8-2009

The Emergence of an Own-Gender Bias Within a Change Blindness and Eyewitness Paradigm

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THE EMERGENCE OF AN OWN-GENDER BIAS WITHIN A CHANGE BLINDNESS AND EYEWITNESS PARADIGM

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A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Grand Forks, North Dakota
August
2009

This dissertation, submitted by Alison E. Finstad in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

Chairperson

This dissertation meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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August 4, 2009

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Department	Psychology
Degree	Doctor of Philosophy

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ACKNOWLEDGEMENTS

I would like to acknowledge a number of individuals for helping make this project possible. First, many thanks to my committee members Ric Ferraro, James Antes, Douglas Peters, Cheryl Terrance, and Joseph Hartman, for your guidance and valuable comments. Thanks to my mom and dad for your patience and understanding throughout this undertaking. Thanks to Matthew Burton-Kelly for your interest, encouragement, and enthusiasm for everything I do. Special thanks to Kim Christopherson and the Morningside College psychology students for your time and efforts, and for eagerly volunteering to help create the stimulus materials for this project. Thanks to Jon Parsons, Jeff Maddock, and Andrew Gerde for your dependable assistance in collecting, scoring, and entering the data. Finally, thanks to Steve Ross for the inspiration for this project idea and for your willingness to answer my questions.

This project is dedicated to my grandfathers, Erwin P. Finstad and Eugene E. Hustad, who both passed away this spring.

ABSTRACT

Studies exploring the change blindness phenomenon have consistently shown that individuals are surprisingly poor at detecting changes to visual scenes and identities in real-world interactions. The area of eyewitness identification has revealed a similar type of visual processing error; specifically, the tendency for eyewitnesses to incorrectly identify a perpetrator. Recently, researchers have attempted to merge these two areas, creating a combined change blindness/eyewitness paradigm, allowing for the study of variables of similar interest within the two areas. Using this type of combined paradigm, the present study explored the possibility of an own-gender bias within a change blindness/eyewitness experience. Participants viewed a video of a simulated house burglary, with the identity of the burglar changing halfway through the film. To assess for gender bias, two videos were created: one with two female burglars and one with two male burglars. After viewing the video, 144 participants were given a photo lineup and asked to identify the correct burglar. Contrary to what was expected, an own-gender bias failed to emerge in both change detection and identification accuracy. Implications for change blindness and eyewitness misidentification are further discussed.

CHAPTER I

INTRODUCTION

Overview

Research in the area of visual cognition has consistently revealed the inability to detect changes to our perceptual environments. Although many believe that such changes are easily detected, observers have repeatedly failed to notice changes to visual scenes. This "change blindness" phenomenon has been demonstrated using photographs, filmed scenes, and even real-world interactions. Furthermore, observers have failed to detect changes to an assortment of items and elements- from general shapes, to articles of clothing, to actual identities of individuals with whom they are interacting (Simons & Ambinder, 2005). This inability to detect changes to identities has relevance to issues within the eyewitness literature; namely, to eyewitness identification accuracy. A large portion of the eyewitness literature has been devoted to factors influencing the ability of eyewitnesses to correctly identify a perpetrator. Despite the apparent overlapping issues, only until very recently have researchers attempted to merge the areas of change blindness and eyewitness identification. The present study utilized this type of combined change blindness/eyewitness paradigm, while also looking at the impact of gender. An own-gender bias has been found within the eyewitness identification and face recognition literatures, with females accurately identifying and recognizing female faces more than males, and males accurately identifying and recognizing male faces more than females (Wright & Sladden, 2003). This gender bias has not been examined in a change detection task, nor has it been examined within a combined change blindness/eyewitness experience. Therefore, the goal of the present study was to determine whether an own-gender bias would emerge within this type of paradigm.

Change Blindness

Background

As observers, individuals generally believe that they would be able to notice changes in their visual environment, given the changes are sufficiently noticeable. Unfortunately, decades of research has shown that this is not the case (Levin et al., 2002). Instead, what has emerged is a pattern of findings that demonstrates that humans are consistently blind to changes in their perceptual environment– or what has been termed the *change blindness phenomenon.* These findings have been shown under a wide array of experimental conditions, sometimes using changes that are large, repeatedly made, and even anticipated by participants. Change blindness and change detection research has evolved through three phases, beginning in the early 1960s. Throughout each of these phases, a number of characteristics central to change detection studies have been investigated, including (1) the contingency of the change, (2) the content of the stimuli, (3) the methods of introducing the change, and (4) the manipulation of observer intention (Rensink, 2002).

In change detection studies, changes to a scene are typically introduced simultaneously with a particular event. The *contingency of the change* refers to the type of event used while introducing the change, and a number of contingencies have been studied and used. For instance, some studies have used *blink-contingent* procedures, which make the changes to the scene during an eye blink. O'Regan et al. (2000) utilized this type of procedure by showing observers digitized photographs of indoor or outdoor scenes. Each time observers blinked, a large change occurred in each scene—an object appeared or disappeared, shifted position, or changed color, surface, or region. The results indicated that over 40% of observers failed to notice the changes to the scenes. Other studies have utilized *splat-contingent* procedures, whereby the change occurs simultaneously with the appearance of a brief distractor, or a "splat." For instance, O'Regan, Rensink, and Clark (1999) presented photographs of various scenes to participants, with changes occurring to either central-interest elements or marginal-interest elements. The changes to the scenes were simultaneous with the dispersing of 'mudsplashes' across the scene. When changes were made to central-interest elements, participants typically detected them as soon as they occurred. But when changes were made to marginal-interest objects, 13-30% of participants failed to detect them.

Occlusion-contingent procedures present the changes while the changed element is briefly occluded. For example, Simons and Levin (1998) staged a conversation between an experimenter and a pedestrian, with the experimenter stopping to ask the pedestrian for directions. Partway through the conversation, two men carrying a door walked directly between the experimenter and the pedestrian. One of the men was a second experimenter, who switched places with the first experimenter, and then continued to carry on the conversation with the pedestrian. Simons and Levin found that only 7 out of the 15 pedestrians (47%) reported noticing the change in the two experimenters.

Cut-contingent procedures are used with videos, and involve making changes during a cut from one camera position to another. Levin and Simons (1997) showed participants a VHS video of two actors conversing, with the camera showing both actors and cutting to shots of each of them as they spoke. Across each cut, an error of continuity was made (a change to an item in the scene), with a total of nine errors made. For instance, in one shot, an actor was shown wearing a large colorful scarf, and in the next shot, the scarf had disappeared. In total, only 10% of the participants reported noticing any of the changes during the first viewing of the film.

The *content of the stimuli* used in change blindness studies has also changed throughout the past few decades, with studies progressively using more realistic types of stimuli. For example, early change detection studies used simple figures as stimuli, including dots, lines, and letters. Phillips (1974) used displays of partially filled grids of dots and had participants report whether they detected the addition or removal of dots from subsequent displays. Further studies began to use drawings of objects and scenes, and eventually actual photographs of objects and scenes as stimuli. Henderson and Hollingworth (1999) altered target objects that were presented within colored images of naturalistic scenes, requiring participants to report whether they noticed the deletion or rotation of the objects. More recently, studies have shifted to using the most realistic type of stimuli to study change detection, including films and real-world interactions (Levin & Simons, 1997).

In addition to the stimuli used, the *methods of introducing change* also vary. Some studies have created a change by adding or deleting an item from a scene. Others have made changes to the properties of an item (e.g., its orientation, size, shape, or color). More commonly, studies have made changes to the identity of an item by rearranging its parts or substituting an entirely different item altogether.

