IN SUPPORT OF A DIVERSITY OF METHODS: EYEWITNESS MEMORY IN ACTUAL CASES OF ROBBERY AND FRAUD

by

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ABSTRACT

Much of our knowledge of eyewitness memory is built on laboratory-based studies. In recent years this has caused a controversy, the resolution of which seems to be an acceptance of the need to learn about eyewitness memory from a variety of methods such as field studies, case, and archival research. The thesis reports an archival analysis of actual Royal Canadian Mounted Police case files of robbery and fraud. Previous research on the configuration of robberies was replicated. The majority of robberies are victim-only crimes that do not involve bystander eyewitnesses. Robbery victims and witnesses provided more details (10.96 and 9.37 respectively) regarding the perpetrator's appearance than fraud victims (2.11). Less than 10% of robbery victims and witnesses, but almost 75% of fraud victims were unable to describe the perpetrator. All eyewitnesses tended to overestimate age and underestimate height and weight. Identification outcomes were analyzed according to the evidence category of the perpetrator (Confession, Implicating and None). The likelihood that the police suspect was indeed the actual perpetrator is assumed to be highest in the Confession condition and lowest in the None condition. In the Confession condition, the police suspect was selected by 84.6% of robbery victims, 55.55 of robbery witnesses and by 22.7% of fraud victims. Identification accuracy was adversely influence by the average delay between the crime and attempting an identification. Delay was a confound in these analyses as on average, victims of robbery attempted their identifications sooner than both robbery witnesses and fraud victims. Limited support was

found for the weapon focus phenomenon. Weapon presence (in robbery cases only) did not influence descriptions (amount or accuracy). Weapon presence did not significantly adversely influence identification accuracy, but was close to obtaining significance ($p = .061$). The present analysis demonstrated the feasibility as well as the utility of archival research.

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Like horse and cart, the study of eyewitness memory has been coupled with and propelled by a debate about the external validity or the generalizability of the research (for an excellent historical review see Cutshall, 1985). Since the 1970's we have amassed a great deal of knowledge about eyewitness memory, most of which has had an explicit agenda to assist the triers of fact. There are many books (e.g. Loftus, 1979; Ross, Read, & Toglia, 1994; Wells & Loftus, 1984; Yarmey, 1979), hundreds of journal articles and several meta-analyses (e.g. Deffenbacher, 1986; Shapiro & Penrod, 1986) dedicated to eyewitness memory. In addition there are several journals (e.g. Law and Human Behavior) that deal largely, but not exclusively, with eyewitness issues. Yet the bulk of our knowledge on eyewitness memory is derived from laboratory studies. In what has become the standard laboratory method, an event, usually depicting some kind of crime, is presented to university students via slides, video or staged live. Memory for the event is tested by a variety of methods, such as questionnaires, interviews, and the use of photospreads or the occasional live lineup. It is uncommon for subjects in these experiments to be involved in the event, although there are some exceptions (e.g. Hosch & Bothwell, 1990; Kassin, 1984; Read, Yuille & Tollestrup, 1992;) and ethical considerations rightly prevent subjects from being seriously victimized, aroused and/or engaged to the extent that eyewitnesses to violent crimes can be. Subjects are often debriefed about the staged nature of an event immediately after its occurrence, thus eliminating any consequences of their recall or recognition decisions for either themselves

or the "perpetrator." A few studies have kept subjects blind about their participation in an experiment on eyewitness memory right through the identification task (e.g. Murray & Wells, 1982), but subjects in all laboratory experiments know they are taking part in some kind of psychological experiment. Until recently, very few researchers had taken experimental methodology out of the laboratory to conduct field studies (e.g. Brigham, Maass, Snyder & Spaulding, 1982; Flin & Shepherd, 1986). In field research an event is staged before subjects who are often drawn from a population other than university students. They generally learn about their participation in an experiment only after they have attempted to identify the confederate. Like laboratory studies the event is limited in the extent to which it can engage and arouse the subjects. Only a handful of case (Cutshall & Yuille,1989; Yuille & Cutshall, 1986) and archival studies (Kuehn, 1974; Sporer, in press) of actual eyewitnesses have been conducted. Both case and archival research can address the influence of arousal on eyewitness memory, as well as point out the variety of contexts in which eyewitnesses to crimes find themselves. They suffer from an almost complete lack of control and are costly and time consuming. At the outset, it is acknowledged that these categories of research are fuzzy and that placement of a particular study into one of the categories is occasionally less than straight forward.

The dependence on laboratory studies has created a controversy with respect to the generalizability of eyewitness findings. Many psychologists have testified in court about the weaknesses of eyewitness accounts and this

testimony has depended on laboratory findings. It remains unknown whether the exponential increase in eyewitness memory research has been accompanied by an increase in the prevalence of expert testimony but there is some suggestive evidence. At least one prominent psychologist has written a book about her experiences as an expert witness for the defense (Loftus & Ketcham, 1991) and there are a number of books (e.g. Blau, 1984; Brodsky, 1991; Kagehiro & Laufer, 1992) and journals (e.g. Expert Evidence) on the topic of expert testimony. Regardless, the debate about generalizability and whether or not psychologists have a sufficiently proper and adequate data base about eyewitness memory from which to draw their expert testimony was ignited by an exchange between McCloskey and Egeth (1983) and Loftus (1983). Since that time extreme positions have been advocated with some arguing that only strictly controlled laboratory studies can lead to generalizable findings (Banaji and Crowder, 1989) and others taking the position that only archival research can provide us with meaningful information (Konecni & Ebbesen, 1986). While those holding these more extreme viewpoints do offer some valid criticisms of other modes of research, much of the fire has been taken out of the debate by a growing recognition of a need for a multi-method approach to the study of eyewitness memory (Christianson, Goodman & Loftus, 1992, Davies, 1989, 1990; Yuille & Wells, 1991). For example, Davies (1990) has argued that "no one research method can of itself provide a reliable data base for legislation or advocacy. Rather, problems need to be addressed from a

number of perspectives each of which makes a different compromise between ecological validity and methodological rigor" " (p. iv).

One of the most studied topics in the area of eyewitness memory and the one seemingly most testified about by expert witnesses in court, is eyewitness identification. There have been hundreds of studies conducted on this topic, all either laboratory or field based. To the best of my knowledge there has been only one attempt at examining identification by actual eyewitness to crimes, quite some time ago (Borchard, 1932), the purpose of which was to demonstrate the existence of mistaken eyewitness identifications. To be fair, the task of studying actual eyewitness identifications is fraught with difficulties, not the least of which is a lack of ground truth against which to categorically determine the accuracy of eyewitness identifications. Nonetheless, it is time that a start be made to address the imbalance between laboratory-based and archival knowledge about eyewitness identification. In the spirit of contributing to the multi-method approach, the present thesis involved an archival examination of case files from the Richmond, B.C. detachment of the Royal Canadian Mounted Police (RCMP). As such, the purpose of this thesis was to determine how frequent eyewitnesses are asked to make an identification, and to the extent that it is possible, examine the accuracy of eyewitness identification and indicate factors that might influence identification performance. In addition, the thesis provides data on the amount of detail and accuracy of perpetrator descriptions provided by eyewitnesses. It is hoped that data from this research and others like it will help to clarify issues

regarding the generalizability of laboratory and field research and in doing so solidify and expand the data base on eyewitness memory.

Just what is the current state of our knowledge on eyewitness memory? The following review of eyewitness research is organized according to methodology with laboratory research presented first, followed by field research, with case studies and archival research concluding the review. A progression of quality is not intended in the presentation order of the research approaches. In the following pages, the major findings pertaining to eyewitness identification and descriptions as well as the strengths and weaknesses of each of these areas will be reviewed. When a topic such as cross-racial identification has been looked at by a variety of methods, conclusions regarding the topic will be offered in the last section of the review in which the research was conducted.

Laboratory Research

There are two distinct laboratory-based approaches to the study of eyewitness memory. The standard method, described earlier involves presenting an event to students and testing their memory by questionnaires, interviews, and the use of photospreads or the occasional live lineup. Most typically, subjects passively watch the event and are not physically or emotionally involved in or by it. Unless specified, the reader is to assume the standard approach was employed.

The second method, photo recognition, does not present events and instead involves showing subjects slides or photos of faces. Often a number of

faces are serially presented and subjects must later recognize these among new faces. Although much of this research was designed to learn about the neural structures and processes involved in face recognition and does not have a mandate of forensic relevance, some research germane to eyewitness memory has been conducted with this paradigm. Most of the findings from the photo recognition research that have forensic relevance have been supported by research in other paradigms.

Wells' (1978) seminal paper on the distinction between system and estimator variables offered a classification system that allowed researchers to orient their research in ways that would be more immediately applicable to the criminal justice system (CJS). Estimator variables refer to aspects of the crime or its investigation over which the criminal justice system has no control and whose influence in any particular case must be estimated. Most estimator variables are associated with the crime itself such as the characteristics of the eyewitnesses and perpetrators, the seriousness of the crime, and illumination.. Estimator variable research is aimed at finding factors that can help the CJS increase in some contexts or reduce in others its reliance on an eyewitness's testimony. In contrast, a system variable is one over which the CJS can exert some control. Examples include lineup presentation and construction, and the type of questions police ask eyewitnesses. The goal of system variable research is generally to improve eyewitness performance. Wells suggested that research into system variables would offer the most immediately beneficial findings to the CJS and encouraged research into this area. The distinction between

estimator and system variables is used to organize the laboratory and field research on eyewitness memory.

Estimator Variables

Individual Differences

Several individual difference variables have been examined in relation to eyewitness memory. In comparison to older children and adults, young children are less accurate in answering objective questions and they offer shorter free recall accounts (Leippe, Romanczyk & Manion, 1991). There is a whole separate area that deals with the eyewitness memory of children, most of which is focused on children as victims of sexual abuse. The present thesis is concerned only with adult eyewitness memory. Yarmey, Jones and Rashid (1984) compared the recall and identification performance of young and old adults and found that young adults are more accurate in answering specific questions and they offer more complete, but less accurate free recalls than older adults. Young adults are less likely to make false alarms on a target-absent lineup than older adults.

The degree of self-monitoring has been related to identification accuracy (Hosch & Cooper, 1982; Hosch & Platz, 1984; Zimmerman, 1982). High self-monitors are concerned about behaving "correctly" or appropriately in social situations than low self-monitors. High self-monitors tend to be more accurate eyewitnesses. Self-monitoring scores have also been related to susceptibility to bias in lineup presentation (Hosch, Leippe, Marchione & Cooper, 1984). Four

of the five studies on the relation between scores on the Benton Facial Recognition Test (BFRT) and identification accuracy summarized by Hosch (1994) report a strong and positive correlation. Two studies have examined the relationship between observational ability and eyewitness memory. General observational accuracy was positively related to eyewitness recall of an event (Boice, Hanley, Shaughnessy, & Gansler, 1982). Identification accuracy was positively related to memory for the event in one study (Boice et al, 1982) and was negatively related to memory for peripheral details of the room in which the event occurred in another (Wells & Leippe, 1981).

In Shapiro and Penrod's (1986) meta-analysis of factors affecting facial recognition, individual difference variables demonstrated a small but significant effect on both hits and false alarms. The result of the meta-analysis and the earlier reported findings suggest that there may be some paper and pencil tests that the police could give to an eyewitness after a crime to help them determine the general ability of the eyewitness to identify faces and recall the details of the crime. However, none of these methods have been used on actual eyewitnesses, and only the relation between self-monitoring and identification accuracy has been tested on subjects in a field study. This aside, there are practical issues regarding the hypothetical use of these tests by police that have been left unaddressed by the psychologists proposing them. Police departments may not have the time, space and/or money to administer and score the tests. Moreover, they may not want to routinely administer tests that could potentially end up assisting in the defense of a suspect. A closer liaison

with the potential consumers of research on eyewitness memory, police officers, lawyers, judges, etc., could lead to more usable research as well as make it easier for these consumers to accept the findings by feeling that they played a role in their discovery.

Situation Variables

With the exception of arousal, discussed in a separate section, there has been little research into situation variables (aspects of the crime itself or the participants) that could influence eyewitness memory. Clifford and Hollin (1981) found that subjects were able to accurately identify the main perpetrator if there was one or three perpetrators, but performed at chance level if there were five. Poor illumination did not affect recall accuracy, but did adversely affect identification accuracy (Yarmey, 1986). The appearance of the perpetrator has been shown to influence identification accuracy. Guilty or unpleasant looking perpetrators are more likely to be correctly identified than perpetrators who were innocent or pleasant looking (Yarmey et al., 1984). This finding is reminiscent of the typicality effect obtained from photo recognition studies (Courtois & Mueller, 1981; Vokey & Read, 1992) in which atypical faces are easier to recognize than typical faces. Finally, McKelvie (1988) used a photo recognition design to demonstrate that recognition of bespectacled faces was poorer than faces without glasses primarily due to higher false alarms on bespectacled faces.

The effect of race (subject and target) has been extensively examined, mainly with Caucasian and Black faces, and it has generally been concluded

that people are better at recognizing faces from their own race than from others (e.g. Ayuk, 1990; Brigham & Barkowitz, 1978).

Finally, there have been some investigations into the effects of alcohol (Read, et al. 1992; Yuille & Tollestrup, 1990) and marijuana (Yuille, Tollestrup, Marxsen & Porter, under review) on eyewitness memory. These studies were conducted after archival research (Yuille, 1986) indicated that eyewitnesses to crimes were occasionally under the influence of intoxicants. Subjects in Yuille et al witnessed a live event and were interviewed twice; immediately after the event and a week later. Marijuana did not affect accuracy of recall, nor did it have a significant effect on identification accuracy. However, the study lacked adequate power to detect any differences in identification accuracy or choosing rates. On the target-absent photospread marijuana subjects were twice as likely than placebo subjects to chose the photo of an innocent foil. The effects of marijuana on the amount recalled appeared to be temporary as subjects who had consumed the drug recalled less than those who had consumed a placebo, but only on the immediate interview. By the second interview, when presumably the effects had worn off, placebo and marijuana subjects performed equivalently.

In contrast to marijuana, the effects of alcohol were not temporary. Subjects in the Yuille and Tollestrup (1990) study consumed alcohol or a placebo and watched a staged event. Some subjects were interviewed immediately and all subjects were interviewed a week later. Alcohol suppressed the amount recalled during the immediate interview and both the amount and accuracy of

recall after a 1-week delay. Like marijuana, alcohol did not affect identification accuracy except on target-absent lineups where alcohol subjects made numerically more selections of innocent foils than placebo subjects. Finally, the study demonstrated the advantage of an immediate interview; subjects who were interviewed twice recalled much more after a week delay than those for whom the 1-week interview was their first.

The second alcohol study also examined the effects of arousal (Read et al. 1992). It employed a mock theft paradigm in which subjects committed a simulated theft. Arousal was manipulated by varying subject's perceptions of the likelihood and consequences of getting caught in the act of thievery. A confederate interrupted the theft which allowed for an examination of the effects of alcohol and arousal on identification accuracy (in the second study only). Subjects were interviewed only once, a week after the simulated theft. In the first study reported in Read et al. (1992), alcohol had an adverse effect on the amount and accuracy of recall, with the greatest impairment being in the recollection of the appearance of the confederate intruder. In the second study, subjects consumed less alcohol and recalled fewer details about the appearance of one of two targets. Alcohol also impaired the accurate recall of the sequence of actions during the theft, something which was not analyzed in the first study. With target-present photospreads, alcohol had an adverse effect on identification accuracy only if arousal was low. This suggests that higher arousal enabled subjects to overcome the adverse effects of alcohol with

respect to identification and that perhaps actual eyewitnesses who are similarly intoxicated and aroused might also be able to identify the perpetrator.

