

Investigating Investigators: How Witness Identifications
and Other Evidence Influence Investigators

by

Leora Catherine Dahl
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Abstract

This research examined the influence of eyewitness identification decisions on participants in the role of police investigators. Undergraduate “investigators” interviewed confederate “witnesses” and then searched a computer database of potential suspects. The database included information on each suspect’s physical description, prior criminal record, alibi, and fingerprints. Participants selected a suspect and estimated the probability that the suspect was guilty. Investigators subsequently administered a photo lineup to the witness and re-estimated the suspect’s guilt. Investigators were greatly swayed by eyewitness decisions. If the witness identified the suspect probability estimates increased dramatically. If the witness identified an innocent lineup member or rejected the lineup, investigators’ probability estimates dropped significantly, even when pre-lineup objective evidence (e.g., fingerprints) was strong. Eyewitness decisions similarly influenced investigators’ confidence in the witness and willingness to arrest the suspect. Participant-investigators greatly overestimated the amount of information gain provided by eyewitness identifications.

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Investigating Investigators: How Witness Identifications and Other Evidence Influence Investigators

When a crime occurs in full view of people, those witnesses are often asked to aid in the process of apprehending the perpetrator(s) and serve as a source of evidence about the crime. The police play a monumental role in obtaining and evaluating eyewitness evidence. The investigating officer(s) must interview the witnesses, analyze and interpret evidence, apprehend a suspect, create and administer a lineup, and evaluate the witness's identification decision in the context of other evidence. Despite the critical role police play in the investigative process, most research examining eyewitness identification testimony has considered the eyewitness in isolation of the investigating officer(s).

Early research concerning eyewitness issues focused on eyewitness accuracy, with particular attention paid to post-event distortions in eyewitnesses' recollections. For example, Loftus, Miller, and Burns (1978) examined the effect of post-event information on eyewitness event recollection. They found that eyewitnesses provided with misleading information were less accurate on both a yes-no task and a forced-choice recognition task than those who were provided with consistent or irrelevant information. Hence, this research revealed that eyewitness memory is malleable and eyewitness recollections can be contaminated. This research spawned a significant amount of research on eyewitness memory for both event recollection and identification accuracy. The typical eyewitness identification experiment involves exposing participants to a staged crime, usually presented via slides or videotape, although it is sometimes staged live. Participants are then asked to attempt to recognize the culprit in a live or (more commonly) photo lineup and recall details of the witnessed event.

Subsequent research examined the influence of these lineup identifications and testimony on triers of fact such as juries (e.g., Brigham & Bothwell, 1983). Eyewitness identifications provide seemingly strong evidence for the guilt of the defendant for simulated juries and other triers of fact dealing with contradictory and confusing evidence (e.g., Cutler, Penrod, & Stuve, 1988; Deffenbacher & Loftus, 1982; Leippe, Manion, & Romanczyk, 1992; McAllister & Bregman, 1986; Wells, & Leippe, 1981; Wells, Lindsay, & Ferguson, 1979). Yet, it is the police investigators who serve as the gatekeepers of eyewitness testimony; they decide whether the eyewitness identification is credible and reliable enough to warrant pursuing the suspect and taking the case to court. However, very little research has examined the influence of eyewitnesses on investigators (e.g., Lindsay, Nilsen, & Read, 2000). Hence, the current research examines the influence of eyewitness identifications on police investigators. What power do eyewitness identifications hold over those who conduct the investigation and who encounter the witness before rehearsal, training, and other factors can occur?

Eyewitness Identification Accuracy

The study of eyewitness identification accuracy is extremely important. Of the 128 convictions that have been overturned by DNA evidence in the United States, mistaken identifications were the most common factor leading to these convictions (e.g., The Innocence Project; Wells, et al., 1998). As such, a number of studies have examined the accuracy of eyewitnesses under a variety of conditions (e.g., Brewer, Potter, Fisher, Bond, & Luszcz, 1999; Davies, Shepherd, & Ellis, 1979; Steblay, Dysart, Fulero, & Lindsay, 2001; see Wells, 1993; and Shepherd, Ellis, & Davies, 1982 for review).

One such study was conducted by Cutler, Penrod, and Martens (1987), who

examined the influence of estimator variables (those that are not under the control of the criminal justice system, such as exposure time) and system variables (those that are under the control of the justice system, such as lineup instructions) on eyewitness performance. Collapsing across target-absent and target-present lineups and across the independent variables, the researchers found that 36% of the participant eyewitnesses made the correct decision and 61% made a mistaken decision. Cutler et al. examined the effect of a number of variables on eyewitness accuracy (e.g., exposure time, weapon focus, retention interval, etc.) and found that six variables affected eyewitness accuracy. Identification accuracy was better when the robber was not wearing a disguise, when the weapon was less visible, when witnesses were asked to elaborate on the culprits' facial description, when target-present lineups were used, and when the retention interval was longer (the witnesses performed better one week after viewing the event than witnesses who were shown the lineup immediately following the event). The authors suggested that the effect of retention interval was due to the fact that if the picture of the target lineup member does not exactly match the clear image that participants have in their minds (from recently viewing the video), identification would be more difficult than if participants no longer had a clear image but only a general idea of what the culprit looked like. In addition, the researchers found that accuracy was lower when biased lineup instructions were used (participants were not given the option of rejecting the lineup).

A number of other variables have also been found to influence witness accuracy, including the seriousness of the crime (Leippe, Wells, & Ostrom, 1978). When witnesses knew beforehand how valuable the stolen object was, they were more accurate in the high seriousness condition (more expensive) than in the low seriousness condition (less

expensive). Lineup presentation procedures have also been found to influence eyewitness accuracy (e.g., Steblay, Dysart, Fulero, & Lindsay, 2001; Wells, 1993). For example, Steblay et al. found that when using a meta-analysis to compare simultaneous and sequential lineups, correct decisions were more likely to occur in a sequential lineup (where lineup members are presented individually, one following the other) than in a simultaneous lineup (where all lineup members are presented at the same time). Critically, in a sequential lineup, correct rejections were 23% higher and identifications of innocent foils were 22% lower than in simultaneous lineups. Other variables that can have an effect on eyewitness accuracy include own-race biases, where witnesses are better able to identify people of their own ethnicity (Brigham & Malpass, 1985), and weapon focus. For example, eyewitness memory performance was found to be poorer in conditions where there was a weapon than in conditions without weapons (Loftus, Loftus, & Messo, 1987). Target distinctiveness also has an effect on eyewitness accuracy; less distinctive targets are less likely to be identified than moderately and highly distinctive targets (Brigham, 1990). Further, Loftus (1979) found that presenting eyewitnesses with misleading information can also affect accuracy. Eyewitnesses who were given misleading questions were more likely to later report that misleading information than those who were not given the misleading information.

In addition to the laboratory studies on eyewitness accuracy, case studies of actual eyewitness identifications have also been conducted. Behrman and Davey (2001) examined the accuracy of eyewitness identifications in real world criminal cases. These cases included 289 photo lineups, 258 field showups (eyewitness viewed a single suspect, typically at the crime scene), and 58 live lineups. It is more difficult to determine witness

accuracy in real world situations, as it is unknown whether the culprit is present in the lineup (or showup). That being said, 48% of witnesses chose the suspect in the photo lineups, 76% identified the suspect in the field showups, and 50% identified the suspect in the live lineups. Although it is unknown what percentage of witnesses in the photo lineup condition mistakenly identified a foil or rejected the lineup, in the live lineups, 24% of the witnesses identified an innocent foil and 26% did not make an identification.

Tollestrup, Turtle, and Yuille (1994) also examined real world eyewitness identifications. They examined 170 identification decisions made on fair lineups; 154 of the identification attempts were on photo lineups and 10 were on live lineups. The remaining identifications were made when the police brought the suspect to the victim, when the victim watched a videotape of the scene, or when the witness ran into the suspect and called the police. The researchers divided the identification attempts into conditions where there was no evidence of the suspects' guilt, there was some implicating evidence, or the suspect confessed. They found that the fewest number of positive identifications (identifying the police suspect) were made in the condition where there was no prior evidence of the suspect's guilt (17.5%) and the largest number of positive identifications were made when the suspect had confessed (47.7%). Tollestrup et al. were unable to examine rejections of the lineups or cases of identifications of innocent foils as the police notes did not distinguish between the two conditions.

Finally, Wright and McDaid (1996) examined 1561 eyewitness decisions that took place either in a police station or in a suite specially designed for eyewitness identifications. The suites were created to accommodate more difficult lineups, for example, those involving ethnic minorities where it may be more difficult to create

lineups with foils who fit the description of the culprit. The suites have volunteer lineup members who are contacted when lineups need to be created, whereas the police stations tend to ask random people on the street to participate. The authors found that overall, 39.1% of the witnesses identified the suspect while 19.9% identified a foil and 41% made no identification. There were no differences between the suites and the police stations in the number of witnesses who identified the suspect, however, eyewitnesses who viewed the lineups in the suites tended to identify more foils than those at police stations. This may be due to the fact that the foil members in the suites better fit the description of the culprit than those at police stations because of the selection methods used. Therefore, various laboratory and case studies have shown that a number of variables can influence eyewitness accuracy and that even when the probability that the suspect is the culprit is quite high (when the suspect confessed), eyewitnesses are far below 100% accuracy.

Eyewitness Accuracy and Confidence

What makes eyewitness inaccuracy particularly problematic is the level of confidence that eyewitnesses often display when reporting these misidentifications in court. This is problematic because jurors use witnesses' self-reported confidence as a measure of witnesses' accuracy. Why should accuracy and confidence be correlated? Leippe (1980) suggested that memory trace theories such as Wickelgren (1970) would imply a confidence-accuracy correlation because well-learned material would be retrieved more quickly and clearly, which would help people determine the likely accuracy of the memories. On the other hand, Leippe suggested that eyewitness memory situations differ from idealized memory situations because of the reconstructive processes involved in the construction and retrieval of memories of the culprit's face, etc. As such,

the more extensive the reconstructive process the smaller the accuracy-confidence correlation because people are not aware of the memory modifications. In addition, people are often not aware of the social influences that can affect their accuracy, leading to smaller confidence-accuracy relationships. In fact, a number of studies have found that eyewitness accuracy is not strongly correlated with eyewitness confidence (e.g., Bothwell, Deffenbacher, & Brigham, 1987; Brigham, 1990; Busey, Tunnicliff, Loftus, & Loftus, 2000; Penrod & Cutler, 1995). Thus, a witness who is extremely confident in his or her decision is not necessarily more likely to be accurate in that decision than a witness who is less confident.

However, the claim that there is a weak confidence-accuracy correlation has not gone undisputed. There have been some studies that suggest that this relationship is stronger when only looking at those witnesses who made a choice, that is, excluding those who did not identify a lineup member (e.g., Fleet, Brigham, & Bothwell, 1983; Sporer, Penrod, Read, & Cutler, 1995). Other research suggests that when witnessing conditions are varied in the laboratory (to more closely simulate real world witnessing conditions) the confidence-accuracy correlation rises substantially (e.g., Lindsay, Read, & Sharma, 1998; Read, Lindsay, & Nicholls, 1998). For example, Lindsay, Read, and Sharma manipulated eyewitness viewing conditions such that some participants had a poor view, some had a moderate view, and some had a good view. The researchers found that when using a fair lineup presented in an unbiased manner immediately following the witnessed event, the percentage of accurate identifications went up with the increasing quality of view. When collapsing across conditions, the confidence-accuracy correlation was much higher than in previous studies. In general, participants in the poor view

condition performed quite poorly and were not confident in their decisions, whereas those in the good condition performed quite well and were fairly confident in their decisions.

Researchers have argued that statistical correlation does not accurately represent eyewitness confidence-accuracy relationships, and that when eyewitness confidence and accuracy are calibrated the outlook is much brighter (e.g., Brewer, Keast, & Rishworth, 2002; Juslin, Olsson, & Winman, 1996; Olsson, 2000). Calibration involves plotting the probability of being correct against confidence in that identification decision. Therefore, the proportion of correct identifications is plotted for each confidence category.

Calibration is not affected by the distribution of confidence responses, and confidence and accuracy can be strongly calibrated even when the confidence-accuracy correlation is weak (Juslin et al., 1996). Confidence-accuracy calibration is informative, as it allows one to assess the reliability of an identification made with varying degrees of confidence (e.g., the reliability of an identification made with 40% confidence versus an identification made with 80% confidence). Therefore, the informativeness of witnesses' confidence in the accuracy of their identification decisions is still open to debate. Be that as it may, it is clear that witnesses can be very confident in false identifications.

Eyewitness Confidence and Post-Identification Influences

Although it is important to understand the confidence-accuracy relationship at the time of identification, eyewitnesses are often asked to report their confidence in their decisions in court many months, if not years, after the time of identification. In addition, only those eyewitnesses who display a fair amount of confidence in their decision are likely to be asked to testify due to the fact that jurors rely on this confidence assessment to judge the reliability of the witnesses' decision. The delay between identification and

testifying allows for numerous factors to influence eyewitness confidence. Leippe (1980) suggested a number of factors that can influence eyewitness confidence but do not influence memory accuracy. These include biased testing instructions (e.g., subtly or overtly suggesting the culprit is in the lineup), commitment on a non-forced choice test (e.g., committing to an identification decision that was made voluntarily), and beliefs about facial memory (e.g., if eyewitnesses have strong faith in their facial identification abilities).

Other variables have subsequently been found to influence eyewitness confidence (Leippe, 1980; Luus & Wells; 1994b; Wells, Leippe, & Ostrom, 1979; Wells, Rydell, & Seelau, 1993; Wells, Seelau, Rydell, & Luus, 1994). For example, Luus and Wells (1994a) found that witnesses' identification confidence increased when told that a co-witness identified the same person and decreased when told that a co-witness either identified another lineup member or rejected the lineup. Feedback from lineup administrators has also been found to influence eyewitness confidence (e.g., Bradfield, Wells, & Olson, 2002; Brimacombe & Dahl, 2003; Garrioch & Brimacombe, 2001; Wells & Bradfield, 1998; 1999; Wells, Olson, & Charman, 2003). Bradfield, Wells, and Olson, found that participant-witnesses who received feedback that their decision was correct were more confident in that decision than participants who received no feedback. They also found an interaction between decision accuracy and feedback such that the feedback inflated the confidence of inaccurate witnesses but not accurate witnesses. Rehearsal for cross-examination questioning has also been found to play a role in influencing eyewitness confidence. Participant-witnesses who were instructed to rehearse their answers to potential questions were more confident post-questioning than

those who were not instructed to rehearse (Wells, Ferguson, & Lindsay, 1981). As with the Bradfield et al. study, there was an interaction such that inaccurate witnesses who rehearsed rated themselves as more confident than witnesses who did not rehearse, whereas accurate witnesses who rehearsed rated themselves as equally confident as those who did not rehearse.

Investigator-Witness Interactions

Interestingly, even though research has determined that eyewitness confidence is malleable from the moment that the decision is made, very little investigative attention has been paid to those who have the most contact with the witness: The police investigators. A few studies have examined how police investigators affect eyewitness decisions either through the construction of the lineup (e.g., Buckhout, Figuroa, & Hoff, 1975; Doob & Kirshenbaum, 1973; Leippe & Wells, 1995; Phillips, McAuliff, Kovera, & Cutler, 1999; Wells, Leippe, & Ostrom, 1979; Wells, Rydell, & Seelau, 1993; Wells, Seelau, Rydell, & Luus, 1994; Wells, Small, Penrod, Malpass, Fulero, & Brimacombe, 1998; Wogalter, Malpass, & Burger, 1993), through their interviewing technique (e.g., Fisher, Geiselman, & Raymond, 1987; Yarmey, 2001), or through post-identification feedback (e.g., Bradfield, Wells, & Olson, 2002; Wells & Bradfield, 1998, 1989). Examples of these types of studies include Buckhout, Figuroa, and Hoff who found that when eyewitnesses were presented with a biased lineup, such that one of the photos was presented at an angle and the lineup member's facial expression differed from the other photos, participant-witnesses were much more likely to choose the suspect than in conditions with an unbiased photospread. Also, Fisher, Geiselman, and Raymond examined standard police interviews of eyewitnesses. The authors identified several

problems with police interviewing techniques, including interrupting the eyewitness, using closed-ended questions, and asking questions out of sequence, among other issues.

Garrioch and Brimacombe (2001) also examined how lineup administrators influenced eyewitness confidence. Pairs of participants were divided into eyewitnesses and investigators. The investigators were informed that they were taking part in an eyewitness memory experiment and that they would be administering a lineup. Some investigators were given no information as to the thief's identity, the rest were informed which lineup member was the "thief." However, for some of these investigators, the thief was the person most likely to be identified by eyewitnesses (as determined by pilot studies), for some investigators the thief was a plausible choice (next most likely identified by eyewitnesses in pilot studies), and for some, the thief was an implausible choice (a lineup member who looked quite dissimilar from the other lineup members). In actuality, the lineup was target absent, meaning that the actual culprit was not present in the lineup. The investigators were given a procedure and script to follow during the lineup administration and subsequent interview and were told not to stray from the procedure. The researchers examined how investigators' knowledge of the thief's identity influenced eyewitnesses' self-reported confidence and the credibility of that witnesses' testimony as judged by participant-jurors.

The results revealed that when the witness chose the lineup member who the investigators' believed was the thief, their confidence in that decision was higher than witnesses who were in the control condition, that is, the condition where investigators were given no information about the thief's identity. On the other hand, when the witnesses identified a lineup member who looked quite dissimilar to the investigators'

lineup member (the implausible condition) confidence was significantly lower than in the control condition. When the eyewitness identified a lineup member who looked similar to the investigators' target, self-reported confidence was similar to that condition where the investigators had no knowledge of the thief's identity. Independent raters analyzed the investigators' verbal and nonverbal behaviour to examine how the investigators were influencing the eyewitnesses' self-reported confidence. They found that the investigators emphasized different parts of the confidence question depending on the condition. When the witness identified an implausible other the investigator emphasized "not at all confident," and when the witness identified the investigators' target the investigator emphasized "extremely confident." Investigators in the implausible ID condition were also more likely to repeat the lineup choice during identification in a questioning manner, look down and smile while recording the decision, and look down at the lineup after the identification decision. However, when examining the perceived credibility of the eyewitnesses when using participant-jurors, the authors did not find differences in the witnesses' perceived credibility across the identification conditions.

