simple matching strategy responses were more likely to be accurate than inaccurate (3.3 and 2.8, respectively; see Table 20). Although in the right direction, there was no significant difference between conditions, t (36) = 1.04, *ns*. In addition, both verbally informed and written informed participants were equally likely to state that witnesses citing deliberative strategy responses were more likely to be inaccurate than accurate (-1.9 and -1.7, respectively; t (36)= .427, *ns*).

Discussion

Study 6 was an assessment of whether explicit information about the decision processes of accurate and inaccurate eyewitnesses would be helpful and aid potential jurors in successfully distinguishing them. Some participants were informed of the decision processes examined in studies 1-3 by being given a written "helpful hints" instruction page, which highlighted that accurate witnesses tended to use a simple matching strategy and inaccurate witnesses a more deliberative and thoughtful strategy. The other half of the participants were not given any cues about eyewitnesses' decision-making. All participants were asked to decide for 40 protocols whether the witness's positive identification had been correct or incorrect.

In general, participants showed almost no insight into the accuracy of witnesses using the decision-making protocols. This was apparent by the barely chance or below chance levels of performance for both uninformed and informed participants. Not only did giving some participants written information about witnesses' actual decision-making strategies not improve performance, but these participants performed below chance and significantly

worse than uninformed participants. Additional analyses revealed that the informed participants did not pay attention to or take into account the extra information given to them.

In order to further discover whether educating people increases their ability to distinguish witness accuracy, an additional group of participants were given a "mini lecture" about witness decision processes before facing the witness protocols. These verbally informed participants did perform significantly better than those who were only informed in writing. However, they performed at barely chance levels and did not perform significantly better than the uninformed participants. Again, data analyses revealed that informed participants did not give significantly more weight to the decision strategies indicative of accuracy or inaccuracy when evaluating the protocols.

Summary

Study 6 demonstrated that informing participants about simple matching and deliberative thought processes and their associations with witness accuracy did not increase their performance at postdicting accuracy. These findings are very perplexing and disturbing. It is difficult to believe that educating jurors with written instructions or verbal instructions about eyewitness decision-making would not improve their ability to distinguish accurate from inaccurate witnesses. What is more problematic is that the data do not suggest that the information would not be useful but indicate that people were not even using the information provided for the postdiction task. Further replication would be necessary to conclude that educating people is not worthwhile or that postdicting witness accuracy is not possible with only witness decision-making strategies. This will be discussed further in the last chapter.

CHAPTER EIGHT:
MODIFYING SEQUENTIAL LINEUP PRESENTATIONS

Overview

The previous six studies explored eyewitness decision processes using the original sequential lineup procedure, where eyewitnesses were only allowed to see each photograph once. The goal of police officers is to acquire as much information from eyewitnesses as possible, and, at times, this may motivate them to alter lineup procedures to accommodate an eyewitness or their own desire to learn more from an eyewitness. Even though there is a growing body of research looking at witness accuracy and decision processes using sequential lineups, there has been very little research looking at minor or significant alterations or changes to the sequential presentation procedures.

In 1998 the New Jersey Attorney General, set out statewide guidelines for conducting lineups which required "when possible" that police personnel use sequential lineups (Farmer, 2001). However, these guidelines do not instruct police on how many times a given eyewitness can go through the sequential lineup or under what specific conditions. It was my goal to determine if different methods for presenting the sequential lineup more than once impacted identification rates. One of the larger concerns with sequential lineups is witnesses' hesitation to select a photograph too early, fearing that a closer match will come in later photos. On the other hand, at what point, after multiple viewings of the lineup, does it become equivalent to a simultaneous procedure by allowing relative judgment processing? Again, the sequential lineup procedure was created to maintain accuracy while preventing false identifications from relative judgment processing. It would be helpful to investigators to show that any alterations to the sequential procedure by police

will not change its effectiveness, but if this is not the case then researchers need to be able to articulate the negative effects of changes to the procedures. Otherwise, police personnel will not understand why they need to follow the procedure exactly as it was designed. Having the consequences of alterations at hand would help researchers explain the importance of rigidly following recommended protocols.

Before explaining the details of the present study, it is relevant to review previous research looking at how alterations to the sequential lineup presentation have been shown (or not shown) to impact eyewitness accuracy. Researchers in Ontario, Canada convinced police to adopt sequential procedures, but they quickly discovered that some police officers were making modifications to the procedures. While the modifications were based on the logic of reducing relative judgments, no empirical work had demonstrated that the changes would not affect accuracy rates. In a recent article, eyewitness researchers in Canada designed a study to test two modifications of the sequential procedure (Lindsay & Bellinger, 1999). The specific deviations tested reflected how uncomfortable some police investigators are with the idea of having someone else conduct their lineups (i.e., double-blind testing). Hence, some officers designed self-administered versions of the sequential lineup. The first alteration was called the "stack procedure," and consisted of the investigating officer handing the stack of 15 pictures to the witness accompanied by sequential lineup instructions and the sequential lineup identification form, and then leaving the room so as not to influence the decision. The second deviation called the "album procedure," provided the witness with a small photo album containing a single picture on each of 15 pages such that witnesses had to turn the pages to see the next picture. Again, sequential instructions and forms were used.

In the Lindsay and Bellinger (1999) study, participants were randomly assigned to one of the two modified procedures or to the original procedure. Although the witnesses were left alone during the modified procedures, they were surreptitiously monitored by the experimenter who watched and recorded their behavior through a slightly ajar door. They found that the original sequential procedure produced a significantly higher rate of correct rejection of a target-absent lineup than the stack or album procedures. Not surprisingly, in both the stack and album conditions many witnesses were observed violating the instructions they were given and comparing pictures, producing relative judgment processing. Of the 28 witnesses in the stack condition, 12 violated the instructions and compared the pictures, and 88% of these violators made false-positive identifications compared to 0% of those who followed the instructions. In the album conditions, 15 out of 25 (60%) of the participant witnesses compared the pictures. Most of these witnesses lingered while turning the pages so that they had an opportunity to compare pictures on adjacent pages. Of the 33% total false positives, 100% were made by witnesses who compared pictures. This research showed that self-administered sequential lineups were only successful if the instructions were followed, but that witnesses often compared pictures if the opportunity was there. These researchers concluded that preventing comparison of photographs is superior to advising against it or instructing witnesses not to do it, especially if witnesses are left in position to violate the instructions.

Aside from self-administered sequential procedures, the procedures could be varied in other ways with unknown effects on identification accuracy. The Law Reform Commission of Canada states in its recommendations that police may show the lineup to witnesses again if they fail to choose anyone from a sequential procedure (Brooks, 1983). Why would such a

recommendation be included? One of the concerns of critics of the sequential lineup, as discussed in the introduction, is that there can be a small decrease in accuracy rates compared to the simultaneous procedure. This decrease is primarily due to eliminating correct identifications of the culprit by those who do so only by chance, using a relative judgment process. However, it could also be the case that witnesses, during a sequential procedure, are more hesitant to make an identification and, therefore, have a higher threshold before they are willing to make an identification (i.e., very aware that the next photograph could be a better match). Would giving eyewitnesses an unexpected "second chance" to see the lineup recapture the slight decrease in accuracy without increasing false identifications?

In two experiments Lindsay and colleagues (1991) tested whether a "second chance" after viewing sequential lineups impacted accuracy rates (Lindsay, Lea & Fulford, 1991). If the second chance was in the form of a *simultaneous* viewing, witnesses given an unexpected opportunity to examine the same lineup again showed a small but not significant increase in accuracy (46.7% to 53.3%). However, 16(69%) of the total witnesses made false identifications, and 5 out of 16 changed from correct rejections to false identifications during the second viewing. If the second viewing was using a *sequential* procedure, only 1 witness out of 16 changed decisions from a correct rejection to a false identification and accuracy was unaffected (25% and 28%). Thus, showing the sequential lineup a second time using the same sequential procedure did not prove to be detrimental to accuracy and inaccuracy rates, but showing a simultaneous lineup the second time proved to increase accuracy at the price of increased false identifications. This is a trade-off that eyewitness researchers and DNA exonerations have shown to be problematic.

The goal of Study 7 was to compare eyewitness accuracy rates across logical variations of the sequential procedure with accuracy rates from the original "one time" only procedure. In this study, three presentation procedures were compared using target present lineups: 1) viewing the sequential lineup only once, 2) viewing the sequential lineup as many times as desired as long as the photographs were shuffled between viewings, and 3) a two step process of seeing the sequential lineup once without making any identification, shuffling the photos, and seeing the lineup one last time with the opportunity to make an identification.

This last procedure was designed to overcome the concern with sequential lineups that accurate witnesses' hesitate to select a photograph too early, fearing that a closer match will come in later photos. The small decrease in accurate identifications in the sequential compared to the simultaneous lineup could be explained by a shift in response criterion. Eyewitnesses viewing sequential lineups, having only one chance to see each photograph, may use a more conservative response criterion. This would ensure that they do not make many mistakes or false identifications but it will also increase the chances of missed accurate responses. Is there a sequential lineup procedure that would relax the response criterion enough to increase the frequency of accurate responses without increasing inaccurate responses? In comparison to the traditional sequential procedure, allowing eyewitnesses to view the lineup once, knowing that they cannot make identification and then permitting a second viewing after shuffling the order of the pictures may reduce the threshold for acceptance to a more reasonable level. While at the same time, this procedure should make it too difficult to use relative judgment processing and, in turn, improve accuracy rates from the traditional sequential lineup. This 2-

step presentation procedure turned out to be similar to Britain's VIPER lineup system that requires eyewitnesses to see the sequential lineup twice.

VIPER, which stands for "video identification parade electronic recording" is a unit of the West Yorkshire Police and was developed as a "parade" or sequential lineup system to be used in the UK since 1997 (Pike, Kemp, Brace, & Allen, (2000). The system has a central database of video sequences of faces that are linked to terminals situated in police departments. Suspects are given the opportunity to select the "distractor" photos that they want to appear in the parade with them, as well as their location in the final video sequence. The law in the United Kingdom requires that a witness must make a decision only after considering each parade member at least twice (Kemp, Pike, & Brace, 2001). Therefore, each witness is shown the video-based lineup photographs one at a time, in a sequential fashion. However, witnesses can request to look at a particular parade member again, as well as move forward and backward through the tape. Accuracy rates of the VIPER system compared to the traditional simultaneous lineups used elsewhere have not been published to date.

Some researchers were concerned that multiple viewings would undermine the superiority of the sequential procedure. There is one study that looked presentation of the VIPER parade once, twice, or twice before being allowed to rewind the tape as they chose (Pike, Rowland, Towell, &, Kemp, 1999). They found that in target present parades, performance improved with additional viewing of the parade. For target absent parades, they found that people who were allowed to rewind the tape at will were more accurate than those who saw the parade only once or twice. This is a surprising but encouraging finding that has not been replicated to date. Another concern with the VIPER system is that the lineup photographs are not reordered between

viewings. In order to ensure that relative judgment processing would be very difficult or impossible in my design of the no-ID-first viewing condition, the pictures must be shuffled between viewings and participants cannot move backward to previously seen pictures.