These last studies of the effects of drug use were undetaken because archival research had revealed drug use played a role in actual crimes. As such they illustrate how archival research can provide fruitful avenues for research on situation variables. Each different type of crime such as fraud and assault is likely to have a different complex of situation variables such as number of perpetrators, familiarity with the perpetrator, and the number of non-victim eyewitnesses. Archival research can also aid in determining how much of the laboratory context overlaps with that of actual eyewitnesses.

Arousal

This topic has been examined from a variety of angles. In early efforts, some studies manipulated arousal by means such as electric shock or white noise that were external to the to-be-remembered material (Brigham, Maass, Martinez & Whittenberger, 1983; Deffenbacher, 1983). These studies report detrimental effects of arousal. Most would agree that this method does not provide a close enough approximation to the situation faced by actual eyewitnesses and have found other ways to approach the topic. Currently, arousal is typically operationalized by the use of violent or non-violent material or by looking at differences between victim and non-victim subjects. Additionally, there are some who employ the mock theft paradigm described earlier in which subjects commit a simulated theft and arousal is manipulated by varying the threat of apprehension. Further lines of research have pursued

the qualities of memories for arousing events and the weapon focus phenomenon.

Event Violence. The outcomes of research on the effects of arousal, operationalized as event violence, on eyewitness memory includes the whole gamut of possible findings, from detrimental through to facilitative. Two reviews of this literature, almost a decade apart, drew very different conclusions regarding the discrepant findings and the effects of arousal on eyewitness memory (Deffenbacher, 1983; Christianson, 1992).

Deffenbacher (1983) reconciled the different findings by fitting them to the oft-cited Yerkes-Dodson inverted u-shape curve which demonstrates that performance improves with low to moderate levels of arousal, but is impaired under high levels of arousal (Yerkes & Dodson, 1908). Deffenbacher inferred that the studies which showed either a facilitative or no influence of arousal had induced lower levels of arousal than the studies which showed a detrimental influence. Like many other researchers, (e.g. Loftus, 1979; Yarmey, 1979) Deffenbacher assumed a relatively simple relationship between arousal and eyewitness memory and cautioned that the level of arousal faced by actual eyewitnesses to violent crimes would be very high, thus their memory for the event would be poor.

With many more studies under our collective belt, Christianson (1992) concluded in his review that the lack of consensus in the field is more apparent than real and reflects the different foci of various researchers. For example, some focus on eyewitness accuracy and persistence over time (Reisberg et al,

1988), and others (Wagennar & Groeneweg, 1990) focus on errors and the decline in memory over time (for a more detailed analysis of these two foci, see Cutshall, 1985). In terms of the effects of arousal on eyewitness memory, he concluded that there "are no real grounds for a simple relationship between intense emotion and memory" (p. 302). Two variables, retention interval (e.g. Christianson, 1984; Heuer & Reisberg, 1992) and type of detail (e.g. Burke, Heuer & Reisberg, 1992; Christianson & Loftus, 1987, 1991) interact with arousal to paint a complex picture that is more supportive of Easterbrook's (1959) theory of arousal and memory than that of Yerkes and Dodson (1908). Essentially, Easterbrook's theory predicts that with high arousal, more attention is focused on the source of the arousal. This leads to an accurate, detailed and persistent memory for the material upon which attention was focused, also referred to as the central details. Information outside of this focus of attention, referred to as peripheral detail, is remembered in less detail, is less accurate and less persistent.

Eyewitness Role. Several studies have examined differences between victims and non-victims ('witness' in this discussion), all of which assume that the role of victim is more arousing that the role of witness and all involved a live staged theft. In terms of identification accuracy, three studies show no difference between victims and witnesses (Hosch & Bothwell, 1990; Hosch & Cooper, 1982; and Hosch, et al 1984) and one showed that victims were inferior to witnesses (Kassin, 1984). The effects of eyewitness role on providing description are less clear with two studies showing no difference

(Hosch & Cooper, 1982 and Kassin, 1984) and one showing superior descriptions provided by victims (Hosch & Bothwell, 1990). These studies differ on many dimensions which makes it difficult to draw any firm conclusions about laboratory-based differences between victims and witnesses or the effects of arousal.

Mock theft paradigm. In study 1 of Read, et al. (1992), there was no effect of arousal on either the amount or accuracy of recall and identification accuracy was not examined. In the second study, the event was changed slightly to increase the amount of arousal experienced by all subjects, but particularly those in the high arousal condition. With the modified event, high arousal subjects recalled more correct information than low arousal subjects. Subjects were asked to identify two targets, the confederate intruder and a bystander whom subjects encountered before receiving instructions on how to commit the crime. The intruder was considered to be central to the event and the bystander was considered to be peripheral. Identification accuracy of these two targets was the same for low arousal subjects, but high arousal subjects accurately identified the intruder more often than the bystander, suggestively supportive evidence for Easterbrook's theory of the effects of emotion on memory.

Qualities of memory of arousing events. Christianson and Loftus (1990) have surveyed students about their memories of traumatic events. They report that these memories are quite vivid and the more intense the emotion of the event, the more central, but not peripheral details are recalled. In addition,

most people with memories of traumatic events think about and frequently discuss the event with others. There is often a specific detail that is remembered best. This well-remembered detail is equally likely to be described as central or peripheral to the event. Most describe this well-remembered detail as being concrete (e.g. "an average leather jacket"), but over one-third recalled a thought or a feeling (e.g. "my heart felt like it was sinking").

Weapon Focus. According to the notion of weapon focus, eyewitnesses pay more attention to a weapon than the face of the person holding the weapon, which results in poor memory for the face. The laboratory studies that have examined this topic have found support for weapon focus in terms of the greater attention paid to the weapon (Loftus, Loftus & Messo, 1987) and the predicted effects on both recognition and recall (Kramer, Buckhout & Eugenio, 1990; Maass & Kohnken, 1989; Tooley, Brigham, Maass & Bothwell, 1987).

Although the absolute effects of arousal on eyewitness memory are not yet entirely clear, there is substantial evidence to support the notion that attentional focus is narrowed under arousal. The weapon focus phenomenon is perhaps the clearest example of this narrowing of attention to the source of arousal. Yuille and Tollestrup (1992) speculated that attention need not be focused on the source of arousal. For example in cases of extreme arousal people may direct their attention inward, largely in self-protection, and would store little of the event. They may end up with amnesia, or like some subjects in Christianson and Loftus (1990) they may remember their emotional state

most clearly. The present study was able to address attentional narrowing only in the form of weapon focus; the eyewitness statements were not as complete as those obtained from laboratory subjects. For example, statements provided by actual eyewitnesses generally did not contain the "gist" or action details of the crime, which are considered central details in lab research. Even if they had, it would have been extremely difficult, if not impossible to determine the accuracy of those details.

The potential difference in arousal experienced by the typical laboratory eyewitness and various eyewitnesses to actual crimes has been one of the most persistent issues in the generalizability debate (e.g. Yuille & Tollestrup, 1992). Archival research (Yuille, 1986; Yuille & Cutshall, 1986) has demonstrated that there are several discrepancies between the role of the typical laboratory eyewitness and an actual eyewitness to a violent crime (Yuille & Tollestrup, 1992). The usual role of the laboratory eyewitness is that of an uninvolved observer to a relatively non-arousing event. In actual forensic contexts, eyewitnesses are cast in a multitude of roles that exhibit varying degrees of similarity to the typical laboratory eyewitness. For example, violent crimes such as robbery and assault (sexual and non-sexual) typically involve only the victim. So, the modal eyewitness to a violent crime is a direct participant in an arousing and threatening event. Not all eyewitnesses are involved in arousing events. Victims of fraud and witnesses to minor traffic accidents, for example, probably have levels of arousal that are similar to the typical laboratory eyewitness. Low levels of arousal are also experienced by secondary

eyewitnesses, those who did not witness a crime but who might have interacted with a suspect and can tie him or her to the crime (for example, a store clerk who sold a unique piece of clothing left at the crime scene). The debate about generalizability could benefit from information about actual eyewitnesses that demonstrate various degrees of similarity to the typical eyewitness. Certainly a fair and valid test of the generalizability of laboratory based findings is to see if they are replicated with actual eyewitnesses who were in similar contexts. The present study examined cases of robbery and fraud. It is assumed that victims of robbery bear the least similarity to the typical laboratory eyewitness, fraud victims bear the most similarity and witnesses of robbery are somewhere in between. Additionally, the comparison between actual eyewitnesses to robbery and fraud will hopefully address some issues regarding the effects of arousal.

Accuracy of description and identification

Framed from a psychologist's point of view, the issue is one concerning the relation between the skills of recalling and describing the appearance of a person from memory and the skill of recognizing that person in a photo lineup. Only a handful of studies have set out to examine this question directly. Wolfskiel and Brigham (1985) reported that subjects who gave accurate descriptions were not more likely than those who gave poor descriptions to identify one of two targets. In a photo recognition study Wells (1985) used 88 target faces and found a small but significant correlation between descriptive accuracy and identification accuracy. However, the relation was due to the

fact that faces which were better described were also better identified. Other studies have reported incidental findings that support some relation between accuracy of description and identification. Buckhout, Alper, Chern, Silverberg, and Slomovits (1974) reported that subjects who successfully identified a confederate thief were more accurate at estimating his weight than subjects who did not successfully identify the confederate. Kassin (1984) reported a significant positive correlation between identification accuracy and scores on a police description form ($r = .37$) and Hosch and Bothwell (1990) reported a significant positive correlation between identification accuracy and free recall description accuracy ($r = .31$). This topic has been examined further in field studies.

Confidence and accuracy of identification

Is an eyewitness's stated confidence in her/his identification indicative of the accuracy of that decision? There have been two meta-analyses of this topic. First, Wells and Murray (1984) reported an average correlation between accuracy and confidence of only .07. Bothwell, Deffenbacher and Brigham (1987) analyzed a sample of studies that were homogeneous in terms of the task expected of the subjects, the measure of memory accuracy and the manner of calculating the accuracy-confidence correlation. The Wells and Murray analysis did not meet these criteria. Bothwell et al reported an estimated correlation of .25 with a 95% confidence interval of .08 to .42. Exposure duration was tested as a possible moderator variable and found to influence the accuracy-confidence correlation. Longer exposure durations allowed for

greater predictability of accuracy from confidence. Several other studies have identified more moderator variables. Higher accuracy-confidence correlations are obtained when subjects are in a state of "retrospective self-awareness," (Kassin, 1985; Kassin, Rigby & Castillo, 1991), among subjects who made a selection from a lineup (Fleet, Brigham & Bothwell, 1987;) as opposed to those who did not make a choice (choosers vs. non-choosers), and when the target person is distinctive looking, attractive or both (Brigham, 1990). Finally, Cutler and Penrod (1989) performed a meta-analysis of nine studies in which subjects had made two confidence assessments, one before their identification attempt, and one after. Post-identification confidence ratings correlated much more strongly with accuracy than did pre-identification confidence ratings. The confidence-accuracy relationship is relatively easy to study and there have been several field studies which have reported on this relationship.

Delay

Like the fields of botany and biology, psychology has a 'field season,' a window of time during which data must be collected. As most subjects are university students, the field season for studying the effects of delay on eyewitness memory is generally limited to an academic term of eight months or less. The police generally collect statements when they arrive at the scene of a crime or within a few days, so the issue of the effects of delay on recall have not been too much of a concern for psychologists. Furthermore, although there are often lengthy delays between the crime and a court appearance, eyewitnesses are often permitted to review their statement. The present review

is concerned only with the effects of delay on identification accuracy. Shapiro and Penrod's (1986) meta-analysis reported a modest detrimental effect of delay on hits ($\underline{d}$ = .43) and a smaller effect on false alarms ($\underline{d}$ = .33) and Deffenbacher's (1986) meta-analysis reported similar results. Laughery and Wogalter (1989) reviewed the effects of delay on identification accuracy and found that five studies showed no adverse effect of delays from 48 hours to two weeks and five studies which reported a decline in identification accuracy after delays from a few days to 11 months. Obviously more research into moderating factors such as length of exposure, and target distinctiveness are needed to clarify the effects of delay on identification accuracy.

System Variable Research

In contrast with estimator variable research which typically examines the effect of a variable on both recall and recognition, system variable research often manipulates variables related to only one or the other. System variables related to recall (providing a statement) are presented first, followed by those related to recognition (identification). The present research was unable to address most of the system variables. The case files usually did not indicate how the eyewitness account was collected and copies of lineups were sealed in evidence envelopes and could not be viewed. Yuille (1986) reported that ride-alongs with the RCMP showed that they employ an acceptable and uniform procedure for obtaining statements from eyewitnesses. And with regard to identification procedures, the officers I spoke with were aware of the problems

of constructing and administering lineups and in the interest of insuring that their cases had the best chance of being prosecuted, they had adopted many of the procedures suggested by system variable research regarding lineups.

Recall Variables

Cognitive Interview. One of the most important recent developments regarding collection of eyewitness statements has been the Cognitive Interview (Fisher & Geiselman, 1992) which encourage eyewitnesses to use many retrieval paths and to increase the feature overlap between retrieval and encoding contexts. The Cognitive Interview, compared with standard police interviews has been shown to increase the amount of details an eyewitness recalls without adversely affecting the accuracy of those details (Fisher, McCauley, & Geiselman, 1994; Geiselman et al., 1984).

Rehearsal. To the extent that eyewitnesses go over the event in their mind or speak about it to others, rehearsal must also be considered an estimator variable. It is also possible for police to exert some influence on the timing and type of rehearsal that eyewitnesses to particularly violent crimes are apt to engage in (Yuille & Tollestrup, 1992). Schooler and Engstler-Schooler (1990) reported an alarming finding that verbalizing a description of a perpetrator, a form of rehearsal, lead to poorer identification accuracy than not describing the perpetrator. However, this finding has not ever been replicated and even if it had been a reliable result, it is unlikely that police could afford to not ask eyewitnesses for description of the perpetrator.

Read, Hammersley, Cross-Calvert and McFadzen (1989) found that mental rehearsal of an event resulted in little memory loss over a week delay compared to no rehearsal. With respect to rehearsal's effects on identification accuracy, they found that rehearsing the event immediately after it's conclusion, compared with no rehearsal lead to an improvement in identification accuracy if the target's face was unchanged in appearance, but was reduced if the face changed slightly from viewing to test. If rehearsal was delayed by ten minutes, identification accuracy was improved even if there were changes in the appearance of the face.

Suggestibility and post-event misinformation. Loftus and her colleagues have largely used slide sequences to demonstrate that subjects are influenced by question wording. For example, higher speed estimates were offered by subjects who were asked how fast a car was going when it *smashed* than by subjects who were asked the question with the word *hit* (Loftus & Palmer, 1974). Similarly, Loftus and Zanni (1975) demonstrated that subjects were more likely to incorrectly answer a question about an item not seen in the event if the definite article *the* was used than if the indefinite article *a* was used. Zanni and Offerman (1978) however, failed to replicate this effect of definite articles. Again with slide sequences, Loftus, Miller and Burns (1978) showed that when inconsistent post-event information is given to a subject, the accuracy of responses to a questionnaire decreases significantly. Christianson, Sweeney and Ochalek (1983) used a live event to demonstrate the impact of post-event information. Information that the principal man in the event was a

truck driver lead to larger weight estimates than information that he was a dancer. Also, subjects who heard the man referred to as a *young man* compared to those whom heard him referred to as just a *man* provided younger age estimates. This post-event misinformation phenomenon is still under debate as to how the misinformation affects the original memory. Some contend that misinformation actually impairs the original memory, others believe that the misinformation leads to confusion as to what actually happened during the event (see Belli, 1989, 1993 for reviews of these different hypotheses).