The influence of police investigators on eyewitnesses' decisions and confidence in those decisions is obviously important, as demonstrated by the Garrioch and Brimacombe (2001) paper. However, it is important to keep in mind that in police-eyewitness interactions both players can be influenced by the other. Consequently, the influence of the eyewitness on the police investigator is an important issue. Police investigators interact with eyewitnesses during the actual lineup procedure, before rehearsal and training can influence eyewitness confidence. Although the police do not play a decision-making role in the actual court trial, they do make significant decisions

regarding the evaluation of eyewitnesses in the process of gathering, weighing, interpreting, and integrating evidence. Evidence must be evaluated to incriminate or exonerate a suspect. Police must use this incriminating and exculpatory information to determine the relative likelihood that the suspect is the culprit. Part of this procedure includes deciding whether an eyewitnesses' lineup identification decision is reliable and credible enough to pursue investigating and arresting the suspect. Or, in cases where the witness rejects the lineup or identifies an innocent foil, investigators must decide whether to trust that decision as exculpatory evidence. However, there have been no studies (to my knowledge) examining how participant-investigators integrate eyewitness decisions into their knowledge of other evidence, and only one study has examined investigators' confidence in the accuracy of witnesses' identifications.

Lindsay, Nilsen, and Read (2000) tested 144 pairs of undergraduate students with one of the students assigned the role of an eyewitness and the other assigned the role of a lineup administrator. The witnesses viewed either a good (3 minutes long, taken from a variety of perspectives) or poor (10 seconds long, taken from one perspective) version of a video depicting a target person. The witnesses then judged either a target-present or target-absent photo lineup administered by their co-participant investigator. Following the lineup, the witnesses were asked to rate their confidence in the accuracy of their lineup decision, and the investigators were independently asked to rate how accurate they thought the witness was. Similar to the Lindsay et al. (1998) study, they found that witnesses' accuracy and confidence were higher in the good condition than in the poor condition and that the confidence-accuracy correlation was significant within both the good and poor witnessing conditions. But, more importantly, when collapsed across the

conditions the confidence-accuracy correlation was substantial. Investigators' confidence in the witnesses' decision was also higher in the good witnessing condition than in the poor condition. Investigators' confidence was significantly correlated with witnesses' accuracy in the good condition but not in the poor condition. Specifically, the investigators tended to overestimate witnesses' accuracy. In addition, logistical analyses showed that investigators' confidence had no influence on the prediction of eyewitness accuracy above and beyond the eyewitnesses' own confidence. This implies that when using blind investigators (the investigator does not know who the target is), as recommended by Wells et al. (1998), participant-investigators are not very adept at judging the accuracy of eyewitness identifications.

This situation becomes more complicated when the investigator is aware of who the target/suspect is. The participant-investigators in the Lindsay et al. (1998) study were blind to the identity of the target shown in the video and were not informed whether the target was present or who the correct target was in the photo-lineups. One might expect that an investigator's knowledge about the lineup suspect or evidence against that suspect would influence how the investigator subsequently viewed the eyewitness' decision. Despite the recommendations made by Wells et al. (1998), in the real world lineup administrators often not only know who the suspect is in the lineup, they are also frequently involved in actually gathering evidence against that suspect. This prior knowledge may bias investigators' views of the eyewitness and the eyewitness' decision. For example, an investigator who has put a lot of time and effort into gathering evidence against a suspect may have high expectations that the eyewitness will identify that suspect. How is such an investigator affected by an eyewitness misidentification or

rejection of the lineup? Will the investigator believe that their own choice of suspect was flawed or will they believe that the eyewitness is mistaken and continue to pursue the suspect?

Motivated by the Lindsay et al. (2000) study, and taking into account real world investigative practices, I was interested in examining how investigators view different eyewitness decisions and how these decisions influence investigators' judgments about their choice of suspect and credibility of the eyewitness. In addition, I was interested in exploring how investigators integrate eyewitness decisions into their knowledge of other evidence. To date there has been no research on how police investigators integrate material evidence (e.g., fingerprint evidence) and eyewitness identification decisions into their decision-making. However, two studies have examined the integration of eyewitness versus fingerprint evidence using participant-jurors and participant-witnesses.

Participant-Jurors' Appraisal of Eyewitness versus Fingerprint Evidence

Bregman and McAllister (1987) examined how 36 participant-jurors integrated fingerprint evidence with eyewitness decisions. Participants were given questionnaires that assessed their verdicts on nine different crime scenarios. The authors found that when the fingerprint evidence and eyewitness identifications were both positive (e.g., both indicated the guilt of the defendant), judgments of guilt were higher than when only one piece of evidence was positive. In addition, judgments of guilt were significantly lower when both pieces of evidence exonerated the defendant. However, if the fingerprint information and eyewitness identification evidence were contradictory, jurors tended to emphasize the eyewitness decision. For example, if jurors were told that fingerprints incriminated the defendant but the eyewitness exonerated the defendant, they

tended to believe the eyewitness decision and reported lower ratings of defendant's guilt. On the other hand, if the fingerprints exonerated the defendant but the eyewitness identified the defendant, the participant-jurors reported higher guilty ratings.

Participant-Witnesses Appraisal of Eyewitness versus Fingerprint Evidence

Brimacombe and Dahl (2003) also examined the influence of material and eyewitness evidence, but their examination focused on eyewitnesses' identification confidence. The authors examined the effect of post-identification feedback in the form of either co-witness information or fingerprint evidence. Participants were shown a short video and were subsequently asked to make an identification from a target-absent lineup. Participants were not informed that they could reject the lineup by not making an identification. Following the lineup, participants were either given no information or were given information regarding a co-witnesses' decision or fingerprint evidence. Unlike the Bregman and McAllister (1987) study, participants were only given information about one or the other source of evidence, not both. Results indicated that both the co-witness decision and fingerprint evidence affected eyewitness confidence. If the co-witness or fingerprint evidence agreed with the eyewitnesses' decision their confidence increased. If the co-witness or fingerprint evidence disagreed with the eyewitnesses' decision their confidence dropped. Interestingly, disconfirming co-witness and fingerprint evidence had disparate effects on eyewitness confidence. Confidence dropped significantly more when fingerprint evidence disagreed with the witnesses' decision than when co-witness evidence disagreed with the decision. Thus, when the evidence appeared to negate the witnesses' own decision, fingerprint evidence was more influential than co-witness evidence. This result clearly differs from that of the Bregman

and McAllister paper, and is most likely explained by the difference in methodologies between the studies. Bregman and McAllister studied jurors' evaluations of fingerprint versus eyewitness evidence to assess a defendant's guilt in a within-subjects design. Brimacombe and Dahl's participants did not compare physical versus eyewitness evidence, but rather used either fingerprint or co-witness decisions to evaluate their own decisions in a between-subjects design.

The contradictory findings of Bregman and McAllister (1987) and Brimacombe and Dahl (2003) regarding the relative weight given to eyewitness and fingerprint evidence leaves one in doubt as to how police investigators would react when faced with the two types of evidence. Like jurors, police investigators must integrate the various pieces of evidence to make a decision regarding the probability that the suspect committed the crime. Further, police investigators are present with the witness during the identification procedure. Perhaps the proximity to the eyewitness identification decision makes eyewitness decisions more salient than other evidence that is gathered. As such, investigators may give more strength to eyewitness decisions than to other arguably more objective evidence. On the other hand, like the eyewitnesses in the Brimacombe and Dahl study, police investigators may see the evidence as either a confirmation or disconfirmation of their own decision (to subject the suspect to the lineup). This use of the evidence to evaluate their own decisions may lead investigators to treat the eyewitness decision as less informative and credible than the material evidence, especially if the eyewitness decision contradicts the investigator's own decision.

Current Research

Taking into account the Lindsay et al. (2000), Bregman and McAllister (1987),

and Brimacombe and Dahl (2003) studies, the current research examined how participant-investigators who have expectations regarding the guilt of a member of the photo lineup interpreted eyewitness decisions. The central question of interest is how investigators' estimates of the suspect's guilt change depending on the eyewitness identification decision. For example, do estimates of probable guilt go up when the eyewitness identifies the suspect? Conversely, do they go down if the eyewitness fails to identify the suspect? In addition, how is the investigator's opinion of the eyewitness affected by the eyewitness' decision? Specifically, will the investigator perceive the eyewitness as more accurate if the witness chooses the investigator's suspect and less accurate if he/she does not choose the suspect? Finally, investigators play a large role in deciding whether to arrest a suspect and how much evidence is enough to arrest a suspect. How is this arrest decision influenced by eyewitness identification decisions?

To examine police decision-making and confidence in this study, I designed the materials in such a way that they would partially replicate (to my knowledge) real world police procedures. The goal was that participants would actually find a suspect based on information they had received about the crime and decide whether to arrest that suspect based on the available evidence. In the real world, police investigators wouldn't administer a lineup unless they had some reason to believe that the suspect was the culprit. I wanted to replicate that in this line of research. That is, I wanted our participant-investigators to have a hunch regarding who committed the crime prior to the administration of the lineup.

This paper presents five experiments that aimed to explore the influence of eyewitnesses' identification decisions on investigators' judgments of suspects' guilt,

judgments of witness credibility, and integration of physical evidence with eyewitness identification evidence. Experiments 1 and 2 examined the influence of a witness who identified the participants' suspect, identified an innocent foil, or rejected the lineup by declaring that the culprit was not present. Experiment 3 served as a pilot study of the manipulation of materials to alter prior odds that the suspect was guilty. Experiment 4 explored the influence of an eyewitnesses' decision on investigators' judgments when the pre-lineup odds that the suspect was guilty were either quite high or fairly low. Finally, Experiment 5 examined the identification behaviour of participant-witnesses using the materials utilized in the participant-investigator studies to determine normative rates of the various eyewitness identification decisions.

Experiment 1

Method

Participants. Twenty-Four male and female University of Victoria undergraduate students participated individually in return for optional extra credit in an introductory psychology course. Participants were randomly divided into three conditions: ID Suspect, ID Foil, and Not Present (did not make an identification).

Materials. A 3-minute video depicted a Volkswagen rabbit pulling into a parking lot. Three men exit the car and proceed to break into a building. The men go into the building and retrieve boxes, which they put in the back of the car. The video ends with a police car pulling up. Two of the culprits escape while one is caught and arrested. The description of the crime and culprit given by the confederate was based on this video.

A computerized database of potential male suspects was created for this study. The first page contained a list of thirteen potential suspects' names. To start the program,

participants clicked on a potential suspect's name to view the individual information for that person. The information given for each potential suspect included his physical description (including date of birth, hair colour and length, height and build, and eye colour) and prior criminal record. Also on this page was a link to get additional information about the suspect. The additional information included the suspect's alibi for the duration of the crime, current employment, and any registered vehicles the suspect owned (see Appendix A for a sample page). In addition, for some of the suspects, fingerprint information was available. If this was the case, there was a link to see the probability that the suspect's fingerprint matched a partial fingerprint lifted from the crime scene. The database was constructed so that participants would have to read through at least the basic information for each suspect at least once before going to a page on which they could make their decision as to which (if any) of the suspects committed the crime. To make their decision, participants clicked on the name of the man that they suspected committed the crime. This took them to a page containing the suspect's photo (the perpetrator in the video). The program was designed so that the same picture would appear regardless of which suspect was chosen. Participants then clicked on a link to see their suspect's photo in a photo lineup (see Appendix B). This photo lineup was used during the eyewitness identification portion of the experiment.

Two questionnaires were used in the study (see Appendix C). The Pre-Identification questionnaire asked participants to list the name of the suspect that they had chosen and their suspect's position in the photo lineup (this was done to ensure that they actually knew where their suspect was in the lineup). In addition, participants were asked to estimate the probability that their suspect was the culprit on a scale from 0%-

100%. Participants were then asked if they would arrest the suspect based on the information that they had obtained so far and, if not, what evidence they would need to arrest the suspect. The following question asked participants to indicate how confident they felt in their decision to arrest or not arrest the suspect. Finally, participants were asked to rate various types of evidence according to how important each one was when choosing the suspect. Participants rated each piece of evidence as “not at all important,” “somewhat important,” or “very important.”

The Post-Identification questionnaire was quite similar to the Pre-Identification questionnaire. It first asked participants to indicate what lineup member (if any) the eyewitness chose (to ensure they had paid attention to the witnesses’ decision). It then asked the participants to rate how confident they were in the accuracy of the witness’ decision. Participants were again asked to estimate the probability that the suspect they chose had committed the crime. They were also again asked whether they would arrest the suspect based on the information obtained so far, and how confident they were in that decision to arrest or not arrest the suspect.

Procedure. When participants signed up to participate in the study, they were informed that they would be participating in pairs and the sign-up website was rigged to make it appear that this was true. In fact, only one participant signed up for each session, as the other person was a confederate. Hence, for each session there were two sign-up times available, one for the participant and one filled with a false name for the confederate. A confederate was used to manipulate the identification decision and to maintain consistency in the eyewitness’s responses to the interview and apparent confidence in the identification decision. When participants arrived they were informed

that they would be taking on the role of a police officer in the experiment and were then told that another participant (the confederate) was watching a video that depicted a crime and would take on the role of an eyewitness. It would be the participant's job as a police officer to interview the eyewitness to determine what crime was committed and what the suspect looked like, to use the information gathered in the interview to attempt to find a suspect using a computer database, and finally to administer a photo lineup to the witness. The participant was told that he/she would first complete the interview with the eyewitness. Participants were informed that they could ask the witness any questions that they would like, in any manner that they would like, but that there was some information that they should try to obtain from the witness to help them find a suspect. Participants were also told that, to make it easier for them, the experimenter would write down everything that the witness said during the interview. They were then given an instruction sheet with the instructions reiterated on it and with a point-form list of information to obtain from the suspect (see Appendix D). Participants were asked if they had any questions and any questions that they did have were answered before the experimenter brought in the confederate for the interview.

The confederate stayed in another testing room during the experiment except when he was needed for the interview and photo lineup. The experimenter brought the confederate into the testing room for the interview and sat him across from the participant. The participant was then told that he/she could start the interview. During the interview, the confederate was instructed to respond in a fairly confident manner with predetermined answers to all of the questions given to the participant investigator on the interview sheet. If a question was asked that did not relate to any of the predetermined

answers, the confederate was to answer honestly if it had been depicted in the video and answer, “I don’t know” if it was not in the video or if the confederate honestly did not know.¹ After the interview was completed, the confederate was taken back to the other testing room while the participant was given the written copy of the confederate’s answers to read over.

When the experimenter returned, she gave the participant instructions for using the computer database to find a suspect. Participants were told to imagine that they were police officers in a small town and as part of their investigation they would examine a database containing information on people in the town who had previous arrests or convictions. Participants were told to use the information obtained in the witness interview to try to find someone in the list of suspects who could have committed the crime. Participants were instructed to imagine that the crime had just taken place, so that all of the information in the interview was up to date (such as hair colour, length, etc.) and all of the information in the database was also up to date. Thus, if a particular suspect’s physical description did not match that given during the interview or if he was in jail at the time the crime took place then he obviously could not have committed the crime. In addition, the participants were told to imagine that a partial fingerprint was taken from the scene of the crime; for some of the suspects, the database contained information on the probability that their fingerprint matched the one taken from the scene of the crime. Participants were provided with paper to write notes on and were told to take as much time as they needed to make their decision. They were also warned that

¹ Although participants were told that they could ask whatever questions they wanted, they rarely asked questions unrelated to the suggested questions that they were given. When they did ask such questions, they always referred to information that was unrelated to the information given in the computer database. Therefore, these participants were no further ahead when it came to choosing a suspect than those who did not ask additional questions.

once they had made their decision and chosen their suspect, that decision was final.

Participants were instructed to look closely at their chosen suspect's picture and to make note of the position of their suspect in the photo lineup. The experimenter answered any questions that the participant had about the computer database portion of the experiment. In general, participants had very few questions about the procedure and appeared to have few problems completing this portion of the experiment.

After viewing the photo lineup containing their suspect, participants were given the Pre-Identification questionnaire to complete. Following the questionnaire, participants were given instructions for the administration of the lineup to the eyewitness. Participants were instructed to try not to influence the witness toward choosing their suspect. They were told that real-life police officers are supposed to be impartial during the lineup and that we wanted them to be so as well. Participants were also informed that real-life police officers must instruct the witness that it is possible that the culprit is not present in the lineup and if so, the eyewitness does not have to make an identification. As such, participants were given the following instruction to read to the eyewitness: "The culprit seen in the video may not be present in this lineup. If you do not think the culprit is shown here please say 'not present' when I ask you for your identification decision." The participants were also informed that the lineup consisted of one person who could have committed the crime (their chosen suspect) and five people who could not have committed the crime (foils). The experimenter explained that in the real world, police often construct the lineup such that there is one suspect and the other lineup members are other police officers or prisoners who could not have committed the crime. Thus, they should imagine that of the men in the lineup, only their chosen suspect could have

committed the crime. The experimenter answered any questions that the participant had about the lineup and gave him/her a Lineup Checklist instruction sheet to use during the lineup procedure. The computer monitor was turned off before the experimenter left to get the confederate to prevent the “eyewitness” from seeing the lineup before the participant had finished reading the instructions aloud.

When the experimenter returned with the confederate, the participant was instructed to administer the lineup. The Lineup Checklist suggested that the participant sit the confederate in front of the computer, give him the lineup instructions, and then turn on the computer monitor. Participants were then told to wait to allow the witness to make his decision and to write down the decision on the Lineup Checklist. Prior to the start of the experiment, the confederate was instructed to wait a few seconds while he looked over the lineup and then to answer either “It’s number three” (ID Suspect condition), “It’s number six” (ID Foil condition), or “He’s not there” (Not Present condition). After the confederate made his decision, the participant was informed that he/she could ask any additional questions that he/she thought would be helpful. The majority of participants did not ask any further questions, but some participants subsequently asked how confident the witness was in his decision. If this was the case, the witness responded “fairly confident” in all conditions. (No records were kept of these questions.) Once the participant decided that he/she had completed the lineup procedure, he/she was given the Post-Identification questionnaire to complete while the experimenter took the confederate back out of the room. Following completion of the questionnaire, participants were fully debriefed as to the purposes of the experiment and to the use of the confederate.