In this study, participant witnesses were asked to identify the culprit from a target present, eight person, sequential lineup procedure, after viewing the same video-taped staged crime used in Studies 1-3, where the perpetrator steals a CD from a campus bookstore. Witnesses participated in one of the three conditions described earlier. After completing the lineup procedure, witnesses were then asked about the decision processes they had followed in reaching their decision, using the same decision statements selected in Study 1. It was predicted that procedure 3 (i.e., no-ID-first-viewing) would avoid both of the above concerns and produce the greatest accuracy with the least number of false identifications, followed by procedure 1 (i.e., one time only), and then procedure 2 (i.e., as many viewings as desired). The last condition had the greatest probability for relative judgment processing.

Participants

Participants were 426 Cornell University undergraduates recruited from a variety of courses in psychology and human development who earned extra credit for their participation.

Procedure

The procedures were exactly the same as the "sponsoring Cornell" cover story in Studies 1-3, except there were three sequential lineup procedures. In all three conditions, participants were given the option to identify one of the

photographs, refuse to make any decision, or decide that the perpetrator was not in the lineup. All conditions saw the same target present lineup.

In the "one time" only condition (ONCE): The experimenter read the sequential lineup instructions: "You will be shown a sequence of individual photographs and you must decide for each photograph whether or not it is a picture of the criminal you saw in the video. You can take as long as you wish to make a decision for each photograph but you will only be shown each photograph once."

In the "as many times as desired" condition (MULTIPLE): The experimenter read the sequential lineup instructions: "You will be shown a sequence of individual photographs and you must decide for each photograph whether or not it is a picture of the criminal you saw in the video. You will be able to see the lineup as many times as you like, however each time the lineup will be shuffled and you will have to go through the entire lineup and decide for each photograph whether or not it is the criminal you saw. You can take as long as you wish to make a decision for each photograph."

In the "no-ID-first-viewing" condition (NoID): The experimenter read the sequential lineup instructions: "You will be shown a sequence of individual photographs and you must decide for each photograph whether or not it is a picture of the criminal you saw in the video. You will see the lineup TWICE. The first time you will go through the lineup without making ANY identification, you will simply be able to look at each photograph for as long as you like and will have to say "next" for the next photo. The second time, the pictures will be shuffled; you will have to go through the entire lineup and decide for each photograph whether or not it is the criminal you saw. That will be the last time you will see the lineup but you can take as long as you wish to make a decision for each photograph."

Dependent Measures

The dependent measures were exactly the same as those used in Studies 2-6.

Results

Of the 426 participant witnesses, 139 were in the "one time" only (ONCE) condition, 123 in the "as many times as desired" (MULTIPLE) condition, and 164 in the "no-ID-first-viewing" (NoID) condition. Due to a lack of decision processing differences between target present inaccurate and target absent inaccurates in studies 3 and 4, inaccurate identifications were witnesses who selected a distractor photograph from a target present lineup. The same target present lineup was used in all three conditions.

Identification Judgments across Conditions

The results in Figure 1 support the primary prediction and show the greatest percent accuracy in the no-ID-first-viewing condition (39%), followed by the multiple-ID condition (29%), and then the one-time-only condition (22%). There was a significant relationship between accuracy and lineup presentation procedure ($X^2(2) = 10.06$, $p < .007$). However, there were no significant differences in false positive responses across conditions: the no-ID-first condition (24%), the multiple-ID condition (23%), or the only-one-view condition (18%) ($X^2(2) = 1.90$, *ns*). Looking at the non-choosers (those who indicated that they were not sure enough to select a picture and those who incorrectly rejected the lineup), there was a significant relationship between those who refused to select a picture and lineup presentation procedure ($X^2(2) = 49.32$, $p < .0001$). Eyewitnesses in the ONCE condition (40%) were most likely to make "no decision," more so than both the MULTIPLE (14%) and the NoID

(9%) conditions. In contrast, there was a significant relationship between those who insisted that the perpetrator was not in the photographs and the lineup presentation procedure ($X^2(2) = 27.51$, $p < .0001$). Both the MULTIPLE (30%) and NoID (27%) conditions were more likely than the ONCE condition (6%) to incorrectly insist that the culprit was "not there" in the lineup. Additionally, the ONCE condition (14%) had more multiple identifications by individual witnesses than either the MULTIPLE (4%) or the No ID conditions (1%). This was also a significant relationship across lineup procedures ($X^2(2) = 24.25$, $p <$ .000). It is evident by these trends that the criminal in these materials was generally difficult to identify, however, it was across conditions and it was the comparison between procedures that was of interest. Particularly, eyewitnesses in the ONCE condition had the most difficult time identifying the culprit, evidenced by a low identification rate and the highest "no decision" and multiple identifications by individual witnesses.

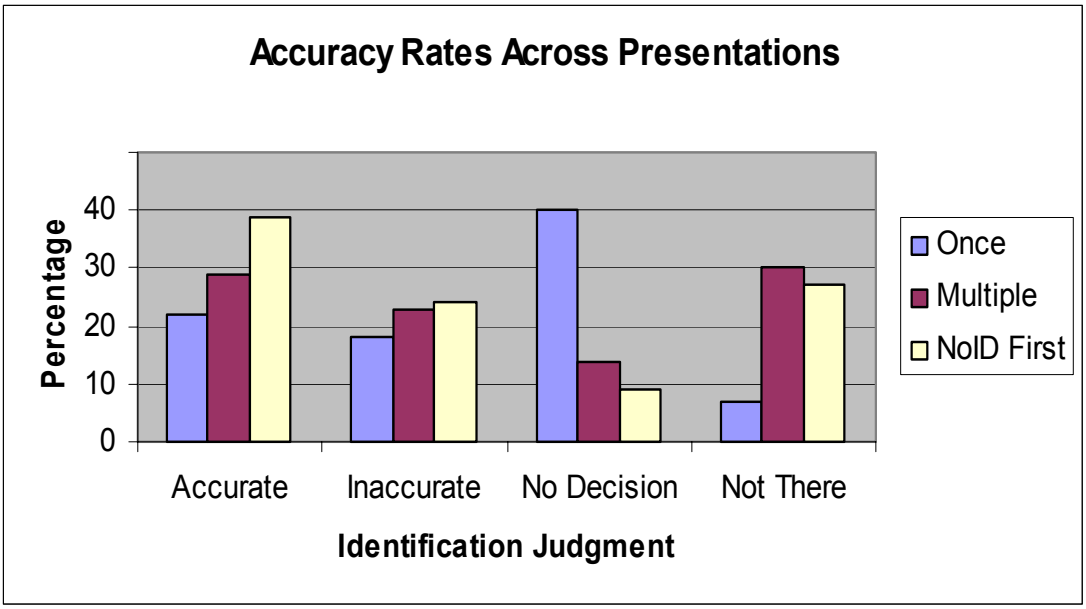

Figure 3. Mean Eyewitness Identification Judgments across Three Conditions.

In the MULTIPLE condition, only 31 (25%) of eyewitnesses chose to see the lineup a second time, and nobody desired to see it more than twice. Of these 31 witnesses, 12 made no identification at all either time, 5 reiterated their original decision, 5 went from no choice to selecting the culprit, and 9 went from no choice to selecting an innocent distractor. Note that not one eyewitness moved from accurate to inaccurate or vice versa by seeing the lineup a second time. Of course police probably would not ask a witness who had already identified the suspect to attempt a second identification. If only those who had not selected the suspect had made a second choice, the final percentage of correct identifications would have been 29% (compared with 25% for first choices) and the final percentage of incorrect identifications would have been 23% (compared with 15% for first choices). Of those who changed their identifications from no decision, 5 made accurate identifications on the second shot and these comprised 14% of the final accurate identifications, but 9 made inaccurate identifications and these contributed 32% to the total inaccurate identifications. Thus, a third of the inaccurate identifications came from witnesses who did not make an identification the first time but chose to see the lineup a second time. It is important to note that, in total, only 21% of those who did not make an identification from the first lineup chose to see the lineup again. In debriefing, most witnesses felt that seeing the lineup again, in a different order, and having to say "yes" or "no" for each picture again would confuse them more.

Confidence Ratings

Within the three conditions, accurate witnesses were marginally or significantly more confident than inaccurate witnesses (Figure 2): ONCE (74% versus 62%, $t(52) = 1.90$, $p < .06$), MULTIPLE (68% versus 55%, $t(60)$ 2.12, $p <$

.04), and NoID (73% versus 64%, $t(99) = 2.02$, $p < .05$). However, between conditions there was only one marginally significant effect, NoID inaccurate eyewitness were more confident than MULTIPLE inaccurate witnesses ($t(63) = 1.84$, $p < .07$). Therefore, greater confidence after seeing the lineup twice in total cannot explain the superiority of the NoID condition in producing greater accuracy than the traditional sequential procedure.

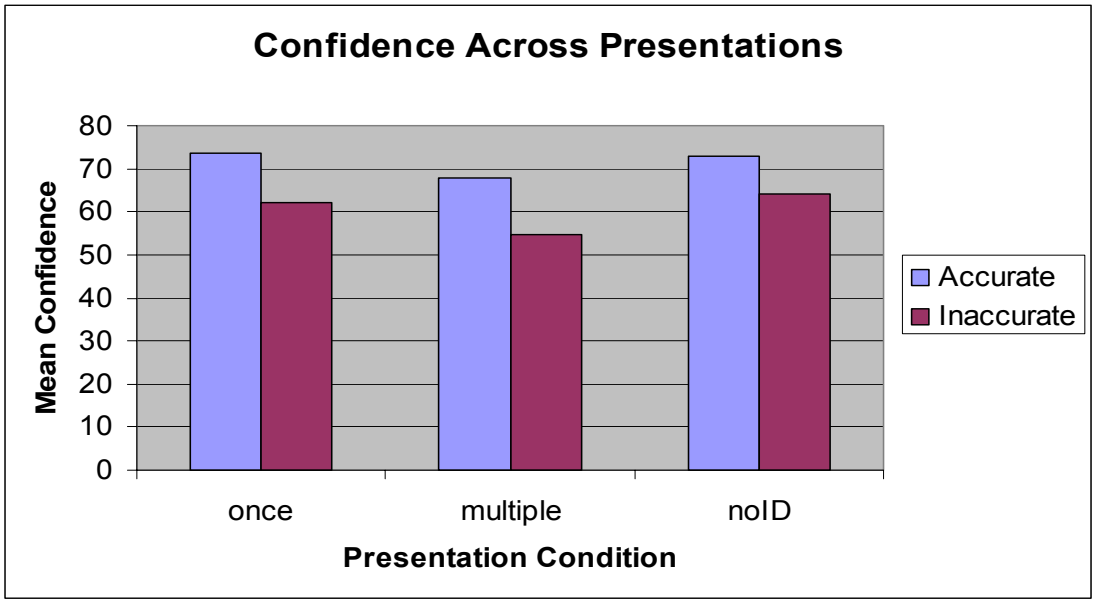

Figure 4. Mean Confidence of Accurate and Inaccurate Eyewitnesses Across Three Presentation Conditions.