Identification Variables

Pre-identification procedures. Police often ask eyewitnesses to help them get a better idea of the suspect's appearance. There are two of these pre-identification methods used. In the first, mugshot viewing, the eyewitness searches through hundreds of photos of people who have committed crimes to find the perpetrator. The other method, composite construction, involves creating an image of the perpetrator. Eyewitnesses may be asked to do both and if so, the mugshot viewing usually precedes the composite construction. Much of the research into the use of mugshots has focused on the impact on subsequent identification accuracy that such a practice may have. Subjects who choose a mugshot photo from a set not containing the perpetrator often remain committed to that photo at an identification task even when the perpetrator's photo is present (Brigham & Cairns, 1988; Brown, Deffenbacher & Sturgill, 1979; Gorenstein and Ellsworth, 1980). Another approach has

examined the possible interfering effects of mugshots and has proposed that viewing so many faces may corrode the original memory and lead to reduced accuracy at an identification task. Davies, Shepherd and Ellis (1979) found that subjects who viewed mugshots were less accurate in their identifications than either a control group that waited an equivalent amount of time before attempting an identification or a group who viewed the same mugshots but rated them for attractiveness instead of searching for the targets. Lindsay, Nosworthy and Martynuck (1992) point out that the potential dangers of mugshots apply only to the extent that viewing the mugshots is seen as an identification technique rather than an investigative tool. They report that subjects are reasonably accurate at picking out a confederate's photo from up to 700 mugshots and they generally do not select many incorrect photos.

As with mugshots, much of the concern over composite drawings has revolved around possible interfering effects. Interference is measured by comparing the identification accuracy of subjects who previously constructed a likeness of the target against the accuracy of subjects who did not. Wogalter, Laughery and Thompson (1990) determined that the amount of verbal activity involved in construction of the face does not influence subsequent identification accuracy or quality of the constructed face. They also noted that there seems to be a trade-off between image quality and accuracy of later recognition. Methods such as sketching and Mac-A-Mug which involve manipulating a great deal of facial detail produce the highest quality images, but subsequent recognition suffers. In contrast, methods such as Identi-kit and

Photo-fit result in lower quality images, but may improve later recognition. In the present research, it was noted if any pre-identification procedures were employed, but too few eyewitnesses were asked to look at mugshots or construct a composite image to draw any conclusions regarding possible interfering effects or to evaluate the quality of composite images.

The present research was able to note the frequency and what type of pre-identification procedures were used, but the frequency was too low to permit an examination of the effects of such procedures.

Lineup Construction. Bias in the construction of a lineup, for example, by tilting the suspect's photo (Buckhout, Figueroa & Hoff, 1975) or by dressing the target in the same clothing worn during the event (Lindsay, Wallbridge & Drennan, 1987) leads to higher identification of the suspect than non-biased construction. There are more subtle ways in which the construction of a lineup can affect identification accuracy. Wells, Leippe and Ostrom (1979) introduced the concept of functional size of a lineup which refers to the number of viable members of the lineup and is contrasted with the nominal size which refers to the number of the people in the lineup. The functional size of a lineup is reduced to the extent that the other members of the lineup (distractors) are easily ruled out as not being suspected by the police. In an extreme example, if a suspect is described as being black and the eyewitness is shown a lineup with six white men and only one black man, the nominal size is 7, but the functional size is 1. There is a problem however, if the lineup members too closely resemble the suspect. For example, if the lineup administrator goes to great

lengths to find distractors that match as many features of the suspect as possible, then the lineup is said to have lost propitious heterogeneity and the identification task becomes confusing and difficult (Luus & Wells, 1991).

Wells and his colleagues (e.g. Wells & Turtle, 1986; Wells, Seelau, Rydell, & Luus, 1994) have been instrumental in drawing up guidelines for the construction of fair lineups. One of the most widely accepted practices is to give a description of the suspect to people who have never seen him and then ask these mock witnesses to "identify" the suspect solely on the basis of the description (Wells et al. 1979). If the lineup is fair, then the choices of the mock witnesses will be distributed equally across all lineup members.

Lineup Administration. Several studies have demonstrated that sequential presentation of a lineup in which pictures are presented one at a time and a yes/no judgment must be made for each picture, significantly reduces false alarms and does not affect correct identifications when compared to the traditional presentation method in which all lineup members are presented simultaneously (e.g. Cutler & Penrod, 1988; Lindsay & Wells, 1985; Melara, DeWitt-Rickards & O'Brien, 1989).

The instructions an eyewitness receives regarding a lineup can also influence eyewitness accuracy. Eyewitnesses viewing a sequentially presented lineup are responsive to non-verbal suggestion from the administrator of the lineup such as leaning forward or pausing at a particular photo regardless of whether the photo these behaviors were directed at was the target (Smith, Pleban & Shaffer, 1982). Failing to inform eyewitnesses that the offender may

not be present (e.g. Cutler, Penrod & Martens, 1987; Malpass & Devine, 1981; Warnick & Sanders, 1980) can dramatically inflate false identifications of innocent suspects. Kohnken and Maass (1988) used identical instructions as Malpass and Devine (1981) and additionally manipulated whether or not subjects were informed about the staged nature of the event and subsequent identification. They successfully replicated Malpass and Devine's findings, but only with informed subjects which suggests that eyewitnesses may be less susceptible to biased instructions than previous research had indicated.

Finally, the general topic of the accuracy of eyewitness identifications needs to be addressed. About one in every eight articles reviewed in this thesis commented on the great range of eyewitness identification accuracies in the literature and then went on to outline and explore a different explanation for this state of affairs. The range is impressive; from a low of 14.1% (Buckhout, 1975) to highs of over 80% (e.g Malpass & Devine, 1981). Given all of the variables that can affect identification performance such as the distinctiveness of the target, various factors related to lineup construction and administration, and delay between exposure to the target and identification just to name a few, it seems hasty to draw any general conclusions other than it is multiply determined and that we know of some of the factors that influence the identification performance of laboratory eyewitnesses.

Concluding remarks about laboratory research

There are several advantages and strengths of the laboratory approach to the study of eyewitness memory. Of all the methods, laboratory research is

most likely to be the least expensive and least time consuming to execute. These are not trivial matters in the publish or perish world of academics. The precision with which variables can be controlled is unrivaled, making a factorial design conducted in a laboratory setting a very powerful exploratory tool. Similarly, there are some factors such as drug or alcohol use that can not be studied in situ. However, laboratory experiments are limited in the extent to which they can arouse subjects and it is difficult to instill in subjects the belief that their identification will have consequences for subject and person they identify. Although realism is usually strived for in the event itself in that some kind of crime is staged, subjects are normally debriefed about their participation in an experiment before they attempt an identification. Thus they do not have to worry about making a false identification or letting a guilty person remain free and unpunished. They do not have to consider that they might be involved in a lengthy trial and they do not risk possible retribution from the person they identify.

This issue was illuminated by Malpass and Devine (1984) who noted that "while realism is not the only issue, and not the only strategy of importance, until we know more about the degree to which simulations actually produce results which can be validly applied to genuine events in the natural environment, realism will be an important aspect of psychological research in this area, and its absence will be an important source of reservation about the applicability of the research literature" (p. 86). Only a few studies have manipulated realism by informing or not informing subjects before they made

an identification that the event was staged (e.g. Murray & Wells, 1982; Sanders & Warnick, 1981). Sanders and Warnick (1981) found no difference in identification accuracy between informed and uninformed subjects. Uninformed subjects in the Murray and Wells (1982) study were more likely to choose a foil and less likely to identify the offender from a target-present lineup. They also had lower confidence-accuracy relationship than subjects who were informed that the event was staged. Murray and Wells (1982) conclude that "...there should be some value placed on the general plan of corroborating results from the informed witness procedure by using an uninformed witness procedure" (p.52). This suggestion has gone largely unheeded and it is likely that the tremendous logistical and procedural problems involved in keeping subjects uninformed in a laboratory experiment has contributed to this state of affairs. Even when subjects have been kept in the dark through the identification procedure about the staged nature of the event, the fact remains that the staged event must be relatively innocuous. Murray and Wells (1982) staged a theft of a T.V. game and Sanders and Warnick (1981) staged a cheating episode. Also, the perceived status of campus security (Murray & Wells, 1982) and the proctor of an exam (Sanders & Warnick) as lineup administrators may be different from that of a police officer. Field research lends itself more readily to keeping subjects uninformed throughout the entire procedure but there are still limits on the events that can be staged for an unsuspecting public and the role in which the lineup administrator can be cast.

Field Research

The majority of these studies take place outside of the confines of the laboratory or class room; those that do not were published as an integrated series of laboratory and field research. Similarly, most of the subjects in these studies are from a population other than university students and most were not initially aware of their participation in an experiment. Field research on estimator variables is presented first, followed by the field research on system variables.

Estimator Variables

Several field studies have adopted a procedure first employed by Brigham et al. (1982) so the gist of it is reported here first. A confederate or confederates are sent into convenience stores to pose as customers. The interaction is engineered to be memorable such as paying for an item with pennies or buying a soda with a money order. To insure eye contact and to make the interaction longer, the confederate asks for directions to a distant location or inquires about a product not sold in that state. Some time later, other members of the research team return posed as law interns who are looking for someone who might have been in the store within the past 24 hours. They show the clerk a photo lineup and administer any questionnaires they have and then, after all the data has been collected, they inform the clerk that she/he has been in an experiment. This procedure is referred to here as the law intern procedure.

Individual Differences

Hosch and Platz (1984) used the law intern procedure to examine the relation between self-monitoring scores and identification accuracy. They found a significant correlation, with high self-monitors being more accurate at identifying the confederate from a target present lineup. The correlation in the field was roughly twice those obtained in laboratory studies, suggesting that at least for non arousing events, self-monitoring scores are related to identification accuracy.

Flin and Shepherd (1986) examined people's ability to estimate the size (height and weight) of others. They were particularly interested in learning how height and weight estimates were influenced by these same characteristics in the person making the estimate, the person being described and a context person asking for these estimates. There was an overall tendency to underestimate height. All subject's estimates of height were influenced by the actual height of the target. The underestimates of both women and men increased with the height of the target, so that the greatest underestimates accompanied the tallest targets. The subject's own height also contributed significantly to estimates of the target's height such that the taller subjects (female and male) produced more accurate estimates. The height of the context person did not have any effect on height or weight judgments by women or men.

On average, men underestimated, and women overestimated weight. The actual weight of the target influenced the estimates of both women and

men. Weight estimates showed regression toward the mean with heavier estimates of targets who were below average weight and lighter estimates of targets who were beyond average weight. The subject 's own weight influenced only the males estimates, with heavier men providing more accurate estimates. These results suggest that the police might be aided in determining the height and weight of a perpetrator by obtaining the height and weight of the eyewitnesses providing these estimates. Additionally, researchers employing live events who ask their subjects to estimate the size of the target(s) should report the target's height and weight.

Situation Variables

Perhaps because of its social significance, cross racial identification is one of only a few topics that has been studied in three different research paradigms. Brigham et al. (1982) developed the law intern procedure that kept subjects ignorant of their participation in an experiment until after the data were collected. Convenience store clerks were engaged by two confederates (one white, one black) in separate, unusual but non-threatening transactions. Two hours later, other members of the research team posed as "law interns" and had the clerks examine two target-present lineups (one for each confederate). After their identification decision the clerks were asked to rate their confidence in terms of how willing they would be to testify in court about it, which helped, along with their nebulous connection to the CJS, to instill the belief that their identification would have consequences for the "suspect" and also perhaps for themselves.

The white clerks who rated themselves as the having the most cross-racial experience were more accurate and reported higher confidence in their identification of the black confederate than the less experienced white clerks. Unfortunately, cross-racial effects amongst blacks could not be examined as there were too few black clerks in the sample. Across all confederates, identification accuracy was related to distinctiveness and to distinctiveness and attractiveness combined. This finding replicates the typicality effect (e.g. Vokey & Read, 1992) demonstrated in photo recognition research.

Accuracy of description and identification

Pigott, Brigham and Bothwell (1990) used the law intern procedure to examine the relation between accuracy of description and identification. The bank-teller subjects in this experiment provided a description by means of a standard police suspect identity chart that listed 16 features of appearance. Each feature was accompanied by a list of descriptive nouns from which to choose. There was no relation between accuracy of description and identification. It is possible that the three laboratory-based studies that incidentally found support for a relation between description and identification accuracy just happened to employ targets that were easily described and thus, as Wells (1985) reported, more easily identified. However, two of the three that found a significant correlation employed a live, staged theft of an item belonging to the subject (Hosch & Bothwell, 1990; Kassin, 1984), and the third (Buckhout et al, 1974) employed a theft staged live in front of a classroom. All of these events would have been more arousing and engaging than the

events employed in the studies that did not find support for a relation between descriptive and identification accuracy. Of the four studies that failed to demonstrate a relationship, the field study of Pigott et al (1990) employed the most engaging event; the target tried to cash an obviously altered money order with bank teller subjects. This event was successful in arousing the suspicion of the tellers, several followed the confederate out of the bank to record his license plate, but it may not be the same as having one's own purse stolen or watching a brazen theft followed by a vigorous pursuit. Wolfskeil and Brigham (1985) used a live target, but he simply stood in front of the subjects, and Wells (1985) used only photos. Of course it remains to be seen if this difference in arousal induced by the to-be-remembered event plays any part in the pattern of results obtained thus far. There were other differences that may play a role as well, such as the manner in which the descriptions were collected (free recall vs. a checklist), length of exposure to the target and delay between exposure and identification. However, I could not discern any pattern between these variables and whether or not the study found a correlation between descriptive and identification accuracy.

Unconscious Transference

Read (1990) has been very inventive and entrepreneurial in finding field settings. He has utilized the captive audience of shopping mall clerks, and gone door to door soliciting the help of an unsuspecting public. He has also been very adept at weaving the techniques and findings of laboratory-based and field research into a comprehensible whole. Read, Tollestrup, Hammersley,

McFadzen and Christensen (1990) tried to demonstrate the phenomenon of unconscious transference in a series of lab and field studies. Unconscious transference refers to an eyewitness's misidentification of an innocent person for a perpetrator because of the witness's exposure to the (innocent) person in another context. This phenomenon was demonstrated in an actual eyewitness by Houts (1956) and as Read et al. (1990) note "...is a phenomenon that has, by virtue of its frequent reference, been reified as a danger in person identification for which we should ever be vigilant" (p. 3). The only experiment to demonstrate unconscious transference (Loftus, 1976) used photographs seen only for 2 s, rather than a live event and more accurately demonstrates that people are poor at recalling the circumstances of encountering photos of faces. Read et al. (1990) conducted a series of five field and laboratory-based studies that involved over 700 subjects, five retention intervals, seven intervals between exposure to the perpetrator and the innocent person, two levels of lineup similarity (of distractors to the perpetrator), four different innocent persons, and four different perpetrators. Despite persistent efforts, Read et al. were only able to demonstrate unconscious transference when they returned to a controlled laboratory setting, when the perpetrator and innocent person were similar in appearance and with a lineup in which the similarity of other distractors to the perpetrator was low, thus making the innocent person the only reasonable choice. This topic might be a good example of something that can happen to actual eyewitnesses, but only under a relatively rare set of circumstances. The present research was unable to address this phenomenon.

Arousal

Yuille, Davies, Gibling, Marxsen and Porter (in press) employed a very unusual and exciting paradigm in their research on eyewitness recall. They made use of the Police training Centre in Hendon England which employs a realistic village setting. Recruits are sent into the village in groups of four to five with one designated as the "on patrol" officer, another videotapes the event, and the rest are observers. The recruits encounter a variety of situations, that range from routine and easy to deal with to unusual and difficult. The authors took advantage of these naturally occurring events that have the variable of participation "built-in" and which also permit manipulation of the degree of arousal experienced and the frequency and timing of recollections of the event. One half of the recruits were interviewed twice; once a week after the event and again after 12 weeks while the other half of the recruits were interviewed only after 12 weeks. Manipulation checks confirmed that the stressful event was experienced as more stressful and more difficult than the non-stressful event by both participants and observers.