The final characteristic central to change blindness studies is *observer intention*, or whether observers are told to expect a change to occur. Some studies have utilized an *intentional approach*, where observers are told to expect changes to occur, and to fully devote their available resources to detecting the change. Other studies have used a *divided-attention approach*, whereby a different task is made primary (e.g. memorizing an image), but observers are told to watch for changes that will occasionally occur, and to report when they notice the changes. A number of studies have relied on the *incidental approach*, where observers are not notified ahead of time that a possible change may occur. In this type of approach, observers are commonly given another task as their primary responsibility, and then questioned afterward about whether they noticed a change. Each of these approaches has been found to produce change blindness, with the incidental approach typically producing the fewest number of participants that detect the change (Rensink, 2002).

Recent research on change blindness and change detection ability has continued to confirm that individuals typically fail to notice changes to their environments. For instance, Roiselle and Scaggs (2008) explored change detection by altering a photograph of a college campus. The photograph showed a scene of the campus that included where the library should have been, but had been removed as part of the alteration. Participants viewed the photograph and were subsequently asked to identify what was wrong in the picture. The findings indicated that change detection among participants was extremely poor, despite the fact that the change was classified as being quite large. Similarly, Beck, Levin, and Angelone (2007) showed participants pre- and post-change photographs of everyday scenes, with the post-change photograph including an object that had been replaced. Participants were divided into two conditions. One group was informed that changes would occur in the photographs (intentional condition) and that they were to identify the changed objects. The second group was not informed that changes would occur, but were still asked to identify the changed objects after viewing the photographs (incidental condition). Change detection accuracy was significantly higher in the intentional condition than the incidental condition, with 91% correctly identifying the changed objects in the intentional condition and 38% in the incidental condition. Lastly, Davis et al. (2008) recently explored change blindness to identities using a video of a shoplifting incident at a supermarket. The first actor was shown browsing through items, walking down an aisle, and then passing behind a stack of boxes. As the first actor passed behind the boxes, the second actor emerged from behind the boxes and continued to walk down the aisle, eventually stopping at the wine section and stealing a bottle. Almost 60% of participants failed to notice the change in the actors.

Change Blindness and Identity Change

As previously discussed, some change blindness studies have focused on the ability to detect changes to an actor's identity. The present study will utilize this type of change, so the previous literature in this area will be discussed in further detail. Levin and Simons (1997) were the first to explore change blindness and identity change, with a number of studies following suit. Levin and Simons (1997) initially studied detection of identity changes using videos of actors performing different tasks. For example, one actor was shown working at a desk and upon hearing the phone ring, got up and walked toward the hallway to answer it. At this moment, the camera cut to a view of the hallway and showed a different actor answering the phone. Only 33% of participants noticed the identity change of the actors, as reported in a subsequent questionnaire.

As previously mentioned, Simons and Levin (1998) continued to investigate change blindness and identity change in their "door study." Instead of using a video paradigm, however, Simons and Levin (1998) demonstrated change blindness to identity using a real-world interaction. Further extending their original door study, Levin et al. (2002) explored change blindness and identity change in a series of three experiments. The first experiment altered the method of substituting actors, opting for a less intrusive method. Rather than having a door impede the experimenter and pedestrian, the substitution of actors occurred behind a counter. One experimenter began an interaction with a participant, briefly ducked behind a counter to put away a consent form, and a second experimenter stood up in place of the first experimenter. Results indicated that almost 75% of the participants failed to detect the change in experimenters, despite a number of the participants reporting already being familiar with change detection studies. The procedure for the second experiment included a replication of the original door study, along with an additional change detection task using a variant of the door procedure. In this task, the experimenters approached a passerby and requested to have their picture taken in front of a large display. As the passerby looked through the camera, two experimenters came through with a large piece of cardboard, allowing for the identity switch to be made. In addition to the change detection tasks, the second experiment included a photo lineup that tested participants' ability to identify the first experimenter. In total, 45% of the participants failed to notice the change in experimenters. In the door condition, 38% failed to notice, and 53% missed the change in the camera condition.

Additionally, those who were able to detect the change showed better accuracy in identifying the experimenter from the photo lineup. Altogether, these experiments provided further demonstrations that individuals are poor at detecting changes in real-world interactions, while expanding upon the previous door study by inducing change blindness across a variety of situations.

Explanations for Change Blindness

While no single explanation can account for all instances of change blindness, researchers have proposed a handful of explanations for how and why the phenomenon may occur. First, a common explanation for change blindness is that it results from *limited attention.* Specifically, if we fail to attend to the changing object, or if we do not completely focus our attention on the changing object, then we will likely fail to notice the change (Rensink et al., 1996). However, even if we do fully attend to changing objects in a scene, change blindness studies have revealed that attention may not always be sufficient to detect a change. Levin and Simons (1997) supported this notion by demonstrating that changes to central objects in a visual scene (e.g. actors' identities) that were clearly attended to often go unnoticed. Further, they concluded that in addition to attention, observers need to intentionally encode properties of the objects in order to successfully detect change.

The most frequently proposed mechanism to account for change blindness is the *overwriting hypothesis*. Some change blindness studies have utilized a flicker paradigm, whereby observers view one version of a scene, followed by a brief blank screen, and then a changed version of the previous scene. Observers are asked to indicate when they notice any changes in the scenes, with results typically showing that observers take considerable time before noticing changes (Rensink et al., 1997). The overwriting hypothesis suggests that the second version of the original scene creates a visual disruption, and subsequently "overwrites" the original version, leading observers to forget aspects of the first scene and ultimately fail to detect the change (Simons et al., 2002). As with other explanations, studies have revealed that the overwriting hypothesis falls short in some instances of change blindness. Particularly, Simons et al. (2002) demonstrated that pre-change information can still be retained, despite observers failing to detect change. On the basis of these findings, Simons et al. (2002) offered the *first impressions hypothesis* as an explanation for change blindness. This explanation proposes that change blindness occurs as a result of inadequately representing details of the second changed image. In other words, observers are able to accurately encode features of the initial image, but fail to accurately encode features of the changed image. Research on the attentional blink has revealed findings congruent with this type of explanation (Shapiro, Arnell, & Raymond, 1997). When demonstrating the attentional blink, two targets are presented within a short time of each other (e.g., 500 msec) and participants are asked to subsequently identify the targets. Typically, results show that participants are able to correctly identify the first target, and that they incorrectly identify the second target, unless they are specifically instructed to ignore the first target (Shapiro et al., 1997).

To summarize, a number of studies have demonstrated the difficulty with which individuals report detecting changes to their visual environments. Change detection studies have evolved over the past few decades, using a variety of procedures, stimuli, and methods. Most notably, researchers have demonstrated that participants are largely blind to changes in identities presented within both filmed sequences and real-world interactions. Explanations for change blindness have also varied, with some arguing for limited attention, others arguing for an overwriting of the original scene, and still others arguing for inadequate representation of the changed image.

Eyewitness Identification

Background

The area of eyewitness identification has been heavily researched throughout the past few decades. Eyewitness identification is a strong form of evidence in court proceedings, so eyewitness identification accuracy is highly important. The consequences of mistaken identification are costly, sometimes leading to wrongful incarceration. In fact, Scheck, Neufeld, and Dwyer (2001) reported that eyewitness misidentification has accounted for the largest percentage (almost 75%) of real-life wrongful conviction cases. Due to the importance of eyewitness accuracy, psychological researchers have focused on factors that influence the accuracy of eyewitness identifications. A number of variables have subsequently been identified and have been broken down into two classifications: *estimator variables* and *system variables*. Estimator variables are those that are not controllable by police officers or the justice system. These variables include characteristics pertaining to the witness and characteristics of the event itself (Wells & Olson, 2003).