Eyewitness Decision Processes

Confidence rates did not explain the significant increase in accuracy from the ONCE to the NoID condition. Perhaps accurate eyewitnesses in the NoID condition were using different decision processes. Using the decision processes statements found in Study 1, accurate witnesses in the NoID condition were more likely than witnesses in the ONCE condition to endorse two decision processes: "As soon as I saw the picture, I knew that it was the

culprit" (13% versus 0%, z (93) = 2.06, p < .04) and "I just recognized him, I cannot explain why" (21% versus 6%, z (93) = 1.88, p < .06). Both of these decision processes reflect an automatic decision strategy. Previous studies found that witnesses in the original sequential lineup were more likely to endorse automatic decision strategies if they were accurate, but the finding did not remain significant in all studies. As an eyewitness, being able to look through all of the lineup photographs sequentially without the pressure of having to decide for each picture may increase their ability to use automatic recognition or absolute judgment processes. The original sequential lineup procedure may inhibit automatic processing for some eyewitnesses who cannot handle the pressure of selecting without having seen all of the pictures, even if they are not comparing the pictures. This could be part of the explanation for why the sequential lineup produces a small decrease in accuracy from the simultaneous lineup procedure. The no-ID-first-view sequential procedure may have uninhibited these accurate eyewitnesses while still controlling inaccuracy.

Diagnosticity

Based on the above findings, no single procedure demonstrated the greatest accuracy with the least false identifications, although one did provide the greater accuracy without affecting inaccuracy. Is one procedure superior to the others? Eyewitness researchers argue that the diagnosticity ratio is one of the best indicators of the potential value of a lineup technique as a source of evidence (Wells & Lindsay, 1980, 1985). The diagnosticity ratio is calculated as the ratio of the proportion of correct and false decisions. The higher the diagnosticity ratio, the greater the probative value of identification decisions from such lineups should be. The diagnosticity ratios were 1.22, 1.26, and 1.63 for identifications of suspects from the ONCE, MULTIPLE, and NoID

sequential presentations (Table 21). The probative value of the sequential procedure was greatest for the no-ID-first viewing condition, making it more diagnostic than the original design. The MULTIPLE modification proved to be no different than the original ONCE procedure.

Table 21. Identification Decisions (%) and Diagnosticity Ratios Resulting from ONCE, MULTIPLE, and NoID Sequential Lineup Procedures

	Identification		Diagnosticity Ratio [a]
Lineup Method	Accurate	Inaccurate	
One Time Only	22	18	1.22
As Many Times as Desired	29	23	1.26
No-ID-First Viewing	39	24	1.63

[a] Proportion of correct identifications: proportion of false identifications

Discussion

The purpose of this study was to determine if modifications to the sequential procedure would alter the value of the procedure for maintaining accuracy while minimizing inaccuracy. Testing three possible presentations of the sequential procedure: seeing it once, as many times as desired, or no-ID-first viewing, some differences were found. The no-ID-first viewing presentation provided the greatest percentage accuracy while not significantly altering false identifications. It also proved to be the most diagnostic. It is possible that the no-ID-first-viewing condition proved to be most effective because participants

did not feel the pressure to select someone nor did they harbor concern that a better photo could come if they picked too early in the lineup. With this procedure inaccurate eyewitnesses did not have enough of an opportunity to compare photographs to each other and select the best match, but the accurate eyewitnesses used more automatic processing compared to the original "one time" only procedure. Support for this explanation comes from the astonishingly high rate of no decisions in the one time only condition (40%), not including those who did not make a decision but indicated that the perpetrator was not present in the lineup. These participant witnesses were simply not sure enough to make a choice, probably concerned that more pictures were going to be shown. If this were the case, then it was anticipated that confidence ratings would have increased for all choosers, both accurate and inaccurate identifications in the no-ID-first-view condition. Confidence ratings were uncorrelated with all of the presentation conditions.

Consequently, the only explanation supported by the findings is that the no-ID-first-viewing procedure reduced the selection threshold and promoted more automatic recognition, allowing greater accuracy without significantly increasing inaccuracy. This modified sequential procedure gave accurate eyewitness the opportunity to get comfortable enough selecting the culprit without allowing inaccurate eyewitnesses the ability to compare lineup photographs.

The "as many times as desired" procedure proved to be less interesting, partly because only 31 out of 123 participant witnesses actually desired to see the lineup more than once, and not a single participant saw the lineup more than twice. The data indicated that seeing the lineup more than once led just over half of the witnesses to stay with their original judgment and the other half went from no decision to selecting the culprit or inaccurately selecting a

distractor. After the second lineup, there was an 8% increase in incorrect identifications. Alternately, there was only a 4% increase in accurate identifications after witnesses saw the lineup a second time. Since the increase in false identifications was sizably larger than the increase in correct identifications, it would be logical to conclude that seeing the lineup more than once harmed witness accuracy. However, the MULTIPLE condition did not significantly differ in overall accuracy rates from the ONCE condition, making it unfruitful but not harmful to permit eyewitnesses to see the sequential procedure a second time.

The findings from the MULITPLE procedure replicate those from the "second chance" studies discussed previously. This design differed from the previously described "second chance" study because participants in that study were given an unexpected opportunity to see the lineup again, whereas in this study they were told in advance that they would be able to see the lineup as many times as they liked. Under unexpected "second chance" conditions eyewitnesses had made a choice they felt comfortable with and a second opportunity to look through the lineup produced insignificant deviations from that choice. However, when witnesses knew that they could see the lineup more than once, seeing the lineup the second time led to an increase in accuracy coupled with a substantial increase in inaccuracy, which could have been a dangerous situation. Even considering the changes in identification accuracy after a second view of the lineup, the MULTIPLE procedures final identification rates did not look differently from the rates in the original ONCE procedure. Based on these findings, police officers should be advised that informing eyewitnesses that they will be allowed to view the sequential procedure more than once, even if the pictures are shuffled between viewings, has the potential

to harm sequential lineup accuracy, although not below rates produced by the original sequential lineup in this study.

Summary

This study demonstrated the superiority of the no-ID-first-view sequential procedure. Not only did it continue to prevent relative judgment processing but it increased accuracy rates. There were, however, two possible limitations to this study. First, only target present lineups were conducted. Further research needs to address the issue of target absent lineups, which focus not only on choosers but also on incorrect choosers who select a most similar looking but innocent suspect. Second, generalization of the findings is limited to one set of crime materials. In Study 8, the "objective film criteria" crime materials from Studies 4 and 5 were used to replicate these findings and both target present and target absent eyewitness conditions were examined. After replication of these findings, recommendations will be made as to how police should be instructed to present the sequential lineup, with information regarding how accuracy is affected by alterations from the recommended presentation procedures.

CHAPTER NINE:
REPLICATION OF ACCURACY AND
LINEUP PRESENTATION MODIFICATIONS

Overview

Study 8 sought to replicate the findings from Study 7 using a new crime, perpetrator, and lineup. Eyewitnesses again found the "Sponsoring Cornell" witness situation and lineup task to be difficult. Because in the real world conditions are significantly more variable from crime to crime than in the laboratory, it was important to be certain that the diagnosticity of the no-ID-first-view condition could be replicated in situations where the viewing conditions were different. The "objective film criteria" crime and lineup materials used in Studies 4a and 4b were used this in study. In addition, this study aimed to extend the accuracy findings to target absent lineup situations, where an innocent suspect replaced the actual perpetrators photograph in the lineup.

In this study, participant witnesses were asked to identify the culprit from either a target present or target absent, eight person, sequential lineup procedure, after viewing a new video-taped staged crime in which the perpetrator steals a woman's purse. Witnesses participated in one of the three lineup conditions discussed and compared in Study 7: 1) only one view, 2) as many times as desired or 3) the two-step process of seeing the lineup once without being allowed to select and then seeing the lineup again after the photos are shuffled and being able to select a picture). After completing the lineup procedure, witnesses were asked about the decision processes they had followed in reaching their decision, using the same decision statements used in studies 2-7. It was predicted that Study 8 would replicate the findings of Study

7, procedure 3 (i.e., no-ID-first-viewing) would produce greater accuracy with no significant increase in false identification, and would be more diagnostic than the original, one time only sequential procedure. It was also predicted that the multiple condition would, again, prove to be no improvement over the original design.

Participants

Participants were 442 Cornell University undergraduates recruited from a variety of courses in psychology and human development who earned extra credit for their participation.

Procedure

The procedures were exactly the same as Study 7, except for one additional condition. In this study, participants either saw a target-present or target-absent lineup. As before, participants were randomly assigned to one of three sequential lineup procedures: the "one time" only condition (ONCE), the "as many times as desired" condition (MULTIPLE), and the "no-ID-first-viewing" condition (NoID). In all conditions, participants were given the option to identify one of the photographs, refuse to make any decision, or decide that the perpetrator was not in the lineup.

Dependent Measures

The dependent measures were exactly the same as those in Studies 2-7.

Results

Of the 442 participant witnesses, 187 were in the "one time" only (ONCE) condition, 134 in the "as many times as desired" (MULTIPLE)

condition, and 121 in the "no-ID-first-viewing" (NoID) condition. Accurate eyewitnesses were those who selected the culprit from the target present lineup and inaccurate eyewitnesses were those who selected the similar looking replacement suspect in the target absent lineup.

Identification Judgments across Conditions

The results in Figure 3 show that this study did not significantly replicate all of the findings from Study 7. In the target present condition, although the NoID condition produced a greater percent accuracy (48%) than the ONCE condition (34%) and equivalent accuracy to the MULTIPLE condition (50%), the relationship between accuracy and lineup presentation procedure approached but did not reach significance ($X^2(2) = 1.77$, *ns*). Replicating Study 7, in the target absent condition there were no differences in inaccuracy rates across the three conditions: the no-ID-first condition (22%), the multiple-ID condition (16%), or the only-one-view condition (16%) ($X^2(2) = 1.24$, *ns*). In both the target present and target absent conditions, there were no differences in "no decision" judgments across the three lineup procedures ($X^2(2) = 2.93$, *ns*, $X^2(2) = 2.0$; *ns*, target present and target absent, respectively). In contrast, there was a relationship between witnesses insisting that the culprit was "not there" in the lineup and lineup presentation procedure in the target present condition ($X^2(2) = 8.12$, $p < .02$). Eyewitnesses viewing the ONCE lineup procedure (28%) were significantly more likely to incorrectly claim that the culprit was not present in the target present condition than in the NoID lineup procedure (7%) and the MULTIPLE procedure (19%). However, there was no difference in "not there" decisions across procedures in the target absent condition ($X^2(2) = 2.68$, *ns*).