Recruits who were interviewed twice offered more details in their first interview than their second and those in the low stress roleplay recalled more, but were less accurate than those in the high stress role play. The loss of detail from the first to the second interview occurred only for recruits who saw the high stress role play. On average, recruits in the high-stress roleplay suffered a 22% decrease in the amount of information from the first to the final interview, and recruits in the low stress roleplay offered the same amount of information

in both interviews. Finally, for recruits who were interviewed twice, participants recalled more than observers in the delayed recall. In analyses of only the recalls provided at 12 weeks, the advantage of an early interview was obvious. Subjects who were interviewed twice remembered more and were more accurate in their final interview than were those who were only interviewed once. Again, recalls of the low stress event were more detailed, but less accurate than the high stress recalls.

The effects of stress as demonstrated in this study fit Easterbrook's theory of the effects of stress on attention. The high-stress subjects may have focused their attention on fewer, more relevant details. But why should they be more accurate than low-stress subjects and why should they alone suffer decay? The pattern of memory loss across high and low stress groups does not fit with the remarkable memory hypothesis of Yuille and Tollestrup (1992). One possible explanation is that the events depicted in the role plays did not merit too much consideration after they were over. Furthermore, recruits were asked not to discuss the event with others.

There are many differences between this study and typical laboratory studies. The first recall was a week after the incident and most lab studies do not wait so long. The interview was "standard police protocol" in which subjects first described the event in free recall and then answered standard questions designed to elicit specific details. Most lab studies examine amount and accuracy of free recall and questions separately, however in this study they

were combined. But, like lab studies subjects knew they were participating in a research study and that they might be questioned later.

Confidence and Accuracy

The relationship between confidence and accuracy is often much higher in field studies than in lab studies. Brigham et al. (1982) reported an overall correlation between confidence and identification accuracy of r =.50. Pigott et al. (1990) reported that their confidence-accuracy correlation among those who made a choice from the lineup was .42. and Krafka and Penrod (1985) report a correlation of .52 among choosers who reinstated the context of their interaction with the perpetrator prior to viewing the lineup. However, in a lab study (Murray & Wells, 1982) which kept some subjects ignorant of their participation in an experiment until after they had made an identification decision on a lineup, the uninformed subjects had *lower* confidence-accuracy correlations than subjects who knew they were taking part in an experiment. As these uninformed subjects were essentially in a field study, it can't be unequivocally stated that the confidence-accuracy relationship is higher in the field than in the lab. The confidence-accuracy relation could not be examined in the present study because it was not standard police procedure to obtain confidence judgments from eyewitnesses after their identification.

The effects of delay

Krafka and Penrod (1985) report there was no effect of delay (2 vs 24 hours) for subjects who viewed target present photo spreads, but for those

viewing target absent arrays, the proportion of false choices after 24 hours was much greater (52.4%) than after two hours (15%). This finding is interesting in light of a pilot study reported in Brigham et al. (1982) which found that clerks exposed to an event of similar content and duration performed at chance level on a target present lineup after 24 hours. Brigham et al. did not use target-absent lineups. What could account for one study finding a devastating effect of only a 24 delay and the other finding no effect of the same delay, especially since they employed similar events? One possible explanation is that the specificity of the questions posed to the clerks at identification tasks differed between these two studies. The clerks in both studies were asked to look at the lineup to see if they recognized anyone who might have been in the store in the past 24 hours. The clerks in the Krafka and Penrod study were told what this person probably did while in the store, and clerks in the Brigham et al. study were not. Thus, the clerks in one study received more information about the identity of this person than those in the other. A second explanation could lie in the fact that the confederate in the Krafka and Penrod study, the one demonstrating no effect of a 24 hour delay, drew attention to his appearance during the interaction. The confederate in the other study did not. The events in these studies are more akin to fraud where eyewitnesses are unaware that a crime has occurred until some time later when the cheque is returned NSF or the credit card is reported stolen or invalid. The present thesis was able to address the effects of delay on identification accuracy for both

fraud and robbery eyewitnesses as well as some variables, such as weapon presence, that moderate this relationship.

System Variable Research

Pose Change

An interest in the generalizability of photo recognition studies on the effects of pose change on identification accuracy prompted Logie, Baddeley and Woodhead (1987) to conduct a combination of laboratory and field tests. First, they employed standard facial recognition research to demonstrate the robust effect that recognition accuracy is influenced by the type of pose at study (e.g. Davies, Ellis & Shepherd, 1978; Woodhead, Baddeley & Simmonds, 1979) More information at study (frontal, three-quarter and profile poses) leads to better performance and if just a single pose is used, three-quarter leads to the best performance. They also demonstrated that a change in pose from study to test leads to poorer performance than if the pose remains unchanged. Then, in a laboratory study subjects saw the target in a live staged event and were tested on lineups composed of photos in one of the three pose types. As in the photo recognition work, the three-quarter pose lead to better recognition performance than the profile pose, but did not differ from the frontal pose. The shorter delay between the event and test lead to better identification performance, but had no effect on the pattern of results for pose. These results suggest that there is no need to alter current police practice of composing lineups of frontal poses.

In field research, subjects were given photos of six confederates in different poses to examine for 15 minutes. Subjects then followed the same walking route as the confederates, except in the opposite direction. They were to note the time and location as well as attire of any confederates they spotted. Only half of the subjects reported seeing one or more confederate and of these "sightings", false recognitions greatly outweighed correct identifications. Pose did not affect the rate of false recognitions. In an attempt to improve performance, they replicated the experiment, with subjects searching for only one target instead of six. With this modification, subjects were much more accurate at detecting the confederate. Once again, there was no effect of pose on identification accuracy. As this scenario is more akin to someone responding to a missing person ad or a wanted poster, these results suggest that the current practice of displaying front-posed photos of missing or wanted persons need not be altered. Further tests in which subjects see a live target and recognition is tested by using photos of different poses are needed to complete the picture of the effects of pose change. In this scenario though and in the context of an actual crime, it is conceivable that subjects would see a live target from a variety of angles, frontal, three-quarter and profile, and thus would not be seeing just one "pose" but several.

Context Reinstatement

Krafka and Penrod (1985) modified the law intern procedure by having the confederate drawing attention to his appearance by commenting on how much he had changed compared to the photo on his driver's license which he

produced in order to purchase an inexpensive item with a traveler's cheque. Before viewing the lineup, half of the clerks in the context reinstatement condition (CR) were asked to recall the transaction, to visualize the confederate's face, and were presented with photo copies of his non-photo identification and a cheque signed by the confederate. The other half in the no context reinstatement condition (NCR) did not receive any of these instructions or materials. Context reinstatement is one of the components of the cognitive interview and this experiment demonstrated its potential for becoming an advantageous system variable. Importantly, context reinstatement did not alter subject's willingness to choose. It only affected lineups that contained the confederate's photo, in which case, the identification accuracy in the CR condition was nearly double that of the NCR condition. And finally, the correlation between confidence and identification accuracy among CR choosers ($r(19) = .52$) was the only significant accuracy-confidence correlation found in this study.

The principal advantages to field studies is that subjects are often drawn from a non-university population and they usually don't know they are participating in an experiment which makes it easier to make them believe their identifications will have consequences. However, because the experiment has to be taken to the subjects in field research, it is more time consuming and costly than laboratory research and often suffers from higher attrition rates. A slight loss of control has to be suffered in field research, but factorial designs are still feasible. Events in field research can't approximate

very high levels of arousal, and judging from the events in the current collection of field studies, it may be even more difficult to come up with field events that are within ethical limits, or at least within the comfort zone of the researchers than it is to design laboratory events. None used an event in which a subject was victimized, and I'm not sure that it would be possible to do so in a field study. This makes field research a good analog for fraud, a less glamorous, but certainly still costly crime. For example, credit card fraud in the United States amounted to one billion dollars in 1982 and it is predicted that shortly, these losses will climb to two billion dollars (Caminer, 1985). Several field studies on the eyewitness abilities of children have taken advantage of naturally occurring stressful events such as dentist appointments or innoculations (e.g. Peters, 1991). While these experiences might be able to inform us about memory for arousing events, they are not good analogs for studying adult eyewitness memory.

Case Studies and Archival Research

Although the methods in this section are diverse, the one element they have in common is an examination of the memory of actual eyewitnesses. In contrast to other types of research which have focused on identification, this research method has focused on eyewitness descriptions.

In the only study involving actual eyewitnesses to manipulate a variable, Fisher, Geiselman and Amador (1989) tested the effectiveness of training police officers in the cognitive interview. Experienced detectives in the robbery division of Miami Florida took part in this pre-test post-test design.

The cases selected for inclusion met the following criteria: serious enough to require an in-depth interview by a detective (as opposed to those only requiring the initial interview by the uniformed officer at the scene of the crime); at least one eyewitness had sufficient chance to observe the crime; and each interviewed eyewitness had to be fluent in English and be cooperative. The interviews were primarily with victims of commercial robbery or purse-snatching. All of the detectives recorded several pre-training interviews using the standard police procedure. One-half of the officers were trained in the Cognitive Interview, with the remainder forming the control group. Post-training interviews of the trained and control groups were recorded. All interviews were transcribed and scored by people blind to the officer's training status. The scoring consisted of counting the number of relevant, objective statements made by the eyewitness in the interview. The scored statements primarily concerned physical descriptions of the perpetrator and relevant actions, clothing, weapons, vehicles, objects taken and conversations.

The trained detectives obtained 47% more information in their post-training interviews than their pre-training interviews. A comparison of the amount of information obtained by trained versus control officers indicated that prior to training the two groups of officers elicited an equivalent amount of information, but in the post-training interviews, the trained officers elicited 63% more information than the control group. Importantly, a comparison of the interview conducted at the scene of the crime by a uniformed officer and the interview conducted by the trained detectives in terms of the amount of

same, different and new information revealed that the increase between pre- and post-trained interviews was attributable to new information. Training in the cognitive interview was effective in eliciting more information and did not contaminate or discredit the eyewitness by increasing the amount of information that was different or changed between the initial interview conducted by the (untrained) uniformed officer and the trained detective.

Although an examination of the effects of the cognitive interview on accuracy of recall was not possible, the authors were able to look at corroboration in cases involving two or more eyewitnesses. Over 94% of corroborable statements were corroborated (between eyewitnesses) and there was no difference between the pretrained and the posttrained interviews. Thus, this test of the cognitive interview replicated laboratory study findings that the cognitive interview boosts the amount of information recalled without adversely affecting the accuracy of the recall.

Kuehn (1974) examined the ability of victims of violent crimes to describe the appearance of their assailants. His sample consisted of 22 rapes, 15 assaults, 61 armed robberies and 2 murders whose victims lived long enough to provide a description. All of the cases involved a single account from a victim who was unacquainted with the perpetrator. His analysis consisted of whether the victim's description of the perpetrator included each of the following nine physical descriptors: race, sex, age, height, weight, build, complexion, hair color and eye color. The study did not involve an assessment of the accuracy of descriptions. Although not expressly stated, it was casually

implied that the police force used a form to collect standardized descriptions and that this was the source of the nine traits.

Only four victims were unable to describe their assailant. The mean number of traits in the victims descriptions was 7.2, the mode was 8 and over 85% of the victims described six or more traits. Descriptions most often included the assailant's sex (93%) and least often included eye color (23%). The remaining traits were listed in more than 70% of descriptions.

There was plenty of evidence in Kuehn's data to suggest that arousal has a negative effect on the completeness of descriptions. Victims of robbery, possibly overall the least arousing crime in his sample, provided fuller descriptions than assault or rape victims. Injury had an overall negative effect on completeness. Injured victims of all crime types provided less complete descriptions than uninjured victims. Nonetheless, injured victims of robbery still provided more complete descriptions than injured victims of rape or assault. Male victims of robbery or assault provided fuller descriptions than female victims of these crimes. Also, injured males provided more complete descriptions than injured females. It is possible that the female victims of assault were more frightened than the males, so this arousal could underlie this gender difference.

Descriptions provided in crimes involving white victims and black or white suspects were more complete than descriptions provided by black victims. Kuehn raises the possibility that the police were not particularly diligent in assisting black victims, but as there were only six black victims, the

result could also be an artifact of the small sample size. In contrast to laboratory studies, the presence of a weapon was not related to completeness, neither was victim intoxication.

In a more recent archival study, Sporer (in press) also examined eyewitness descriptions of perpetrators and factors that affect the number of details in these descriptions. His sample consisted of 139 descriptions from eyewitnesses to bank robberies, forcible rape, indecent exposure and violations of public safety. All of these cases involved at least one person description and an identification attempt by an eyewitness. Sporer argued that selecting cases in which an identification was attempted "..implies that all cases can be considered major violations, because otherwise police would not have gone through the trouble of constructing identification parades" (p. 9). The accuracy of person descriptions was not assessed, nor was any attempt made to examine identification procedures or eyewitness identification performance. Sporer's sample included 52 victims of the crimes, 12 non-victim witnesses and 75 "incidental witnesses" who did not directly witness the crime but who had been questioned by the police about the appearance of the perpetrator whom they had observed on a different occasion. Unlike Kuehn (1974) his analysis was not restricted to nine physical appearance traits, but encompassed whole person descriptions (clothing, jewelry, physical appearance etc.) and appears to have been based on free recall.

The overall average number of descriptive details was 9.71. Victims and witnesses offered an average of 13.17 and 11.67 descriptive details

respectively, significantly more than the 7.79 offered by incidental witnesses. The total sample of person descriptions was composed of 30% details about facial features, 31% about clothing, a combination of age, height, stature and race accounted for 22.4%, and the remaining details were about the personality, jewelry, dialect, smell and disguise of perpetrators.

Sporer examined the effects of a number of variables on the amount of details in eyewitness descriptions. There was no influence of gender for any of the eyewitness types in his sample. Subsequent analyses exclude incidental witnesses. Alcohol had an adverse effect on the amount of detail in descriptions. These results and those on gender differ from those of Kuehn (1974) who failed to find an adverse influence of alcohol, but did report a gender difference in favor of males. As one would expect, descriptions for crimes that occurred in good and medium levels of illumination included more details than those that occurred in low levels. As with Kuehn's study, there was no support for a weapon focus phenomenon.

Using information available in police files, Sporer operationalized arousal in four (likely non-independent) ways; the degree of injury to the eyewitness, whether or not the eyewitness engaged in self defense, the degree of threat to life, and anxiety. A main effect of arousal for each of the four variables was reported. However, for all four variables a graph of the number of details provided at each level showed a U-shape with similar amounts of detail provided at the lowest and highest levels and fewer details offered at middle levels. There was no report of any tests conducted to determine if the

amount of detail at middle levels of arousal was significantly lower than that provided at low and high levels.

Cutshall (1985) combined archival and case analyses. She first employed the archival method to learn about the demographic characteristics of people involved in violent crimes and the configuration (number of victims, witnesses and perpetrators and their relation to one another) of these crimes. Then, a robbery case which had plenty of eyewitnesses and sufficient evidence to reconstruct the crime was selected for an examination of the amount and accuracy of information contained in eyewitness' recollections of the incident. This research was the first to assess the accuracy of eyewitness memory in situ.

The archival analysis presented in Cutshall (1985) demonstrated that murder, robbery and assault present different patterns of eyewitnesses. For example, in non-sexual and sexual assaults, most often the victim is the only eyewitness. If other people are present during the assault, they often know the victim and/or the perpetrator. In contrast, about half of the robbery cases involved additional eyewitnesses and they rarely knew the victim or the perpetrator. This simple descriptive data is often cited as reason to conduct case and archival research. The more we know about the contexts to which we want to generalize laboratory findings, that is the more we know about the various contexts that actual crimes take place in, the more adequately we will be able to determine if our laboratory studies match these real world contexts and how important a match or mismatch of context is.

Cutshall's case analysis involved a gun shooting incident. This particular case was selected for three reasons. There was sufficient evidence to assess the accuracy of both descriptive and action details. There were enough eyewitnesses to compare their accounts, and finally, the death of the perpetrator closed the case which allowed the witnesses to be interviewed without influencing the outcome of a trial. The police interviewed 21 eyewitnesses within two days of the incident. Four to five months later, 13 of these witnesses participated in a research interview (the victim of the crime declined participation). This research was able to address questions regarding the amount of detail in eyewitness accounts, the accuracy of these accounts, consistency of eyewitness accounts over time, the effects of stress, and suggestibility of eyewitnesses. Identification however, was not an issue as the perpetrator was killed in the shooting.