An eyewitness's age has been shown to influence identification performance, with the very young and very old performing significantly worse than younger adults. This pattern has been found to emerge only when the culprit is not included in the lineup, however (Pozzulo & Lindsay, 1998). Another estimator variable that has been extensively researched is the race of the eyewitness. The presence of an own-race bias within eyewitness identification has consistently demonstrated that individuals are better at recognizing faces of own-race members than those of other-race members (Meissner & Brigham, 2001). The gender of an eyewitness is an additional estimator variable of interest, but will be discussed in later sections of the paper.

Characteristics of the witnessing event that have been found to influence identification accuracy include the amount of viewing time, lighting conditions, the culprit's appearance, and the presence of a weapon. The amount of time spent viewing a culprit's face has been found to impact later identification accuracy, with more viewing time leading to better accuracy (Ellis, Davies, & Shepherd, 1977). The level of lighting when viewing a culprit's face has also been found to influence identification accuracy, with lower light levels leading to poorer recognition (Wells & Olson, 2003). If the culprit is distinctive-looking or either highly attractive or highly unattractive, then they will likely be correctly identified (Light et al., 1979; Fleishman et al., 1976). In addition, Cutler et al. (1987) found that disguises or alterations in appearance (e.g. covering hair or wearing sunglasses) impair the accuracy in identifying faces. Finally, the presence of a weapon has been shown to affect the ability of a witness to accurately identify a face. A number of studies have examined this weapon-focus effect (e.g., Cutler et al., 1987; Loftus et al., 1987; Steblay, 1992) and found that weapons draw a witness's visual attention away from the details of the culprit's face. Furthermore, the presence of a weapon has been shown to influence arousal or fear, which reduces identification accuracy (Clifford & Hollin, 1981).

More recently, Loftus and Harley (2005) identified distance from the perpetrator as another variable that influences eyewitness accuracy. In the past, eyewitnesses have testified that they accurately identified perpetrators' faces, despite being at far distances from the perpetrator at the crime scene (up to 450 feet away). Loftus and Harley subsequently decided to test the impact of distance on accurate face identification and found that accuracy decreases as the observer's distance from the face increases. Particularly, as an observer moves farther from a face, important facial details are lost at a rate that is proportional to distance, leading to a poorer representation of the face. From these findings, the authors concluded that witnesses likely cannot accurately perceive features of a perpetrator's face at such large distances.

In contrast to these types of *estimator variables*, a number of *system variables* have been found to influence eyewitness identification accuracy. As opposed to estimator variables, system variables are controllable by the criminal justice system, and have thus received more attention from psychological researchers. Examples of system variables include lineup test factors, whether witnesses receive instructions, and how the lineup is constructed.

Lineups can either be culprit-present or culprit-absent, and research has shown that culprit-absent lineups lead to poorer identification accuracy. Wells (1993) reasoned that eyewitnesses tend to rely on a relative-judgment decision process; typically selecting an individual from the lineup that most resembles their memory for the culprit, thus leading to the potential for misidentification if the culprit is not included in the lineup. Pre-lineup instructions also have considerable impact on eyewitness identification accuracy. If eyewitnesses are warned before viewing the lineup that the culprit "might or might not be present," misidentification rates have been found to decrease (Steblay, 1997). The selection of fillers is an additional system variable that has received considerable attention. A suspect should not stand out from the others in the lineup, as this may lead to potential misidentification. Likewise, a culprit should not blend in too much with the others in the lineup, as this may lead to the culprit going unidentified (Lindsay & Wells, 1980). In addition to lineup selection, the presentation mode of the lineup has great impact on identification accuracy. Two presentation methods have been consistently studied; a simultaneous lineup and a sequential lineup. In a simultaneous lineup, all members are shown to an eyewitness at once, whereas a sequential lineup presents members one at a time. With a sequential lineup, the eyewitness is asked to make a decision before moving onto the next member. A meta-analysis comparing both types of lineups revealed that the sequential method led to a reduction in mistaken identifications, but only in culprit-absent lineups (Steblay et al., 2001).

Explanations for Inaccurate Eyewitness Identification

Aside from the variables previously discussed, the theory of unconscious transference (Loftus, 1976) has been offered as a potential account for eyewitness misidentifications. This theory posits that some mistaken identifications can result from eyewitnesses incorrectly believing someone else is the perpetrator of a crime. Further, this person is familiar to the eyewitness from a different context, but is later confused with the real perpetrator. Unconscious transference has been demonstrated in two contexts within the eyewitness literature. First, Read et al. (1990) showed that participants misidentified innocent individuals who were familiar from previously viewed mugshots, rather than from the crime scene. Second, Ross et al. (1994) found that a large percentage of participants inferred that an innocent bystander was the same person as the perpetrator from a crime scene. In other words, the participants inferred that the innocent bystander and the perpetrator were "one in the same." This second context of unconscious transference represents an error in change detection, demonstrating that unconscious transference can sometimes be an instance of change blindness (Davis et al., 2008). The relevance of this overlap between unconscious transference and change blindness will be discussed further in later sections of this paper.

Convergence of the Literatures

The areas of change blindness and eyewitness identification share common elements, making them complementary areas to overlap. Both areas have focused on instances where observers either poorly encode, or fail to encode, the features of a scene (or person). Change blindness to identity changes has the most direct relevance to the eyewitness literature, as failing to notice a change in identities may result in the misidentification of an innocent bystander (Davis et al., 2008). Despite the apparent overlap in these two areas, very few studies have combined change blindness with an eyewitness experience.

Davis et al. (2008) were the first to merge change blindness and eyewitness issues through exploring change blindness as an explanation for mistaken eyewitness identifications. As previously noted, the theory of unconscious transference has been utilized as a possible explanation for eyewitness misidentification, with some instances involving confusion of an innocent bystander with the actual perpetrator. Davis et al. (2008) suggested that this type of unconscious transference might actually be an instance of change blindness, and designed a study to specifically test this hypothesis. A video of a staged shoplifting incident was created, with an identity change between the innocent bystander and the actual perpetrator. The video first showed the innocent bystander walking through the aisles of a grocery store. As the bystander passed behind a set of boxes, the identity change occurred, with the perpetrator shown walking down the aisle and eventually taking a bottle of wine. After viewing the video, participants were asked to identify the perpetrator from a lineup. To adequately test their hypothesis, the lineup did not contain the actual perpetrator, but did include the innocent bystander. Results confirmed that change detection was related to unconscious transference; a significant percentage (75%) of participants who failed to notice the change went on to misidentify the innocent bystander as the shoplifter. In other words, a large percentage of participants (67%) did not notice that the innocent bystander and the perpetrator were two different individuals, and a large percentage of these participants later misidentified the bystander as the real perpetrator.

Davies and Hine (2007) were the first to actually combine change blindness with an eyewitness identification experience. They used an established eyewitness paradigm, whereby observers watched a video of a simulated house burglary, completed a questionnaire about the content of the video, and were then asked to identify the perpetrator from a lineup. To induce potential change blindness, the identity of the burglar changed halfway through the video. In addition, the study manipulated observer intent in that participants appeared in either the intentional condition, where they were instructed to carefully watch the video and that they would be questioned later, or the incidental condition, where they were only instructed to watch the video. The authors were also interested in whether any gender differences would arise with respect to detecting change and identification accuracy. The primary findings of interest revealed that 39% of participants failed to detect the identity change in the burglars, with those in the intentional condition being significantly more likely to notice. Further, those who detected the change were significantly more likely to identify both burglars in the lineup, while those who failed to notice the change also failed to select both burglars from the lineup. A slight female advantage in change detection also emerged, with a significantly larger number of female participants reporting detecting the change, but only in the intentional condition. Similarly, a large percentage (67%) of those who correctly identified both burglars were female participants, but this was not a significant difference.