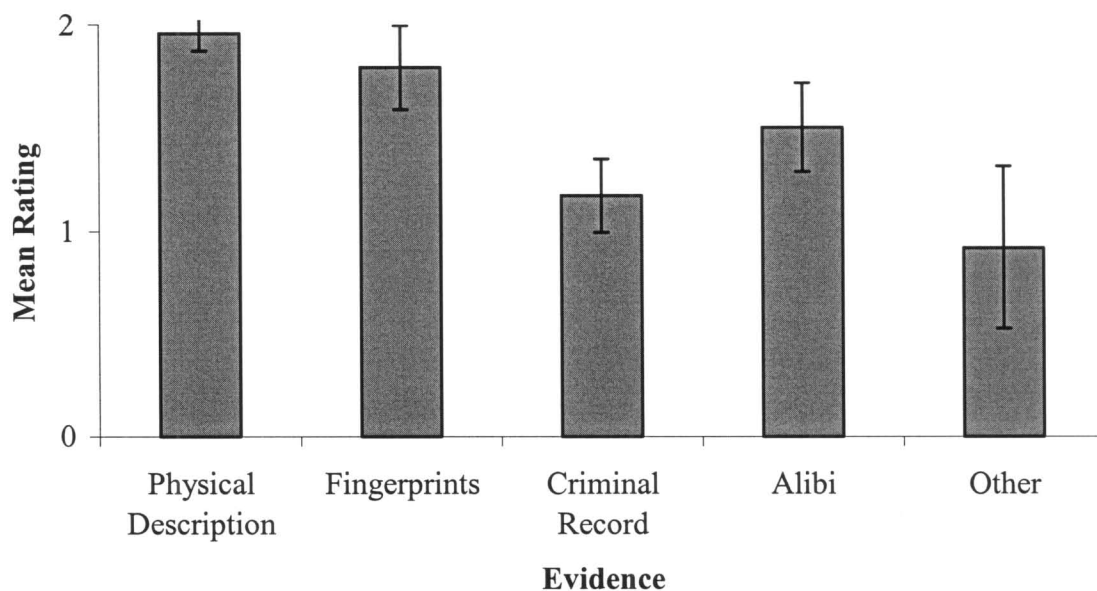
Results

Pre-Identification Questionnaire. Participants were asked to rate the probability on a scale from 0% to 100% that their suspect was the culprit. The overall mean was 77.08% ($SD = 9.08$). Slightly less than half of the participants reported that they would arrest the suspect based on the information obtained thus far. Those who said that they would not arrest the suspect at this time ($N = 13$) were asked what information they would need to arrest the suspect. Eight of these participants reported that they would need more evidence (e.g., car license plate, stolen goods) and 5 reported that they would need an eyewitness identification to arrest the suspect. When asked on a scale from 1 to 10 how confident they were in their decision to arrest the suspect, the mean confidence across the decisions to arrest (yes or no) was 7.17 with a standard deviation of 1.63. There was no significant difference in confidence between those who indicated they would versus would not arrest the suspect, $F(1, 22) = 3.60$, $MSe = 2.40$, $p = .07$, $\eta^2 = .14$. The mean confidence for those who reported that they would arrest the suspect was 7.82 ($SD = 1.08$) and was 6.62 ($SD = 1.85$) for those who would not arrest the suspect.

Ratings of the Evidence. Participants were asked to rate how important physical description, prior record, fingerprint evidence, alibi, and other evidence were in their choice of suspect. Participants rated the importance as not at all important, somewhat important, or very important (coded during analyses as 0, 1, and 2 respectively). A repeated measures ANOVA using the Greenhouse-Geisser correction to account for violations of the assumption of sphericity indicated that there were significant differences in rated importance between the evidence factors, $F(2.73, 55.68) = 16.09$, $MSe = .46$, $p < .001$, partial $\eta^2 = .41$. Subsequent pair-wise comparisons were carried out using the

Bonferroni correction and only the significant results are reported. (Refer to Figure 1 for a graph of the means). Physical description was rated as more important than prior criminal record, $t(23) = 7.62, p < .001$, alibi $t(23) = 4.41, p < .001$, and other evidence, $t(23) = 5.11, p < .001$. Fingerprints were rated as significantly more important than prior criminal record and other evidence, $t(23) = 5.32, p < .001$ and $t(23) = 4.32, p < .001$, respectively. Alibi was rated as significantly more important than other evidence, $t(23) = 3.08, p = .005$. Overall, 13 of the participants rated other information as somewhat important or very important to their decision. Of these, 11 reported that the car owned by the suspect was an important factor in their decision.

Figure 1.



Error Bars = 95% confidence intervals of the marginal means.

Post-Identification Probability Suspect Committed Crime. After participants had administered the photo-lineup to the eyewitness they were again asked what the

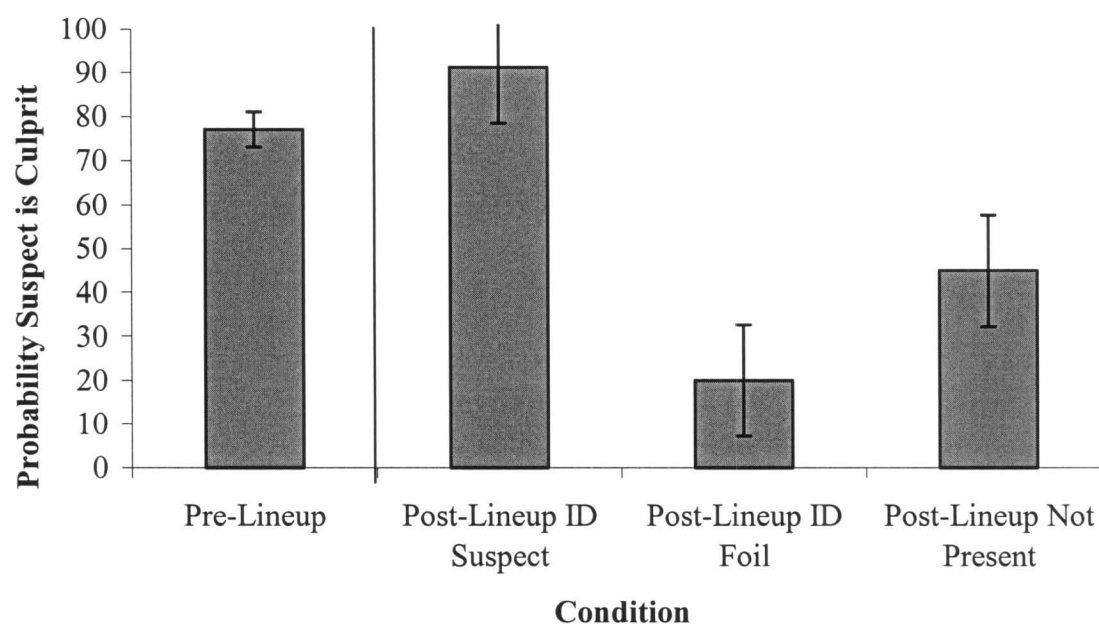
probability was that their suspect had committed the crime. A 2 (Time: Pre-ID, Post-ID) x 3 (Condition: ID Suspect, ID Foil, Not Present) repeated measures mixed model ANOVA was used to investigate whether there were significant differences in participants' estimated probability that the suspect was the culprit. The interaction was significant, $F(2, 21) = 34.96$, $MSe = 151.79$, $p < .001$, $\eta^2 = .77$. Paired samples t-tests using the Bonferroni correction revealed that for those in the ID Suspect condition, there was a significant difference between the pre-lineup report of 76.25% ($SD = 11.88$) and the post-lineup report of 91.25% ($SD = 3.54$), $t(7) = 3.97$, $p < .01$, $\eta^2 = .69$. Post-lineup probabilities were significantly lower than pre-lineup probabilities in the ID Foil condition (pre-lineup: $M = 76.25\%$, $SD = 7.44$ vs. post-lineup: $M = 20.00\%$, $SD = 22.04$), $t(7) = 8.62$, $p < .01$, $\eta^2 = .91$. The same pattern was found in the Not Present condition between pre- ($M = 78.75\%$, $SD = 8.35$) and post-lineup ($M = 45.00\%$, $SD = 20.00$) probabilities, $t(7) = 4.47$, $p < .01$, $\eta^2 = .74$.

There was a main effect of time, $F(1, 21) = 49.41$, $MSe = 151.79$, $p < .001$, $\eta^2 = .70$. This effect was not examined using post-hoc analyses because it was not a main focus of the experiment. There was also a main effect of condition, $F(2, 21) = 21.86$, $MSe = 236.31$, $p < .001$, $\eta^2 = .68$. However, because the eyewitness decision only impacted post-ID probabilities (as expected, there was no effect of condition on the pre-ID probability estimates, $F < 1$), post hoc tests were only conducted on the post-ID probability ratings. Post Hoc analyses using the Bonferroni correction revealed that there were significant differences between conditions. Participants who believed that the witness had identified their suspect ($M = 91.25\%$, $SD = 3.54$) were significantly more likely to think that their suspect was the culprit than participants in both the ID Foil ($M =$

20.00%, $SD = 22.04$) and Not Present ($M = 45.00\%$, $SD = 20.00$) conditions, $t(14) = 9.03$, $p < .001$, Cohen's $d = 4.51$ and $t(14) = 6.44$, $p < .001$, Cohen's $d = 3.22$, respectively.

The participants in the ID Foil and Not Present conditions, however, were not significantly different (using the Bonferroni α of .017) in their beliefs that the suspect was the culprit, $t(14) = 2.38$, $p = .032$, Cohen's $d = 1.19$.

Figure 2.

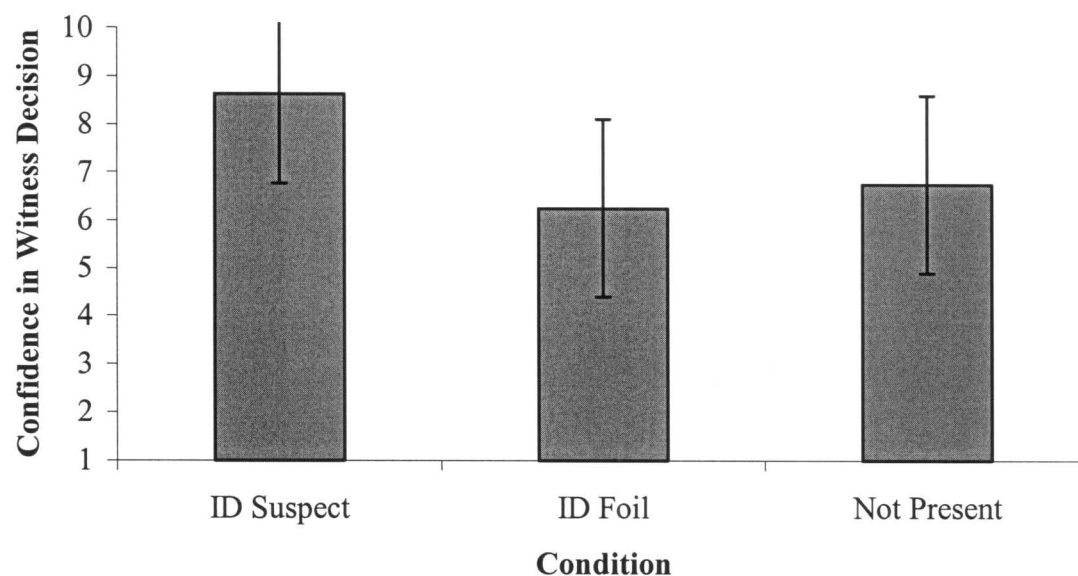


Error Bars = 95% confidence intervals of the marginal means.

Confidence in the Witness. Participants were asked to rate their confidence in the witnesses' decision. There was a nonsignificant trend for participants to be more confident in a witness who identified their suspect than in a witness who identified a foil lineup member or rejected the lineup, $F(2, 21) = 2.42$, $MSe = 5.19$, $p = .11$, $\eta^2 = .19$ (See Figure 3). In the ID-suspect condition, mean confidence in the witness was 8.63 ($SD = .52$). In the ID Foil condition, mean confidence was 6.75 ($SD = 3.11$). Finally, in the Not

Present condition, mean confidence in the witness was 6.25 ($SD = 2.38$).

Figure 3.



Error Bars = 95% between-subjects confidence intervals.

Arrest Decision. Participants were again asked whether they would arrest the suspect based on all of the information that they had obtained so far. With one exception, everyone in the ID Suspect condition reported that they would arrest the suspect. The participant who reported that he would not arrest the suspect stated that he would search the suspect's property for the stolen goods before making an arrest. Compared to the pre-ID reports of arrest decision, the frequency of arrest decisions increased in the ID-Suspect condition and decreased in the ID-Foil and Not Present conditions, but the small sample size prohibited use of a 2 x 3 Chi-square to assess the statistical significance of this overall pattern.

Participants were again asked for their confidence in their decision to arrest the suspect. A three-way ANOVA examining the effect of Arrest Decision (Yes, No), ID

Condition (ID Suspect, ID Foil, Not Present) and rated probability that the suspect was the culprit (coded as: High: 51%-100%, Low: 0%-50%) indicated no significant main effects or interactions, (all p 's > .4).

Discussion

The results of Experiment 1 revealed that participant-investigators were heavily influenced by eyewitness decisions in all conditions. When the eyewitness agreed with the investigator's decision, probability estimates of the suspect's guilt rose significantly from pre-lineup estimates. Similarly, when the eyewitness identified an innocent lineup member or rejected the lineup by failing to make an identification, probability estimates decreased significantly from pre-lineup estimates. It is somewhat surprising that participants were so affected by the eyewitness decisions in the ID Foil and Not Present conditions. The pre-lineup probability ratings suggested that the material evidence (e.g., fingerprints, car ownership, etc.) was quite strong, and the participant had made at least some commitment to the hypothesis that his/her suspect was in fact guilty. One might expect that hypothesis-disconfirming evidence would be given little weight. Instead, reported judgments of probable guilt plummeted.

As anticipated, the ID Suspect condition lead to significantly higher probability ratings that the suspect was the culprit than the other two conditions. However, there was not a significant difference between the ID Foil and Not Present conditions. Although the trend was not significant (possibly due to small sample sizes), there was a tendency for participants to report lower judgments of probable guilt in the ID Foil condition than in the Not Present condition. As far as the investigator is concerned, both conditions involve the eyewitness failing to identify the investigator's culprit. One might expect that

the witness would be discounted if he identified a foil because the participant knew that such a decision was definitely an error (whereas rejection of the lineup would be correct if the participant's suspect was not the culprit). However, the results suggest that the investigators treated the ID Foil condition as strong evidence that their suspect did not commit the crime (as evidenced by extremely low probability ratings), perhaps even stronger than in the Not Present condition where probability ratings were at 45% that the suspect was the culprit. When asked during debriefing why their probability ratings dropped so dramatically, participants in the ID Foil condition, reported that the lineup member that the witness chose looked quite dissimilar from their own choice of suspect and that therefore, even though the investigator understood that the lineup member identified could not have committed the crime, the participants believed that the real culprit must look more like the identified lineup member than their own chosen suspect.

Surprisingly, there were no differences in ratings of confidence in the witnesses' decision. Participants were equally confident in the witness regardless of the actual decision although there was a nonsignificant tendency to be more confident in witnesses who identified the suspect. This may be due to the small sample sizes involved in this study.

Experiment 2

Experiment 1 provided some very encouraging and intriguing findings. While most of the results appeared fairly straightforward, one unexpected result was the trend that participants' estimates of suspect's guilt decreased more after the witness identified another member of the lineup ($M = 20.00$) than when the witness reported that the culprit was not present in the lineup ($M = 45.00$). While it is not all that surprising that

participants would lose confidence in their chosen suspect after an eyewitness misidentification or nonidentification, it is interesting that those two conditions would have a disparate effect on participant-investigators' probability estimates. Based on investigator's self-reports, one possible explanation for this difference is that in the ID Foil condition, the confederate identified a lineup member who looked fairly dissimilar to the chosen suspect leading the participant to infer that the foil identified looked more like the culprit than their own chosen suspect.

Consequently, a second experiment was conducted to examine what role lineup member similarity plays in investigators' assessments of eyewitnesses' decisions. If participant-investigators compare the physical similarity of foil lineup members to their chosen suspect, a more similar-looking or dissimilar-looking lineup member may have differential influences on ratings of the suspect's guilt and confidence in the witness. If identification of a dissimilar-looking lineup member results in participants discrediting their own choice of suspect as too dissimilar to the culprit, how would the identification of a similar-looking lineup member influence the investigators? If the innocent foil identified looks quite similar to the suspect, participants may be less likely to automatically reject their suspect and more likely to assume that the eyewitness made a mistake. Thus, while identification of a similar lineup member may not be seen as validation of their choice of suspect, participants might still view this decision as less discrediting than the identification of a dissimilar-looking foil. As such, Experiment 2 was designed to replicate the findings of Experiment 1 with a larger sample size while also examining the influence of the witness identifying a lineup member who was either physically similar to or dissimilar to the chosen suspect. The procedure and materials in

this experiment were identical to those used in Experiment 1 unless reported otherwise.

Method

Participants. Seventy-two male and female University of Victoria undergraduate students participated individually in return for optional extra credit in an introductory psychology course. Participants were randomly divided into four conditions: ID Suspect, ID Similar Foil, ID Dissimilar Foil, and Not Present.

Materials. Some of the materials were changed slightly between Experiment 1 and Experiment 2. To emphasize the fact that the culprit may not be present in the computer database of suspects, a link was added to the Make A Decision page that allowed participants to choose none of the suspects. If a participant clicked this link they would be taken to a page that said “Finished, please notify the experimenter.” However, based on the confidence scores obtained in Experiment 1, we did not expect anyone to make that choice. All of the other information in the database was identical to that in Experiment 1.