Details in the eyewitness accounts were classified as either action, people description or object description. As there was no appreciable difference in accuracy between the two interviews, only the results from the police interview are included here. Descriptions of objects were most accurate (88.53%) and people descriptions were least accurate (75.57%). Many of the errors in person description came from inaccurate estimates of age, height and weight. Fifty percent of these estimates offered during the police interview were incorrect. It was not possible to assess if Flin and Shepherd's (1986) findings on providing estimates of height and weight were replicated.

The research interview was more broad in scope than the police interview and witnesses actually provided more details four to five months later than they did at the time of the crime. This precluded an analysis of the effects of delay on the amount of information, but did allow for a consideration of the effects of delay on the consistency and accuracy of information. Of the details in the research interview that had also been offered to the police, just over 80% were consistent (whether right, wrong, or unclassifiable). The overall accuracy of details repeated in the research interview was comparable to the overall accuracy from the police interview (79.4% and 82.1% respectively). This suggests that these eyewitnesses were able to maintain an accurate memory of the event over a period of five months. In addition, witnesses were resistant to suggestive questioning about the perpetrator's car, a peripheral object during the event.

Five witnesses who had contact with either of the two main players in the shooting or with a weapon reported the greatest amount of stress, thus stress and proximity to the action were confounded. The accuracy of this higher stressed group was greater in both the police and the research interview. The question about whether or not it was the arousal or the opportunity to view that lead to this group being more accurate is partly moot in that these two factors will almost always be confounded in natural events with a third, participation (being a victim).

Another, less deliberate approach to case analysis is to wait for opportunities to present themselves, usually crimes reported by the news media

or referred to a psychologist by police or some other player in the criminal justice system. Christianson and Nilsson (1989) report the course of amnesia and successful memory recovery of a woman who was raped while jogging. Identification was not an issue once her memory returned as the perpetrator confessed and as well, she had covered her eyes and did not see his face.

One of the most important strengths of case and archival research is that they study actual eyewitnesses. So far, the research has focused on violent crimes, mainly because the other methods of research can only induce mild to moderate levels of arousal, thus leaving the high end of arousal unexplored and unexplorable by these methods. Case and archival research can provide information about the context of eyewitnesses in various crimes that can be used to direct and inform laboratory research.

On the down side, there is an almost complete lack of control. Banaji and Crowder (1989) note that "...the multiplicity of uncontrolled factors in naturalistic contexts actually prohibits generalizing to other situations with different parameters" (p.1189). This statement seems a bit extreme, but is not without merit. Another issue that makes generalizability a bit more problematic is that instead of dealing with a known event in a laboratory, researchers doing case and archival work have to settle for less than an absolute determination of truth or accuracy. For example, a very special set of circumstances were required in Cutshall's case analysis so that the actual mechanics of the crime could to be "triangulated" in order to evaluate the accuracy of eyewitness memory. Data are very difficult to analyze with

traditional statistical tools. And finally, both case and archival research require a phenomenal amount of time, work, and patience. Simply getting through the red tape to gain access to the police files in this project took well over one full year.

The present research was able to overcome and accomodate many of the difficulties of archival research. The goals of this study were to provide data on the amount and accuracy of details in eyewitness descriptions of perpetrators, to determine the the frequency of identification attempts in cases of robbery and fraud, to learn about how often eyewitnesses select the police suspect when viewing a lineup, and to learn about the influence of delay and arousal on recall and recogntion.

METHOD

Data Source and Description of Sample

A member of the Richmond detachment of the Royal Canadian Mounted Police (RCMP) supplied a list of all cases of robbery committed during the years 1987 through 1989 and all cases of fraud committed in the year of 1989. This list contained 119 cases of robbery and 66 cases of fraud. Some case files represented requests for assistance from other police departments, unfounded cases (usually a false tip of criminal activity) or fraud between business associates who knew each other. These types of files, involving 42 robbery and 45 fraud cases, did not contain any information regarding eyewitness descriptions or identification attempts and thus were not suitable for analysis. The final sample contained 77 cases of robbery and 21 cases of fraud.

The author read each case file and recorded information about the crime itself, eyewitness accounts of the crime, and eyewitness identifications. An elaboration of the types of data collected under each of these three categories, the coding thereof follows. First, the reader should be aware of a few stylistic conventions that have been adopted to aid smoothness of expression. Several robbery cases involved multiple perpetrators. I have adopted the convention of using only the singular throughout the thesis. All perpetrators of robbery and the majority in fraud cases were male. Therefore, the male gender is used to refer to perpetrators. Finally, the term 'eyewitness' is used when a distinction between victims and non-victims is unnecessary. When finer distinction is

required, 'victim' refers to individuals who directly interacted with the perpetrator and 'witness' refers to individuals who were present during all or part of the crime but who did not directly interact with the perpetrator.

Descriptive Information about the Cases

The data collected about the crime itself included the date, the amount stolen, number and type of eyewitnesses (victim or witness) and perpetrators, demographic data about the participants (age, sex, race), their relation to each other, and in cases involving an arrest, the police description of the charged suspect and whether a confession was offered.

Eyewitness Accounts

In lab, field, and to some extent case research, the amount and accuracy of eyewitness recall is based on descriptions of people (the perpetrator and victim), objects (weapons, details of other objects in the event) and actions (of perpetrator and eyewitnesses if relevant). In contrast, eyewitnesses in the present study generally offered statements regarding what the perpetrator(s) looked like, and if they said or did anything threatening such as waving a gun about and shouting "nobody move and nobody gets hurt." Other actions of the perpetrator, and objects not carried, driven or worn by the perpetrator were not of interest to the police. Consequently, the present thesis can offer information pertaining only to eyewitness descriptions of perpetrators. Because other research methods consider eyewitness recall differently, the extent to which comments can be made about the generalizability of those findings on the basis of the present findings is limited.

Scoring of Eyewitness Accounts

Two people reviewed the eyewitness' accounts and coded the data for a gross count of the number of clothing and physical appearance details. Items such as age, hair color, facial hair, and complexion as well as personality judgments (e.g. nasty), odor (e.g. he smelled of cigarettes) and gait (e.g. He had a loping kind of walk) were coded as physical appearance details. Any mention of the perpetrator's attire including hats, jewelry, glasses and bags (e.g. gym or army-type bags, purses) was categorized as clothing details.

Within these categories, the amount of detail was calculated by the procedure developed by Yuille and Cutshall (1989). This procedure parses description into object-adjective sets such as 'curly black mustache' or 'plaid pants'. A point is assigned to each object and to each non-redundant adjective. The phrase 'curly black mustache' would be assigned 3 points (1 each for black, curly and mustache) and the phrase 'plaid pants' would be assigned 2 points (1 each for plaid and pants). Any mention of an absence of facial hair or glasses (e.g. 'He didn't have a mustache' or 'He wasn't wearing glasses') was considered to contain as much information as a mention of the presence of these features and was awarded points accordingly (one point in each example). In cases where an eyewitness provided a range for estimates of height, weight or age (e.g. 'He was between 20 and 25 years old'), the midpoint of the range was calculated if it was five inches or less, ten pounds or less or five years or less. Ranges that exceeded five inches, ten pounds or five years were considered less precise and were scored with only half of a point. Vague

descriptions such as "he was tall" or "he was middle-aged" were also assigned a half of a point unless accompanied by a number estimate in which case the more precise number estimate was assigned points, and the vague description was not. For example, if an eyewitness said that a perpetrator was "really tall - probably between 6'5" and 6'7", the height estimate would have been recorded for scoring purposes as 6'6" and would have been assigned one point. Any qualifiers in a statement such as "*I'm not sure*, but he may have had Nike runners on" were disregarded. Inter-rater reliability for scoring the amount of clothing detail and phsyical appearance detail were .99 and .97 respectively.

The accuracy of eyewitness accounts could be evaluated only in cases where a suspect was arrested. In addition, to account for the possibility that the police may not always charge the guilty party, the accuracy of eyewitness accounts is considered only in cases in which the perpetrator confessed and/or was apprehended at the scene of the crime. In cases involving an arrest, the police measured the suspect's height and weight and recorded his age, hair and eye color, the presence of facial hair and any unusual marks such as tattoos, scars, or birthmarks. Even if a suspect was apprehended at the scene of the crime, the files did not contain a description of his attire or disguise and no case files contained any information relevant to assessing the accuracy of weapon description. Thus, the assessment of the accuracy of eyewitness descriptions is confined to the above elements of physical appearance.

For the statistics of height and weight, a signed difference score was calculated by subtracting the measured value of the charged suspect from the

estimated value provided by the eyewitness. The accuracy of age estimates was calculated by determining the suspect's age at the time of the crime and then subtracting that age from the eyewitness' estimate. A negative score reflects an underestimate and a positive score reflects an overestimate. Recall of hair color and facial hair was scored as accurate if it was consistent with what was recorded at the time of arrest. Hair color was conservatively scored so that even a difference between the eyewitness and police descriptions that could reflect different categories of hair color were scored as incorrect. For example, if the police recorded hair color as blonde and the eyewitness described it as mousy brown, the eyewitness' description was scored incorrect. With the exception of height, it must be acknowledged that a perpetrator's appearance could change quite dramatically between the crime and his subsequent arrest. He could put on or lose weight, dye his hair, and grow or shave facial hair. It was impossible to determine if such changes had occurred, and as such, one will have to take the results on the accuracy of eyewitness descriptions with a grain of salt, the size of which will no doubt be individually determined.

Eyewitness Identification Attempts

The data collected about eyewitness identifications included whether or not an eyewitness was asked to identify a suspect, the type of identification task (e.g. photo spread, live lineup, chance encounter, etc.), the date of the attempt, the outcome of the identification attempt and the eyewitnesses pre- and post-

identification confidence levels. It was also noted if the eyewitness viewed any mug shots or helped a police artist make a composite picture of the perpetrator prior to the identification attempt. Virtually all identification attempts were made with lineups, so the cumbersome phrase 'identification task' is replaced with 'lineup.'

The consideration of the accuracy of eyewitness identifications faced two obstacles. The first was to determine whether the lineup contained a photo of the perpetrator. This obstacle was overcome by classifying cases according to the degree of certainty that the lineup did indeed contain the guilty party. Police files generally do not include court decisions as to the guilt or innocence of a suspect. Even if they did, that would not guarantee that the right person was charged. However, some cases involved evidence that pointed directly to the guilt or innocence of a particular person. In some cases, the suspect confessed to his deeds and/or was apprehended at the scene of the crime. In other cases there was evidence that implicated the suspect's guilt or innocence. For example, possession of marked bills, or the identification (driver's license) of the victim. Finger prints matching the suspect were frequently found at the scene of the crime or in an abandoned vehicle used during the commission of the crime. There was evidence in only one case which supported the *innocence* of the suspect; a mismatch between finger prints found at the scene of the crime and those of a suspect. Finally, many case files contained no evidence that supported the guilt or innocence of the suspect. These three evidence conditions (confession/apprehension, implicating and none) reflect

degrees of certainty regarding the presence of the perpetrator in the lineup. In cases involving a confession or an on-the-scene-apprehension the likelihood that the police suspect in the lineup was the actual perpetrator is quite high although not absolute. Some confessions may not have been genuine, or some may have been obtained under duress. In cases involving implicating evidence, the likelihood that the police suspect in the lineup was the actual perpetrator is perhaps not quite as great as in cases involving a confession or immediate apprehension, but nonetheless is still quite high. Finally, we can be least certain of the presence of the perpetrator in lineups from cases in which there was no evidence. Some of the lineups in this category were a collection of photos of people known to commit a certain type of crime. In these types of "fishing expeditions" the police generally did not a have a particular suspect in mind and the lineup, much like a mugshot inspection, was an attempt to generate one.

The second obstacle could not be overcome and thus served to limit the analysis. The actual decision in identification attempts that did not result in selection of the police suspect could not be determined reliably. The police in this detachment did not use a uniform reporting system for eyewitness responses to identification tasks. Identification outcomes were entered in the files in a variety of ways such as "negative results", "unable to identify police suspect", no in the lineup", "pointed out suspect and one other as looking like perp", "positive ID", and "weak ID". Sometimes it was clear from comments made by an eyewitness at the time of the identification attempt whether or not

they had rejected the photospread entirely (e.g. "there's not even one close") but for the most part, no reliable distinction could be made between outcomes in which an eyewitness rejected the photospread or failed to select the police suspect. Identification attempts in which an eyewitness selected only the police suspect were coded as "positive." All other outcomes had to be coded simply "negative" and these include false alarms and rejections. This recording procedure suggests that police do not consider the lack of an identification distinct from a misidentification and certainly not as informative as a positive ID, despite Wells and Lindsay's (1980) argument suggesting that nonidentifications can be just as informative as positive identifications.

RESULTS

Descriptive Information

Robberies are considered first. There was a total of 122 perpetrators (M = 1.58 per case; Range: 1 to 6), 81 victims (M = 1.05 per case; Range: 1 to 2), and 83 witnesses (M = 1.07 per case; Range: 0 to 33). All perpetrators of robbery were male. Police descriptions of charged individuals indicated that the average age of robbery perpetrators was 20.87 years (range: 15 to 40 years). There were 35 female and 45 male victims of robbery[1]. The average age of female and male victims was 36.81 and 35.85 years respectively. The age of the female victims ranged from 18 to 78 years; males ranged from 11 to 82 years. There were 44 female and 28 male witnesses to robbery. The average age of female and male witnesses was 29.51 and 27.18 years respectively. Their ages ranged from 11.5 to 47 years in the case of females and from 11.5 to 58 years in the case of males.

The majority of robberies (n = 48; 62.3% of the sample) involved a single victim and no other witnesses. There were 28 (36.3%) cases in which there was at least one witness. Finally, one case (1.3%) involved two victims and no witnesses. The identity of the perpetrator was generally unknown to eyewitnesses of robbery. In only two cases (2.6%) were victims able to supply the police with the identity of the perpetrator. Five robberies (6.5%)were committed by a perpetrator who seemed familiar to the eyewitnesses (5 victims, and 1 witness). These eyewitnesses thought that the perpetrator lived

in the area or had been in the vicinity prior to the robbery. When witnesses were present during a robbery, they were frequently acquainted with the victim. Witnesses were co-workers, friends, or family members of the victim in 16 (57.14%) of the 28 robberies that had witnesses. These data on the typical configuration of a robbery (number of eyewitnesses, relationships between participants) replicates that found in an archival study reported by Yuille (1986).

In the 21 cases of fraud there were 44 perpetrators (M = 2.09 per case; Range 1 to 13) and 134 victims (M = 6.38; Range: 1 to 24). All but two of the fraud cases involved a single perpetrator. The average number of perpetrators in the fraud cases was elevated by two cases in which police suspected that several perpetrators were at work. I considered each of the incidents in these two cases to have been perpetrated by a different individual (n = 12 and 13).

The police charged an equal number of males and females with fraud (n = 4 each). The average age of charged suspects was 26.88 years and ranged from 20 to 35 years. Most victims of fraud were female (90 female, 39 male)[2]. The average age of victims where recorded (n = 9 female, 5 male) was 25.86 years and ranged from 17 to 58 years.

Unlike robbery, any potential eyewitnesses present during the commission of a fraud (including the victim) are usually unaware that a crime is taking place. Hence they do not have a reason to attend to the event or remain on the scene like witnesses to robbery. Once the crime has been detected, it is difficult to locate eyewitnesses unless they work in the store or

place of business where the frauds most often occurred. The fraud files that were examined involved only victims. Most fraud victims within a case were involved in separate instances, and it is assumed that within a case the victims were strangers to one another. By virtue of the selection criteria, no victims of fraud knew the identity of the perpetrator and unlike robbery, no fraud victims reported feeling a sense of familiarity with the perpetrator.