More recently, Ross, Finstad, and Ferraro (under review) further explored change blindness and eyewitness identification, but added the race of the perpetrator as a further variable of interest. As previously discussed, an own-race bias has emerged within the eyewitness identification literature. Findings have largely indicated that eyewitnesses are more likely to misidentify those of another race than they are to misidentify those of the same race (Wells & Olson, 2001). An own-race bias has also emerged within a change detection task, whereby individuals detect changes to faces of their own race faster than to faces of other races (Humphreys, Hodsoll, & Campbell, 2005). Taking advantage of these similarities, Ross, Finstad, and Ferraro (under review) created a change blindness/eyewitness experience almost identical to that of Davies and Hine (2007). Participants viewed either one of two videos of a simulated house burglary: the first video used Caucasian burglars and the second video used African American burglars. As with Davies and Hine (2007), the identity of the burglar changed halfway through both films. Upon viewing the video, participants were given a lineup and asked to select who they saw in the video. Results indicated that again, overall, a large percentage (87%) of participants failed to detect the change in the burglars. An own-race bias also emerged, with Caucasian participants being significantly more likely to notice the change in Caucasian burglars than African American burglars. Identification performance was not significantly higher for those who detected the change, however, and those in the Caucasian video condition were not significantly more accurate in identifying the burglars, as was expected.

In summary, the areas of change blindness and eyewitness misidentification have both demonstrated fallibility in encoding features in our visual environment. Due to the similarities between these areas, researchers have recently developed a combined change blindness/eyewitness paradigm, allowing for the study of variables of mutual interest. Findings have indicated that those who are able to detect identity changes are more likely to be accurate in identification, while those who fail to detect changes are less accurate in identification. Further, an own-race bias has emerged within this combined paradigm, indicating that, in an eyewitness experience, participants are more likely to detect an identity change in individuals of their own race.

Gender Differences and Memory Performance

As a whole, studies of memory performance have suggested that males and females do not differ in overall memory ability, but that they do differ in terms of the types of information they remember best. In a review of 22 studies measuring verbal memory, Maccoby and Jacklin (1974) found that 10 of these studies showed a female superiority in verbal memory tasks, while the remaining 12 showed no gender differences. Loftus et al. (1987) reviewed 35 memory performance studies and found a similar female advantage for verbal tasks, with 20 studies revealing a female superiority, 13 revealing no difference, and 2 revealing a male superiority. Overall, Loftus et al.

(1989) concluded that females do appear to perform better on verbal memory tasks, but cautioned that over one-third of the reviewed studies showed no gender differences.

While females show superiority in memory for verbal material, males have been found to perform better on spatial memory tasks (Maccoby & Jacklin, 1974; Loftus et al., 1987). In a literature review of studies measuring spatial memory performance, eight of the 16 reported a male superiority, six reported no difference, and two reported a female superiority. Overall, then, it appears spatial memory tasks favor males, but as before, the authors caution about interpreting the significance of the differences due to the low number of studies available and to those that showed no gender difference (Loftus et al., 1987).

Gender differences have also surfaced in memory for faces, with females performing better than males when recognizing previously seen faces. Loftus et al. (1987) reviewed 11 studies of face recognition memory and found that seven showed female superiority, and the remaining four showed no gender difference. In addition, Shapiro and Penrod's (1986) meta-analysis of face recognition studies revealed a small female superiority in recognizing faces. Despite the fact that females outperform males in face recognition, gender differences in eyewitness memory and identification appear to be less clear-cut. Some studies have reported that females outperform males on eyewitness accuracy tasks (Ellis et al., 1973), some have reported that males perform better than females (Trankell, 1972), and some have concluded that no differences exist (Wells & Olson, 2003). Overall, both Loftus et al. (1987) and Wells and Olson (2003) have concluded that one gender is not consistently better at recognizing individuals in eyewitness studies than another gender.

Own-Gender Bias

These gender difference findings have led researchers to explore the possibility of an own-gender bias within eyewitness experiences. Similar to other own-group biases, including the own-age bias (Wright & Stroud, 2002) and the own-race bias (Brigham & Malpass, 1995), some studies have demonstrated the existence of an own-gender bias within eyewitness identification situations. The own-gender bias has not been studied as extensively as the own-race bias, nor has it been as consistent and robust as the own-race bias (Slone et al., 2000). As described by Lindsay et al. (2002), an own-gender bias results when women recognize women better than men recognize women, and when men recognize men better than women recognize men. This bias appears to go in both directions, but is more often the result of females recognizing females better than they recognize males.

A number of studies have either demonstrated an own-gender bias or provided support for the possible existence of an own-gender bias in eyewitness tasks. For instance, Yarmey and Kent (1980) found that females were superior to males when identifying a female bystander, and that males were superior to females when identifying a male assailant in a crime scene. Further, Christiaansen, Ochalek, and Sweeney (1984) found that females demonstrated higher accuracy when identifying a female confederate. In addition to eyewitness identification accuracy, males and females have been found to perform in a biased manner on eyewitness memory tasks. Powers et al. (1979) created an eyewitness situation for participants and found that females recalled stereotypically female-oriented details more accurately than males, and that males recalled stereotypically male-oriented details more accurately than females. Taken together, Shaw and Skolnick (1994) have suggested that an own-gender bias may explain these gender differences in reliability.

To further test this hypothesis, Shaw and Skolnick (1994) explored this potential own-gender bias within an eyewitness accuracy situation. Participants were shown a slide sequence depicting an event involving a target person (either male or female), and subsequently asked to identify the target person from a lineup. The findings revealed a significant own-gender bias, indicating that both men and women identified the target person of their own gender more easily than they did the target person of the opposite gender. In particular, female participants identified the female target person more accurately than male participants, and male participants identified the male target person more accurately than female participants.

Shaw and Skolnick (1999) further demonstrated the own-gender bias in a study examining possible explanations for the weapon-focus effect (Cutler & Penrod, 1988). Participants viewed a video depicting a classroom intrusion, with the intruder carrying either an object of no salience (e.g., a book) or carrying an object of salience (e.g. a weapon). After viewing the video, participants were asked to identify the intruder from a lineup. An own-gender bias was found when the intruder was carrying an object of no salience, but was reversed when the intruder was carrying a weapon. Thus, Shaw and Skolnick (1999) concluded that the own-gender bias most likely occurs in situations that do not include salient objects.

An own-gender bias has also been demonstrated in studies assessing face recognition. In a meta-analysis of facial recognition studies, Shapiro and Penrod (1986) found an own-gender bias for faces that were correctly identified. Other studies have produced less consistent findings, however. Cross, Cross, and Daly (1971) were able to demonstrate the own-gender bias, but the effect was mostly attributed to females recognizing female faces better than male faces, and not to males recognizing male faces better than female faces. Similarly, Lewin and Herlitz (2002) found that the effect failed to occur to the same extent in females and males. Wright and Sladden (2003) further explored the own-gender bias using a facial recognition task, and revealed more consistent gender findings. Specifically, male participants performed better at recognizing male faces than females, and females performed better at recognizing female faces than males, with the magnitude of this effect being approximately equal for males and females. Identification accuracy for both males and females was further strengthened when the faces included hair than when the hair was covered, especially for faces of their own gender. Thus, the presence of hair appears to be an important factor in the own-gender bias; hair seems to be helpful when making same-gender identifications and less helpful when making cross-gender identifications.