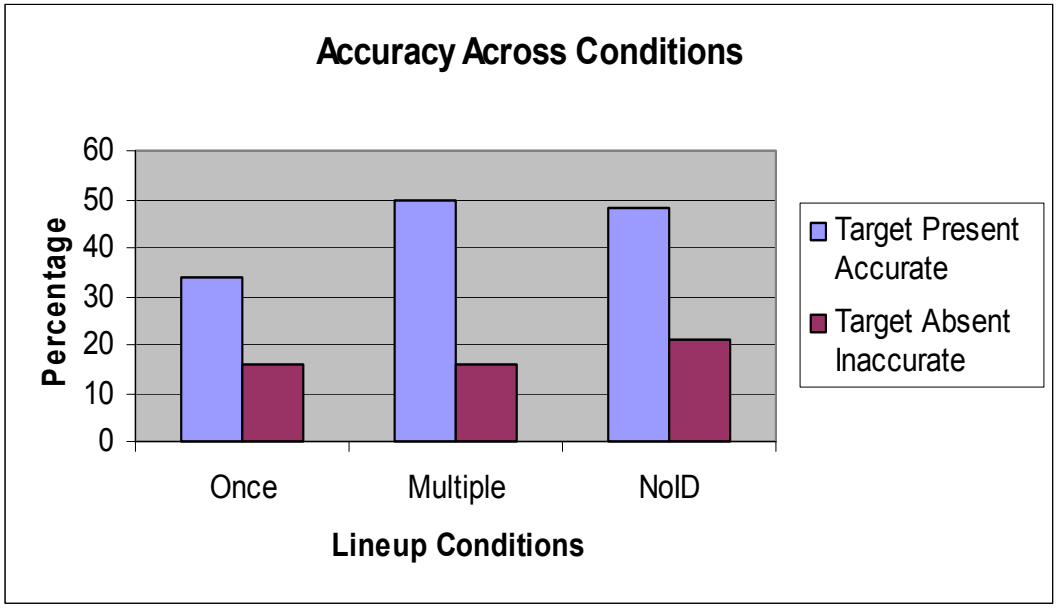

Figure 5. Mean Eyewitness Identification Accuracy (%) Across Three Presentation Conditions.

In this study the MULTIPLE lineup procedure produced accuracy rates more similar to the NoID condition, than to the ONCE condition, opposite from the findings of Study 7. In the MULTIPLE condition, 34 out of 134 (25%) participant eyewitnesses chose to see the lineup a second time and, like Study 7, not one witness desired to the lineup more than twice. Of these 34 witnesses, 13 saw target present lineups and 2 of these witnesses made accurate identifications (comprising 7% of the total accurate identifications), 6 selected foil photographs, and 5 did not make a decision again. Of the participant witnesses that saw target absent lineups, 21 asked to see the lineup again, and 1 made an inaccurate identification (contributing 8% to the total inaccurate identifications), 10 selected or re-selected foil pictures, and 10 did not select anybody. In total, 32% of those who did not make an identification from the first lineup chose to see the lineup again.

Confidence Ratings

Within the three lineup procedure conditions, accurate witnesses from target present conditions were not more confident than inaccurate witnesses from target absent conditions (Figure 4): ONCE (78% versus 72%, $t(38) = 0.764$, *ns*), MULTIPLE (79% versus 74%, $t(37)$ 0.764, *ns*), and NoID (72% versus 74%, $t(35) = -0.297$, *ns*). In addition, between conditions there were no significant differences in confidence ratings.

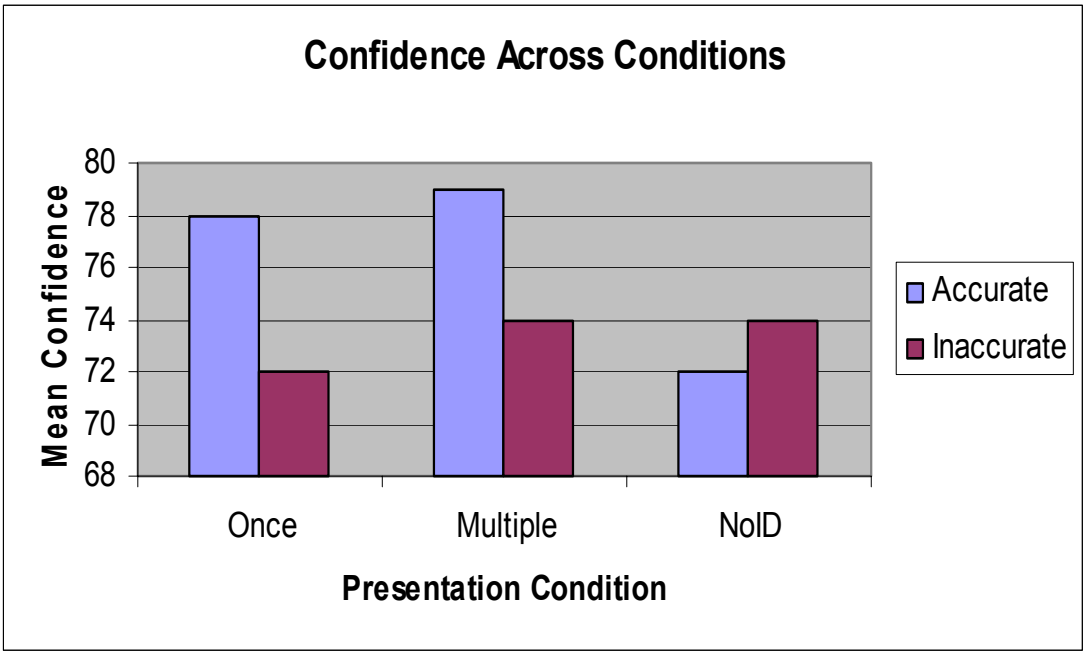

Figure 6. Mean Confidence of Accurate and Inaccurate Eyewitnesses Across Three Presentation Conditions.

Diagnosticity

Did one procedure prove to be better than the others in this study? Diagnosticity ratios were calculated as indicators of the potential value of a lineup technique as a source of evidence. The diagnosticity ratio is calculated as the ratio of the proportion of correct and false decisions. The higher the diagnosticity ratio, the greater the probative value of identification decisions

from such lineups should be. The diagnosticity ratios were 2.19, 3.13, and 2.18 for identifications of suspects from the ONCE, MULTIPLE, and NoID sequential presentations (Table 22). The probative value of the sequential procedure was greatest for the multiple viewing condition, making it more diagnostic than the original design and the no-ID-first viewing design. However, the NoID presentation proved to be very diagnostic for correctly rejecting the lineup when the culprit was not present versus when the culprit was present, a ratio of 5.0.

Table 22. Identification Decisions (%) and Diagnosticity Ratios Resulting from ONCE, MULTIPLE, and NoID Sequential Lineup Procedures

	Identification			
Lineup Method	Suspects	Foil	No Decision	Not There
One Time Only				
Criminal Present (n=72)	35	24	12	29
Criminal Absent (n=115)	16	23	14	47
Diagnosticity Ratio	2.19[a]			1.62 [b]
As Many Times as Desired				
Criminal Present (n=54)	50	24	7	19
Criminal Absent (n=80)	16	28	16	40
Diagnosticity Ratio	3.13 [a]			2.11 [b]
No-ID-First Viewing				
Criminal Present (n=42)	48	26	19	7
Criminal Absent (n=79)	22	34	9	35
Diagnosticity Ratio	2.18 [a]			5.00 [b]

[a] Proportion of correct identifications: proportion of false identifications.

[b] Proportion of correct rejections: mistaken rejections of lineup.

Discussion

The purpose of this study was to replicate Study 7 using target absent lineups, in addition to target present lineups, and determine if modifications to the sequential procedure alter the value of the traditional procedure for maintaining accuracy while minimizing inaccuracy. Study 7 tested three possible presentations of the sequential procedure: seeing it once, as many

times as desired, or no-ID-first viewing, and found some differences. Did these findings replicate? In this study, the no-ID-first viewing presentation provided 12% greater accuracy than the once time presentation, however, the difference did not reach significance. However, the NoID presentation did not prove to be more diagnostic than the one time only presentation, as it had in the previous study. Thus, the no-ID-first viewing presentation did not maintain much of an advantage over the traditional procedure. It did however produce a greater ratio of correct rejections of target absent lineups to mistaken rejections of target present lineups. This was something that could not have been demonstrated in the design of Study 7.

The MULTIPLE presentation results from this study deviated the most from the findings of Study 7. Previously this condition produced accuracy rates most similar to the traditional procedure, but in this study it looked more similar to the NoID condition and was more diagnostic than the other two conditions. The only difference between the designs of Studies 7 and 8 was the addition of target absent conditions for each presentation procedure. This, however, could not explain the improved accuracy that the MULTIPLE presentation showed over the one time only presentation because the target absent lineup could only impact false identifications rates.

The target absent lineup condition was included to determine whether the different presentation procedures would affect inaccuracy rates differently when witnesses were selecting an inaccurate foil versus selecting the replacement suspect when the culprit was absent. There were no differences in inaccuracy rates across presentation conditions for both Study 7 and the present study. Thus, the choosing rates of witnesses selecting a foil in target present situations as well as those selecting an innocent suspect in target absent situations did not differ between presentation conditions across Studies 7 and 8.

All of the results for Studies 7 and 8 indicated that modifying the procedures so that witnesses see the lineup twice or in a two-step process did not impact eyewitness accuracy. Both presentation procedures proved to be more diagnostic in one of two studies but neither remained a reliable improvement. More importantly, neither alteration to the original sequential procedure harmed accuracy rates. In addition, the multiple viewing presentation replicated the findings of previous researchers who offered witnesses an unexpected "second chance" to see the lineup photographs. These studies extended those findings to witnesses who "expected" to be able to see the lineup again if they chose to.

Based on the findings of Studies 7 and 8, researchers should be less concerned about police officers allowing eyewitnesses to see the lineup a second time, particularly those who did not make an identification the first time, as long as the photographs are shuffled between viewings. Although doing so did not reliably improve identifications, it also did not impair them. Additionally, the no-ID-first view presentation presented here did not maintain a consistent advantage over the traditional sequential lineup but also did not hurt accuracy rates. It will be important to see data comparing Britain's VIPER system to the traditional sequential lineup to be sure that not shuffling the photos between lineup viewings does not increase relative judgments and inaccuracy.

Summary

This study did not replicate the previous findings from Study 7. The no-ID-first viewing presentation did not provide superior accuracy over the traditional method and was not more diagnostic. The modified procedure did prove to be just as good as the traditional procedure, without any reduction in

accuracy or increase in inaccuracy. The multiple viewings condition, although also not providing significantly greater accuracy or reduced inaccuracy was more diagnostic than the traditional design. However, this cannot be explained by the addition of the target absent condition. In sum, Studies 7 and 8 showed that two potential modifications to the traditional one-time-only sequential lineup presentation did not significantly affect eyewitness accuracy rates. At times, the two modified procedures proved to show some advantage over the traditional procedure but these advantages were not reliable. Recommendations for police lineup procedures will follow in the general discussion.

CHAPTER TEN:
GENERAL DISCUSSION

> "The police lineup is both the critical means of presenting eyewitness identification in court and one of the most dangerous tools of justice (Brooks, 1983, p.45)."

Recent DNA exoneration cases have corroborated the warnings of eyewitness identification researchers by showing that mistaken eyewitness identification was the largest single factor contributing to the conviction of these innocent people. The series of studies presented in this manuscript do not solve this "eyewitness problem" (Wells, 1993). However, eyewitness decision-making is at the root of the problem, which is not surprising considering that face recognition is generally so good on a daily basis. The findings presented here contribute to a better understanding of how eyewitnesses cognitively process sequential lineups, an area that has received inadequate attention in the eyewitness literature. I sought to identify the decision strategies of accurate and inaccurate eyewitnesses viewing sequential lineups, as well as manipulate the strategies in an attempt to reduce false identifications. In addition, I aimed to determine whether minor modifications to the sequential presentation would affect eyewitness accuracy rates.