Amount of detail in eyewitness descriptions of perpetrators

Most eyewitnesses to robbery were able to provide some information about the appearance of the perpetrator. However, this was not the case for fraud victims. Only eight robbery victims (9.88%) and eight witnesses (9.6%) were unable to describe the perpetrator(s). Almost three-quarters of fraud victims (n = 97; 72.4%) offered no information regarding the appearance of the perpetrator. Whereas some fraud files contained a clear indication that the victim was unable to describe the perpetrator (e.g. that the clerk didn't even remember the interaction), there generally was no consistent indication in the files regarding whether the victim could not describe the perpetrator or was not asked to.

A closer look at the circumstances of the crimes in which eyewitnesses to robbery were unable to describe a perpetrator revealed that most often just being a victim was enough to render one unable to describe a perpetrator. None of these victims had been verbally threatened, none of the perpetrators wore a disguise, only two victims were involved in crimes committed with a

weapon and only two were involved in multi-perpetrator crimes. The scenario for witnesses who were unable to describe the perpetrator was quite different, especially regarding weapon use and number of perpetrators. One had been witness to a crime involving a verbal threat of death or injury, three witnessed a crime in which the pepetrator wore a disguise, all *but* two were involved in crimes committed with a weapon, and all but one were involved in multi-perpetrator crimes.

Because some robbery cases [n = 27) involved multiple perpetrators, there were a total of 116 possible descriptions from victims and 100 from witnesses of robbery. One-way ANOVA's indicated a significant effect of type of eyewitness on the total amount recalled, amount of clothing and physical appearance details [all F's (2,349) > 54; p's <.0001]. Scheffe tests at p = .05 were conducted. Fraud victims provided an overall average of 2.11 details which was significantly less than the 10.96 provided by victims of robbery and the 9.37 offered by robbery witnesses. Fraud victims also offered fewer details regarding the clothing of the perpetrator (0.34) than victims (4.03) and witnesses (4.35) of robbery. Victims of robbery offered more detail regarding the physical appearance of the perpetrator (6.9) than both robbery witnesses (5.02) and fraud victims (1.76).

The previous analysis included eyewitnesses who were unable or were not asked to provide a description of the perpetrator as well as eyewitnesses who provided descriptions so scant that they could not have been very useful. A description of only two details regarding physical appearance (for example, that

the suspect is a white male) does not radically reduce the population of suspects and thus does not offer much helpful information to the police. A description of four units regarding physical appearance (for example, the suspect is a white male with brown hair and is about 6'4" tall) is a bit more useful. The above analysis was repeated on a reduced sample of eyewitnesses who provided a minimum of four details regarding the physical appearance of the perpetrator. Table 1 presents these results.

In this sample, victims (n=73) and witnesses of robbery (n = 48) offered an average total of 14.71 and 14.79 details respectively and fraud victims (n = 28) offered an average total of 9.11 details. One-way ANOVA's indicated a significant effect of type of eyewitness on the total amount recalled, amount of clothing and amount of physical appearance details. [all F's (2,146) > 5.80; p's <.01] Post-hoc multiple comparisons (Scheffe at p = .05) indicated that victims and witnesses of robbery offered more total details than fraud victims. Victims and witnesses of robbery also provided more clothing details(4.94 and 6.41 respectively) than fraud victims (1.54). Finally, Victims of robbery offered more details (9.76) regarding the physical appearance of the perpetrator than fraud victims (7.57).

Accuracy of eyewitness descriptions of perpetrators

In cases where a suspect was charged, his/her age, height, weight, hair and eye color were recorded by the police. This permitted a comparison

Table 1. Mean number of descriptive details provided by eyewitnesses who provided at least four details regarding the suspect's physical appearance.

	Type of Eyewitness		
Type of Detail	Robbery Victims (n = 73)	Robbery Witnesses (n = 48)	Fraud Victims (n = 28)
Clothing			
M	4.94	6.41	1.53
S.D.	3.91	4.30	2.28
Physical Appearance			
M	9.76	8.38	7.57
S.D.	3.54	3.21	1.71
Total			
M	14.71	14.79	9.11
S.D.	5.94	5.92	3.17

between the eyewitness descriptions of these attributes and the measured values obtained from the charged suspect(s). Too few (n=3) eyewitnesses offered information regarding eye color of the suspect to draw any conclusions regarding accuracy. The accuracy of fraud victims' descriptions could not be assessed as there were too few descriptions offered.

No eyewitnesses (fraud and robbery) reported a different sex or race of the perpetrator than was recorded by police at the time of arrest. Because the sample of charged suspects might have contained some innocent suspects, only those cases in which the suspect confessed his or her guilt are considered. This resulted in the exclusion of only 25 out of 144 estimates of age, height or weight from the following analyses. The police laid charges in 23% of robbery cases (n = 18 cases involving a total of 27 perpetrators) and 38% of fraud cases (n = 8 cases involving a total of 8 perpetrators). Of the cases where charges were laid, 67% of robbery cases (n =12 cases involving a total of 20 perpetrators) and 50% of fraud cases (n = 4 cases involving a total of 4 perpetrators) saw a confession offered. Too few fraud victims gave descriptions to analyze the accuracy of their estimates in either the sample based on suspects who confessed or in the sample based on all charged suspect. Table 2 depicts the accuracy of age, height and weight estimates provided by victims and witnesses of robbery in cases in which the suspect confessed. The analysis of description accuracy included dependent-groups t-tests for the difference scores' deviation from zero, as well as independent-groups t-tests for differences between victims and witnesses of robbery. The results indicate that

Table 2. Mean difference scores for robbery eyewitness' estimates of age, height, and weight of perpetrators who confessed

	Type of eyewitness	
Type of Estimate	Victim	Witness
Age		
M	2.87	3.40
Md	2.75	2.25
Min	-1.00	-4.00
Max	10.00	10.00
S.D.	3.48	4.05
n	12	24
Height		
M	-1.90	-.476
Md	-1.50	--.450
Min	-5.50	-6.40
Max	0.00	3.00
S.D.	1.56	2.27
n	11	38
Weight		
M	-7.56	-4.78
Md	-5.13	-11.80
Min	-31.60	-36.40
Max	25.40	25.40
S.D.	14.93	14.35
n	10	24

Note: Difference scores were calculated by subtracting the actual value from the estimate provided by the eyewitness. Negative values represent underestimates.

Age = years; height = inches; weight = pounds
Md = median; S.D. = standard deviation

both victims and witnesses overestimated age while only victims underestimated height. Victims' age estimates were over by an average of 2.87 years, $t(11) = 2.86$, two-tail $p < .05$, and witnesses' by an average of 3.40 years, $t(23) = 4.11$, two-tail $p < .05$. The two groups did not differ from one another in their degree of overestimation, $t(34) = -0.41$, two-tail $p > .05$. Victims' height estimates fell short by an average of 1.9 inches, $t(10) = -4.04$, two-tail $p < .05$, which was significantly lower than their witness counterparts who were short by only 0.476 inches, $t(37) = -2.38$, two-tail $p < .05$. Neither victims' (M = -7.56 pounds) nor witnesses' (M = -4.78 pounds) underestimates of weight were slim enough to be significant, $t(9) = -1.6$ and $t(23) = -1.63$, respectively, both two-tail p's $> .05$, nor were the two groups different from each other, $t(32) = -.5$, two-tail $p > .05$.

Finally, in order to be able to compare the accuracy of estimates provided by these eyewitnesses with that reported by Cutshall (1985) estimates were considered accurate if they were within 2 years, 2 inches or five pounds of the actual value. In the sample of perpetrators who confessed, 45.4% of the estimates were accurate, and in the whole sample, 47.2% were accurate.

Two z-tests on proportions were conducted for descriptions of hair color and facial hair. Hair color was consistent with what was recorded at the time of arrest in 38.46% of victim's and 48.28% of witnesses' descriptions. These proportions do not significantly differ. Victims' and witnesses did differ significantly ($z=-2.25$) in description of facial hair. Sixty percent of victims

and 100% of witnesses' descriptions of facial hair were consistent with what was recorded at the time of arrest.

Identification Procedures

There were a total of 170 identification attempts. Of these, 90.58% (n = 154) were with photospreads. It appears live lineups have fallen out of favor due the cost and the difficulty in constructing a fair one, particularly for suspects from ethnic minorities. Only 10 identification attempts were made with traditional physical or live lineups. Four identification attempts were ones in which the police either brought the suspect to the victim, or the victim to the suspect (i.e., showups). One identification attempt consisted of a fraud victim viewing a videotape of the bank activities on the day of the crime. Finally, in one case a victim of robbery encountered her assailant while out shopping and alerted the police.

I could not look at most of the lineups shown in the cases analyzed in this study because they were generally sealed in evidence envelopes. However, I was able to view some. Most photospreads shown at this detachment contained eight photographs. The photo arrays I viewed were well constructed; in all cases, the foils resembled the suspect (e.g similar hair color and length, race, facial hair, facial shape etc.) and there was nothing in the construction of the array that suggested the identity of the police suspect. One officer was well aware of the tactics employed by defense lawyers to discredit an eyewitness

identification. In anticipation, therefore, he first showed his lineups to other officers who knew nothing about the case and asked them to select the suspect and to look for bias in his lineups. This is precisely the procedure used by Wells et al. (1979) to assess the fairness of a lineup and is generally viewed as a reasonable way to avoid some problems of using lineups.

Frequency of Identification Attempts

Almost 40% (n=30) of all robbery cases and two-thirds (n=14) of fraud cases included an identification attempt. The police suspect was identified in 16 cases of robbery and 10 cases of fraud. Thus, in this sample, the police had a positive eyewitness identification in 20.8% of all robberies and 47.6% of all frauds.

Identification Outcomes

Table 3 presents the proportion of positive identifications by eyewitness type and evidence condidtion. Three identifcation attempts that were made on a lineup known to not contain the perpetrator (he confessed after a lineup not containing his photo was shown) were the only ones made on a confirmed target-absent lineup. All three eyewitnesses did not select the (innocent) police suspect. These three identification attempts were not included in the following analyses as they were known target-absent lineups and the rest were either known target-present or possibly target-present. The police suspect was selected in just less than half of all identification attempts by victims of

Table 3. Percentage of positive identification and average delay (days) between exposure to the perpetrator and identification attempts by type of evidence and eyewitness

	Type of Evidence			
Type of Eyewitness	None	Implicating	Confession	Total row averages
Robbery victims				
Percentage Pos ID	21.7	57.1	84.6	46.5
n	(23)	(7)	(13)	
Avg. Delay	43.22	31.71	9.38	31.11
n	(23)	(7)	(13)	
Robbery witnesses				
Percentage Pos ID	11.0	---	55.5	33.3
n	(9)	---	(9)	
Avg. Delay	84.11	---	4.67	44.39
n	(9)	---	(9)	
Fraud victims				
Percentage Pos ID	16.7	38.9	22.7	25.47
n	(48)	(36)	(22)	
Avg. Delay	121.78	105.94	16.0	108.10
n	(32)	(32)	(4)	
Total column averages				
Percentage pos ID's	17.5	41.9	47.7	
Average delay	88.25	92.6	8.77	

robbery, one-third by witnesses to robbery and in one-quarter of attempts by fraud victims. Identification accuracy of perpetrators who confessed or whose

guilt was supported by implicating evidence was much higher than for perpetrators for whom there was no evidence. A chi-square test of association across evidence conditions revealed a significant association [χ^2 (2, n = 167) = 6.25; p <.05] between the three types of eyewitness and identification outcomes. Post hoc multiple comparisons (Marascuilo, 1966) did not reveal any significant differences between eyewitness types.

Considering only cases in which a suspect confessed, a second chi-square test again revealed a significant association [χ^2 (2, n = 44) = 12.82; p<.05] between type of eyewitness and identification outcome. The police suspect was selected in 84.6% of identification attempts made by victims of robbery, 55.5% of attempts made by witnesses to robbery, and in 22.7% of attempts made by fraud victims. Subsequent multiple comparisons demonstrated a significant difference between victims of robbery and fraud [χ^2 {2, n = 17} = 5.99; p < .05].

The delay between exposure to the perpetrator and subsequent identification could be determined for all robbery eyewitnesses, but for less than two-thirds of fraud victims. Bearing this in mind, victims of robbery may owe their superior performance to the fact that on average, they waited only 31.11 days before attempting an identification. Robbery witnesses waited an average of 44.39 days and fraud victims waited for 107.87 days. Additionally, the delay between exposure and identification was shortest in cases involving a confession (M = 8.77 days) and longest in cases in which there was no evidence (M = 88.25 days).

Table 4. Range and average delay between exposure to the perpetrator and identification attempt in cases of robbery and fraud.

Range	n	Average	Percent Positive ID's
Robbery			
0-1	14	0.5	71.43
3-5	15	3.6	46.67
7-34	21	18.9	33.33
38-191	14	120.21	14.29
Fraud			
7-62	18	32.94	77.7
70-90	18	74.4	5.55
107-154	15	131.67	20.0
170-382	17	200.42	17.65

One of the clearest findings to emerge from this analysis is that the percentage of positive identifications dropped dramatically with time. Table 4 presents this information. Particularly in robberies, the longer an eyewitness waits to attempt an identification, the less likely s/he is to select the police suspect. A second striking feature of this table is that eyewitnesses to robbery and fraud who faced the shortest delays made roughly the same high proportion of positive identifications despite a difference in average delay of over a month. One possible factor that might account for this is the difference in the extent to which eyewitnesses to robbery and fraud interact with the perpetrator. The robberies in this sample were brief and the eyewitnesses may not have been exposed to the perpetrator for very long. The frauds in this sample were generally brief as well, but there were exceptions. Thirty-two fraud victims (35.9%) had a relatively extensive interaction with the perpetrator such as selling him items valued at over $1000 (e.g. furniture, a car, stereo equipment), handling a suspect's fraudulent application for welfare benefits or instructing a suspect on the use of automated teller machines. These interactions were more involved and likely lasted longer than the routine transactions that characterized the majority of the fraud interactions. Seventy-four percent of fraud victims who selected the police suspect had an extensive interaction with the perpetrator whereas only 19.3% of fraud victims who did not select the police suspect had such an interaction with the perpetrator.

Presence of a Weapon

The analysis of weapon effects includes only robbery cases. Of the 77 robbery cases, a total of 43 (55.84%) were committed with an actual (38 cases) or implied weapon (five cases). Table 5 reports the average amount of information recalled as a function of presence or absence of a weapon. Separate 2 X 2 ANOVA's (victim versus witness by weapon versus no weapon) were conducted for each of the three categories of details (clothing, physical appearance, and total). Despite the fact that we should expect victims to suffer the most from the weapon-focus phenomenon, no interaction between weapon presence and eyewitness role was found in any of the three analyses. There were, however, significant main effects for weapon presence and eyewitness role.

Eyewitnesses in crimes involving a weapon provided an average total of 11.29 details which was significantly higher than the average total of 8.3 provided by eyewitnesses to weaponless crimes [$F(1,212) = 13.19$; $p < .0001$]. This pattern or greater detail provided by eyewitnesses in crimes committed with a weapon was repeated in analyses of clothing [$F(1, 212) = 15.07$; $p < .0001$] and physical appearance details [$F(1, 212) = 5.42$; $p < .01$]. Overall, victims proved significantly more total details ($M = 10.97$) than witnesses [($M = 9.37$), $F(1, 212) = 7.11$; $p < .01$) as well as more physical appearance details[(M's 6.93 and 5.02, respectively), $F(1, 212) = 14.04$; $p < .0001$].

Table 5. Average number of details robbery eyewitnesses provided by weapon presence and absence.