Explanations for the Own-Gender Bias

Precise explanations for an own-gender bias remain generally unclear, but Shaw and Skolnick (1994) offer a potential explanation based on the differences-in-processing explanation offered for the own-race bias. Chance and Goldstein (1981) described differences in the processing of own-race and other-race faces, noting that participants used social inferences to describe own-race faces, while using superficial physical attributes to describe other-race faces. Further, this type of inferential processing led to better recognition than the more superficial processing. Shaw and Skolnick (1994) extended this hypothesis to own-gender bias findings, suggesting that there may be differences in the processing of information about members of the same gender versus members of the opposite gender. Specifically, they suggested that eyewitnesses tend to rely on inferential processing when viewing members of their own gender (e.g. asking questions such as "What type of person is this?"), and tend to rely on superficial processing when viewing members of the opposite gender (e.g. asking questions such as "How attractive is this person?"). Therefore, according to this hypothesis, better own-gender performance results from more inferentially-typed processing of own-gender individuals.

A further explanation for the own-gender bias is similar to the contact hypothesis for the own-race bias. Specifically, this hypothesis presumes that increased contact time with and processing of individuals of one's own race leads to better recognition and identification (Chiroro & Valentine, 1995). Wright and Sladden (2003) discussed the possible extension of this hypothesis to an own-gender bias, suggesting that increased exposure to same-gender individuals may lead to better recognition and identification accuracy. The authors pointed to increased exposure from media sources, such as magazines, noting that a majority of photographs are of same-gendered individuals as the target audiences. Although this may at least partially account for the gender bias, Wright and Sladden (2003) argued that exposure seems to be less intuitive as an explanation for own-gender findings than for own-race findings, and thus needs to be further explored.

Present Study

Building off of Davies and Hine (2007) and Ross, Finstad, and Ferraro (under review), the present study utilized a combined change blindness/eyewitness paradigm, adding potential gender bias as a variable of interest. The present study involved a 2 x 2 between-subjects factorial design, with Burglar Gender (male vs. female) and Participant Gender (male vs. female) as the independent variables. There were three primary dependent variables of interest: Overall Change Detection, Change Detection Within Gender Conditions, and Identification Within Gender Conditions.

Based on previous findings, four specific predictions were made, two pertaining to change blindness and two pertaining to eyewitness identification accuracy. First, a large percentage of participants were expected to exhibit change blindness, regardless of condition. Based on previous similar change detection studies, over 50% of participants were expected to demonstrate change blindness to the identity change. Second, an own-gender bias was expected with regards to change detection. Specifically, female participants would be more likely to detect the change in the female burglars than male participants in the female video condition, and male participants would be more likely to detect the change in the male burglars than female participants in the male burglar video condition. Third, with regards to eyewitness identification accuracy, participants who noticed the identity change were expected to more accurately identify one or both burglars in the subsequent lineup than participants who failed to notice the identity change. Fourth, an own-gender bias was also expected to arise with respect to eyewitness identification accuracy. Specifically, female participants were expected to more accurately identify the female burglars than the male burglars, and male participants were expected to more accurately identify the male burglars than the female burglars.

CHAPTER II

METHOD

Participants

As suggested by an a priori power analysis (GPOWER; Erdfelder, Faul, & Buchner, 1996), 144 participants were tested in the present study. The mean age of the participants was 19.81 years ($SD = 1.87$), and the majority of participants were freshmen or sophomores (N = 66 and N = 33, respectively). Participants included both males and females, with an equal number (N = 72) assigned to both video conditions. In total, 36 males and 36 females appeared in the male video condition, and 36 males and 36 females appeared in the female video condition. All participants were compensated for their participation in the form of extra credit toward their undergraduate psychology courses.

Materials

Video Clips

Two three-minute videos of a simulated home burglary were filmed and served as the stimuli for change detection. The content of the videos was similar to videos used in previous studies looking at change blindness and eyewitness identification (Davies & Hine, 2007; Ross, Finstad, & Ferraro, under review). In the first video condition, two females played the role of the burglars, and in the second video condition, two males played the role of the burglars. The burglars in both conditions were young Caucasian adults of moderate heights and weights. Care was taken to choose burglars and lineup distractors that participants likely did not know or recognize, as this would influence identity change detection and identification. To control for this, all burglars and lineup distractors were undergraduate psychology students at Morningside College in Sioux City, Iowa.

The content of the videos was as follows. The films began by showing the first burglar forcing his/her way into the front door of the home. After entering the home, the burglar walked into the den and began placing valuable items in a backpack. The burglar then walked upstairs and into a bedroom, continuing to put items in the bag. The identity of the burglar changed as he/she walked back down the stairs. The camera then cut to a shot of the second burglar at the bottom of the stairs. The burglar entered two more rooms, placed items in the backpack, and exited the home through the same door the first burglar entered. Each burglar was on camera for nearly equal lengths of time, with both head-and-shoulders and full-body shots.

To attempt to control for differences in the appearance of the burglars, each burglar was judged by a group of 15 undergraduate students. The students were asked to rate each burglar along the following dimensions: how distinctive-looking they were, how attractive they were, and how similar they were to the other lineup members. Each rating was made on a 7-point likert-type scale (1 = very ordinary, very unattractive, not at all similar; 7 = very distinctive, very attractive, very similar).

Content Questionnaire

After viewing the videos, participants were given a content questionnaire to assess their memory for content in the video. The primary purpose of the questionnaire, however, was to assess for change detection. The first and last questions asked participants to indicate (1) whether they noticed anything unusual about the burglar, and if so, to further describe; and (2) whether they noticed anything about the burglar change during the film. The remaining questions asked about events that took place and details from the video (e.g. "What color was the backpack the burglar used in the film?").

Photo Lineups

As used in Davies and Hine (2007) and Ross, Finstad, and Ferraro (under review) two six-person simultaneous lineups, one for the female video condition and one for the male video condition, were constructed for participants to view after completing the content questionnaires. Each lineup contained photos (in color) of both burglars and four distractors. To control for possible order effects, six different versions of the male and female lineups were created. Thus, each lineup member appeared in each of the 6 possible lineup positions (e.g. Burglar 1 was in Position 1 in Version 1, in Position 2 in Version 2, in Position 3 for Version 3, etc.). Participants were asked to indicate which burglar(s) they saw in the film by answering the following question: "Who in this lineup did you see in the film?" Asking the question in this manner allowed participants to select both burglars in the event that they did indeed detect the identity change. Participants were also asked to provide a confidence judgment for their lineup choice. Specifically, they were asked to indicate, on a 7-point likert-type scale (1 = not at all confident; 7 = very confident), how confident they were in their judgment.

Background Questionnaire

In order to obtain demographic information to characterize the sample, participants were asked to complete a background questionnaire. The questionnaire asked them to provide data regarding their age, gender, and years of education. In addition, participants were asked whether they usually wore contacts or glasses, and if so, if they were wearing them while taking part in the study. All participants who reported usually wearing glasses or contact lenses reported they were wearing them during the experimental sessions.

Procedure

Participants were tested either individually or in groups with experimental sessions that lasted approximately 15 – 20 minutes. All participants were randomly assigned to one of the two video conditions. Each session began with the experimenter giving participants the following directions: "You are about to watch a short video involving a small theft. The video illustrates the ease and frequency with which burglars can enter suburban residences. Make sure you give the video your full attention, and please refrain from making any comments during the film." After viewing the video, participants completed the content questionnaire. After all participants were finished with the questionnaire, the photo lineups were administered. The lineups were constructed on a sheet of paper that contained the following directions: "Please indicate who from this lineup you saw in the video." Asking the question in this manner was important, as it allowed participants to choose both burglars, should they have detected the identity change. Participants provided their responses by circling the lineup member(s) they thought appeared in the video (see Appendices B and C). After all participants completed the lineups, they were given a background questionnaire to complete. Once all participants were finished with the background questionnaire, they were debriefed. During this time, the experimenter revealed the true purpose of the study and also stressed the importance of not discussing the study with other potential participants.