The questionnaires were also changed slightly to allow for the possibility of not choosing a suspect. The wording of the Pre-Identification questionnaire was altered to include “If you chose a suspect...” to all of the questions on the questionnaire. Otherwise, the questionnaire remained identical to that used in Experiment 1. The Post-Identification questionnaire was also modified to make one of the questions more clear. To ensure that participants understood the question regarding their confidence in the witness’ decision, the question was revised and another question was added. The revised question asked “If the witness made an identification, how confident are you that the witness is correct in his or her decision (that is, correctly identified the culprit)?” In

addition, a separate question asked, “If the witness did not make an identification, how confident are you that the witness is correct in his or her decision (that is, correctly indicated that the culprit is not in the lineup)?” All of the other questions remained identical to those used Experiment 1.

Procedure. The procedure in Experiment 2 was identical to that in Experiment 1 except for a few minor changes to the instructions for finding a suspect and the instructions for the lineup. The instructions for trying to find a suspect were changed to emphasize before the participants started that the culprit might not be among the suspects listed and that if they did not think that the culprit was present they should click on the “None of the above” link when it came time to make their decision. The instructions for the lineup were also changed to ensure that participants understood that only their suspect could have committed the crime.

A different female confederate was used for Experiment 2. The new confederate was trained to respond with the same answers as the previous confederate had.

Results

Pre-Identification Questionnaire. The overall mean probability that the suspect was the culprit was 79.58%, with a standard deviation of 10.80. This is similar to the mean confidence reported in Experiment 1 (77.08%). Just over half of the participants (55.60%) reported that they would arrest the suspect based on the information obtained thus far. Reasons to not arrest the suspect included checking out the suspect’s alibi, finding other evidence such as stolen goods, and getting the eyewitness to identify the suspect. Participants’ mean confidence in their arrest decision was 7.54 ($SD = 1.15$). There was a significant difference in confidence between those who would not arrest the

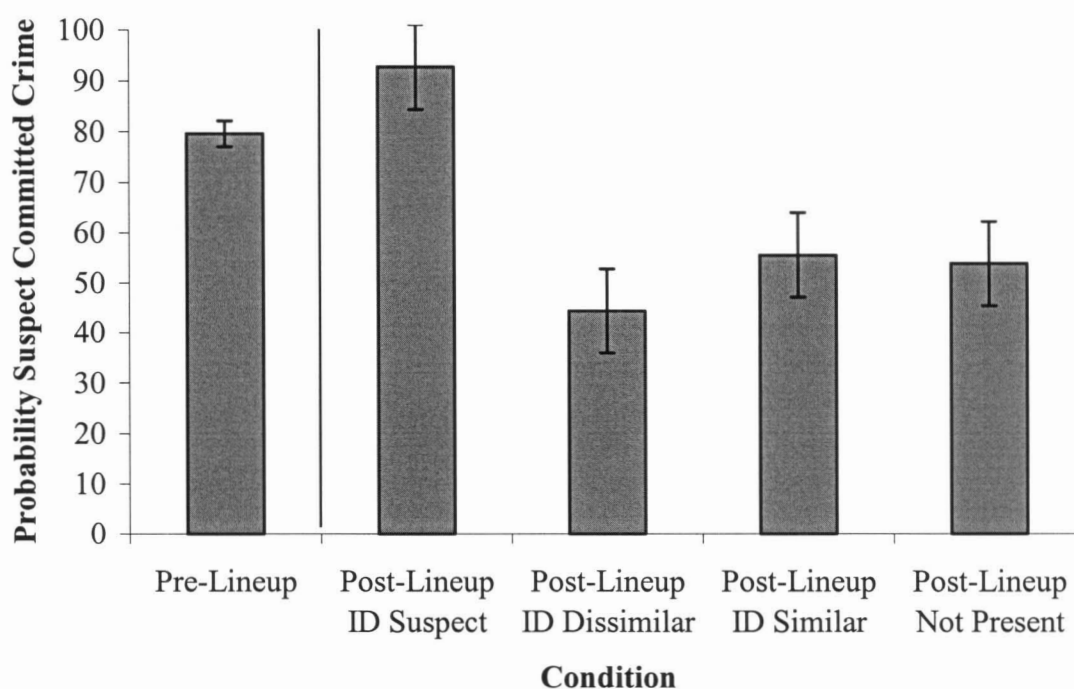
suspect ($M = 7.09$, $SD = 1.06$) and those who would arrest the suspect ($M = 7.90$, $SD = 1.10$), $F(1, 70) = 9.83$, $MSE = 1.18$, $p < .05$, $\eta^2 = .12$.

Ratings of Evidence. A repeated measures ANOVA indicated that participants rated the evidence categories differently, $F(3.37, 168.66) = 19.72$, $MSE = .30$, $p < .01$, $\eta^2 = .28$. Subsequent pairwise comparisons were completed using the Bonferroni correction and only the significant results are reported. Physical description ($M = 1.86$, $SD = .35$) was rated as significantly more important than prior criminal record ($M = 1.11$, $SD = .57$), alibi ($M = 1.24$, $SD = .54$), and other evidence ($M = 1.29$, $SD = .58$), all p 's $< .01$. Fingerprints ($M = 1.69$, $SD = .49$) were also rated as significantly more important than prior criminal record, alibi, and other evidence, all p 's $< .01$.

Post-Identification Probability Suspect Committed Crime. A 2 (Time: Pre-ID, Post-ID) x 4 (Condition: ID Suspect, ID Similar Foil, ID Dissimilar Foil, Not Present) repeated measures mixed model ANOVA was conducted to determine whether there were significant differences within the ID conditions on participants' pre-lineup vs. post-lineup estimate of probability that the suspect was the culprit. There was a significant interaction, $F(3, 68) = 27.27$, $MSE = 128.80$, $p < .01$, $\eta^2 = .55$. Paired samples t-tests adjusted using the Bonferroni correction demonstrated that the difference between pre- and post-lineup estimates of probability was significantly different within each group. For the ID Suspect group, the pre-lineup probability was significantly lower at 82.22% ($SD = 8.78$) than the post-lineup probability at 92.78% ($SD = 5.75$), $t(17) = 5.58$, $p < .01$, $\eta^2 = .65$. In the ID Dissimilar Foil group, the pre-lineup probability was significantly higher ($M = 78.89\%$, $SD = 10.79$) than the post-lineup probability ($M = 44.44\%$, $SD = 21.48$), $t(17) = 9.04$, $p < .01$, $\eta^2 = .83$. The same was true for the ID Similar Foil

condition, (pre-lineup: $M = 76.67\%$, $SD = 12.83$, post-lineup: $M = 55.56\%$, $SD = 21.21$), $t(17) = 5.34$, $p < .01$, $\eta^2 = .63$. The Not Present condition also had higher pre-lineup probability ratings ($M = 80.56\%$, $SD = 10.56$) than post-lineup ratings ($M = 53.89\%$, $SD = 18.20$), $t(17) = 5.50$, $p < .01$, $\eta^2 = .64$. (See Figure 4.)

Figure 4.



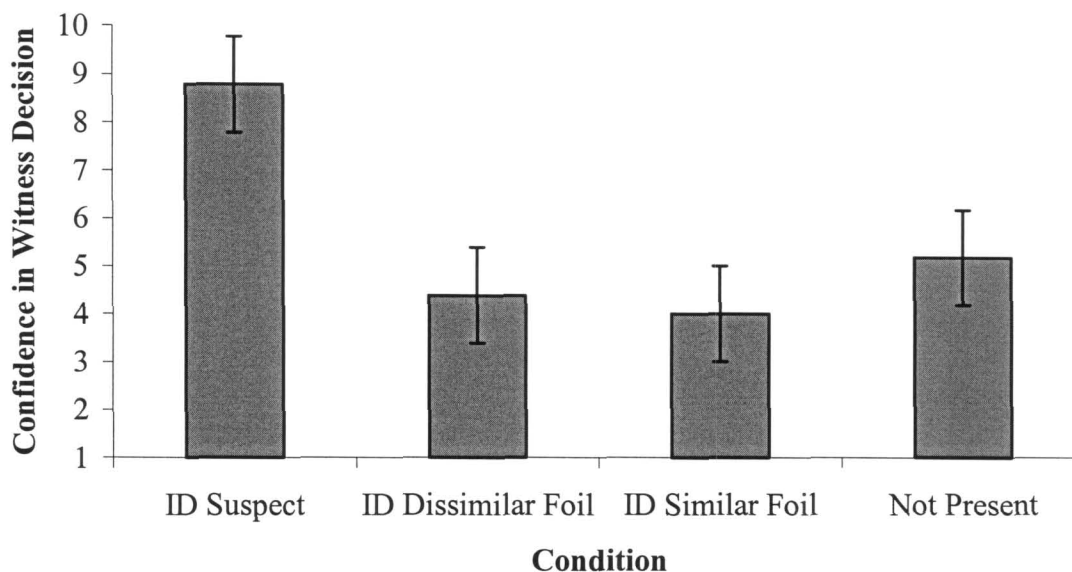
Error Bars = 95% confidence intervals of the marginal means.

There was a main effect of time, $F(1, 68) = 89.72$, $MSE = 128.80$, $p < .01$, $\eta^2 = .57$. No post hoc tests were conducted on this effect. There was also a main effect of condition on the rated probability that the suspect was the culprit, $F(3, 68) = 15.50$, $MSE = 307.39$, $p < .01$, $\eta^2 = .41$. Due to the fact that the eyewitness decision did not influence the pre-ID probabilities ($F < 1$) independent samples t-tests using the Bonferroni correction were conducted on only the post-ID probability ratings. The analyses revealed

that participants in the ID Suspect condition rated the probability that their suspect was the culprit significantly higher than participants in all the other conditions (all p 's < .01). Participants in the ID Dissimilar Foil, ID Similar Foil, and Not Present conditions did not differ significantly in their estimates that the suspect was the culprit (all p 's > .3).

Confidence in the Witness. There were significant differences between the identification conditions, $F(3, 68) = 21.32$, $MSE = 4.03$, $p < .01$, $\eta^2 = .49$ (See Figure 5). In the ID Suspect condition ($M = 8.78$, $SD = .81$) participants were more confident in the witness than in any other condition (all p 's < .01). Participants in the ID Dissimilar Foil ($M = 4.39$, $SD = 2.33$), ID Similar Foil ($M = 4.00$, $SD = 2.47$), and Not Present condition ($M = 5.17$, $SD = 1.98$) did not differ significantly in their confidence in the witness (all p 's > .5).

Figure 5.



Error Bars = 95% between subjects confidence intervals.

Arrest Decision. When participants were again asked whether they would arrest their suspect after the identification procedure a 2 (Time: Pre ID and Post ID) x 4 (Condition: ID Suspect, ID Similar Foil, ID Dissimilar Foil, Not Present) Chi Square analysis revealed that there were significant differences post-ID compared to pre-ID, $\chi^2(3, 67) = 10.24, p < .05$. The majority (83.33%) of participants in the ID Suspect condition reported that they would arrest the suspect. This was significantly higher than those in the ID Dissimilar Foil (16.77%), ID Similar Foil (33.33%), and Not Present conditions (16.77%), as determined by tests of significance difference between two independent proportions (all p 's $< .03$). The ID Dissimilar Foil, ID Similar Foil, and Not Present conditions did not differ significantly in their willingness to arrest their suspect (all p 's $> .6$).

A three-way ANOVA was conducted to examine whether arrest decision (Yes, No), rated probability that the suspect was the culprit (coded as High: 76%-100%, Medium: 50%-75%, and Low: 0%-49%), and ID condition (ID Suspect, ID Dissimilar Foil, ID Similar Foil, Not Present) would interact to affect confidence in the arrest decision. None of the interactions were significant (all p 's $> .34$). The main effect of arrest decision was not significant, $F(1, 55) = 1.90, MSE = 1.88, p > .17, \eta^2 = .03$. The main effect of ID condition was also not significant, $F < 1$. However, the main effect of probability judgment was significant, $F(2, 55) = 3.60, MSE = 1.88, p < .05, \eta^2 = .12$. Independent samples comparisons using the Bonferroni correction revealed that participants who rated the probable guilt of their suspect as high were significantly more confident in their arrest decision ($M = 8.79, SD = 1.38$) than participants who rated the probable guilt of their suspect as somewhat high ($M = 6.00, SD = 1.26$), and more

confident than participants who rated the probable guilt of their suspect as low ($M = 5.59$, $SD = 1.50$), all p 's $< .01$. Participants who rated the probable guilt of their suspect as somewhat high or low did not differ in confidence in their decision to arrest the suspect, $t(46) = 1$, $p > .32$.

Discussion

As in Experiment 1, Experiment 2 revealed that participant-investigators are greatly influenced by eyewitness decisions. When the witness identified the investigator's suspect probability ratings increased dramatically as the identification was considered confirmation of their choice of suspect. On the other hand, if the witness identified another lineup member or made no identification, probability ratings dropped significantly.

However, Experiment 2 did not replicate the finding that probability ratings were substantially lower in the ID Foil conditions than in the Not Present condition. There were no significant differences between any of the ID Foil and Not Present conditions. It is possible that the trend found in Experiment 1 was a Type I error, as the larger sample sizes in Experiment 2 provided ample power (observed power = 1) for examining the differences between conditions.

Given that the trend was in the right direction (probabilities were slightly higher in the ID Similar condition than in the ID Dissimilar condition), another possibility is that the lineup members were not sufficiently similar to or dissimilar from the target lineup member to lead to significant differences between the conditions. The same lineup used in Experiment 1 was used in Experiment 2, with the witness in the ID Similar condition choosing the lineup member who appeared most similar to the target lineup member.

However, all of the lineup members were quite similar to the target as they were all chosen to fit the general description. As such, future studies are planned that will manipulate the lineup to make it more heterogeneous to determine the effects of lineup member similarity on investigators' judgments of suspect's probable guilt.

In Experiment 2 there were differences in ratings of confidence in the witness. Participants in the ID Suspect condition were significantly more confident in the witness than in the other conditions. There were again no differences between the other three conditions, suggesting that investigators treated the responses in these three conditions as equally incorrect independent of what that response was. What is particularly interesting about these results is that even though the investigators reported low confidence in the witness decision, they nonetheless allowed those decisions to affect them greatly when rating the probability that the suspect they chose was the culprit. Therefore, even though they knew (in the ID Foil conditions) that the eyewitness was mistaken and reported that they were not very confident in the witnesses' decision, investigators still treated those decisions as strong evidence that their choice of suspect was incorrect.

When asked whether they would arrest their suspect after the lineup, participants in the ID Suspect condition were significantly more willing to arrest their suspect than participants in the other three conditions, which did not differ. As with the probability ratings, the expected trend was found (although not significant) that participants would be more willing to still arrest their suspect in the ID Similar condition. If the investigators were treating the ID Similar decision as a mistake but a mistake that somewhat confirms their choice of suspect (choosing someone who looks quite similar to the suspect) than it makes sense to continue to want to pursue that suspect. However, as the results were not

significant, further studies are needed to examine how lineup member similarity affects probability judgments and arrest decisions.

Experiment 3

When Experiment 1 was first constructed, the computer database was designed so that participants would likely choose one of the suspects with fairly high confidence and high probability ratings that the suspect was the culprit. This design was successful, with all of the participants choosing the suspect, and with an overall mean probability rating of 77.08%. However, in the real world, it is highly unlikely that a police investigator would always have sufficient evidence for there to be high prior odds that the suspect is the culprit. It is much more likely that the prior probabilities that the suspect is the culprit would range from quite small to fairly high, depending on the evidence and the crime.

Differing prior probabilities that the suspect is the culprit should lead to different effects of the eyewitness decision on the investigator. An eyewitness identification is of more informational value when the prior odds are low. If the prior odds are so high that the investigator is sure of the suspect's guilt, then an eyewitness identification is not going to add much information, only confirming the other evidence. On the other hand, if the prior odds are fairly low, an identification can provide a fair amount of information and evidence value to the investigator. The opposite is true if the eyewitness identifies an innocent foil. If the prior odds are fairly low (the investigator did not have much evidence against the suspect to begin with), the eyewitness identifying a foil does not provide that much information, it only serves to confirm that the evidence against the suspect is not very strong. If however, the prior odds are fairly high, the identification of a foil suggests that the filler member identified looks more like the culprit than the

suspect (Wells & Olson, 2002). In fact, Wells and Olson suggested that the identification of a filler lineup member is more likely to occur if the culprit is not in the lineup, therefore, the identification of an innocent foil serves to disconfirm the hypothesis that the suspect is the culprit.

To examine how eyewitness decisions would influence participant-investigators when the prior odds were manipulated, new databases needed to be constructed. To determine what levels of evidence are needed to obtain relatively high and low prior odds from participants, Experiment 3 was designed to manipulate the fingerprint evidence and/or information about the suspect's vehicle ownership. Thus, this experiment served as a pilot study of materials for Experiment 4.

Method

Participants. Sixty male and female University of Victoria undergraduate students participated in groups in return for optional extra credit in an introductory psychology course. Participants were randomly divided into 6 conditions, each representing a different version of the materials.

Materials. Participants in this experiment received the same list of suspects that was used in Experiments 1 and 2. However, these participants received the information in a paper booklet rather than on computer to allow for group testing. The booklet that each participant received contained all of the information that was contained in the computer database (e.g., each suspect's physical description, prior record, fingerprint information, etc.). It also included the same instructions that were used in Experiment 2 for trying to find a suspect. Participants received the same Pre-Identification questionnaire used in Experiment 2.

Given that the purpose of the study was to pilot test the pre-lineup materials a confederate no longer took part in the experiment. Instead, a written eyewitness description was given to each participant. The written description included all of the information for the interview questions given to participants in Experiments 1 and 2. As such, it contained a description of the crime, the culprit's physical appearance, the car used during the crime, etc.

Six different versions of the database were constructed with the objective that participants would continue to choose the same suspect as in Experiments 1 and 2 but that their level of confidence in that choice of suspect would differ. Version 1 was identical to that used in Experiments 1 and 2 to ensure that changing formats from computer to paper and pencil did not have a significant influence on estimates that the suspect was the culprit. Refer to Table 1 for a description of the versions.