	Weapon used		No Weapon used	
Type of Detail	Victim	Witness	Victim	Witness
Clothing	5.07	4.89	2.96	2.20
S.D.	4.27	4.51	3.16	2.89
Physical Appearance	7.92	5.16	5.91	4.45
S.D.	4.77	4.10	4.52	3.97
Total	12.98	10.95	8.88	6.65
S.D.	7.62	7.44	6.29	6.37
n	59	80	57	20

The police charged a suspect in 14 cases committed with a weapon and in 6 weaponless cases. The sample of perpetrators who confessed was too small to examine weapon presence effects in these cases alone so these results are based on all suspects charged by police. The tendency to overestimate age and to underestimate height remains, regardless of the presence or absence of a weapon. Separate 2 X 2 ANOVA's (victim versus witness by weapon versus no weapon) were conducted for each of the three estimates (age, height and weight). There were no interactions and no significant main effects of either weapon presence or eyewitness role. There was a marginally significant difference between the average errors in height estimates provided by of victims (M = -1.72) and witnesses [(M = -0.48), $F(1, 55) = 3.24$, $p < 0.10$].

Less than a quarter (n=8, 23%) of weaponless cases and over half of crimes committed with a weapon (n=22, 51%) resulted in an identification attempt. Only 30.61% of identification attempts made by eyewitnesses to crimes committed with a weapon resulted in selection of the police suspect. In weaponless crimes, 73.33% of identification attempts resulted in selection of the police suspect. However, eyewitnesses in weaponless crimes made their identification attempts after a much shorter period of time than eyewitnesses in crimes committed with a weapon (M = 7.33 versus 41.47 days).

All but one identification attempt in weaponless crimes were made after only 17 days. Almost half (n = 22; 44.8%) of identification attempts in crimes committed with a weapon were made at delays greater than 17 days. I tried to control for the different delays between weapon conditions by examining only

identification attempts made at delays of 17 days or less. In this analysis, the average delays were 5.15 and 4.5 days for crimes committed with and without a weapon. Even with similar delays between exposure and identification attempt, eyewitnesses to crimes committed with a weapon were less likely to choose the police suspect than eyewitnesses to weaponless crimes. Positive identifications were made in 44.44% of identification attempts by eyewitnesses to crimes involving a weapon and in 71.42% of identification attempts by eyewitnesses to weaponless crimes. An analysis of covariance with identification outcome as the dependent measure, presence or absence of a weapon as a factor, and delay as covariate demonstrated a marginally significant effect of weapon [$F(1,126) = 3.578$; $p = .061$].

Summary of Results

Victims and witnesses of robbery offered more details than fraud victims in their descriptions of the perpetrator. The accuracy of descriptions and identifications was assessed according to the type of evidence (Evidence condition) against a police suspect. Confession Evidence represents the highest likelihood that the police suspect is the actual perpetrator, Implicating Evidence represents a lower likelihood and No evidence represent the lowest likelihood. Accuracy of descriptions provided by robbery eyewitnesses was analyzed only in the Confession Evidence condition. No eyewitness reported a different sex or race of the perpetrator than was recorded at the time of arrest. Victims and witnesses of robbery both overestimated the age of the perpetrator,

but did not differ from each other in their overestimations. Victims of robbery, but not witnesses underestimated the height of the perpetrator and victim's estimates were less accurate than witnesses. There was no tendency to over or underestimate weight and victim's and witness's estimates did not differ from each other.

Across evidence conditions there was a significant association of eyewitness type and identification outcome. Victims of robbery were most likely to identify the police suspect and fraud victims were least likely.) but there were no significant differences between eyewitness types. In just the Confession Evidence condition, there again was a significant association of eyewitness type and identification outcome and in this analysis robbery victims were significantly likely to select the police suspect than fraud victims. Delay was a confound in theses analyses as robbery victims waited the shortest amount of time to attempt their identifications and fraud victims waited the longest.

There was no adverse influence of weapon presence (robbery cases only) on either the amount of detail in descriptions of the perpetrators or the accuracy of those descriptions. In fact, eyewitnesses in crimes involving a weapon provided more detailed descriptions than eyewitnesses in weaponless crimes. There was suggestive, but not conclusive evidence of an adverse influence on weapon presence.

DISCUSSION

The discussion begins with comments on how specific findings compare with those from other types of research and how this in turn impacts on generalizability. Suggestions for future research accompany comments on specific findings. The discussion concludes with a reiteration of the need for the multi-method approach.

The analysis of the amount of descriptive detail provided by all robbery eyewitnesses revealed results that were similar to those obtained by Kuehn (1974) and Sporer (in press). Regarding just physical appearance (excluding clothing), the victims in Kuehn's sample recalled an average of 7.2 details and victims in this study recalled an average of 6.9 details. In terms of total person description (clothing and physical appearance), victims in Sporer's study recalled an average of 13.17 details, and victims in this study recalled an average of 10.96 details. However, since Sporer's sample was drawn from cases in which an identification attempt was made, it is unlikely that his sample contained victims who were unable to provide a useful description. The comparison between the 14.71 details provided by victims in this study who offered descriptions involving four or more details and Sporer's 13.17 details might be more appropriate. Finally, the "incidental witnesses" in Sporer's study were *possibly* in roles similar to the fraud victims. These incidental witnesses did not see the crime but were questioned by the police about the appearance of the perpetrator whom they had observed on a different, and possibly less arousing occasion. Unfortunately, the circumstances of the

incidental witnesses encounter with the perpetrator such as how arousing the interaction was or the length of time that passed between seeing the perpetrator and talking to the police about it could not be determined from Sporer (in press). With this grain of salt in mind, Sporer's incidental witnesses offered an average of 7.79 details in their descriptions of the perpetrator and fraud victims in the present study offered 2.11 details. If only those who offered four or more details are considered, fraud victims averaged 7.11 details in their descriptions.

These similarities in the amount of descriptive details are striking, especially given that the eyewitnesses in Kuehn and Sporer's studies were drawn from a variety of crime types including assault and rape which may be more arousing than robbery, at least for the victims. Furthermore, each of these three archival studies has been conducted in a different country; Kuehn in the U.S., Sporer in West Germany and the present study was conducted in Canada. One puzzling difference is the higher percentage of victims who were unable to describe the perpetrator in the present study (9.88%) compared with Kuehn's (4%). Sporer (in press) did not report these figures. Kuehn's study was based on more violent crimes, but did include robbery (armed only). While there are factors other than memory per se that could affect the number of victims who were unable to provide a description, such as how insistent the police were in obtaining a description or how willing the victim was to cooperate with the investigation, the issue may be simpler than that. Although not expressly reported in either Kuehn (1974) or the present study, it can be reasonably

inferred that the methods by which the police collected descriptions differed between the two studies. The police in Kuehn's study likely employed a standard form to collect their statements. If this form was given to the victims to fill out, or the police asked questions from it, then it may have served as a kind of cued recall test. Descriptions in the present study were almost guaranteed to have been obtained by free recall. Within the field of eyewitness memory research and beyond, in the field of cognitive psychology, there have been many demonstrations of the quantitative advantage of cued recall over free recall (e.g.Lipton, 1977; Whipple, 1909). Had the victims in this study been faced with a form listing features as opposed to an open-ended question, then the number of victims who were unable to describe the perpetrator might have been equivalent between the two studies. As the type of recall task employed was hypothesized to account for differences in a variety findings between the present study and others, future case or archival research should involve a concerted effort to determine the manner in which eyewitness statements were collected.

Although eyewitnesses tended to describe the perpetrator as older and shorter than he actually was, the values of these over and under estimates were slight; about 3 years and 1 inch. The field study of Flin et al (1986) also reported a tendency to underestimate height. The percentage of correct estimates of age, height and weight offered by eyewitnesses in Cutshall's (1985) case study and the present study were similar; 50% and 47.2% respectively. Although these figures are not too impressive, it must be considered that they

reflect not only memory, but estimation as well. It is possible that estimates of age, height and weight made by some eyewitnesses while the suspect is present would be about as accurate as those made from memory.

Less than one-half of eyewitness recollections of hair color were consistent with what was recorded at the time of arrest. This could be an artifact of a very stringent scoring system, a change in hair color between the crime and arrest, or as Cutshall (1985) reported, it could reflect the poor color memory of eyewitnesses. Recollections of facial hair fared better, with most eyewitness' recollections consistent with what was recorded at the time of arrest.

Most discussions of the negative effects of biased lineups have centered on lineups which do not contain the actual perpetrator and the possibility of drastic consequences for an innocent person who is falsely identified under these circumstances. If the perpetrator *is* present in a biased lineup, the bias generally acts to secure his/her positive identification. However, due to the fact that most defense lawyers are well-versed in the effects of biased lineups, and can easily discredit an identification made with such lineups, bias in target present lineups has drastic real-world consequences for the prosecution of the case. The officers in the detachment employed in the present study had considered the legal consequences of biased lineups and had taken steps to eliminate suggestion in the construction and administration of lineups.

There is a well established literature describing case studies in which wrongful conviction and imprisonment resulted from eyewitness

misidentifications (e.g., Brandon & Davies, 1973: Borchard, 1932; Wall, 1965). However, the present project represents the first large-scale analysis of eyewitness identification in actual police cases. Perhaps the simplest feature of the identification data concerns the question raised by Konecni and Ebbesen (1986) regarding the frequency of eyewitness identification evidence in real cases. They estimated that only a very small proportion of cases that made it to court concerned the identification of the offender and suggested that the efforts of eyewitness researchers are therefore out of proportion to the actual role identification evidence plays in real cases. Goldstein, Chance, and Sneller (1989) have pointed out that even a conservative estimate that only 3% of cases involve identification of the offender results in approximately 77,000 such cases in a typical year in the U.S. In the present study the police had a positive eyewitness identification in much higher than3% of both robbery and fraud (20.8% of robberies and 47.6% of frauds). Presumably, these cases would be prosecuted, but the weight of the eyewitness identifications remains unknown because the police records seldom include information regarding the fate of a case once it is turned over to the prosecution. It is very possible that a positive identification leads to the collection of more evidence that carries the case in court, or that the accused is encouraged to plea bargain and the case is closed at that point. Either way, this admittedly small sample suggests that identification is an important issue in many cases and that continued research is warranted.

It is impossible to consider identification accuracy in the present study outside the context of delay. Identifications in the confession evidence condition and by robbery victims were numerically the most accurate, and were also made at the shortest delays. Not surprisingly then, the most impressive figure in the identification data is the 85% accuracy of victims of robbery in the confession evidence condition who on average, viewed a lineup only nine days after the crime. In the same evidence category robbery witnesses, who averaged viewing a lineup almost five days *sooner* than victims, were accurate 55% of the time and fraud victims were accurate only 23% of the time, but it was impossible to determine the delay for over 80% of these fraud identifications. The robbery victims in this study were aroused, had particular reason to attend to the perpetrator and during the crime, or shortly thereafter, they may have even thought that they would have to describe and perhaps identify him. Finally, they may have thought about or discussed the incident several times afterwards. In contrast, the fraud victims were not likely to have been aroused, and other than completing the routine transaction, probably had no particular reason to attend to the perpetrator, think about or discuss him later (unless he was the object of flirtation, or had some peculiar feature about him such as extreme height, big ears, or a snakeskin suit). If any of these distinctions, particularly arousal, are responsible for the different identification performance of robbery and fraud victims, then the poorest context in which to study eyewitness memory is the laboratory. There are circumstances to which much of the laboratory research could be applied. For example, one could

witness two suspicious persons laden down with stereo equipment leaving a vacationing neighbor's house. In this circumstance, there would be little witness involvement with the perpetrator, the witness would know to pay attention, and the event would be shocking, but likely only mildly arousing. These types of situations however, are not the type referred to when laboratory research is being applied to actual eyewitnesses. Laboratory research is being applied from the (expert) witness box to eyewitnesses of rape, assault, murder and robbery, and it is being generalized to generic eyewitnesss of actual crimes by many forensic researchers.

Despite similar lengthy delays, eyewitnesses in the no evidence condition were much less successful in selecting the police suspect than were those in the implicating evidence condition. This is possibly due to a higher proportion of target-absent lineups in the no evidence condition. As a note in passing, the issue of false negatives, or failing to identify a suspect when s/he is in the lineup, has been given the back seat to the other kind of error, false positives. Most discussions and a great deal of expert testimony on eyewitness identification focuses of the fallibility of eyewitness memory and the weighty risks and consequences of an innocent suspect being fingered by an errant eyewitness. It is unfortunate that this research could not shed light on the entire picture of eyewitness identification, hits, false positives, false negatives, and correct rejections.

Throughout the present research, the unit of analysis has been at the level of eyewitnesses. From a police perspective, another informative unit of

analysis is at the case level. That is, in how many cases of robbery or cases of fraud is there a suspect identification, as opposed to how many robbery and fraud eyewitnesses identify the suspect. As it turns out, this case/eyewitness distinction bears on crime solution rates. A case-wise look at overall identification accuracy shows that slightly more than half of the robberies, but more than two-thirds of the fraud cases in which an identification was attempted involved a positive identification. The perpetrators of fraud usually hit more than one business and thus although the chances of any one eyewitness correctly identifying the suspect was low, there were more opportunities for these perpetrators to be identified.

The higher arousal of eyewitnesses to actual violent crimes is generally considered to be beyond the optimum level described in the Yerkes-Dodson law and Easterbrook's (1959) cue utilization theory. Thus, in generalizing laboratory findings most researchers have predicted that eyewitnesses in actual forensic contexts should perform worse than in the laboratory. However, there is little in the present study to suggest that stress has deleterious effects on eyewitness recall. Throughout the present research it has been assumed that victims of robbery would be most aroused, witnesses to robbery would be less aroused and fraud victims would be least aroused. A second way of conceptualizing arousal considered robbery eyewitnesses only and assumed that eyewitnesses in armed robberies would be more aroused than eyewitnesses in unarmed crimes. Robbery eyewitnesses recalled more and were more likely to select the police suspect than were fraud victims. This difference likely

reflects a combination of the low arousal of fraud victims, plus their lack of knowledge that a crime was taking place and that they might have to remember the "customer" and a delay of several days before they were asked to describe the perpetrator. There was no difference between victims and witnesses of robbery in the amount of descriptive detail offered and equal numbers of victims and witnesses of robbery could not describe the perpetrator.

With respect to the accuracy of descriptions, all eyewitnesses in the present study, including the few fraud victims who offered a description, presented the same pattern, albeit not significant in all comparisons, of overestimating age and underestimating height and weight. Victims and witnesses of robbery did not differ from each other in their estimates of age and weight. The only significant difference between accuracy of victim's and witness' estimates was on height, in which witnesses were closer to the actual value. It is interesting to note that although not significant, witnesses also provided more accurate estimates of weight, and victim's estimates of age were more accurate. Actual proximity to the victim could not be coded in this study, but it is possible that victims were closer to the perpetrator than witnesses. It is possible also, that this proximity offered them a better view of the perpetrator's face from which to gage his age, but hindered or warped their view of the perpetrator's body.

The second way of conceptualizing arousal lead to the same results regarding eyewitness recall. In contrast with laboratory research, the presence of a weapon did not have a detrimental influence on the amount or accuracy of

descriptive information provided by actual eyewitness. In fact, weapon presence lead to *more* detailed descriptions which is incompatible with a weapon "focus" phenomenon. The archival studies of both Sporer and Kuehn also failed to find any evidence of a weapon focus phenomenon on eyewitness recall. This lack of replication of laboratory findings could be due to a number of differences between the contexts of actual forensic and laboratory eyewitnesss. Most laboratory studies of the weapon focus effect have employed slide sequences (only Maass and Kohnken (1989) employed a live event). In addition, all of the studies employed some sort of a cued recall test of eyewitness memory that varied from a multiple choice test (Loftus, Loftus & Messo, 1987) to a set of open-ended questions (Maass & Kohnken, 1989). In contrast, the eyewitnesses in this study usually provided a free recall and may have answered some open-ended questions. In this unstructured atmosphere the actual eyewitnesses often offered information that many of the laboratory studies did not seek such as the complexion, odor or gait of the perpetrator. Furthermore, the accuracy that the two types of research examined are different. In laboratory studies accuracy scores are generally a compound of attributes such as hair color, age, and clothing description. The accuracy scores in the present research are for separate estimates of age, height and weight. Finally, the greater amount of descriptive information provided by eyewitnesses in crimes committed with a weapon might result from a more vigorous pursuit of descriptions from eyewitnesses, particularly victims, in these cases due to their more serious nature. These differences highlight some

ways in which future laboratory research on the effects of weapon presence could be improved to make comparisons with the effects of weapon presence on actual robbery eyewitnesses.