CHAPTER III

RESULTS

Burglar Appearance Ratings

In order to assess each burglar's distinctiveness, attractiveness, and similarity to other lineup members, a separate group of student judges (N = 15) rated each burglar on these dimensions. The judges were asked to indicate, on a scale of 1 to 7; (1) how distinctive-looking the burglars were (1 = very ordinary; 7 = very distinctive); (2) how attractive the burglars were (1 = very unattractive; 7 = very attractive); and (3) how similar the burglars were to the other lineup members (1 = very dissimilar; 7 = very similar). Results of these analyses follow.

Distinctiveness

To assess for differences in the distinctiveness of Burglars 1 and 2, a two-way ANOVA was run with Distinctiveness Rating as the dependent variable and Burglar Gender and Burglar Number as the independent variables. Overall, the average distinctiveness rating for the male burglars was 3.43 (*SD* = 1.76, *range* = 1.00-7.00), while the average distinctiveness rating for the female burglars was 3.30 (*SD* = 1.62, *range* = 1.00-6.00). These mean differences were not statistically different, as indicated by a nonsignificant main effect of Gender ($F(1, 56) = 0.12$, $p = 0.73$). Thus, burglars of one gender were not rated as being significantly more distinctive than the other.

Keeping Burglar Gender constant, the average distinctiveness rating for Burglar 1 was 2.83 (*SD* = 1.64, *range* = 1.00 – 6.00) and the average distinctiveness rating for

Burglar 2 was 3.90 (*SD* = 1.56, *range* = 1.00 – 7.00). These mean differences were significantly different, as indicated by a significant main effect of Burglar Number (F (1, 56) = 7.67, p = 0.01). Across both genders, Burglar 2 was rated, on average, as being significantly more distinctive-looking than Burglar 1.

Comparing both burglars in each condition, the average distinctiveness ratings for male Burglars 1 and 2 were 2.27 (*SD* = 1.10) and 4.60 (*SD* = 1.50), respectively, while the average distinctiveness ratings for female Burglars 1 and 2 were 3.40 (*SD* = 1.92) and 3.20 (*SD* = 1.32), respectively. There was a significant Gender x Burglar Number interaction (F (1, 56) = 10.82, p = 0.001), indicating that the effect of Gender was not the same on both levels of Burglar Number. A subsequent Tukey test revealed that Male Burglar 2 was rated as significantly more distinctive-looking than both Male Burglar 1 and Female Burglar 2 ($p < .01$).

Attractiveness

To assess for differences in the attractiveness of Burglars 1 and 2, a two-way ANOVA was again run with Attractiveness Rating as the dependent variable and Burglar Gender and Burglar Number as the independent variables. Overall, the average attractiveness rating for the male burglars was 2.77 (*SD* = 1.19, *range* = 1.00 – 5.00) and the average attractiveness rating for the female burglars was 3.63 (*SD* = 1.56, *range* = 1.00 – 6.00). These means were statistically different, as indicated by a significant main effect of Gender (F (1, 56) = 11.11, p = 0.001). Overall, the female burglars were rated as significantly more attractive, on average, than the male burglars.

Keeping Burglar Gender constant, the average attractiveness rating for Burglar 1 was 4.13 (*SD* = 1.19, *range* = 2.00 – 6.00) and the average attractiveness rating for

Burglar 2 was 2.47 (*SD* = 1.06, *range* = 1.00 – 4.00). A significant main effect of Burglar Number was found (F (1, 56) = 51.53, p = 0.001), indicating that Burglar 1 was rated as significantly more attractive than Burglar 2 for both genders.

Comparing attractiveness ratings of each burglar in each condition, the average attractiveness ratings for male Burglars 1 and 2 were 3.47 (*SD* = 0.99) and 2.07 (*SD* = 0.96), respectively, while the average attractiveness ratings for female Burglars 1 and 2 were 4.80 (*SD* = 1.01) and 2.47 (*SD* = 1.06), respectively. A Gender x Burglar Number interaction revealed that these differences were nonsignificant (F, (1, 56) = 3.22, p = 0.08), indicating that differences in attractiveness ratings within each condition were not statistically different.

Similarity to Other Lineup Members

To assess for differences in the similarity of Burglars 1 and 2, a two-way ANOVA was run with Similarity Ratings as the dependent variable and Burglar Gender and Burglar Number as the independent variables. Overall, the average similarity rating for the male burglars was 2.37 (*SD* = 1.27, *range* = 1.00 – 7.00) and the average similarity rating for the female burglars was 3.07 (*SD* = 1.48, *range* = 1.00 – 6.00). A significant main effect of Gender was found (F (1, 56) = 4.67, p = 0.03), indicating that the female burglars were rated as being significantly more similar to other lineup members than the male burglars.

Keeping Burglar Gender constant, the average similarity rating for Burglar 1 was 2.73 (*SD* = 1.44, *range* = 1.00 – 7.00) and the average similarity rating for Burglar 2 was 2.70 (*SD* = 1.41, *range* = 1.00 – 6.00). These means were not statistically different, as indicated by a nonsignificant main effect of Burglar Number (F (1, 56) = 0.01, p = 0.92).

Thus, across both genders, there were no differences in the similarity ratings of Burglars 1 and 2.

Comparing similarity ratings for each burglar in each condition, the average similarity ratings of male burglars 1 and 2 were 3.00 ($SD = 1.46$) and 1.73 ($SD = 0.59$), respectively, while the average similarity ratings of female burglars 1 and 2 were 2.47 ($SD = 1.41$) and 3.67 ($SD = 1.34$), respectively. A significant Gender x Burglar Number interaction indicated that these means were statistically different ($F(1, 56) = 14.52$, $p = 0.001$). A subsequent Tukey test revealed that Male Burglar 1 was rated as significantly more similar to the other male lineup members than Male Burglar 2. In addition, Female Burglar 2 was rated as significantly more similar to the other female lineup members than Female Burglar 1. Finally, Female Burglar 2 was also rated as significantly more similar to other lineup members than Male Burglar 1 ($p < .01$).

Ultimately, it was expected that the average ratings on each of these dimensions would fall toward the center of the scales so as to limit the influence of these variables on change detection and identification performance. It was also expected that there would be minimal differences (if any) between the burglars along each of these dimensions. However, as analyses indicated, some of the average ratings did not fall toward the center of the scales, and there were statistical differences in distinctiveness, attractiveness, and similarity between the burglars. To summarize, Burglar 2 was rated as significantly more distinctive-looking than Burglar 1 across both conditions, whereas Burglar 1 was rated as significantly more attractive than Burglar 2 across both conditions. Further, Male Burglar 2 was rated as more distinctive-looking than Male Burglar 1. The male burglars were also rated as less attractive than the female burglars. Finally, the female burglars were rated as being significantly more similar to the other female lineup members than the male burglars were to the other male lineup members. Also, Male Burglar 1 was rated as being more similar to the other male lineup members than Male Burglar 2, while Female Burglar 2 was rated as more similar to other lineup members than Female Burglar 1. The potential impact of these differences will be further discussed in later sections of this paper.