Table 1.

Experiment 3 Manipulated Database Conditions

Condition	John Gibb's Fingerprints	William White's Fingerprints	John Gibb's Car	William White's Car
Version 1	70% match	40% match	White Volkswagen	Beige Volkswagen
Version 2	60% match	40% match	White Volkswagen	Beige Volkswagen
Version 3	60% match	50% match	White Volkswagen	Beige Volkswagen
Version 4	60% match	40% match	Yellow Volkswagen	Beige Volkswagen
Version 5	60% match	50% match	White Volkswagen	Yellow Volkswagen
Version 6	60% match	60% match	White Volkswagen	Yellow Volkswagen

Procedure. Participants arrived at a classroom in groups of ten to fifteen students.

On each desk in the classroom was one of the six versions of the experiment.

Participants were asked to sit down at a desk and were given the informed consent forms. After the consent forms had been signed, the participants were informed that they would be taking on the role of a police officer in the experiment. The instructions for trying to find a suspect were identical to those used in Experiment 2, except that all references to the witness interview were revised to refer to the written witness description. Participants were told that once they had made their decision they should notify the experimenter at which time they would be given the Pre-Identification questionnaire to complete. When participants were given the Pre-Identification questionnaire, their booklet containing the suspect database was removed.² Participants were told to turn over their questionnaires when they were done. Once all of the participants were finished, they were debriefed and dismissed.

Results

Participants in Version 1 (same as Experiments 1 and 2) reported a slightly lower mean probability that the suspect committed the crime than their counterparts did in Experiment 1 (72.00% vs. 77.08%, respectively). However, more participants in the current experiment said that they would arrest the suspect (60%) than those in Experiment 1 (46%). This may be due to the fact that participants in the first experiment knew that a lineup would be administered and so they did not want to arrest the suspect until after the lineup decision. Confidence in decision to arrest the suspect was similar in both experiments (7.40 vs. 7.17). All of the evidence factors were also rated similarly in both experiments. No statistical analyses were conducted between Experiments 1, 2, and

² This was done to remain consistent with Experiments 1 and 2 in which participants could not go back to look at suspect information on the computer while filling out the questionnaire.

the current experiment due to the methodological differences that prohibited comparisons across experiments.

The results of Experiment 3 did not clearly point to two experimental conditions that would lead to uniformly high or low prior odds with all participants continuing to choose the same suspect (John Gibbs). (Refer to Table 2 for means and standard deviations for each condition.) As such, only the two best conditions from Experiment 3 were analyzed.

Table 2.

Experiment 3 Database Manipulation Results

Condition	Suspect Chosen And # Who Chose	Estimated Probability	Arrest Decision % Reported Yes	Arrest Confidence
Version 1	John Gibbs (10)	72.00 (14.76)	60.00	7.40 (1.17)
Version 2	John Gibbs (9)	64.44 (11.30)	22.22	6.56 (1.33)
Version 3	Francis Beau (1)	60.00	0.00	4.00
	John Gibbs (4)	75.00 (17.32)	75.00	7.75 (1.89)
	William White (6)	63.33 (10.33)	16.67	5.17 (1.17)
Version 4	John Gibbs (3)	56.67 (25.17)	0.00	6.33 (1.53)
	William White (6)	65.00 (10.33)	16.67	6.17 (1.94)
	Francis Beau (1)	80.00	100	7.00
Version 5	John Gibbs (7)	77.14 (13.80)	28.57	7.14 (.90)
	William White (3)	56.67 (5.77)	0.00	6.00 (1.00)
Version 6	John Gibbs (10)	66.00 (16.47)	0.00	6.10 (2.42)

Note: Standard deviations in parenthesis ().

Versions 1 and 6 (where all the participants chose John Gibbs) were examined to determine whether there were any statistical differences between the conditions. These

conditions were not significantly different for the probability that the suspect committed the crime (Version 1: $M = 72.00\%$, $SD = 14.76$ and Version 6: $M = 66.00\%$, $SD = 16.47$), $t(18) = .86$, $p > .40$. A test of significance of the difference between two independent proportions could not be performed because the arrest decision data did not satisfy the binomial requirements. However, the trend suggested that participants in Version 1 (60%) were more likely to arrest the suspect than those in Version 6 (0%). The conditions were not significantly different for arrest confidence ($M = 7.40$, $SD = 1.17$ for Version 1 and $M = 6.10$, $SD = 2.42$ for Version 6), $t(18) = 1.53$, $p > .1$. There were significant differences between the groups for the ratings of fingerprint evidence and alibi. Participants in Version 1 ($M = 2.90$, $SD = .32$) were significantly more likely to say that fingerprints were important than participants in Version 6 ($M = 2.30$, $SD = .48$), $t(18) = 3.29$, $p < .01$. This is most likely due to the fact that the fingerprint information was fairly ambiguous in Version 6. The same pattern was found for alibi, participants in Version 1 ($M = 2.80$, $SD = .42$) were more likely to say that the alibi was important than participants in Version 6 ($M = 2.10$, $SD = .57$), $t(18) = 3.13$, $p < .01$.

Discussion

While the results of Experiment 3 were more difficult to interpret than expected, they still provided a good starting point for manipulating the prior odds. Versions 1 and 6 appeared to be the best bet for achieving varying degrees of pre-lineup probability ratings while still having all participants choose the same suspect. Although there were no significant differences between these groups this may be partly due to the small sample sizes used ($n = 10$).

Experiment 4

Due to the mixed results of Experiment 3, further pilot studies of the database were conducted with slight changes made to the fingerprint evidence and the physical descriptions of the two main suspects such that both suspects were now slightly outside the age and height range given by the eyewitness.³ This was done to ensure that none of the suspects were an exact match to the physical description. In addition, to make certain that results from the paper and pencil version did not differ significantly from a computer-based version, the pilot studies reverted back to the computer-based procedure. These pilot studies will not be discussed further in this paper.

Experiment 4 endeavored to amalgamate Experiments 1, 2, and 3 into one experiment. As such, the purpose was to examine how an eyewitness' lineup decision influences investigators when the prior odds were either initially low or high. In Experiments 1 and 2, the prior odds were fairly high; the mean probability estimate that the suspect was the culprit was 77.08%. In the real world, however, police may bring suspects in for identification or questioning based only on the weakest hunch that the person was involved with the crime. Thus, the possibility exists that the prior odds of a suspect's guilt could range from quite low when the initial evidence is weak to quite high when the initial evidence is strong. How do prior odds and eyewitness decisions interact to influence investigators' post-lineup probability judgments?

According to Bayes theorem (Wells & Olson, 2002), the identification of an innocent foil should have a greater effect when the prior odds are high than when they are low. Similarly, when the witness identifies the suspect, probability judgments should be more affected when the prior odds were low than when they were high. In the current

³ The eyewitness described the culprit as being in his mid-twenties and between 5'9" and 6'1" tall. The suspect information was changed so that one suspect was 20 years old and 5'8" and the other was 30 years old and 6'2".

experiments, the prior odds are determined by the strength of material evidence such as fingerprints. For example, when the prior odds are high the fingerprint evidence is quite strong. If the eyewitness identifies the suspect that decision does not add a lot of information above and beyond the other evidence. If the eyewitness identifies a foil, the information is of value as it discredits the investigator's hypothesis, but it also goes against strong material evidence. Thus, there is some ambiguity as to whether the investigator's hypothesis is incorrect or whether the eyewitness made a correct identification. How do changes in prior odds influence investigators' assessments of the witness? This experiment examined this question.

Method

Participants. Sixty male and female University of Victoria undergraduate students participated individually in return for optional extra credit in an introductory psychology course. Participants were randomly assigned to one of the two databases and to one of the eyewitness identification conditions.

Materials and Procedure. The procedure used in this experiment was identical to that used in Experiment 2. The same materials and instructions were used as in Experiments 1 and 2 except for the following changes. To manipulate participants' pre-lineup probability judgments (judgments of prior odds), two versions of the database were used (see Table 3 for a comparison of the databases). A second lineup was also added to the computer database. When participants chose their suspect and saw their suspect's photo they were then taken to a page containing the lineup. This lineup labeled the lineup members as being either the participant's suspect (lineup member 3) or in jail (all other lineup members). This was done to ensure that participants understood that

their suspect was the only lineup member who could have possibly committed the crime. Once they had viewed this page and were given the lineup instructions, the experimenter displayed an identical photo lineup that had no labels for use during the lineup administration.

Finally, changes were made to the questionnaires to make the questions more clear (see Appendix E). The wording of the probability question on the Pre-Identification questionnaire was revised and a rating scale was no longer used. This allowed participants more flexibility in their responses. Participants were asked to make their decision using a scale from 1% to 100%. Note that 1% was the smallest rating participants could give as the fact that they chose a suspect necessitated that they must have believed that there was some chance that their suspect committed the crime. This wording of the question also served to reinforce the notion that the culprit may not have been in the computer database. The rating of evidence question was also changed to allow for a clearer dissemination of the results. The question was revised so that participants were no longer rating the importance of each piece of evidence individually, instead, participants were asked to rate the evidence comparatively.

The same changes were made on the Post-Identification questionnaire except that the probability of suspect's culpability question was changed to reflect a 0% chance that the suspect was the culprit. The rating of evidence question was also changed to include the eyewitness decision as a source of evidence to be comparatively rated against the other evidence categories (hence, participants were asked to assign importance ratings to six categories instead of five). This allowed a better examination of how participant-investigators felt the eyewitness decision was influencing their own decisions.

Due to the fact that this experiment focused on the effects of manipulating prior odds, only two eyewitness decisions were used: ID Suspect and ID Foil. The decision was made to limit the eyewitness decision to these two choices because Experiment 2 found no significant differences between the ID Foil and Not Present conditions and in the real world, lineup administrators frequently do not inform witnesses that they do not have to make an identification.

Table 3.

Final Database Conditions Used in Experiment 4.

Condition	John Gibb's Fingerprints	William White's Fingerprints	John Gibb's Car	William White's Car
High Confidence	87% match	53% match	White Volkswagen Rabbit	Beige Volkswagen Rabbit
High Confidence	53% match	51% match	White Volkswagen Rabbit	Yellow Volkswagen Rabbit

Note: The suspect was John Gibbs; William White was the next most plausible suspect.

Results

Pre-Identification. Once participants had chosen their suspect they were asked to rate the probability that the suspect they chose committed the crime. There were significant differences between the high prior odds (HPO) and low prior odds (LPO) conditions. The HPO condition had a significantly higher mean of 82.03% ($SD = 10.30$) than the LPO condition ($M = 63.00\%$, $SD = 17.60$), $F(1, 58) = 26.14$, $MSE = 207.91$, $p < .01$, $\eta^2 = .31$. The two conditions also differed significantly in their willingness to arrest the suspect based on the evidence obtained thus far. A test of the significance of the difference between two independent proportions revealed that participants in the HPO

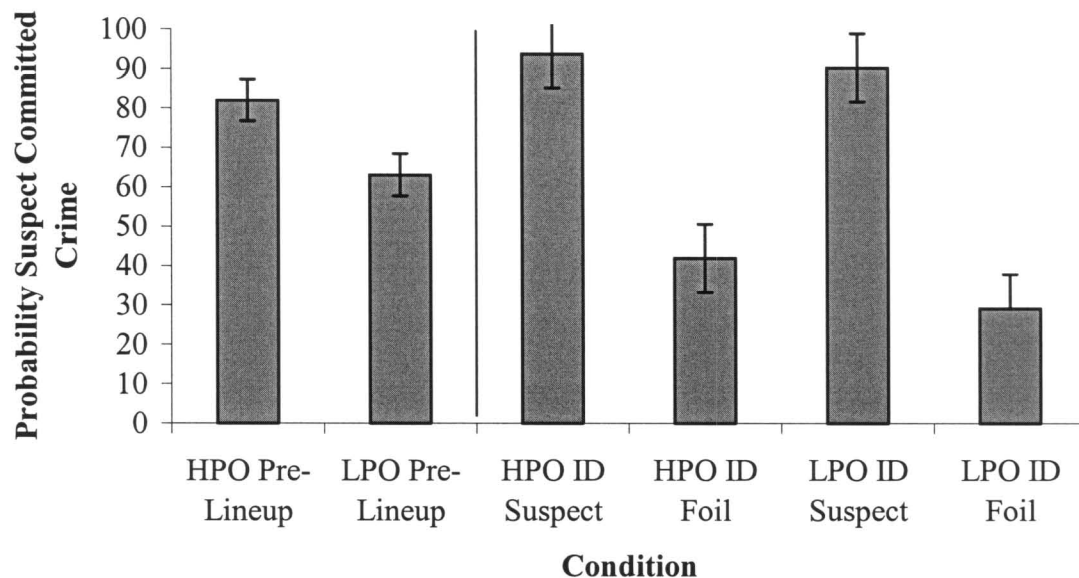
condition (70%), were significantly more willing to arrest the suspect than those in the LPO condition (40%), $z = 2.34, p < .05$. Hence, the manipulation of investigator's pre-lineup confidence was successful.

A two-way analysis of variance (ANOVA) was conducted to determine whether prior odds (High, Low) interacted with the arrest decision (Arrest, Do not Arrest) to influence investigator's confidence in their arrest decision. The interaction was not significant, $F(1, 56) = 2.25, MSE = 2.12, p > .05, \eta^2 = .04$. There was however, a significant main effect of arrest decision, those who chose to arrest the suspect had a higher mean confidence in that decision ($M = 7.48, SD = 1.25$) than those who chose not to arrest the suspect ($M = 6.44, SD = 1.72$), $F(1, 56) = 5.47, MSE = 2.12, p < .05, \eta^2 = .09$. There was no significant main effect of investigator confidence, $F(1, 56) = 1.16, MSE = 2.12, p > .05, \eta^2 = .02$.

A series of one-way ANOVAs were conducted to examine whether the High and Low prior odds conditions would lead to differences in ratings of physical evidence. Participants were asked to rate the various evidence factors according to their relative importance by assigning a percentage to each category. Only the significant results are reported here. The prior odds conditions differed in how they rated prior criminal record, with the LPO group rating it as more important ($M = 16.85, SD = 10.79$) than the HPO group ($M = 11.57, SD = 6.17$), $F(1, 58) = 5.42, MSE = 77.29, p < .05, \eta^2 = .09$. The HPO group rated fingerprints ($M = 32.33, SD = 19.24$) as more important than the LPO group ($M = 20.23, SD = 10.10$), $F(1, 58) = 9.30, MSE = 236.10, p < .01, \eta^2 = .14$. This was to be expected as the probabilities that the fingerprints matched were manipulated in these conditions to influence the investigators' confidence.

Post-Identification Probability Suspect Committed Crime. A 2 (Time: Pre-ID, Post-ID) x 2 (Prior odds: High, Low) x 2 (Condition: ID Suspect, ID Foil) mixed model repeated measure was conducted to examine the probability that the suspect was the culprit. There was not a significant 3-way interaction, $F < 1$. There was a significant 2-way interaction between time and condition, $F(1, 56) = 147.65$, $MSE = 149.22$, $p < .01$, $\eta^2 = .73$. Subsequent pairwise t-tests using the Bonferroni correction revealed that regardless of the prior odds conditions, within the ID Suspect condition, the post-ID probability that the suspect was the culprit ($M = 92.10\%$, $SD = 8.17$) was significantly higher than the pre-ID probability ($M = 73.63\%$, $SD = 16.15$), $t(29) = 8.60$, $p < .001$, $\eta^2 = .72$. In the ID Foil condition on the other hand, the post-ID probability that the suspect was the culprit ($M = 35.67\%$, $SD = 22.73$) was significantly lower than the pre-ID probability ($M = 71.40\%$, $SD = 18.44$), $t(29) = 8.71$, $p < .001$, $\eta^2 = .72$.

Figure 6.



Error Bars = 95% confidence intervals of the marginal means.

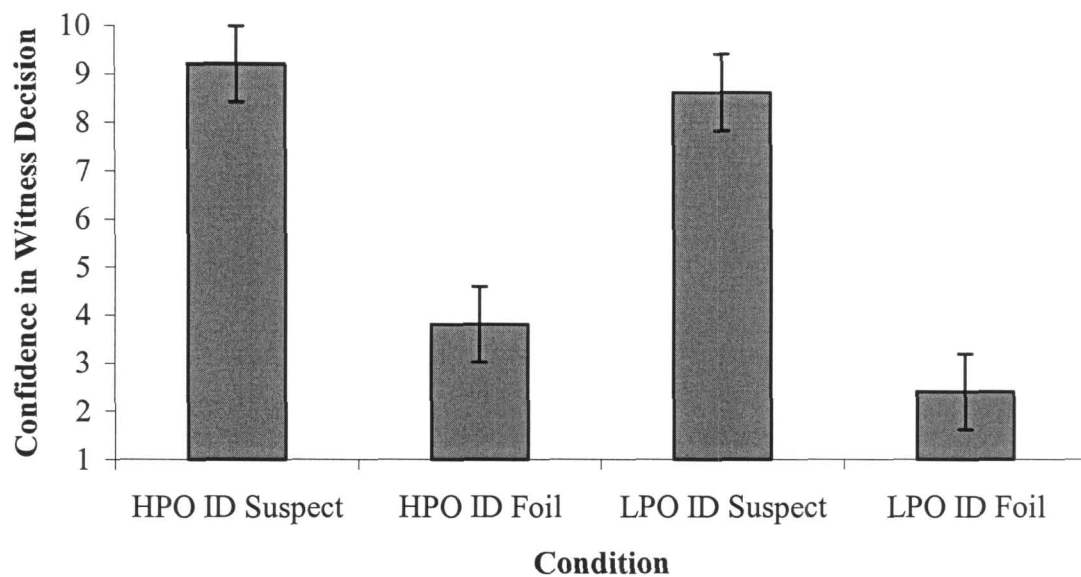
There was also a significant 2-way interaction between time and prior odds, $F(1, 56) = 6.08$, $MSE = 149.22$, $p < .05$, $\eta^2 = .10$. However, because this was not a main focus of analyses, no further post hoc tests were conducted. The interaction between prior odds and condition was not significant, $F < 1$. The main effects of time, $F(1, 56) = 14.98$, $MSE = 149.22$, $p < .01$, $\eta^2 = .21$, prior odds, $F(1, 56) = 16.01$, $MSE = 343.11$, $p < .01$, $\eta^2 = .22$, and condition, $F(1, 56) = 75.23$, $MSE = 343.11$, $p < .01$, $\eta^2 = .57$, were all significant. The main effect of condition is only of interest when examining the post-ID probability that the suspect committed the crime; therefore, post hoc tests were only conducted for that variable. An independent samples t-test revealed that probability ratings were higher in the ID conditions ($M = 92.10\%$, $SD = 8.17$) than in the ID Foil conditions ($M = 35.67\%$, $SD = 22.73$), $t(58) = 12.80$, $p < .001$, Cohen's $d = 3.30$.