Unlike recall, arousal did influence eyewitness identification. Across evidence conditions, there was a significant association between the three eyewitness types and identification accuracy. Victims of robbery were most likely to select the police suspect and fraud victims were least likely to do so, but there were no significant differences between eyewitness types. In the more restricted sample of confession evidence alone, robbery victims were more likely to select the police suspect than fraud victims. These results suggest an enhancing effect of arousal. However, delay acts as a confound in these results that favors high arousal. When arousal was conceptualized by weapon presence and delay controlled for in an analysis of covariance, arousal had a detrimental effect on identification accuracy. The negative effect of weapon presence on identification seems relatively robust. It has been demonstrated in the lab where the level of arousal is low, the target person was usually presented via slides and recognition was tested after very short delays (immediately to 20 minutes). It also was demonstrated in actual robbery eyewitnesses where the level of arousal was higher, the target person was very real and may have been quite close, and recognition was tested at roughly a week to over a month later.

Eyewitness researchers have assumed that the arousal experienced by actual eyewitnesses is beyond the optimum described by Yerkes and Dodson

and Easterbrook and that their performance would suffer. These result show that arousal, at least at the levels, or in the contexts studied, differentially affected recall and recognition. Three, non-mutually exclusive avenues are explored with regards to why arousal influenced recognition but not recall: 1] assumptions about arousal levels; 2] cognitive effects of arousal; and 3] social factors that differ between recall and recognition.

The recall evidence could be a result of three different possibilities regarding the inverted U-shaped curve of arousal and performance. The same three possibilities exist if arousal is measured by weapon presence vs. absence instead of victim vs. witness. First, the assumption that victims of robbery would be more aroused than witnesses of robbery may have been invalid. While the victim and witness(es) to a particular crime may occasionally be equally aroused, particularly if the witness is a spouse or other family member of the victim, it is unlikely that on average, victims and witnesses of robbery are equally aroused. Second, because there were no differences between victims and witnesses of robbery, it is impossible to tell where they are on the inverted U-shaped curve. Fraud victims would be placed somewhere near the bottom of the left side of the curve, but robbery eyewitnesses could both be on the ascending side above fraud victims, at the plateau, or on upper part of the descending side. This might be partly due to the levels of arousal examined which amount to "none" (fraud), "aroused" (robbery witnesses) and "probably more aroused" (robbery victims), but still, if being a victim of a robbery is not sufficiently arousing to put one over the top and down the right side of that

inverted U-shaped curve then what type of crime is? Kuehn (1974) found that victims of robbery recalled more details than victims of assault or rape, implying that victims of *these* crimes might be over the top of the curve. The third possibility is that in more complex real life situations the applicability of the curve depends on the memory system being evaluated.

In terms of the cognitive avenues to explore, the different delays between the crime and recall the crime and recognition may have consequences. Because statements are taken quite soon after the crime, eyewitness recall could possibly benefit from state dependent memory, an advantage likely not present at identification because it usually takes place some time later when the emotional state of the eyewitness would assumedly be quite different from that experienced during the crime. Also the short delay between the crime and providing a statement leaves little opportunity for the memory to decay, but the considerably longer average delay between the crime and identification does leave room for memory loss to occur.

Laboratory research has found detrimental effects of weapon presence on both recall and recognition and has concluded that information about the appearance of the perpetrator is simply not adequately encoded. The present recall data demonstrate that eyewitnesses in crimes committed with a weapon were able to encode information about the appearance of the weapon holder and suggests that the locus of the weapon effect might not be at the encoding stage.

One possible alternative loci of the effect of weapon presence is at the maintenance phase where eyewitnesses may rehearse the event by thinking about it and discussing it with others. If the crime was particularly traumatic for the eyewitness, s/he may have flashbacks, much like a victim of Post Traumatic Stress Disorder. We know from Read et al (1989) that both the timing of rehearsal and the extent to which the appearance of the perpetrator has changed from study to test can influence the identification accuracy of laboratory eyewitnesses. Specifically, a combination of rehearsal immediately after the event followed by a lineup in which the appearance of the perpetrator has changed leads to poorer identification performance. It is not hard to imagine that these two factors would predominate most eyewitness identification situations. Note, in cases where the perpetrator is caught at or very near the scene of the crime and an identification is attempted right away, the appearance of the perpetrator would be close to identical from exposure to test, which in addition to the brief delay, would help their identification accuracy.

A second possible loci for the detrimental effect of weapon focus is at the retrieval phase. Perhaps eyewitnesses undergo a defensive reaction when they see the perpetrator in a target-present lineup. In a study on the eyewitness abilities of children, Peters (1991) videotaped children's response from behind the lineup. When the children would see the perpetrator they would "identify" him with body language (large eyes, shrinking away slightly) but would often pass on to the next lineup member without identifying the actual perpetrator.

Now, while this could reflect a dynamic of a child not feeling empowered enough to "tattle on" an adult, it could also reflect a defensive reaction.

According to Easterbrook (1959) "..it would be expected that, in perceptual tasks as in other tasks, the effect of emotion on proficiency would depend on the number of cues needed for adequate performance of the task. The deleterious effects of increased drive *or stress* would be expected to appear only when the actual range of cue utilization fell below that required for the task" (p. 189, italics mine). If recall involves more cues than recognition, then maybe it would suffer less from a reduction in cues than recognition. Or maybe the attentional narrowing excludes cues that would be helpful only to recognition. The effects of attentional narrowing on identification accuracy might be mimicked in a laboratory study by presenting faces that had been visually degraded so that only some features were wholly visible or by asking subjects to examine only a few features on a face. There is research which demonstrates that recognition accuracy is related to the number of facial features attended to during study. Laboratory research (e.g. Baddely, & Woodhead, 1982; McKelvie, 1985; Sporer, 1991; Wells & Hryciw, 1984) on depth of processing and memory for faces has demonstrated that deep processing when viewing a face such as making character judgments leads to better recognition than shallow processing such as making judgments about facial features (e.g. wide or close-set eyes). Recently Bloom and Mudd (1991) demonstrated that deep processing involves inspection of more facial features than shallow processing. Also, Loftus (1972) has reported that picture

recognition and number of features encoded are positively correlated. If attentional narrowing due to arousal leads to the inspection of fewer facial features, then the influence of arousal on recognition could be at the encoding phase after all.

Finally, there are other, social considerations such as when faced with a lineup, some eyewitnesses may consider the consequences of misidentifying an innocent suspect, or failing to identify the perpetrator. Also, eyewitnesses may have concerns about the future consequences of their identification decision such as retribution and time spent in court. Future research efforts could be directed at determining if actual eyewitnesses were indeed concerned about possible future consequences about their identification decision or with making a mistake and what kind of mistake they felt was most grave. At recall, it is less likely that these inhibitory factors would be present, although eyewitnesses could be reluctant to even get involved and elude their responsibility by claiming they weren't paying attention or that they don't recall very much.

This study replicated previous archival findings (Yuille, 1986) about the configuration of robberies in term of the high proportion of victim-only crimes and witness' familiarity with the victims. This is an important replication because much of the criticism of laboratory research has centered on the inadequacy of the role of uninvolved bystander that most laboratory eyewitnesses play. Any one or all of these configuration factors might affect eyewitness memory, mainly by operating on the level of arousal experienced by victims and/or witnesses when present. For example, the presence of witnesses

might buffer victim's anxiety, and/or it might curb or increase the perpetrator's aggression in committing the crime. And, assuming the familiarity is a friendly one, witnesses who know the victim might be more aroused than witnesses who don't, particularly in crimes where there is a threat to life and limb. These findings make generalizations of laboratory-based research to actual victims and witnesses of crimes difficult at best.

Laboratory findings may not readily generalize to fraud either because the nature of the interaction is different. In contrast to laboratory eyewitnesses, the clerks are not aware that they will have cause to recall the perpetrator, the delay between exposure and description is often greater, clerks are often presented with the cheque or credit card receipt to jog their memory, and there are often very long delays between exposure and identification. Also a very high proportion of frauds do not involve identification or person description as they are perpetrated between business associates. Some field studies however, particularly Read et al (1990) match many of the characteristics of frauds. The identification accuracy of fraud victims in the shortest delay period, presented in Table 5, is compatible with that reported by Read et al who employed similar delays. Perpetrator descriptions were generally more detailed in Read et al than those provided by actual victims of fraud, but this could be due to the fact that the confederates in Read et al. engaged the clerk in rather unusual events which were designed to be memorable.

This study has demonstrated both the strengths and weaknesses of archival research. It was possible to study eyewitness memory in it's entire and

real context and in some instances it was possible to comment on the generalizability of laboratory and field research. It has provided more information about the contexts of robbery and new information about the context in which frauds occur. These differences can now be used to enrich and energize laboratory and field research. The difference between robberies and fraud (awareness that a crime was taking place, delay between exposure and both recall and recognition) makes the fraud victims a less than perfect control or low arousal group than would be acceptable by laboratory standards. However, finding a sufficient number of the low arousal, non-participatory eyewitness such as mentioned earlier (witnessing the theft of a vacationing neighbor's stereo) would be prohibitively time consuming. The archival researcher must take control or comparison groups as they come, warts and all. Similarly, the archival researcher is limited by the form the data take in the real world. For example, in the current study, rates of selecting the police suspect could be examined, but important questions regarding misidentification of innocent suspects and failing to identify the actual perpetrator had to be left largely unaddressed. Also, the police have a much narrower field of interest than most researchers. The police are concerned with learning what the perpetrator looked like and if s/he said or did anything threatening such as waving a gun about and shouting "nobody move and nobody gets hurt." In contrast, eyewitness researchers usually test recall of the entire event. Finally, the problem of ground truth will always accompany the archival researcher.

There are ways to keep it at bay, such as considering the weight of evidence for or against a particular suspect, but the problem will never entirely go away.

No single research type can effectively deal with all of the issues related to eyewitness memory. The weapon focus phenomenon is a good example of how each type of research can be applied to a particular issue. The laboratory is the most appropriate place to study basic processes. An alternative exploration of other loci for the weapon focus phenomenon should be undertaken. Manipulating rehearsal between exposure and test might be a good place to start. Additionally, one possible explanation of the weapon focus phenomenon as demonstrated by laboratory studies is that it is a von Restorf effect where subjects attend to the weapon because it is an unusual item. The control objects in the weapon focus studies have been usual items; a cheque, soup, a bag of chips or a magazine. Had the perpetrator held and pointed a chihuahua at the clerk, a "weapon focus" phenomenon might have been demonstrated for hand-held chihuahuas. Given that the human face carries information about a person's emotional state, in an actual armed robbery situation, I suspect that the victim and perhaps witnesses would alternate looking at the weapon and at the perpetrator's face, particularly if s/he was speaking. They also might send darting glances in the direction of friends if present or at possible exits or hiding places. Depending on the limits of eye movement monitoring technology, these assumptions could be tested in the lab by having the subject victims be approached by a "perpetrator" wielding various threatening (e.g. needles, snakes) unusual (e.g. chihuahuas, lego

houses) or mundane (e.g. papers, pencils) objects while monitoring their eye movements. More of the context of an actual eyewitness situation could be gained in the role play situations conducted at the Hendon training facility utilized by Yuille et al (in press). The "perpetrators" could possibly brandish real weapons in a confrontation with the officers-in-training. Archival research has already demonstrated that future research should consider employing recall tasks that are more in line with those used by police forces instead of relying on the more convenient questionnaire methods. More archival research on weapon focus is needed however to address the power problem likely present in this research, and to determine if weapon presence has similar effects on the identification accuracy of victims and witnesses.

Weapon focus is not the only subject that would benefit from the multi-method approach; the entire field would. A combination of laboratory studies, field simulations, archival studies and case studies is needed. While this fact has been acknowledged (e.g. Davies, 1990; Yuille, 1993), there has been a distinct imbalance in the number of different types of studies. As a result, this field has painted a potentially distorted rather than a comprehensive picture of eyewitnesses. There is a clear and pressing need for more research of this type, as well as more direct studies of actual eyewitnesses of crime. This study needs replication and extension so that the extensive laboratory literature can be appropriately and properly applied.

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APPENDIX A

Analysis of Variance of total amount of detail provided by eyewitness type (robbery victims, robbery witnesses, and fraud victims).

Source	SS	D.F.	MS	F	
Between groups	5634.57	2	2817.28	72.63	$p < .00001$
Within groups	13536.52	349	38.79		

Analysis of Variance of amount of clothing detail provided by eyewitness type (robbery victims, robbery witnesses, and fraud victims).

Source	SS	D.F.	MS	F	
Between groups	1232.71	2	616.35	56.08	$p < .00001$
Within groups	3835.36	349	10.99		

Analysis of Variance of amount of physical appearance detail provided by eyewitness type (robbery victims, robbery witnesses, and fraud victims).

Source	SS	D.F.	MS	F	
Between groups	1726.02	2	863.01	54.07	$p < .00001$
Within groups	5569.88	349	15.96		

Analysis of Variance of amount of total detail provided by eyewitness type (robbery victims, robbery witnesses, and fraud victims) for those eyewitnesses who recalled more than four physical appearance details.

Source	SS	D.F.	MS	F	
Between groups	722.62	2	361.31	11.82	$p < .00001$
Within groups	4461.55	146	30.55		

Analysis of Variance of amount of clothing detail provided by eyewitness type (robbery victims, robbery witnesses, and fraud victims) for those eyewitnesses who recalled more than four physical appearance details.

Source	SS	D.F.	MS	F	
Between groups	425.28	2	212.64	14.68	$p < .0001$
Within groups	2114.41	146	14.48		

Analysis of Variance of amount of physical appearance detail provided by eyewitness type (robbery victims, robbery witnesses, and fraud victims) for those eyewitnesses who recalled more than four physical appearance details.

Source	SS	D.F.	MS	F	
Between groups	117.53	2	58.77	5.86	$p < .01$
Within groups	1463.15	146	10.02		

Analysis of Variance of amount of total detail provided by eyewitness condition (COND - victims and witnesses of robbery) and by weapon presence (WPN).

Source	SS	D.F.	MS	F	
COND	360.43	1	360.426	7.11	$p < .01$
WPN	668.562	1	668.562	13.19	$p < .0001$
COND BY WPN	5.14	1	5.14	.101	$p > .10$
Within (error)	10745.47	212	50.69		

Analysis of Variance of amount of clothing detail provided by eyewitness type (victims and witnesses of robbery) and by weapon presence.

Source	SS	D.F.	MS	F	
COND	6.34	1	6.24	.391	$p > .10$
WPN	240.24	1	240.24	15.047	$p < .0001$
COND BY WPN	3.52	1	3.52	.221	$p > .10$
Within (error)	3384.85	212	15.99		

Analysis of Variance of amount of physical appearance detail provided by eyewitness type (victims and witnesses of robbery) and by weapon presence.

Source	SS	D.F.	MS	F	
COND	271.80	1	271.80	14.04	$p < .0001$
WPN	107.26	1	107.26	5.42	$p < .05$
COND BY WPN	17.17	1	17.17	.887	$p > .10$
Within (error)	4102.98	212	19.35		

Analysis of Covariance of weapon presence with delay on identification outcomes.

Source	SS	D.F.	MS	F	
Covariate					
Delay	2.69	1	2.69	12.83	$p < .0001$
Main Effect					
Weapon	.751	1	.751	3.58	$p < .10$
Within	26.43	126	.210		