Overall Change Blindness

Across both video conditions, a total of 47 of the 144 participants (32.6%) reported noticing the identity change in the burglars, while 97 of the 144 participants (67.4%) failed to notice the identity change. A main effect of Change Detection was significant (χ^2 (1, N = 144) = 15.93, $p = 0.001$), indicating that participants were more likely to fail to detect the identity change. Change detection performance between male and female participants overall did not differ, as 23 of the 72 males (32%) and 24 of the 72 females (33%) reported detecting the change. A main effect of Gender was nonsignificant (χ^2 (1, N = 144) = 1.89, $p = 0.60$), indicating that neither gender was more likely than the other to detect the identity change across both conditions. Finally, within the Male Video Condition, 34 of the 72 participants (47%) reported detecting the change, and within the Female Video Condition, 13 of the 72 participants (18%) reported detecting the change. These differences were significant, as indicated by a significant Condition x Change Detection interaction (χ^2 (1, 144) = 14.31, $p = 0.001$). Thus, participants were more likely to detect the change in the burglars in the male video condition than in the female video condition.

Gender and Change Blindness

To assess for a possible gender bias in change detection, differences between male and female participants in both video conditions were compared. Table 1 displays the cell frequencies for change detection of males and females for both videos.

Table 1. Change Detection by Participant Gender and Video Condition

	Participant Gender		
	Males	Females	Total
Condition and Detection			
Male Video			
Detected Change	18	16	34
Did Not Detect Change	18	20	38
Total	36	36	72
Female Video			
Detected Change	5	8	13
Did Not Detect Change	31	28	59
Total	36	36	72

In the male video condition, 18 of the 36 male participants (50%) reported detecting the change, while 16 of the 36 female participants (44%) reported detecting the change. In the female video condition, 8 of the 36 female participants (22%) reported detecting the change, and 5 of the 36 male participants (14%) reported detecting the change. These differences in change detection were not statistically significant, as revealed by a nonsignificant Gender x Change Detection interaction (χ^2 (1, 144) = 0.035, $p = 0.85$). Altogether, male participants were not more likely than female participants to detect the change in the male burglars, and female participants were not more likely to detect the change in the female burglars.

Overall Identification Performance

Overall, across both conditions, 111 of the 144 participants (77%) correctly identified at least one burglar, while 33 of the 144 participants (23%) failed to correctly identify any burglars. A main effect of Correct Identification was significant (χ^2 (1, 144) = 12.36, p = 0.02), indicating that participants were more likely to make correct than incorrect identifications. Overall identification performance between male and female participants did not differ, with 54 of the 72 males (75%) correctly identifying at least one burglar and 57 of the 72 (79%) females correctly identifying at least one burglar. A main effect of Gender was nonsignificant (χ^2 (1, 144) = 0.20, p = 0.91), indicating that one gender was not more likely than the other to make correct identifications overall. Finally, within the male video condition, 64 of the 72 participants (89%) correctly identified at least one burglar, and within the female video condition, 47 of the 72 participants (65%) correctly identified at least one burglar. These differences in identification were statistically significant, as revealed by a significant Identification x Condition interaction (χ^2 (1, 144) = 11.81, p = 0.001). Overall, then, participants were more likely to correctly identify the male burglars than to correctly identify the female burglars.

Gender and Identification Performance

To assess for a possible gender bias, differences in identification performance of male and female participants in both conditions were compared. Table 2 displays the cell frequencies for correct identifications made by males and females in both conditions.

Table 2. Identification Performance by Gender and Video Condition

	Correct Identification		
	Yes	No	Total
Condition and Gender			
Male Video			
Males	32	4	36
Females	32	4	36
Total	64	8	72
Female Video			
Males	22	14	36
Females	25	11	36
Total	47	25	72

In the Male Video Condition, 32 out of the 36 male participants (89%) correctly identified at least one burglar, and 32 out of the 36 female participants (89%) also correctly identified at least one burglar. In the Female Video Condition, 25 out of the 36 female participants (69%) correctly identified at least one burglar, while 22 out of the 36 male participants (61%) correctly identified at least one burglar. These differences were not statistically different, as indicated by a nonsignificant Gender x Identification Performance interaction (χ^2 (1, 144) = 0.35, p = 0.55). In summary, male participants were not more likely to correctly identify the male burglars than female participants, and female participants were not more likely to correctly identify the female burglars than male participants, as originally anticipated.

Correct Identification and Change Detection

Identification performance was also compared between participants who detected and failed to detect the identity changes. Based on previous findings, those who noticed the change were expected to have better identification task performance than those who failed to notice the change. Of the 47 participants who detected the change, 42 (89%) made correct identifications, and of the 97 participants who failed to detect the change, 68 (70%) made correct identifications. An Identification Performance x Change Detection interaction was significant (χ^2 (1, 144) = 6.58, p = 0.01), indicating that participants who detected the identity change were more likely to make correct identifications than those who failed to detect the identity change.

Correct Identification and Lineup Version

As previously mentioned, six different versions of the male and female lineups were created to control for possible identification performance differences. Overall, 12 participants viewed each lineup version. Table 3 displays the number of correct identifications for each lineup version.

Table 3. Correct Identifications by Lineup Version

Lineup Version	Number of Correct Identifications
1	21
2	18
3	18
4	19
5	15
6	20

An Identification x Lineup Version interaction was nonsignificant (χ^2 (5, 144) = 5.01, $p = 0.41$), indicating that participants were not more likely to make correct identifications in any of the lineup versions.

Identification Performance and Confidence Judgments

The correct identification data was further analyzed to compare the confidence judgments of those who made correct identifications to those who made incorrect identifications. Within the eyewitness literature, confidence has been found to be related to eyewitness accuracy– in some cases strongly related (Lindsay, Read, & Sharma, 1998), and in other cases weakly related (Bothwell, Deffenbacher, & Brigham, 1987). In the present study, those who made correct identifications had an average confidence judgment of 5.37 ($SD = 1.37$), while those making incorrect identifications had a slightly lower average confidence judgment ($M = 3.70$, $SD = 1.26$). An independent groups t test revealed that these means were statistically different (t (142) = 6.25, $p < 0.01$), indicating that those who made correct identifications had a higher average confidence judgment than those who made incorrect identifications.

Burglar Choice

Identification results were further analyzed to determine whether there were differences in burglar choice among participants. Table 4 displays the frequencies of burglar choices (1, 2, or both) for the participants who made correct identifications in both conditions.

Table 4. Burglar Choice by Video Condition

	Burglar Choice			
	Burglar 1	Burglar 2	Both	Total
Condition				
Male Video	13	36	15	64
Female Video	22	24	2	48
Total	35	60	17	112

Overall, 95 of the 112 participants (85%) that made correct identifications chose one burglar during the lineup identification task, and the remaining 17 participants (14%) chose both burglars. Analyses revealed that more participants chose one burglar than both burglars in the identification task, as indicated by a significant binomial test ($p = 0.001$). Further, across both conditions, 35 of the 112 participants (31%) correctly chose Burglar 1, 60 participants (54%) correctly chose Burglar 2, and 17 participants (12%) correctly chose both burglars. Analyses revealed that more participants chose Burglar 2 than Burglar 1, as indicated by a significant binomial test ($p = 0.013$).

Content Questionnaire Accuracy

Content questionnaire accuracy results indicated that participants were generally accurate when assessed for their memory of video content. The highest possible score on the questionnaire was 12 points. The average content questionnaire score across both conditions was 9.38 ($SD = 1.56$), yielding a 78.2% accuracy rate. Table 5 displays the average content questionnaire scores (with standard deviations in parentheses) for both video conditions and for those who did and did not detect the identity change.