Confidence in Witness. A two-way ANOVA was also conducted to examine the interaction of prior odds (High, Low) and identification condition (ID Suspect, ID Foil) on investigator's confidence in the witness. There was no significant interaction, $F < 1$. There were, however, significant main effects of prior odds and identification condition (Refer to Figure 7). Participants in the HPO conditions were more confident in the witness ($M = 6.50$, $SD = 3.38$) regardless of the ID decision, than those in the LPO conditions ($M = 5.50$, $SD = 3.52$), $F(1, 56) = 4.57$, $MSE = 3.29$, $p < .05$, $\eta^2 = .08$. Participants in the ID Suspect conditions ($M = 8.90$, $SD = 1.00$) were also more confident in the witness than those in the ID Foil conditions ($M = 3.10$, $SD = 2.44$), $F(1, 56) = 153.57$, $MSE = 3.29$, $p < .05$, $\eta^2 = .73$.

Decision to Arrest. A 2 (Time: Pre-ID, Post-ID) x 2 (Prior Odds: High, Low) x 2 (Eyewitness Decision: ID Suspect, ID Foil) Chi-Square analysis was precluded due to

small cell sample sizes. As such, Fisher exact probability analyses were conducted instead. A 2 (Time: Pre-ID, Post-ID) x 2 (Prior Odds: High, Low) analysis was not significant, $p > .05$. Neither was a 2 (Prior Odds: High, Low) x 2 (Eyewitness Decision: High, Low) analysis, $p > .05$. A 2 (Time: Pre-ID, Post-ID) x 2 (Eyewitness Decision: High, Low) analysis was significant, $p < .05$. A test of the significance of the difference between two independent proportions revealed that the proportion of those in the ID Suspect condition willing to arrest the suspect was higher than the proportion of those willing to arrest the suspect in the ID Foil condition, $z = 3.66$, $p < .01$.

Figure 7.



Error Bars = 95% between subjects confidence intervals.

A four-way ANOVA that examined the effect of prior odds (High, Low), arrest decision (Arrest, Not Arrest), rated probability that the suspect was the culprit (coded as Low: 0%-50%, Medium: 51%-75%, and High: 76%-100%), and identification condition

(ID Suspect, ID Foil) on investigators' confidence in the arrest decision could not be conducted due to unstable sample sizes across the conditions. Due to the fact that in analyses prior odds appeared to not have any effect on confidence in arrest decision, a three-way ANOVA was conducted that examined the remaining variables. There were no significant interactions, all p 's $> .08$. The only significant main effect was of judgments of probability that the suspect was the culprit, $F(2, 51) = 5.96$, $MSE = 3.11$, $p < .05$, $\eta^2 = .19$. Participants who rated the probable guilt of their suspect as high ($M = 8.70$, $SD = 1.10$) were significantly more confident in the arrest decision than participants who rated the probable guilt as somewhat high ($M = 5.38$, $SD = 2.18$) or low ($M = 5.59$, $SD = 2.40$), all p 's $< .05$. There was no significant difference in arrest confidence between those who rated the probable guilt of their suspect as somewhat high or low, $t(28) = .239$, $p > .81$.

Evidence Ratings. Participants were asked before rating the evidence categories whether they still considered their suspect to be a possible culprit. Everyone in the ID Suspect condition reported that they did still consider their suspect to be the possible culprit. Three participants in the HPO ID Foil condition and two participants in the LPO ID Foil condition reported that they no longer considered their suspect to be the possible culprit. There were no significant differences on ratings of evidence between those who said that they still considered their suspect to be the culprit and those who said they did not consider their suspect to be the culprit ($F < 1$). As such, no further analyses regarding this question were conducted.

A number of two-way ANOVAs were conducted to probe the effects of prior odds and identification decision on the relative ratings of the evidence factors post-

identification. There were no significant interactions; only the significant main effects are reported here (See Figure 8). There was a main effect of prior odds on ratings of prior criminal record, $F(1, 56) = 4.25$, $MSE = 78.60$, $p < .05$, $\eta^2 = .07$. Participants in the HPO condition ($M = 9.07$, $SD = 5.66$) had significantly lower ratings of prior criminal record than participants in the LPO condition ($M = 13.78$, $SD = 11.09$).

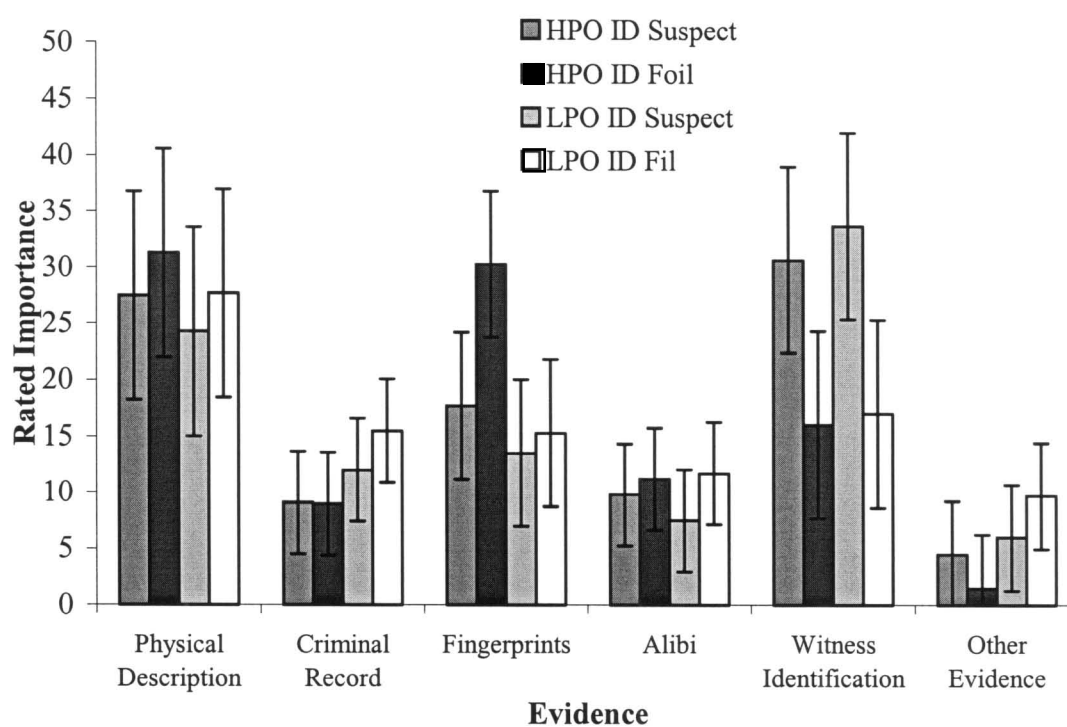
There was also a significant main effect of prior odds on ratings of fingerprint evidence, $F(1, 56) = 8.72$, $MSE = 158.46$, $p < .05$, $\eta^2 = .14$. Participants in the HPO condition ($M = 24.00$, $SD = 16.73$) rated fingerprints as more important than participants in the LPO condition ($M = 14.40$, $SD = 8.27$). Furthermore, within the HPO condition, participants in the ID Foil condition ($M = 30.33$, $SD = 20.66$) rated the fingerprints significantly higher than participants in the ID Suspect condition ($M = 17.67$, $SD = 8.21$), $t(28) = 2.21$, $p < .05$.

Finally, there was a main effect of prior odds on ratings of other evidence. Participants in the LPO condition ($M = 7.87$, $SD = 11.65$) rated other evidence as more important than participants in the HPO condition ($M = 3.02$, $SD = 5.58$), $F(1, 56) = 4.24$, $MSE = 83.32$, $p < .05$, $\eta^2 = .07$. In all conditions, the two most common descriptions of other evidence were the car owned by the suspect ($M = 46.20$) and the neighborhood the suspect lived in ($M = 10.80$).

There was a significant main effect of identification condition on fingerprint ratings, $F(1, 56) = 5.00$, $MSE = 158.46$, $p < .05$, $\eta^2 = .08$. Participants in the condition where the witness identified the suspect ($M = 15.57$, $SD = 8.53$) rated fingerprints as less important than participants in the condition where the witness identified another lineup member ($M = 22.83$, $SD = 17.20$).

There was also a significant main effect of identification condition on ratings of the importance of the witness information, $F(1, 56) = 14.28$, $MSE = 258.96$, $p < .05$, $\eta^2 = .20$. Participants in the ID Suspect condition ($M = 33.67$, $SD = 16.24$) rated the witness information as significantly more important than participants in the ID Foil condition ($M = 17.97$, $SD = 15.80$).

Figure 8.



Error Bars = 95% confidence intervals of the marginal means.

Discussion

The database manipulations were successful, as participants in the condition that was particularly incriminating toward the suspect did report higher pre-lineup probability estimates of the suspect's guilt than participants in the condition where the evidence was less clear. The manipulations also affected participants' willingness to arrest the suspect.

Participants in the HPO condition were much more likely to want to arrest the suspect pre-lineup than participants in the LPO condition. The major manipulation of the database involved the fingerprint evidence and this was reflected in participants' ratings of the fingerprint evidence with those in the HPO condition rating the convincing fingerprint evidence as more important than those in the LPO condition, where the fingerprint evidence was more ambiguous.

Even though the manipulations were sufficient to ensure significant differences between the two conditions on the probability ratings and arrest decision, probability ratings given by those in the LPO condition were not as low as anticipated. Earlier pilot studies of the materials revealed that more extreme changes to the database did not result in lower probability ratings but rather resulted in participants choosing other suspects from the database. Thus, in studies with undergraduate participants, it appears that the prior odds must be somewhat high (63%) to convince participants to choose a suspect and to pursue investigating that suspect by implementing a photo lineup. Nonetheless, the LPO condition did result in probability ratings 25% lower than the HPO condition.

Focusing on the HPO condition, high ratings of pre-lineup probabilities did not prevent the witness from having a significant impact in both the ID Suspect and ID Foil conditions. Post-lineup probability ratings were significantly higher in the ID Suspect condition and significantly and dramatically lower in the ID Foil condition than pre-lineup. Thus, in the ID Foil condition, participant-investigators took the eyewitness misidentification as evidence that their choice of suspect was incorrect even though the pre-lineup evidence was quite strong.

The same trend was found in the LPO condition. Post-lineup probability ratings

were significantly higher in the ID Suspect and significantly lower in the ID Foil conditions than pre-lineup. In the ID Suspect condition, the witnesses' decision led to almost ceiling values of probability ratings. Thus, even though the material evidence was quite weak, the subjective eyewitness decision led participant-investigators to be quite confident that their suspect was the culprit. The eyewitnesses' response in the ID Foil condition also significantly affected the post-lineup probability ratings. However, participants in this condition still believed that there was some chance that their chosen suspect had committed the crime even though the eyewitness did not identify the suspect and the pre-lineup evidence was weak.

Most importantly, comparing the HPO and LPO conditions post-lineup, prior odds did not have a significant affect. Post-lineup probability ratings were similar in both the HPO and LPO conditions. Thus, the particularly strong or weak material evidence did not lead to differing consequences of the witnesses' decision. In the ID Suspect condition, post-lineup probability ratings were near ceiling in both the HPO and LPO conditions. In the ID Foil condition, post-lineup probability ratings were half the size of those reported pre-lineup in both the HPO and LPO condition. Therefore, participants in the high prior odds condition did not treat the identification of a foil as more informative than those in the low prior odds condition. Hence, regardless of the prior odds, participant-investigators in both conditions were similarly influenced by the eyewitnesses' decision.

When examining the post-lineup confidence in the witness, the results were similar to those in previous studies. When the witness identified the participants' suspect their confidence in the witness was equally high whether they were in the HPO condition

or the LPO condition. Likewise, when the witness identified an innocent lineup member, confidence ratings were equally low, regardless of the pre-lineup strength of evidence. Once again, in the HPO ID Foil condition, despite the fact that the pre-lineup evidence was strong and participants were reporting low confidence in the witness, the eyewitnesses' decision continued to significantly influence the investigators' confidence in their own choice of suspect.

Willingness to arrest the suspect post-lineup was only influenced by the eyewitnesses' decision. Participants in both the HPO and LPO conditions reported that they would most likely arrest the suspect when the eyewitness identified their suspect. On the other hand, participants in the ID Foil condition were much less likely to arrest the suspect.

Experiment 5

The studies presented to this point demonstrated that the eyewitness decision had a large impact on participant-investigators. But was that impact really more than it should have been? Perhaps investigators were responding rationally to the information presented to them. One way to examine whether investigators placed too much influence on the eyewitness is to compare the amount of information gain that investigators placed on eyewitness evidence to the amount of actual information gain provided by the witnesses. Information gain is a measure, based on Bayes theorem, of the difference in the probability that a hypothesis is correct before versus after a new piece of evidence is gained. The information gain equation takes into account both the diagnosticity of various pieces of evidence and the prior odds that the hypothesis is correct. Wells and Olson (2002) developed this measure as a means of assessing the informativeness of

various kinds of eyewitness identification judgments (e.g., how much information is gained by a positive identification of the suspect).

In the experiments presented here, the investigators used eyewitness identification decisions to estimate the probability that the suspect had committed the crime. Therefore, investigators' estimated information gain (the difference between the probability estimates that the suspect is the culprit pre-lineup and the probability estimates that the suspect is the culprit post-lineup) can be compared to the actual information gain of participant-witness decisions. Experiment 5 was designed to examine the performance of actual participant-witnesses on the materials that we used in the preceding experiments and to examine the amount of information gain available from these decisions.

Method

Participants. Fifty male and female University of Victoria undergraduate students participated individually in return for optional extra credit in an introductory psychology course.

Materials. The video used in this study was the one that the confederate eyewitness described in the first set of experiments.

A target-present and target-absent lineup was used in this study. The target-present lineup contained the culprit who was caught by the police officer at the end of the video. The target-absent lineup was identical but included an additional foil lineup member in the space the culprit's photo occupied in the target-present lineup.

The interview questions suggested to the investigators in experiments 1, 2, and 4 were given to the participant-witnesses in the form of a written questionnaire.

Participants were also given a brief questionnaire following the lineup procedure asking the witness how confident he/she was in his/her decision.

Procedure. Participants were told that they would be watching a short video and that afterward they would be asked about their impressions of the video. After they watched the video, the experimenter informed the participants that they were taking part in an eyewitness experiment and that they would be taking on the role of an eyewitness. Participants were told that they would be asked to identify the person who was arrested at the end of the video. The experimenter apologized for not being able to tell the participant from the beginning that he/she was taking part in an eyewitness study, and informed the participant that this was done to replicate real world eyewitness experiences where witnesses would not be warned that a crime was about to happen.

Following this debriefing, the experimenter administered the interview questionnaire to the participant. Participants were told to answer the questions in as much detail as possible and to imagine that the questions were coming from a police officer pursuing the culprit, hence, it was very important that they answered all of the questions as accurately and thoroughly as possible. Participants were told to take as long as they needed to complete the questionnaire.

To replicate the timing of the investigator study, participants were asked to complete a filler task that took approximately fifteen minutes. This was the amount of time that it would typically take the participant-investigator to go through the computer database and choose a suspect. The filler task was completed on computer and served as a pilot test of word puzzle materials to be used in another experiment in the laboratory. The materials were examined before use to ensure that none of the puzzles were overtly

related to eyewitness experiences or crime in general.

Following completion of the filler task, the participant-witnesses were informed that they would be shown a photo-lineup on the computer and that they would be asked to try to make an identification of the culprit who was arrested at the end of the video. Participants were informed that they could either choose a lineup member or say “Not Present”. The participant was then shown either the target-present or target-absent lineup and was told to respond when ready. Following the lineup decision, the participant was asked to answer a question assessing his/her confidence in his/her lineup decision. Participants were asked to write down a number between 1% (almost no chance that their answer was correct) and 100% (complete certainty that their answer was correct) that indicated the probability that they thought their answer was correct. Participants were then fully debriefed and dismissed.

Results

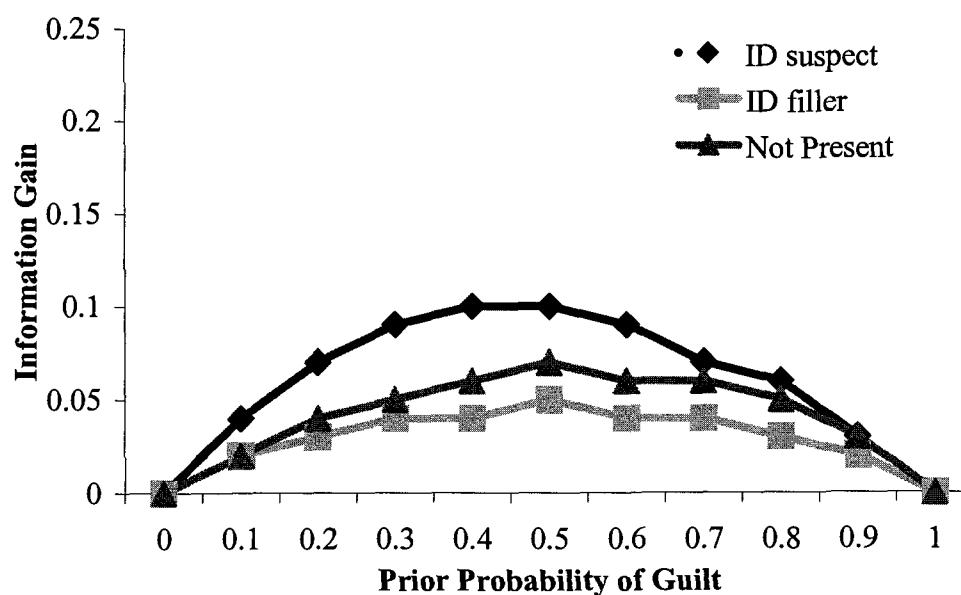
Lineup Accuracy. A univariate ANOVA was conducted to determine if one of the lineups was more difficult than the other. The ANOVA was significant, $F(1, 48) = 10.81$, $MSE = .19$, $p < .01$, $\eta^2 = .18$. Participant-witnesses were more accurate on the target-absent lineup ($M = .52$, $SD = .51$) than on the target-present lineup ($M = .12$, $SD = .33$). Subsequent t-tests were performed to examine performance within each lineup condition. Within the target-absent lineup condition, there was no significant difference in the proportion of participants who correctly rejected the lineup ($M = .52$, $SD = .51$) and those who made an incorrect ID ($M = .48$, $SD = .51$), $t(24) = .20$, $p > .05$. Within the target-present condition, significantly more people incorrectly rejected the lineup ($M = .40$, $SD = .50$) than made a correct decision ($M = .12$, $SD = .33$), $t(24) = 2.06$, $p = .05$.