Summary and Conclusions

In review, in the case of simultaneous lineups accurate eyewitnesses use automatic processing and inaccurate eyewitnesses use controlled processing in the form of relative judgments and process of elimination respectively. The eyewitness literature also tells us that the sequential procedure was designed to

decrease the approximately 30% false identification rate produced by the simultaneous lineup, and does so by decreasing relative judgments and making it impossible to use process of elimination or compare lineup pictures (Lindsay & Wells, 1985). However, there is still a 17% false identification rate with the sequential lineup. What we do not know is what these inaccurate eyewitnesses are doing differently from the accurate eyewitnesses. Dunning & Stern (1994) found that eyewitness identification accuracy could be distinguished by self-reports of witnesses concerning how they made their identifications from a simultaneous lineup. The first six studies contained in this paper intended to determine if eyewitness accuracy after viewing sequential lineups could also be distinguished by self-report of how they made their identifications.

Study 1 was designed to identify the themes or decision processes that accurate and inaccurate eyewitnesses use when viewing sequential lineups. While participant witnesses looked at the lineup photographs they were asked to "think aloud" what was going on in their head as they reached a decision for each photograph and they were asked in an open-ended question to describe how they came to their identification decision. Using primarily their open-ended responses, Study 1 revealed that participant eyewitnesses who accurately identified the perpetrator in a sequential lineup mentioned potentially different themes than those who selected a distractor photograph from the lineup. Accurate eyewitnesses mentioned that the culprit's photograph just looked "familiar" to them or "struck them." In contrast, inaccurate eyewitnesses mentioned having a difficult time identifying the perpetrator and tended to say that they selected the closest photograph and tried to use distinctive features to identify the culprit. Based on a qualitative analysis of the findings, five decision process statements were created or carried over from Dunning & Stern's (1994) analysis of simultaneous lineup decision-

making. These statements included "I just recognized him, I cannot explain why," "I focused on his most distinctive feature," "He was the closest person to what I remember but not exact," "I matched the image in my head to the picture in front of me," and "While I looked at each photograph, I tried to think back to the video and compare."

Study 2 presented these decision strategy statements designed in Study 1 to eyewitnesses after they made an identification judgment, and using factor analysis established two decision strategies that differentiated accurate and inaccurate eyewitnesses viewing the same culprit present sequential lineup. Accurate eyewitnesses were more likely to report a simple matching strategy by endorsing three particular decision statements "I matched the image in my head to the picture in front of me," "The other pictures had little influence on my decision," and "The other pictures did not confuse me." These descriptions were indicative of people who had a clear image of the perpetrator from the film and used that image and not the other lineup photographs to facilitate recognition from memory. Unexpectedly, accurate eyewitness did not consistently endorse the automatic decision statement commonly chosen in the simultaneous procedure, "I just recognized him, I cannot explain why."

On the other hand, inaccurate eyewitnesses endorsed four statements indicative of deliberate and thoughtful but uncertain processing, "He was the closest person to what I remember but not exact," "While I looked at each photograph, I tried to think back to the video and compared," As I looked at more pictures, they all began to look the same," and "The other pictures were all so similar they made me less confident." The statements consistently chosen by inaccurate eyewitnesses were indicative of people who did not retain a clear image of the perpetrator and needed the other lineup photographs and their

ability to think back to the video in order to produce an identification. This will be discussed in detail in the next section of this chapter.

A composite measure of the three decision statements endorsed primarily by accurate eyewitnesses was created and defined as a "simple matching" strategy. A second composite measure of the four deliberative and thoughtful decision statements endorsed more commonly by inaccurate eyewitnesses was created and defined as a "deliberative" strategy. These decision strategies are unique to the sequential lineup procedure. The design of the sequential lineup makes it almost impossible for witnesses to rely on the other lineup photographs to produce a "pop" of the culprit or "process of eliminate" to the closest candidate. The sequential procedure requires witnesses to either use their memory of the culprit or their ability to the think back to the video, as sources of comparison for making identifications. This makes the task significantly more difficult, in that some form of memorial representation is central to the decision-making process of all eyewitnesses, and provides support for the qualitative strategies discovered in Study 1.

In Study 2, accurate eyewitnesses endorsed significantly more simple matching strategy statements than deliberative strategy statements. Inaccurate eyewitnesses did just the opposite and were more likely to endorse deliberative and thoughtful strategy statements. In addition, the automatic recognition statement was moderately more likely to be selected by inaccurate than accurate eyewitnesses. In looking at participants' responses to an open-ended question about their decision processes, it seemed as though accurate eyewitness felt that their process was automatic but they were more likely to say things like "as soon as I saw the picture, I knew that it was the culprit."

This automatic recognition statement was added to the decision process dependent variable in Study 3, which was designed to look at inaccurate

identifications in target absent sequential lineups. Study 3 demonstrated that the decision processes of inaccurate eyewitnesses did not significantly differ regardless of whether they selected an innocent suspect replacement or a known innocent distractor picture. The data from Studies 2 and 3 were collapsed and the predicted interaction between the type of strategy used (simple matching versus deliberative) and the accuracy of the participant witness was significant. In addition, the two automatic recognition statements "I just recognized him, I cannot explain why" and "As soon as I saw the picture, I knew that it was the culprit" were collapsed to form a composite "automatic" recognition measure and this strategy was endorsed significantly more often by accurate eyewitnesses.

Studies 4a and 4b were conducted to replicate the previous findings using a new set of experimental materials. In attempting to model real world conditions and the variability in the viewing conditions from crime to crime, it was important to be sure that the decision-making processes found in the previous studies could be replicated in situations where the viewing conditions were different. The findings successfully replicated the interaction between decision strategy (simple matching versus deliberative) and witness accuracy found in Study 3, but the "automatic" strategy did not differentiate witness accuracy. This lack of replication will be discussed in more detail below.

Study 5 offers evidence that accuracy rates cannot be easily influenced via the manipulation of the decision processes one uses when making an identification. In Study 5, witnesses who were asked to think back to the video and compare that image to each lineup photograph were not subsequently less accurate in their identifications than control witnesses who made their identifications freely. In trying to influence accuracy, witnesses were asked to create an image of the perpetrator before viewing the lineup and were told to use only that image when making their identification. This manipulation did

not prove to increase accuracy. The lack of significant findings in Study 5 will be discussed in more depth later in this chapter.

The last decision process study had participants who had not witnessed the crime behave like triers of fact. In Study 6, participants were given the decision process selections of 40 previous eyewitnesses and were asked to determine whether each witness had made an accurate or inaccurate identification. Half the participants were informed about the decision strategies found to be indicative of accuracy in Studies 2-4 and half were not informed. Unexpectedly, informed participants did not outperform the uninformed condition, nor did they perform better than chance levels. Analysis of the manipulation check uncovered that informed participants did not use the information given to them in making their assessments of witnesses' accuracy. Even when additional participants were given verbal "mini lectures" on witness decision processes, they were not more likely to pay attention to the information, they were not more likely to classify witness protocols, and they did not outperform uninformed participants.

Lastly, Studies 7 and 8 were interested in testing modifications to the sequential procedure and whether logical changes would affect accuracy rates. In an attempt to gather as much information as possible, police officers may be tempted to offer witnesses who do not make an identification a second opportunity to see the lineup. In addition, eyewitnesses are often hesitant to select to early from the sequential lineup procedure for fear that a later picture will be a closer match to the culprit.

Two modifications to the sequential lineup procedure were contrasted with the traditional "one time" view of the sequential lineup, either seeing the lineup as many times as desired (i.e., multiple view) or a two step process of seeing the lineup once without being permitted to identify anyone, and then

seeing the lineup a second time after the pictures were shuffled and indicating yes or no for each picture (i.e., no-ID-first view). Eyewitnesses have only one chance to see each photograph in a sequential lineup, this second presentation modification was designed to reduce eyewitnesses' use of a more conservative response criterion. The no-ID-first view presentation could ensure that eyewitnesses continue to not make many false positive identifications but without increasing the chances of missed accurate response due to an overly conservation response criterion. In Study 7, only target present lineups were conducted across conditions and the no-ID-first view presentation produced significantly greater accuracy than the one time view and multiple view conditions. There were no significant differences in inaccuracy rates across conditions. Study 8 served as a replication and extension, using both target present and target absent lineups. The superiority of the no-ID-first view condition did not reach significance but produced 12% more accurate identifications than the one time view. The multiple view condition produced equivalent accuracy to the no-ID-first view condition. Again, there were no differences in inaccuracy rates across conditions. Thus, neither modification harmed accuracy, and the no-ID-first view presentation might allow the hesitant eyewitnesses more security in making identifications.

Although unexpected findings were discussed throughout, a few results of these studies are worth further elaboration and emphasis. The role of automatic processing proved to be less pronounced than predicted. In Study 1, the open-ended responses did indicate a greater tendency for accurate eyewitnesses to mention being "struck" by a picture or as sense of "familiarity," but with no mention of a "pop out." Due to the power of the automatic response for accurate eyewitnesses in Dunning & Stern (1994), the "I just recognized him, I cannot explain why" statement was included in the final

decision statements. This statement was, however, endorsed more often by inaccurate eyewitnesses in Study 2. In Study 3, a second automatic statement was added, "As soon as I saw the picture, I knew it was the culprit." In Study 3, the new statement was endorsed moderately more often by accurate eyewitnesses but the original automatic recognition statement was endorsed again by inaccurate eyewitnesses. The collapsing of data from Studies 2 and 3 and the creation of an "automatic" composite variable combing the two automatic decision statements produced the first significant evidence of automatic processing by accurate eyewitnesses. However, in Study 4 this effect, although in the right direction, was no longer significant. Why are accurate eyewitnesses not describing automatic statements in their decision-making?

Accurate eyewitnesses consistently described a simple matching process, and although this process is quick and not deliberate it probably does not feel as "automatic" as the "pop out" found in simultaneous lineups. These witnesses may have an inclination to select a photograph but perhaps there is a lurking uncertainty as to whether that same feeling would be there for another photo yet to be seen. Therefore, it may be this hesitation that prevents accurate witnesses from consistently endorsing the automatic decision statements. The fact that the other lineup photographs do not influence their decision is support for an automatic one-to-one match of memory to individual picture. More studies need to further explore the sense of automaticity that accurate eyewitnesses might be feeling in sequential lineup situations, that was not sufficiently tapped by the decision statements used in theses studies.

A second unexpected finding was the lack of effective manipulation of decision strategies in Study 5. In previous work looking at simultaneous lineups, forcing witnesses to use controlled, process of elimination strategies did decrease witness accuracy (Perretta, 1998). Why was this not the case in

Study 5? In the simultaneous lineup experiment the manipulation procedures were a great deal more elaborate. Perretta required participants to spend 5 minutes analyzing their reasons for why each photo in the lineup was or was not a good match with the perpetrator they had witnessed. In my study, in order to test ecologically viable instructions that police could actually use without concern from lawyers, Study 5 participants were only asked to think back to the video for each lineup picture, and only at the beginning of the lineup. Perhaps if we had reminded witnesses to look back to video when each picture was turned over it would have forced them to adhere to the instructions, and could have facilitated the predicted decrease in accuracy. At this point, police would not be recommended to instruct witnesses on specific decision strategies to use or not use. However, real eyewitnesses are highly motivated to follow police instructions and a replication of this study introducing a comparable motivation level in laboratory participants could produce the expected effects.

A third finding requiring some discussion was the lack of above chance results in Study 6. Analysis of the manipulation check indicated that the informed condition participants did not take into account the "helpful hints" instructions given to them. In Study 6, the experimenter did not verbally go over the informed conditions instruction sheet but merely asked them to read it. This could represent an important difference in the criminal justice system between judges' verbal instructions to jurors and the court's written recommendations to jurors. It may be the case that jurors have difficulty seeing decision process differences in people and will be hesitant to pay close attention to written instructions on how to treat eyewitness evidence, even from an authority. Although the present data indicate that this might be the case, an additional dozen participants were given verbal instructions and this did not

improve the situation. Further research needs to replicate these findings before it can be concluded that instructions on witness decision processes are not a useful postdictive variable. It is also important to note that jurors are, in general, more highly motivated to follow judge's instructions than participants in a laboratory procedure are to follow the experimenter or even the graduate student researcher's instructions. There may be ecological concerns with the design of this study and greater motivation for participants may remedy the barely chance findings. Study 6 does highlight that the potential effects of how instructions about eyewitness evidence are given to juries should be of great concern to eyewitness researchers for how their recommendations are put into play in the criminal justice system.

Before any such recommendations are made, it is important to have a better understanding of how inaccurate eyewitnesses make false identifications. Have we successfully identified their decision-making processes? If so, have we successfully demonstrated that they are controllable?

Understanding Inaccurate Face Recognition

In Chapter 1, it was posited that inaccurate eyewitnesses use the "identifying" route of face recognition described by Mandler (1991), where recognition results from a more analytical and deliberative process requiring significant cognitive effort. This prediction was supported by the findings of Dunning & Stern (1994) in their evaluation of inaccurate recognition in simultaneous lineup situations. They found that inaccurate eyewitnesses did use controlled processing, in the form of process of elimination of lineup photographs to narrow the choices. However, the sequential display of lineup photographs clearly prohibits this type of controlled processing by making it very difficult for eyewitnesses to use the other lineup photographs to fill in

their incomplete memorial representations of the culprit. Thus, in this series of studies it was more specifically predicted that witnesses with incomplete memories that make a lineup choice would be more likely in sequential situations to use the constituent features used to encode the face to narrow down the lineup choices. This would be a modified relative judgment strategy.

There is substantial evidence from Studies 2-5 that inaccurate eyewitnesses were not comparing lineup photographs using the constituent parts encoded in memory before selecting a picture, as was predicted from face recognition theory. Across these studies witnesses reported that they did use the other lineup pictures in their decision-making, although the other pictures often confused them and made the decision more difficult. Nevertheless, there was no evidence that they were comparing facial features across lineup photographs as predicted. In Study 1, 74% of accurate and 84% of inaccurate eyewitnesses reported looking for specific facial features, therefore, the statement "I focused on his most distinctive feature" was included as a decision processes statement in all subsequent studies. There was inconsistency in responses to this statement across the remaining studies. In Study 2 there was no difference between accurate and inaccurate choosers in selecting the distinctive feature decision statement. However, in Studies 3 and 4a/4b collapsed accurate eyewitness were marginally significantly more likely than inaccurate eyewitnesses to endorse using specific features in their decision-making ($z = 1.83$, $p < .06$; $z = 1.86$, $p < .06$). In addition, in Study 3, "I focused on his most distinctive feature" was the only decision statement that significantly differentiated target present and target absent inaccurate eyewitnesses. Focusing on a distinctive feature of the culprit to identify a lineup photograph was a strategy used inconsistently by both accurate and inaccurate

eyewitnesses and does not explain much, if any, of inaccurate eyewitnesses decision-making.

If inaccurate eyewitnesses were not using the facial features that were successfully encoded in memory, then they must have been using information gathered sometime during the witness experience to justify their selection of a lineup picture. In Study 2, factor analysis revealed two significant themes in eyewitness decision-making, which were identified as simple matching and deliberative thought strategies. The deliberative thought strategy proved to be significantly used by inaccurate eyewitnesses in Studies 2-4, although it did not reach significance in Study 3. This strategy is generally described as witnesses looking at each photograph and thinking back to the video to compare images, then selecting the closest person to what they remember. It, therefore, requires attention to the other photographs in the lineup when making a selection, which is clearly controlled and analytical processing.

The controlled processing used by inaccurate eyewitness across simultaneous and sequential lineup conditions begs the question of whether these false identifications can ever be suppressed completely. The sequential lineup was created to suppress relative judgment processing and has successfully reduced false identifications from approximately 30% to 17%. However, suppressing one controlled process only led another to emerge. In sequential lineups, inaccurate witnesses tried to use their memory of the video to help them narrow down the lineup photographs, and those unable to do so chose nobody. Given the failure of sequential lineups to reduce false identifications below 17%, is it even reasonable to think that the false identification numbers can be reduced further? There will always be some error in identification accuracy, but if face recognition is normally automatic, what type of reasoning drives inaccurate eyewitnesses to ignore the fact that

their lineup identifications do not feel automatic and effortless like the other face recognitions they do on a daily basis?

Two Systems of Reasoning

The strength of an eyewitness' memory may impact what kind of processing the witness uses when faced with a police lineup. Steve Sloman (1996, 2002) has argued that people have two systems of reasoning, an "associative" system and a "rule-based" system. He believes that "associative thought *feels* like it arises from a different cognitive mechanism than does deliberate, analytical reasoning" (p. 3). The *associative system* is defined as a cognitive system that draws inferences on the basis of similarity and contiguity, and represents decisions or information that "resonate" with people. Similarity is central to associative processing and is derived from the similarity between the current stimulus and previously associated stimuli. Analyses by Sloman of previously collected data showed that associative responses were automatic in that they persisted even when attempts were made to ignore them. Thus, he characterizes associative inferences as reflexive.

In contrast, the rule based system makes different predictions for eyewitness accuracy. The *rule-based system* is described as being very productive and effortful. The rules are thought to come in different kinds (i.e., instructions and laws of nature or society) and can be normative (i.e., telling people how they should behave to reach some prespecified goal). How do people learn these rules? They can be made up, discovered in logic, or passed down through culture. The important thing to note is that humans understand and apply these rules without external support or verification from the environment as long as their analytic mechanisms have mastered the rules and can access them when relevant.

The associative system parallels nicely with the face recognition research which predicts a one-to-one match between the memorial representation and the current stimulus. Matching involves a computation of similarity, thus, it is an associative response. In addition, the face recognition literature asserts that these matches will be automatic and the process will be difficult to explain. Dunning and Stern (1994) found that both of these patterns were related to the decision-processing of accurate eyewitnesses viewing simultaneous lineups. In addition, the studies presented here found that accurate eyewitnesses viewing sequential lineups also reported more automatic and simple matching processing. Accurate witnesses in the sequential procedure retained an image in their head of the perpetrator and used that image to compare with each photograph, which did not require relying on the other lineup photographs for comparison. A compelling case has been made for automatic recognition using similarity matching processing in accurate witness identifications across three different literatures: reasoning, face recognition, and eyewitness identification.

Unfortunately, not all eyewitnesses will have an automatic response to a lineup photograph using the associative system. The face recognition research predicts that this is because these witnesses do not have complete enough memorial images to automatically match with the lineup photographs. The two systems of reasoning theory would predict that witnesses without an instinctual type of response will rely on the rule-based system in trying to make an identification from a police lineup. Researchers have consistently found with simultaneous lineups that people in this situation use a relative judgment rule and apply the rule through a process of elimination strategy. This is a much more deliberate and thoughtful process that aims to produce an identification in place of a recognition that did not pop to mind associatively. Eyewitness

research shows that most of these witnesses are inaccurate in their identifications. This issue will be discussed later in this section.

What happens when applying a particular rule is prohibited or made impossible yet no associative response occurs? The dual-process theory of reasoning would claim that the rule-based system would then follow another logical rule. In sequential lineup situations, the present data show that inaccurate eyewitnesses used a more deliberative strategy in their attempts to make identifications. In the present studies, this strategy or rule included thinking back to the video for each lineup photograph and comparing that image to the photographs. It also showed, although inconsistently, that some inaccurate eyewitnesses relied on all of the lineup photographs to help them reach an identification decision by comparing a specific feature of the perpetrator to each photograph in search of the closest match. If the rule of thinking back to the video was prohibited or made impossible to use for those who did not have the ability to even recall that memory, they would be forced to follow yet a different rule. In these studies, the secondary rule was comparing one or two distinctive features across lineup photographs to produce an identification. Consistent with the face recognition research, when the holistic image stored in memory was not complete but a few constituent features were retained, any identification required the use of those features. In inaccurate identification situations, the current findings and the face recognition research support the belief that these eyewitnesses were relying on the rule-based system of reasoning.

The discussion thus far has argued that accurate eyewitnesses use the associative system and inaccurate eyewitnesses use the rule-based system. Does this mean that the two systems are independent of each other? In other words, if the associative system is reflexive and the rule-based system is productive

does it make sense, or is it possible, for people to use both simultaneously? Sloman (1996, 2002) contends that both systems do not need to be applied to every problem and that neither has an exclusive problem domain. He believes that the domains of application are overlapping and differ depending on each person's knowledge, skill, and experience. However, Sloman also presents research showing that the two systems are interactive and that they "function as two experts who are working cooperatively to compute sensible answers" (p. 6). Evidence that the two systems exist and often work in parallel comes from research showing that people can simultaneously believe two contradictory responses. This has been shown in the field of judgment demonstrated by the conjunction fallacy (Kahneman, Slovic, & Tversky, 1982), in how people project unfamiliar properties against categories (Sloman, 1993), in syllogistic reasoning (Revlin, Leirer, Yopp, & Yopp, 1980), in conditional reasoning, best known by the Wason task (Wason, 1966), and even with the perception illusions like the Muller-Lyer illusion. In the Muller-Lyer illusion where two identical lines look like they are different lengths, depending on how the arrows on each end are facing, knowledge that the two lines are of equal size does not affect the visual perception that they are not. One's associative response is that they are not the same and even when the rule based system says that they are the same, the image still produces the illusion. In all of these examples, both systems contribute a response and try to solve the problem but the associative, more intuitive, system often intrudes even when someone is attempting to use the more rational, rule-based system.

Is it possible then to determine which system is responsible for a given response? Although this is not experimentally tested, Sloman proposes that the contents of awareness can cue when a response is produced solely by one of the systems. He asserts that when people are conscious only of the result of the

decision, but not the process, then the associative system was at work. In contrast, if people are aware of both the result and the process, then the rule-based system was at work. However, Sloman also proposes that the rule-based system can suppress or overrule the associative system, probably because it demands and provides explanation or justification for a response in a more complex manner. However, the opinion of the associative system is always heard and often precedes the rule-based system, presumably because it is quicker and more efficient. Not to mention, humans are "cognitive misers" (i.e., using the least amount of cognitive resources necessary in interpreting their environments). It makes logical sense for people to rely first on the efficient associative system in decision-making and not the rule-based system, especially when an adequate response is produced by the former (Fiske & Taylor, 1991).