Significantly more people also made an incorrect identification ($M = .48$, $SD = .51$), than made a correct identification, $t(24) = 2.57$, $p < .05$. There were no significant differences in the proportion of participants who made an incorrect identification or incorrectly rejected the lineup, $t(24) = .42$, $p > .05$.

Confidence-Accuracy relationship. Participants were asked to rate the probability that their identification decision was correct. A two-way ANOVA was conducted to examine the influence of lineup (target-present, target-absent) and decision accuracy (correct decision, incorrect decision) on confidence in that decision. There was not a significant interaction, $F(1, 46) = 1.39$, $MSE = 388.07$, $p > .05$, $\eta^2 = .03$. There were also no significant main effects of either lineup or decision accuracy, F 's < 1 . Therefore, participants' confidence was not a good indicator of their accuracy.

Information Gain.

Figure 9.



Using the equations and procedures described in Wells and Olson (2002), information gain curves were computed for each of the three eyewitness identification behaviours examined in Experiment 5. The information gain of each eyewitness decision is computed for each possible level of pre-lineup probability that the suspect is the culprit, hence, the curves range from 0.00 to 1.00. (An example of the equation used to determine the curves is presented in Appendix F.) The information gain curves are represented in Figure 9. Due to the fact that the participant-witnesses in Experiment 5 performed quite poorly, the information gain of any of the eyewitness decisions is quite negligible.

Discussion

Using the materials from the participant-investigator studies with participant-witnesses we were able to examine the performance of participant-witnesses on both the investigator interview and the lineup identification task. Participants were asked to complete a questionnaire that required them to give details from the video in response to the questions asked in the interview. In general, participants were able to respond to all of the interview questions and their responses were extremely similar to those given by the confederate in the previous experiments.² However, even though participants were able to respond correctly to the interview questions (suggesting that they were paying attention to the video), their performance on the lineup identification task was quite poor. This poor performance was not entirely unexpected as the video was somewhat grainy and the lineup was quite difficult (the lineup members were quite similar looking). But this is no more difficult than many real world situations where witnessing conditions may

² Due to the fact that the interview questionnaire served as a check that participants were paying attention to the video and could answer the interview questions and was not the main focus of this study, statistical analyses were not carried out.

be quite poor and lineups may be quite difficult due to the similarity of the lineup members, the delay between witnessing the event and viewing the lineup, etc. What is important is that only three out of twenty-five of our participant-witnesses were able to correctly identify the thief in the target present condition. Those who were able to identify the thief were no more confident in their decisions than participants who did not identify the culprit. In fact, as with previous eyewitness identification studies, there was no evidence of a significant confidence-accuracy correlation.

Therefore, given the results of the previous participant-investigator studies, it appears that if we were to use participant-witnesses with our participant-investigators, our investigators would be powerfully swayed by evidence that was most likely incorrect. If Experiment 2 is used as an example of investigators' behaviour, the mean pre-lineup estimate of suspect's guilt is 79.58%, and the mean post-lineup estimates in each of the three conditions are 92.78% in the ID conditions, 55.56% in the ID Similar Foil condition,³ and 53.89% in the Not Present condition. Thus, the amount of information gain the investigators attributed to the eyewitness decision in each of the three conditions was 13.20% in the ID Suspect condition, 24.02% in the ID Similar Foil condition, and 25.69% in the Not Present condition. Compare this to the amount of actual information gain of the eyewitness decisions at a pre-lineup estimate of 80.00% determined in Experiment 5: ID Suspect = 0.06%, ID Similar Foil = 0.03%, and Not Present = 0.05%. It is obvious that participant-investigators grossly overestimated the informational value of the eyewitness decision.

General Discussion

³ Comparisons were made to the ID Similar foil condition because none of the participant-witnesses chose the lineup member used in the ID Dissimilar foil condition; rather, the majority of the participants chose the lineup member used in the ID Similar foil condition.

Estimating Suspect's Guilt

Three experiments examining the influence of eyewitness decisions on participant-investigators revealed that investigators were heavily influenced by eyewitness decisions, regardless of what that decision was. When the eyewitness decision corroborated the investigator's choice of suspect, the investigator's probability estimate that the suspect was the culprit increased dramatically to near ceiling levels. This was the case both when the pre-lineup evidence was strong and when it was weak.

This is similar to the findings of Moore and Gump (1995). Moore and Gump examined the influence of evidence strength and eyewitness confidence on participant-jurors. In two studies, participant-jurors were given a witnesses' description of a crime and information from the prosecutor regarding the culprit's weapon. This information varied in the strength of incriminating evidence against the defendant. Given that these were juror studies, the eyewitness always identified the defendant, but did so with a range of confidence (low, medium, or high). When the eyewitness was quite confident (as in the studies reported here), the participant-jurors' estimates of the probability of the defendant's guilt were high, even when the other evidence (given by the prosecutor) was weak. However, the authors did not examine whether there were statistical differences within the eyewitness confidence conditions (e.g., within the high confidence condition across the evidence strength conditions). As such, we do not know whether guilt estimates in the low strength condition were statistically equivalent to those in the high strength condition as reported here in Experiment 4. Nevertheless, even with the methodological differences between the current studies and the Moore and Gump studies, positive eyewitness identifications led to extremely high estimates of probable guilt

despite the strength of the other evidence.

Experiments 1 and 2 also examined the effect of a witness who rejected the lineup by reporting that the culprit was not present. In this condition, estimates of the suspect's guilt dropped significantly to the point where participant-investigators rated that there was only a fifty percent chance that their suspect had committed the crime. Although pre-lineup evidence was strong in these two experiments, the eyewitness not only failed to identify the suspect but also actually reported that the culprit was not present. For participant-investigators this could be taken as a sign that their suspect was not the culprit. However, the estimates that the suspect committed the crime did not drop to floor levels, so the investigators must have kept the pre-lineup evidence in mind when rating that there was still a possibility that their suspect committed the crime.

In Experiment 1, in the ID Foil condition, the eyewitness identified another lineup member who the investigator knew was innocent. In this condition, estimates of the suspect's guilt dropped dramatically with investigators rating that there was only a slim chance that their suspect had committed the crime. Thus, even though the pre-lineup evidence was strong and the eyewitness identified an innocent foil, participants still took this as evidence that they were mistaken in their choice of suspect. When asked during debriefing why their probability estimates dropped in that condition, participants reported that the real culprit must look more like the lineup member chosen by the eyewitness than like the suspect they chose.

Experiment 2 was conducted to further examine this phenomenon. The ID Foil condition was split into two conditions where the eyewitness either identified a foil that was fairly similar to the investigator's suspect or was fairly dissimilar to the

investigator's suspect (the foil identified in Experiment 1). I predicted that participants would be less influenced when the eyewitness chose a similar-looking foil as investigators' could rationalize that the eyewitness had just made a mistake. As such, because the witness chose someone who looked similar to their suspect, investigators would rationalize that it was likely that their suspect still had a probable chance of being the culprit. Whereas, going by the self-reported logic of investigators in Experiment 1, participants in the ID Dissimilar Foil condition would take the eyewitnesses' decision as evidence that they had chosen the wrong suspect and would no longer believe that their suspect was the likely culprit. Although the results showed a trend for investigators to give higher probability estimates in the ID Similar condition than in the ID Dissimilar condition, the findings were not significant. In both conditions the investigators rated that there was about a fifty percent probability that their suspect was the culprit. Thus, although probability estimates in these conditions did drop significantly from pre-lineup estimates, we did not replicate the extreme drop found in the ID Foil condition in Experiment 1. Nevertheless, Experiment 2 illustrated that even when the pre-lineup evidence is strong and the investigator knows that the witness is identifying an innocent foil (whether similar-looking or dissimilar-looking to the suspect), investigators are still greatly swayed by this misidentification.

Experiment 4 examined the effect of having an eyewitness identify a foil lineup member when the pre-lineup evidence was either quite strong or fairly weak. In both the strong and weak pre-lineup conditions, probability estimates dropped significantly from pre-lineup estimates. In both conditions post-lineup probability estimates were roughly half that of pre-lineup estimates. One might have expected that in the low prior odds

condition, participants' probability estimates would drop to floor levels as neither the pre-lineup evidence nor the eyewitness decision was strongly in favor of the chosen suspect. On the other hand, in the high prior odds condition one might expect that the eyewitness misidentification would not completely outweigh the strong pre-lineup evidence, thus leading to relatively higher probability estimates. While this was the trend found in Experiment 4, it was not significant. Therefore, participant-investigators were greatly swayed by eyewitness misidentifications regardless of the strength of the pre-lineup evidence.

At this point it is interesting to make a comparison between the results of this study and those of Bregman and McAllister (1987) and Brimacombe and Dahl (2003). Both of these studies examined the influence of material and eyewitness evidence on decision-makers. Bregman and McAllister examined how participant-jurors treated contradictory fingerprint and eyewitness evidence and found that the jurors tended to be more swayed by the eyewitness than the fingerprints. Similar to the current studies, they found that when the fingerprints indicted the defendant but the witness did not identify the person, conviction rates dropped significantly. Thus, the participant-investigators in the current studies appeared to evaluate the evidence similarly to participant-jurors, which is not all that surprising given that both are in the role of evaluating and integrating physical and eyewitness identification evidence.

The Brimacombe and Dahl (2003) study examined the influence of co-witness or fingerprint agreement or disagreement on an eyewitness. They found that fingerprint evidence had a larger effect on eyewitnesses' confidence in their own identifications than did co-witnesses. However, because participants were only presented with one source of

evidence (co-witness or fingerprint) it is difficult to say how the results would compare to the current studies and the Bregman and McAllister (1987) study. Experiment 4 did ask participants to rate each source of evidence allowing us to examine how participant-investigators self-reported the influence of each piece of evidence. Collapsing across the pre-lineup evidence manipulations and eyewitness decisions, participant-investigators rated the eyewitness decision as marginally more important than the fingerprint evidence. This is somewhat surprising, as one might have expected participant-investigators to react like the eyewitnesses in the Brimacombe and Dahl study as the evidence presented represents a confirmation or disconfirmation of their own decision. However, the participant-investigators in these studies had much more evidence available to them than the eyewitnesses in the Brimacombe and Dahl study, which may explain why they did not respond similarly. Even so, one might expect participant-investigators to rationalize that the fingerprint evidence is more objective and therefore more valuable when evaluating their own decisions. However, as discussed earlier, this was not the case in these studies.

Evaluating the Witness

In all three participant-investigator experiments, the investigators were asked to rate how confident they were that the eyewitness had made the correct decision. While Experiment 1 did not find any significant differences between groups, most likely because of small sample sizes, Experiment 2 found that investigators were more confident in the witness when the eyewitness identified their chosen suspect. Confidence ratings were fairly low in the ID Foil conditions, suggesting that participants understood that the eyewitness was making a mistake by identifying an innocent lineup member.

Likewise, confidence ratings were not significantly higher in the condition where the eyewitness rejected the lineup. The same pattern of results was found in Experiment 4 where the prior odds manipulations did not interact with the eyewitness identification conditions to influence how the investigators rated their confidence in the witnesses' decision.

Therefore, in the conditions where the eyewitness identifies an innocent lineup member there appears to be a dissociation between investigators' ratings of confidence in the witnesses' decision and the degree to which they let that decision influence them. In Experiment 2 and in the strong pre-lineup evidence condition of Experiment 4, participant-investigators had strong pre-lineup evidence to support their choice of suspect, they knew the eyewitness was choosing an innocent lineup member, and they rated that they had low confidence in the eyewitnesses' decision, and yet they let that decision sway them greatly when estimating the probability that their suspect had committed the crime. Interestingly, on the post-lineup questionnaire, the first question that the participant-investigators completed was that of their confidence in the eyewitnesses' decision, so presumably, the investigators had their confidence rating still in mind when they went on to the next question asking for their probability estimates. Hence, it is not as though the investigators filled out the probability estimate question without having put some thought into whether they thought the eyewitness had made a correct decision. In addition, in Experiment 4, participants were asked to rate the importance of the various sources of evidence in estimating the probability that their suspect was the culprit. Those in the ID Foil conditions reported that the eyewitness decision was only half as important to them as it was to those in the ID Suspect

conditions. Nevertheless, the eyewitness influenced participants' probability estimates in the ID Foil conditions just as much as (and perhaps more than) those in the ID Suspect conditions!

Decision to Arrest

Participant-investigators were asked to report whether they would arrest the suspect based on the evidence that they had obtained. In all three experiments participants were highly likely to say that they would arrest the suspect if the eyewitness identified that suspect. If the witness identified another lineup member or rejected the lineup few would take the risk of arresting the suspect based on the pre-lineup evidence alone. Thus, the eyewitnesses' decision had a similar influence on the arrest decision as it did on the estimates of suspect's guilt. Our participant-investigators were quite conservative in their arrest decisions, not wanting to arrest a potentially innocent person. This suggests that the participants in this study were taking their roles as investigators seriously, understanding the potential consequences of arresting the wrong individual.

Influence of the Eyewitness

The eyewitness decision obviously had an important impact on the investigators' decisions. Why was this decision so influential? One possibility is that the eyewitness decision was the final piece of evidence presented to the participants, giving it more saliency and suggesting to the participants that it should play an important role in their decisions. As such, the eyewitness decision may have had a sort of recency effect as it was presented as the last piece in the puzzle. Future studies could examine this possibility by manipulating the presentation of information such that either the fingerprints or the eyewitness information is presented last. If the last presented piece of

evidence does take on extra saliency, this presents a potential problem. Regardless of the strength of the evidence, if the last piece of evidence is given more weight by investigators, that one piece of evidence may play a larger role than it should in investigators' decisions, especially if that last source of evidence comes from a more subjective source such as eyewitness decisions. These experiments presented the eyewitness information last because in the real world police would not be able to construct a lineup until they had at least some sort of evidence gathered against the suspect. Thus, while future experiments can examine the influence of presenting the material or eyewitness evidence last, it is unlikely that in the real world a lineup would be held before some sort of other evidence had been gathered.

Another possible reason for the saliency of the eyewitness identification was the nature of that evidence. The eyewitness was an actual person who the investigator interacted with who presented the identification decision with a fair degree of confidence. All of the other evidence was presented via computer database. Perhaps it was difficult for the investigators to treat the eyewitness evidence as questionable or to integrate it with the other evidence because of their personal interactions with the witness. It is important to remember that the investigators based their investigation of the database on the eyewitnesses' description from the initial interview. Given that the eyewitness was able to describe the crime and culprit in some detail and then confidently make an eyewitness decision, it is not unfathomable that the investigator would allow that decision to influence him/her greatly even when the instructions suggested that it should not. Future research could examine the influence of the importance of face-to-face interactions by having the initial interview be presented via videotape and by having the

investigator be told what the eyewitnesses' decision was or by presenting the eyewitnesses' decision over videotape as well.

Rationality

Although participant-investigators were vastly more influenced by the witness identification decision than they should have been (i.e., relative to true information gain), that doesn't necessarily imply that they were irrational or nonBayesian in their thinking. For example, it is possible that naïve participant-investigators believe that if the culprit were in the lineup then the witness would almost certainly identify him (and hence that the witness would identify an innocent foil or reject the lineup only if the culprit was not in the lineup). That is, if participant-investigators believed the witness was almost certainly accurate, then there would be nothing irrational with being greatly influenced by the identification response. My studies did not directly assess participant-investigators' pre-ID beliefs regarding the likelihood that the witness would make various kinds of responses, but some of my findings suggest that the over-reliance on the ID judgment was not rational. For one thing, participant-investigators' ratings of confidence in the witness did not always parallel the extent to which they were influenced by the witness. Also, Wells and Olson (2002) showed that information gain varies, in part, as a function of the prior odds that the suspect is in the lineup, but my experimental manipulation of the degree of a priori evidence against the suspect affected pre-ID ratings of probability that the suspect was the culprit but did not modulate the impact of ID evidence. Future studies could more directly examine this issue by asking participant-investigators to rate the probability that the eyewitness would identify the culprit, identify an innocent lineup member, or reject the lineup given that the culprit was/was not present in the lineup.

Material versus Eyewitness Evidence

These experiments attempted to replicate the experience of real world police investigators who must integrate material and eyewitness evidence to make decisions. As such, participant-investigators were presented with information about the suspect's fingerprints, prior criminal record, alibi, and car ownership when completing the computer database. In the first two experiments where participants were asked to rate each piece of information individually, physical description and fingerprints were rated as the most important sources of information. The ratings of the evidence were not conducted again after the lineup as the importance of the eyewitness decision was thought to be reflected in the post-lineup probability estimates. However, in Experiment 4 participants were asked to rate the importance of each source of information in making their decisions both pre- and post-lineup. This allowed us to examine how participants assessed the importance of the various pieces of information in their decision-making. In all conditions, physical description was an important factor whereas prior criminal record and alibi were rated fairly low compared to the other sources of evidence. The rated importance of fingerprints and the eyewitness decision depended on whether the eyewitness identified the suspect. Due to the construction of the materials and questionnaires, it is difficult to determine whether these self-reported ratings of importance really correspond with how each source of evidence was integrated in the investigator's decision. Future studies are needed that examine probability estimates after each source of evidence is presented to better explore the importance of various sources of evidence to inexperienced investigators.