People are very good at face recognition, so much so that they rarely notice that they even process faces, relying almost entirely on the automatic associative system. As well, eyewitness identification findings support the prediction that eyewitnesses are most likely to start out using the associative system in their decision-making. Accurate identifications, as research has demonstrated, are faster and witnesses have consistently described them as being automatic and yet difficult to explain. When forced to explain, they often indicate an absolute strategy of matching their memory to each lineup photograph but there is clearly little or no rule-based system processing. However, when the memory trace is poor for some eyewitnesses and the associative system fails to provide any automatic response, witnesses will turn to the rule-based system to do more evaluative and complex processing of the lineup photographs. These eyewitness identifications are more complex and take longer and paired with witnesses' motivation to select someone, they tend to produce false identifications of distractor photographs or innocent suspects.

The two systems of reasoning clearly apply to the eyewitness situation; accurate witnesses describe using the associative system while inaccurate witnesses describe using the rule-based system. It is important to clarify that the discussion here may appear to imply that using the rule-based system leads to inaccuracy in eyewitness identification judgments. This, however, is not the message that the data reveal. The data reveal a strong correlation between inaccurate eyewitness face recognition and rule-based reasoning. Witnesses who reported using rule-based reasoning (i.e., deliberative strategy) are more likely to have produced false identifications than those who reported using associative reasoning (i.e., simple matching strategy). The causal direction of the link between eyewitness accuracy and decision-making processes has yet to be fully demonstrated or thoroughly discussed and requires further elaboration.

Causal Direction

A connection between identification accuracy and decision-making processes has been demonstrated but the direction of causality has yet to be unequivocally addressed. It could be argued that the use of different decision strategies actually leads to different accuracy rates. Certainly, evidence for this claim could have been provided by Study 5. This study attempted to show that encouraging witnesses to use a simple matching strategy, of creating a clear image of the perpetrator before beginning the lineup and using only that image to match to the lineup photographs, would lead to greater accuracy rates. Trying to improve accuracy rates by asking all witnesses to endorse the strategy of previously accurate witnesses proved ineffective, as it has in previous research with simultaneous lineups (Perretta, 1998). However, these findings make sense when considering the face recognition and reasoning literatures.

The lack of significant findings in attempting to increase accuracy rates may be due to witnesses' inability to force an automatic matching response when their memorial representation is incomplete. Recall that "recognition" requires a familiarity match between a stimulus and a memory trace and the associative system determines similarity by comparing current stimuli and the previous stimulus. If the memory trace is too weak, forcing the consideration of a match will not increase the chances of achieving familiarity or similarity.

Study 5 also attempted to show that strongly encouraging witnesses to use a deliberative strategy of looking back to the video and using only that image to compare with each lineup photograph would reduce accuracy rates. This was unsuccessful and could also be explained by face recognition research and the two systems of reasoning. If good face recognition is automatic and the associative system of reasoning is active then it may be difficult to get eyewitnesses to ignore or bypass their first sense of "familiarity." As the manipulation check revealed witnesses in this condition were not more likely to say that they followed the instructed procedure. The data are not able to determine whether this was because it was too difficult for them to ignore the image of the perpetrator in their memory, if they had retained one, or whether it was only a lack of motivation to comply with the instructions. Further studies would need to be designed to specifically address the unanswered questions from Study 6. However, the data using simultaneous lineups discussed earlier do lend support to the possibility that decision processes might cause witness accuracy (Perretta, 1998).

More likely though, the causal direction is the reverse. It could be argued that determination of decision-making processes is the result of whether or not someone has made a correct identification of the perpetrator. According to face recognition encoding and recognition, people who are certain to be accurate

need a whole configural image of the culprit they saw, and the associative reasoning system predicts a rapid similarity match between new stimuli and past memory, thus seeing the lineup photographs the system would force a quick match of the stored memorial image to each photograph, eliciting feelings of automaticity and familiarity when a match is made. The process should be very different for witnesses that do not have a complete image stored and are not likely to be able to identify the perpetrator at all. In this case, witnesses will find the associative similarity match unsuccessful, if not impossible, requiring action on the part of the rule-based system. The rule-based system may test many rules, such as process of elimination, thinking back to the video, and/or matching the specific features that are stored, and select the best photograph possible with the information it has available. However, due to the poor memory trace to start, the photo selected by any rule is likely to be inaccurate, outside of chance.

The question of causality is difficult to answer but the answer is probably that both directions are involved. It is even possible that one direction is stronger for accuracy than it is for inaccuracy. Perhaps good memory and accuracy initiate and require only the use of automatic associative system processing. It is not likely the case that automatic processes cause eyewitness accuracy. A witness either has a good memory of the perpetrator's appearance or not, and there is nothing forcing that witness to think automatically to improve that memory. Rather, a good memory (which usually leads to a more accurate match between memory and pictures) causes the eyewitness to have an automatic experience when the perpetrator is presented to them. If the witness has a good and complete memory of a perpetrator's face, then that witness will more likely recognize the perpetrator rapidly and without conscious deliberation. As such, although automatic decision processes are

reflective of eyewitness accuracy, they are not likely responsible for that accuracy. On the other hand, decision processing that is very deliberative may lead to greater inaccuracy, regardless of memory. This was demonstrated by Perretta (1998) with simultaneous lineups. These suppositions, although based on the current data analyses and eyewitness literature, require the design of many experiments that specifically address issues of causal direction.

Recommendations to the Legal System

The first six studies presented here sought to identify and better understand one potentially valuable indicator of eyewitness accuracy, witness lineup decision processing. How can these decision processes be practically used in the police stations to diagnose eyewitness accuracy with individual witnesses? Witness decision processes are one part of a potential profile of accuracy that could be used as part of an "eyewitness checklist" by investigators to determine the probability of a given witness's accuracy.

In order to hand a criminal investigator a checklist to help classify a witness's identification as right or wrong, we would need to combine post-diction information. For the sequential lineup this checklist could include the witness decision strategies presented here (i.e., simple matching versus deliberative), rating of relative versus absolute judgment processing (Lindsay, et al, 1991), and decision times (Sporer, 1993), as well as the potential addition of confidence measures (witness confidence after sequential lineups has not been clearly shown to be reliable but research is underway to investigate it further). One study looking at simultaneous lineups used confidence, decision time, and judgment processes to statistically distinguish correct eyewitness identifications from inaccurate ones, and found that they could successfully classify 67% of eyewitnesses making own-race identifications (Smith, Lindsay,

Pryke, & Dysart, 2001). This research suggests that an "eyewitness checklist" is possible but the research does not describe the "boundaries" along these variables that separated accurate witnesses from inaccurate ones. To create a valid checklist, researchers would have to describe the borders. Researchers would have to take multiple variables and determine the boundaries that best separated accurate from inaccurate identifications, or show how the variables could be combined to define a reliable boundary. Again, only in simultaneous procedures, this was done with the single variable of decision time, showing that a border of ten- to twelve-seconds best separated accurate positive identifications from the rest (Dunning & Perretta, 2002). However, before boundaries can be demonstrated and successfully replicated, researchers will first need to standardize measurement of variables across the discipline (e.g., decision-making and confidence).

The studies in this manuscript demonstrated that accurate eyewitnesses were consistently more likely to use a simple matching strategy and inaccurate eyewitnesses were more likely to use a more deliberative and thoughtful strategy. In order to decisively include these decision strategies on an eyewitness checklist, future research would need to reliably show that the use of one or the other of these strategies was predictive of witness accuracy and reliably distinguished the correct identifications from the false positive ones. The studies presented support this possibility but causal direction needs to be further determined. Such a demonstration could compel police investigators to collect and record decision processes, as well as other information as part of their eyewitness evidence.

There are a number of things that police investigators can do to assist in the successful postdiction of eyewitness accuracy. The most appropriate recommendations that can be made from the data presented here on the

sequential lineup procedure are that investigators should discourage eyewitnesses from using relative judgments but more importantly, they should collect and record postdicting information like eyewitness decision strategies.

Through the collection of additional information, that may seem invaluable at the time, investigators and jurors will be able to better assess the accuracy of each eyewitnesses' package of information. That package already includes their description of the culprit, details of the event, and confidence, but should also include decision processes during an identification. Research suggests that providing triers of fact with information about witnesses' decision processes would help them better determine the eyewitness's accuracy. For example, educating people about decision processing differences helped them to assess an eyewitness's identification even more, particularly when the witness was wrong. Dunning and Stern (1994, Study 5) provided a set of participants with information about how twenty witnesses had reached their decisions. The researchers then asked participants to separate the accurate witnesses from the inaccurate ones. Participants showed some facility at this task, achieving an accuracy rate of 61% (where chance accuracy was 50%). Although they properly suspected, without any intervention from the researchers, that accurate witnesses would reach their decisions automatically, they did not realize until told that inaccurate witnesses tended to work their way to an identification through a process of elimination strategy. Once told, they were much better at spotting when a witness had chosen incorrectly, with their accuracy rates rising from 61% to 67% in this circumstance.

Study 6 followed similar procedures in trying to educate potential jurors about the decision processes and weaknesses of eyewitnesses seeing sequential lineups. Surprisingly, educating people about the decision processing

differences did not help them to assess an eyewitness's identification accuracy at a rate greater than chance or even greater than those who were not informed about witness decision processes. The results showed that these participants did not pay any extra attention to the decision processes hints given to them. Therefore, educating jurors with written instructions about eyewitness decision-making patterns may not prove to be effective if they are not motivated to incorporate them into their decisions.

Due to the fact that subtle education is not consistently effective, it is tempting to suggest an even more hands-on role for police investigators in affecting, not just postdicting, eyewitness accuracy when showing eyewitnesses sequential lineups. If people facing sequential lineups are more accurate when they are automatic and use a simple matching strategy, then it could be recommended that investigators force people to use a simple matching strategy and be more automatic when they look over a sequential lineup. Witnesses should be asked to create an image of the culprit and compare only that image to each lineup photograph, a quick match and response for each picture. This was a tempting idea and so in Study 5 I did just that, and found it not to be worthwhile. Other researchers have tried similar tactics of increasing automaticity during simultaneous lineups with no success (Perretta, 1998; Brewer, Gordon, & Bond, 2000). Why might forcing people to rely on such a process not promote accuracy? The best explanation rests on the causal connection between automatic decision processes and eyewitness accuracy. As discussed previously, it is probably not the case that automatic processes *cause* eyewitness accuracy. If the witness has a good and complete memory of a perpetrator's face, then that witness will recognize the perpetrator rapidly and without conscious deliberation. Automatic decision processes are reflective of eyewitness accuracy but they are probably not responsible for that accuracy.

In contrast, the eyewitness literature and the studies presented here do suggest things that criminal investigators can do to successfully help witnesses avoid making false positive identifications. First, as accuracy is the primary goal of the sequential lineup, criminal investigators should prevent witnesses from pursuing an effortful relative judgment strategy in which they consciously and analytically compare lineup choices to each other. Such a strategy is indicative of a poor memory, and thus induces witnesses to make erroneous positive identifications. Other researchers have tried forcing participants to analytically compare lineup choices to each other and successfully shown that it damages their accuracy (Perretta, 1998; Perretta & Dunning, 2003). In Study 5 of this manuscript, some participants were forced for each lineup photograph to go back to the video and compare that image to the picture in order to find the closest match to their memory; a process indicative of a poor memory when viewing a sequential lineup. This procedure was not found to decrease witness accuracy rates in comparison to a control condition, but specific concerns with the study design have already been discussed. If police officers are to ever be encouraged to modify witness decision processes, it is likely that they will also desire to modify the lineup procedures as well.

Can small modifications to the sequential lineup procedure affect eyewitness accuracy rates? Studies 7 and 8 addressed whether two modifications to the traditional sequential lineup procedure would damage the rate of accuracy or increase false positive identifications. Both studies found that seeing the lineup twice or in a two-step process of seeing it once without making a selection and then seeing it again and having to make a selection did affect false identification rates. In Study 7, however, there was a significant increase in accurate identifications using the two-step no-ID-first viewing

presentation, although this relationship did not reach significance in Study 8. Therefore, these studies demonstrate that researchers should not be overly concerned if police investigators modify the sequential lineup presentation in either of these ways. Allowing witnesses a "second chance" when they do make an identification the first time did not harm accuracy rates and may even help investigators acquire more information from eyewitnesses who did not select from the first sequential lineup. In addition, the no-ID-first viewing presentation is similar to that used in Britain's VIPER system, and although not reliably superior to the traditional method it did produce increased accuracy across two studies. Future work should explore further this modified sequential procedure, for it alleviates practical concerns of the American criminal justice system which hesitates to recommend only one viewing of the sequential lineup procedure.

Concluding Remarks

Research evidence overwhelmingly shows that human being are neither unbiased observers nor veridical recorders, and as such will always make mistakes when it comes to eyewitness identification. Researchers have often asked typical people whether or not they agree with certain beliefs about memory like "Memory is like a video recording of your observations and can be played back at will to remind you of what you saw," or "An eyewitness report is accurate evidence as to who was present and what happened at a crime scene" (Haber & Haber, 2000). They found that most people who have been asked either agree or strongly agree with both of these statements. These responses are representative of what a typical juror might believe about how

human memory functions. However, these statements are at a sharp variance with the data presented and reviewed in this manuscript.

Despite the scientific data surrounding the fallibility of eyewitness identification, neither the courts nor the typical person who may become a juror consider eyewitness identification to be a fallible matching test between memory and lineup, with a substantial false positive rate. In general terms, a test is accurate when only true positive outcomes (i.e., when the culprit is present, the culprit is picked) and true negative outcomes (i.e., when the culprit is absent, nobody is picked) occur, and a test is flawed to the extent that either false outcome occurs (i.e., when the culprit is absent but the suspect is picked, or when the culprit is present and he is not picked) (Haber & Haber, 2000). The courts require scientific evidence of a test's accuracy with respect to its likelihood of false positive outcomes when any new forensic matching test is introduced into evidence. This has been the requirement for blood tests, polygraph tests, voice recognition tests, and most recently DNA tests. However, eyewitness identification "tests" have not been assessed with the same rigor as these other tests, and testimony based on the eyewitness identification test, even with its demonstrated high false-positive rates, is almost never excluded by the courts.

The criminal justice system continues to allow almost all eyewitness identifications into the courtroom because it has implemented safeguards. A large part of the criminal justice system genuinely believes that these safeguards are not only sufficient for protecting innocent suspects but warrant giving eyewitness identification such an influential status. However, the system is designed so that it is both practical and advantageous to work around these safeguards. First, there is the presence of counsel at live lineups if they are post indictment, but most lineups are done with photospreads for

convenience and to avoid the hassle of having lawyers present. Second, there are opportunities for motions to suppress identifications, although this assumes a judge will be able to identify a biased identification task or lineup. Third, expert testimony is occasionally allowed to inform jurors about the external influences on eyewitness identifications, but this is not standard in most courts because it is expected that defense lawyers can cover any external influences in their opening and closing statements to the jury. Lastly, cross-examination of identifying witnesses is supposed to give the defense the greatest opportunity to reveal a poor eyewitness identification. However, creating doubt about an eyewitness is not always easy, as the following example demonstrates.

> "After establishing that the incident occurred at night, at some distance, in an area where there were no street lights, the defense counsel demanded, 'Then tell the jury, just how far can you see in the dark?' The witness, a simple country fellow, paused for a moment and then replied, "Well, I can see the moon. How far is that?" (Roberts, 1984, p. 1064).

The jury found the defendant guilty.

The impact of this "tyranny of the eyewitness," as it is properly described in England (Devlin, 1976), is reflected in the horrific number of American DNA exonerations, especially those in which the only or primary evidence against the defendant was the testimony of eyewitnesses. There is, however, one important legal solution to the "tyranny of the eyewitness" problem, the application of the Old Roman "unis testis" rule (Haber & Haber, 2000). In this context, "unis testis" holds that the testimony of only a single eyewitness should never be sufficient to convict a stranger. This rule would

require that less emphasis be put on eyewitness testimony and more emphasis on other types of evidence in building a case. If the United States were to apply such a rule in our adversarial system, it would show people that the courts recognize the fallibility of sincere eyewitnesses attempting to get the perpetrator.

Even if "unis testis" was put into effect it would be difficult, if not impossible, to break the "tyranny of the eyewitness" and get people to understand the weaknesses of human memory in all its complexity. Therefore, it is essential that the criminal justice system look at ways it can prevent confident but inaccurate eyewitness identifications from reaching jurors. The National Institute of Justice, using the eyewitness research that has demonstrated dramatic implications for the way police lineups are done today, made a recent attempt to impact police procedures. *The Guide* was a handbook presented to all police investigators of recommendations on how to best handle eyewitness evidence based on the science of psychology and the practical requirements of the law. Considerable amounts of psychological research were considered when *The Guide* was written, including the first ten years of research on the sequential lineup. Yet the sequential lineup procedure was not included as a central recommendation (Wells et al, 2000).

The Guide was a call for more research. Since *The Guide* was written, eyewitness researchers have sought to better understand the sequential procedure, its small decrease in accuracy rates, its significant decrease in false identifications, as well as the decision time and decision processes of eyewitnesses viewing sequential presentations. Eyewitness researchers have continually demonstrated the superiority of the sequential lineup over the traditional simultaneous lineup (Lindsay & Wells, 1985).

The studies presented here continue to show the superiority of the sequential lineup as well as flesh out the underlying decision processes of eyewitnesses and the effects of variations on the sequential lineup presentation. Six of the studies presented here dug deeper into the decision processing of eyewitnesses to get an understanding of what inaccurate eyewitnesses are doing that impedes their accuracy. I identified two distinctive decision strategies that differentiated accurate and inaccurate eyewitnesses viewing sequential lineups: the simple matching and deliberative thought strategies. Both the identification and demonstration of these processes show that even when relative judgment processing is suppressed, there is still more to learn to about eyewitness decision-making. When one analytical process was prohibited another emerged, demonstrating clear evidence for controlled processing in the case of poor face recognition, and leading me to believe that there will always be eyewitnesses who make false positive identifications. The final two studies presented here demonstrated that the sequential lineup is flexible, such that practical and policy oriented modifications to the presentation of the procedure did not increase false positive identifications and may even increase accuracy rates.

The Guide and the research presented here are steps in the right direction but there is much more that can be done to improve the current situation. There is a need for more "in the field" research that will help us determine how police investigators, judges, and jurors use and understand lineup procedures and other eyewitness evidence. This could be accomplished by the centralization of eyewitness research into a "Center for Eyewitness Evidence" where researchers and practitioners could work together to address issues of concern to the criminal justice system in more systematic but policy oriented ways. While eyewitnesses will always make mistakes, with better research and

better communication between researchers, law enforcement, and the judicial system, we can continue to decrease the numbers of false positive identifications, and increase the efficacy of lineup procedures to the point where eyewitnesses on the witness stand do not have to be asked, "Got Perp?"

APPENDIX A

Identification Form

Remember, as in a real identification situation, the guilty party may or may not be present. Please circle your responses on this form.

			Certainty						
Is #1 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #2 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #3 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #4 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #5 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #6 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #7 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #8 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #9 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #10 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #11 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)
Is #12 the person you saw in the video?	No	Yes	(not very)1	2	3	4	5	6	7(very)

APPENDIX B

1a. What decision did you reach:
_____I chose Photo #_____
_____I reach no decision at all.
_____I believe that he is not there.

1b. If you endorsed "I reach no decision" or "He's not there" which photo would you choose if forced to make a positive identification?→ I would choose Photo #____

2. If you either chose a photograph or said that he was not there, how confident are you in your choice, please respond from 0% - 100%.→___%

3. How would you best describe your decision process (please circle as many as apply)?
   a. I just recognized him, I cannot explain why.
   b. I went with my gut feeling.
   c. I focused on his most distinctive feature.
   d. He was the closest person to what I remember, but not exact.
   e. I matched the image in my head to the picture in front of me.
   f. While I looked at each photograph, I tried to think back to the video and compare.
   g. Other (please explain below).

4. How much influence did the other pictures have on your decision (please circle as many as apply)?
   a. They had little influence on my decision.
   b. As I looked at more pictures, they all began to look the same.
   c. They confused me; they made the task more difficult.
   d. They were all so similar that they made me less confidence.

5. What would you say had a greater influence on your decision, the pictures in the line-up, or your memory of the culprit?
   a. My memory
   b. The pictures
   c. They had about equal impact on my decision.

   Could you explain this last answer. Why did you choose a, b, or c above?

6. In your own words, describe your decision process. What led you to choose the photo you identified?

APPENDIX C

1a. What decision did you reach:
_____I chose Photo #_____
_____I reach no decision at all.
_____I believe that he is not there.

1b. If you endorsed "I reach no decision" or "He's not there" which photo would you choose if forced to make a positive identification?→ I would choose Photo #____

2. If you either chose a photograph or said that he was not there, how confident are you in your choice, please respond from 0% -100%.→___%

3. How would you best describe your decision process (please circle as many as apply)?
   a. I just recognized him, I cannot explain why.
   b. I went with my gut feeling.
   c. I focused on his most distinctive feature.
   d. He was the closest person to what I remember, but not exact.
   e. I matched the image in my head to the picture in front of me.
   f. While I looked at each photograph, I tried to think back to the video and compare.
   g. As soon as I saw the picture, I knew that it was the culprit.
   h. Other (please explain below).

4. How much influence did the other pictures have on your decision (please circle as many as apply)?
   a. They had little influence on my decision.
   b. As I looked at more pictures, they all began to look the same.
   c. They confused me; they made the task more difficult.
   d. They were all so similar that they made me less confidence.

5. What would you say had a greater influence on your decision, the pictures in the line-up, or your memory of the culprit?
   a. My memory
   b. The pictures
   c. They had about equal impact on my decision.

   Could you explain this last answer. Why did you choose a, b, or c above?

6. In your own words, describe your decision process. What led you to choose the photo you identified?

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