Material sources of evidence such as fingerprints are commonly thought to be

stronger evidence than more subjective sources such as eyewitness decisions because of the variability involved in witnessing conditions and witness accuracy. However, the participants in this study often seemed to give more weight to the eyewitness decision than to the material evidence. One reason for this may be the apparent saliency of the eyewitness decision as discussed earlier in the study. Another may be the ambiguous nature of the fingerprint evidence. That is, perhaps the investigators did not consider the fingerprint evidence to be all that objective or strong. Participants were informed that a partial fingerprint was found at the scene of the crime and they would be given information about the probability that a suspect's fingerprint matched that partial print. To keep pre-lineup probability estimates below ceiling, the highest suspect fingerprint probability match was 87%. Thus, even when the fingerprint evidence was supposed to appear quite strong there was still some ambiguity to the evidence. Further, the suspect that the investigators chose was not the only one in the computer database whose fingerprints matched the partial print. To prevent participants from immediately choosing the suspect based on the fingerprints alone, a small number of suspects in the database had probability fingerprint matches ranging from 19% - 51%. It may be that the knowledge of these other fingerprint matches (even though they were not as strong as the suspect's match) lessened the diagnosticity of fingerprints as a source of evidence.

It is important to note that the presentation of evidence in these studies was greatly simplified to real world police investigations. Participants were presented with suspects, some of whom obviously did not fit the description of the culprit, thereby narrowing down the list of potential suspects from the already small thirteen. Participants were presented with all of the evidence at once via the computer database and it would

take roughly fifteen minutes for a participant-investigator to examine the database and make a decision. In the real world, police investigations are necessarily much more complex, requiring multiple investigators, time, and expertise. Nevertheless, unless the evidence gathered is completely indicative of the culprit's identity, there will always be some uncertainty as to whether the investigators have the right suspect. This is the essential aspect of the investigative process that was replicated in these studies.

Participant-Investigators versus Police Investigators

These experiments attempted to simulate some aspects of real world police investigations. However, one aspect that could not be reproduced was police investigator expertise. How would police training influence the findings of these studies? Expertise with various kinds of evidence may lead real world police investigators to interpret and integrate evidence differently than our inexperienced participants. For example, real world police investigators may not have been as swayed by the eyewitness identification decision as the participant-investigators. Participants' responses in the ID Foil lineup member conditions are particularly intriguing when speculating how an experienced police investigator would treat the situation. Perhaps the act of putting together the lineup and knowing first-hand that the foils are innocent would lead to a difference in investigators' responses. Police investigators also have the added pressure when investigating the crime of being responsible for finding a real culprit and bringing that person to justice. That added pressure and sense of responsibility might very well affect the way they interpret and integrate eyewitness decisions.

Recommendations for Eyewitness Identification Decisions

Wells et al. (1998) made a number of recommendations regarding lineup

identification procedures to help prevent false eyewitness identifications. While these recommendations were created with the eyewitnesses' behaviour in mind, a number of the recommendations may influence investigators' behaviours as well. One of these recommendations was that the lineup members should all fit the description of the culprit. Prior research found that when only one member of a target absent lineup fit the description of the target, misidentifications of that innocent lineup member increased substantially compared to lineups where all of the members fit the description (Lindsay & Wells, 1980). In all of the experiments discussed in this paper, all of the lineup members fit the eyewitness description. Even so, although the findings were not significant, Experiments 1 and 2 suggested that if an eyewitness identifies an innocent lineup member, that decision might have differential impact depending on whether that lineup member looks more or less similar to the investigators' suspect. Future studies are needed to examine the influence of these eyewitness decisions on investigators when the lineups are more heterogeneous and when the lineup member identified does not match the description of the culprit.

Wells et al. (1998) also recommend the use of sequential lineups where the eyewitness is only presented with one lineup member at a time and he/she must report whether that lineup member was the culprit or not. Eyewitnesses are not informed of how many lineup members they will be shown and are not able to make relative judgments. Given that the investigators in our studies seemed to also be comparing the similarity of lineup members relative to their suspect, sequential lineups may have a similar impact on investigators' probability estimates.

Finally, Wells et al. (1998) recommended that the person who conducts the lineup

procedure not be involved in the actual investigation. That is, they recommend that the lineup administrator be blind to the identity of the suspect. This recommendation is made such that the investigator cannot subtly (or not so subtly) influence the eyewitnesses' decision. However, knowing the extent to which the eyewitness in these studies influenced the participant-investigators, blind lineup administration may be just as beneficial to the investigators as to the witnesses. If the eyewitness decision is interpreted as more salient than other evidence because it is presented in a highly interpersonal process (unlike other sources of evidence), perhaps investigators would be better able to integrate that evidence if they were not present for the decision. The lack of face-to-face interaction and the slight delay may have an effect on investigators' probability estimates. Further if investigators are not aware of the makeup of the lineup misidentifications may be treated differently than they were in the current studies because the investigator cannot make a relative judgment between the appearance of the innocent lineup member and the suspect.

Conclusions

The goal of this research was to switch focus from the traditional examination of eyewitnesses and the factors that affect eyewitness decisions to the examination of police investigators. Investigators and eyewitnesses interact in interviews and administrations of lineups and although previous research has explored how investigators influence eyewitness decisions, no previous studies examined the influence of eyewitnesses on investigators. Hence, the studies in this thesis were conducted to examine the influence of eyewitness decisions on participant-investigators who had been exposed to other evidence regarding their suspect.

Three experiments revealed that participant-investigators were heavily influenced by eyewitness decisions. When the eyewitness decision corroborated the investigator's choice of suspect, participants' estimates of the suspect's guilt increased dramatically. When the eyewitness identified another lineup member or rejected the lineup by saying that the culprit was not present, probability estimates of the suspect's guilt decreased significantly. The eyewitness heavily influenced participant-investigators even when investigators knew the eyewitness was identifying an innocent person and their reported confidence in the witnesses' decision was low. These same results were found whether the pre-lineup material evidence was strong or weak. This suggests that the investigators were placing more importance on the eyewitness evidence than on the fingerprint evidence they received. In fact, an examination of participant-eyewitness identification decisions revealed that the participant-investigators were likely being swayed by incorrect information and were also treating the eyewitness decision as more informative than it actually was. The eyewitness decision may have had such a large impact because it was more salient given that it was presented last and was an interpersonal interaction with the investigator, whereas, the other evidence was presented via computer.

This research is important as it takes the first step in examining the decisions made by a figure largely ignored by researchers: The police investigator. Police investigators must gather, weigh, interpret, and integrate various pieces of evidence (e.g., fingerprints, eyewitness identifications) to incriminate or exonerate a suspect. Operating under conditions of uncertainty, the police investigators must make decisions regarding the credibility of eyewitness decisions and whether the quantity of incriminating evidence is enough to warrant arresting the suspect. As such, it is important to understand how

investigators integrate the various sources of evidence and what importance is given to each source of evidence. These studies focused on the influence of eyewitnesses on participant-investigators. Previous research has shown that eyewitnesses greatly influence juries and other triers of fact. The current studies found that eyewitnesses powerfully influence participant-investigators as well. In fact, it appears that participant-investigators overestimate the informativeness and credibility of eyewitness identification decisions. Hence, these studies provide an important initial examination of the influence of eyewitness decisions on investigators' judgments of suspect's guilt, witness credibility, and importance of other evidence. The current studies also suggest additional support for recommendations regarding fair lineup administration procedures.

In conclusion, although it is premature at this point to try to generalize the findings of these studies to real world police investigations, the studies reported here pave the way for studies that examine actual police investigators.

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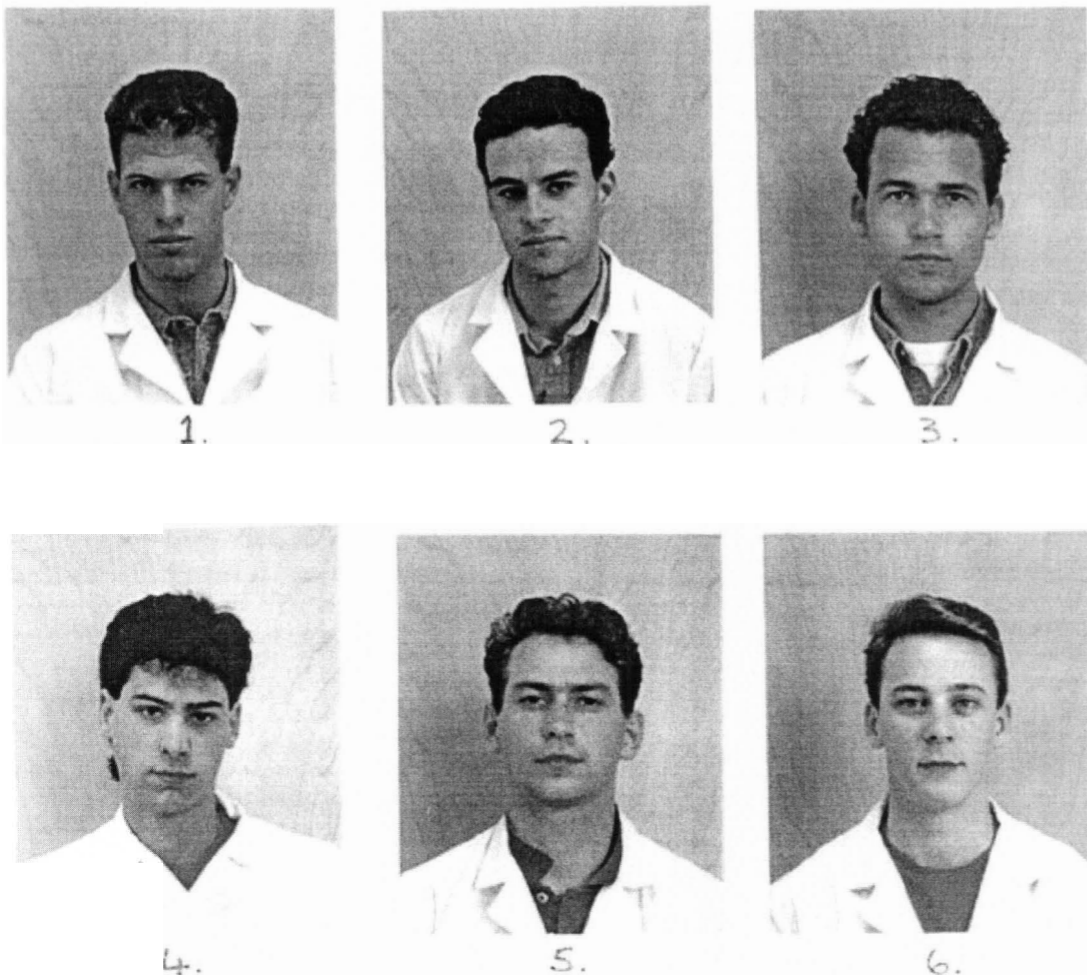
Appendix A

Sample Database for Suspect John Gibbs

- Physical Description:
- DOB: Mar. 13, 1976
 - Height: 5'10
 - Build: medium
 - Eyes: blue
 - Hair: short, curly, brown
 - Caucasian
- Criminal Record:
- 2 arrests, break and enter, 1996, 1998,
 - 1 conviction, break and enter, 1999
 - Paroled Dec. 2001
- Additional Investigation:
- Alibi for duration of crime: Unknown, suspect's most recent address was in neighborhood where the crime took place.
 - Current employment: Unemployed
 - Vehicles Registered: Registered owner of a white Volkswagen Rabbit.
- Fingerprint on file:
- [Click for information.](#)

(Note: for ease of inclusion in the thesis the format is different from the actual database.)

Appendix B



Note: The actual lineup was presented in colour.

Appendix C

Experiment 1

Pre-Identification Questionnaire

1. What is your chosen suspect's name? _____

2. What number is your suspect in the lineup? _____

3. What do you think is the probability that the suspect you chose committed the crime?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

4. Based on the information you have obtained so far, if this were a real case would you recommend that your chosen suspect be charged and taken to trial for this crime? Yes No

If not, what additional information would you need to convince you to pursue the case? _____

5. How confident do you feel about your decision to arrest the suspect? (circle one)

1 2 3 4 5 6 7 8 9 10

not at all

somewhat

extremely

confident

confident

confident

6. Rate the importance of each of the following evidence categories in making your decision:

Category	Not At All Important	Somewhat Important	Very Important
physical description	_____	_____	_____
prior criminal record	_____	_____	_____
fingerprint evidence	_____	_____	_____
alibi (whereabouts during crime)	_____	_____	_____
other (please specify below)	_____	_____	_____

Post ID Questionnaire

1. Which lineup member did the witness choose? _____

2. If the witness made an identification, how confident are you that the witness is correct in his or her decision? (circle one)

1	2	3	4	5	6	7	8	9	10
not at all				somewhat				extremely	
confident				confident				confident	

3. If the witness did not make an identification, how confident are you that the witness is correct in his or her decision? (circle one)

1	2	3	4	5	6	7	8	9	10
not at all				somewhat				extremely	
confident				confident				confident	

4. Now that you have administered the lineup, what do you think is the probability that the suspect you chose is the person who committed the crime? (circle one)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

5. Based on the information you have obtained so far, if this were a real case would you recommend that this suspect be charged and taken to trial for this crime? Yes No

If not, what additional information would you need to convince you to pursue the case?

5. How confident do you feel about your decision to arrest the suspect? (circle one)

1 2 3 4 5 6 7 8 9 10

Appendix D

Sample Interview

The other participant in this study has just completed watching a video that depicted a crime. While you are reading these instructions the experimenter will go get the other participant (the witness) and bring them back into the room. As the police investigator, you will interview the witness to gain some information about the crime and the culprit. You will later use this information to try to find a suspect using our computer database. You can ask the witness whatever questions you would like in whatever manner you would like. Below are some suggestions for information you should ask for. However, feel free to ask any additional questions that come to mind.

To allow you to pay full attention to the witness without having to worry about writing down what they say, the experimenter will record all of the witnesses' answers for you. Thus, you do not have to write down anything that the witness says on this sheet. If you have any questions about this interview please ask the experimenter now.

Suggested Information to Obtain From Witness:

- description of the crime
- description of the culprit
 - e.g., height
 - build
 - hair color
 - age
 - ethnicity
 - facial hair
 - wearing glasses
 - clothes
 - identifying features (tattoos, scars)
- any weapons involved
- any violence involved
- time of day

Appendix E

Experiment 4

Pre-Identification Questionnaire

1. If you chose a suspect, what is your suspect's name? _____
2. If you chose a suspect, what number is your suspect in the lineup? _____
3. Keeping in mind that the thief may not have been among the group of potential suspects in the database you reviewed, what do you think is the probability that the suspect you chose committed the crime? Answer by writing a number between 1% (almost no chance that your suspect is the thief) and 100% (complete certainty that your suspect is the thief); 50% would indicate that you think there is a 50/50 chance that your suspect is the thief; the closer to 1% the less sure you are, and the closer to 100% the more sure you are that your suspect is the thief. Write whatever number best represents your estimate of the probability that the suspect you chose committed the crime. _____
4. Rate the relative importance of each category of evidence by assigning a percentage (out of 100%) to each category according to its importance in your choice of suspect. For example, if you thought that only one category was important in making your decision, you would assign that category 100% and each of the other categories 0%. On the other hand, if you thought that all of the categories were equally important, you would give them each 20% (100/5). You can divide up the 100% among the five categories of evidence in any way you wish, except that they should add up to 100%.

physical description _____

prior criminal record _____

fingerprint evidence _____

alibi (whereabouts during crime) _____

other (please specify below) _____

other: _____

5. Based on the information you have obtained so far, if this were a real case would you recommend that your chosen suspect be charged and taken to trial for this crime? Yes No

If not, what additional information would you need to convince you to charge the suspect with the crime?

6. How confident do you feel about your decision to charge/not charge the suspect?

(circle one)

1 2 3 4 5 6 7 8 9 10

not at all

somewhat

extremely

confident

confident

confident

alibi (whereabouts during crime) _____

eyewitness decision _____

other (please specify below) _____

other: _____

5. Based on the information you have obtained so far, if this were a real case would you recommend that this suspect be charged and taken to trial for this crime? Yes No

If not, what additional information would you need to convince you to charge the suspect with the crime?

6. How confident do you feel about your decision to charge/not charge the suspect?

(circle one)

1	2	3	4	5	6	7	8	9	10
not at all			somewhat				extremely		
confident			confident				confident		

Appendix F

Sample Information Gain Equation

$p(S \text{ is } C)$ = probability that the suspect is the culprit.

$p(IDS|S \text{ is } C)$ = probability that the eyewitness identifies the suspect if the suspect is the culprit.

$p(S \text{ is not } C)$ = probability the suspect is not the culprit.

$p(IDS|S \text{ is not } C)$ = probability the eyewitness identifies the suspect if the suspect is not the culprit.

$$p(\text{suspect is culprit} | \text{ID suspect}) = \frac{p(IDS|S \text{ is } C)p(S \text{ is } C)}{p(IDS|S \text{ is } C)p(S \text{ is } C) + p(IDS|S \text{ is not } C)p(S \text{ is not } C)}$$

$$p(IDS|S \text{ is } C)p(S \text{ is } C) + p(IDS|S \text{ is not } C)p(S \text{ is not } C)$$

$$\text{Information gain} = |p(S \text{ is } C) - p(S \text{ is } C | IDS)|$$

Example Equation from Experiment 5

$$p(S \text{ is } C | IDS) = \frac{(.12)(.8)}{(.12)(.8) + (.08)(.2)}$$

$$(.12)(.8) + (.08)(.2)$$

$$\text{Information gain} = |p(S \text{ is } C) - p(S \text{ is } C | IDS)| = |.8 - .86| = .057$$