Table 5. Content Questionnaire Accuracy by Change Detection and Video Condition

	Change Detection	
	Yes	No
Video Condition		
Male	9.94 (1.50)	9.83 (1.30)
Female	10.00 (1.05)	9.73 (1.81)
Total	9.95 (1.40)	9.77 (1.62)

To assess for possible differences in the accuracy of those who detected the change and those who failed to detect the change, an independent groups t test was run to compare the means of the two groups. The average content questionnaire score for those who detected the change was 9.95 ($SD = 1.40$), while the average content questionnaire score for those who failed to detect the change was 9.77 ($SD = 1.62$). These means were not found to be significantly different ($t\ (142) = -0.62, p > 0.05$), indicating that those who detected the change did not have higher average content accuracy than those who failed to detect the change.

CHAPTER IV

DISCUSSION

Overall, two of the four hypotheses in the present study were supported. First, the present study added yet another demonstration of change blindness to identity changes during a brief visual encounter. Only 32.6% of participants detected the identity change in the burglars, a percentage that is similar to the rates of other change blindness studies (e.g. 30-53%, Levin & Simons, 1997; Simons & Levin, 1998; Levin et al., 2002; Davies & Hine, 2007).

As previously discussed, a number of explanations have been proposed to account for change blindness. In the present study, several possible explanations for the low change detection rate seem plausible. First, participants may have failed to notice the change in burglars due to the nature of the change detection task. Specifically, the present study utilized an *incidental* change detection task, whereby participants were only told to carefully watch the video. Conversely, an *intentional* change detection task would instruct participants to pay close attention to the film because they would later have to answer questions about it. Change blindness research has found that change detection performance is better in intentional rather than incidental change detection tasks (Levin et al., 2002), which may explain why change detection in the present study was low. Similarly, participants may have failed to effortfully encode the features of both burglars to allow for successful change detection. Levin and Simons (1997) have suggested that even objects that are of central interest still need to be extensively processed in order to be adequately represented. If such effortful encoding does not occur, the likelihood of change detection decreases.

Additionally, overall change detection may have been low because of the duration of the videos. Specifically, participants may have failed to notice the identity change because of their brief exposure to the burglars. It has been suggested that exposure time may impact change blindness (Davies & Hine, 2007), as it does eyewitness identification accuracy. Specifically, the amount of time participants spend viewing a perpetrator has been shown to be related to their ability to subsequently identify the perpetrator (Cutler & Penrod, 1995). This relationship is generally linear, with increases in exposure time being related to increases in recognition accuracy (Laugherty, Alexander, and Lane, 1971; Ellis, Davies, & Shepherd, 1977). Similarly, increases in exposure time to stimuli may be related to better change detection performance. Previous change detection studies have not directly manipulated exposure time, but they give some preliminary cues about how differences in exposure time may affect change detection performance. For example, studies using video stimuli with shorter durations (e.g. 60 – 90 seconds; Angelone, Levin, & Simons, 2003; Davies & Hine, 2007) have reported smaller change detection percentages (6.7% and 12.5%, respectively). On the other hand, Davis et al. (2008) showed participants a longer duration video (4 minutes) and found a considerably higher percentage of change detection (40.4%). Thus, future research could further explore this hypothesis by comparing change detection ability in low exposure and high exposure time conditions.

Less support was garnered for the *limited attention* hypothesis of change blindness (Simons, 2000) in the present study, although it may have explained the lack of change detection for some participants. First, overall identification accuracy was quite high, with a large percentage (77%) of participants making correct identifications. This finding suggests that participants were likely paying close attention to the video, as they were able to accurately identify one or both of the burglars in the lineup identification task. Additionally, the content questionnaire results support the unlikelihood of the limited attention hypothesis, as both change detectors and non-change detectors scored relatively high on the questionnaire. Thus, it seems likely that participants were paying close enough attention to accurately recall details of the films.

Overall change detection was also found to be significantly better in the male video condition than in the female video condition. The change in the male burglars may have been easier for participants to detect because they were rated as more distinctive from each other than the female burglars were. Specifically, the differences in distinctiveness between the male burglars were larger than the differences between the female burglars, which may have made it easier for participants to notice the change halfway through the video. This speculation has been briefly discussed by others (Simons & Ambinder, 2005), noting that future research can benefit from further exploring whether change detection ability is impacted by varying degrees of attention to elements of a scene. Particularly, specific features of images or scenes may attract more attention because of their distinctiveness, and may thus improve change detection ability.

Even though there were slight gender differences in change detection, a gender bias in change detection failed to emerge. Male participants *did* notice the change in the male burglars more frequently than female participants in the male video condition, and female participants *did* notice the change in the female burglars more frequently than male participants in the female video condition, but these differences were not statistically significant. It is possible that a gender bias does not exist for change detection ability, but it is also possible that a bias may emerge under better conditions. Specifically, if the pre-experiment piloting of the burglars was done more carefully to limit the differences in attractiveness and distinctiveness, differences in change detection may have emerged.

As previously stated, overall identification accuracy was quite high across both conditions, with 77% of participants correctly identifying at least one of the burglars. As with change detection, significantly more correct identifications were made in the male video condition than in the female video condition. Again, it was easier to correctly identify the male burglars than the female burglars, likely for the same reasons it was easier to detect their identity change. It is possible that differences in distinctiveness could again explain the better identification performance. Perhaps the male burglars were easier to remember because they were more distinctive-looking to participants than the female burglars. Or, it may have been more difficult to identify the female burglars due to their overall relative similarity to the other female lineup members. The analyses of the burglar appearance ratings indicated that the female burglars were rated as being more similar to other lineup members than the male burglars, which may have led to more difficulty in correctly identifying them.

Also consistent with change detection findings, a gender bias failed to emerge for identification accuracy. The number of correct identifications made by male and female participants in the male video condition was exactly equal, and the number made by male and female participants in the female video condition was almost equal. Thus, male participants were not more likely to correctly identify the male burglars than female participants, and female participants were not more likely to correctly identify the female burglars than male participants, as expected.

The lack of replication of the own-gender bias in identification accuracy was surprising, as it has been found in previous studies utilizing a similar type of eyewitness paradigm. In particular, previous studies (Shaw & Skolnick, 1994; 1999) have found an own-gender bias in identification accuracy using a video/distractor task/identification task paradigm similar to what was used in the present study. The lack of bias may be due to characteristics of this particular combined change blindness/eyewitness paradigm. Ross, Finstad, and Ferraro (under review) tested the own-race bias utilizing this combined change blindness and eyewitness paradigm and found a similar pattern of findings. Specifically, identification accuracy was fairly high overall, but an own-race bias in identification accuracy was not found. The exact characteristics of the paradigm that may account for the lack of bias are unknown.

It was also hypothesized that identification accuracy would differ between those who noticed and those who failed to notice the identity changes. Previous studies have found that change detectors are more likely to make correct identifications than non-change detectors (Levin et al., 2002; Davies & Hine, 2007). The present study further supported this finding, as the percentage of correct identifications made by change detectors was significantly higher than the percentage of correct identifications made by non-change detectors. As discussed by Levin et al. (2002), this finding suggests that change detection is related to a better representation of the pre-changed object (or the first burglar). In other words, findings from the present study lend support to the theory that change blindness is associated with poorer memory for the details of the pre-changed object. Results from the burglar choice analyses further confirm this, as those who made correct identifications were more likely to choose Burglar 2 than Burglar 1, suggesting that their initial representation of Burglar 1 may have been poor.

This burglar choice finding additionally provides support for the *overwriting hypothesis* of change blindness, which suggests that the second version of a scene creates a visual disruption and subsequently "overwrites" the original version of the scene. This, in turn, leads observers to forget aspects of the first scene and ultimately fail to detect the change (Simons et al., 2002). It is possible that the representation of the second burglar overwrote participants' original representation of the first burglar, thus leading them to fail to detect the identity change.

Limitations

One limitation that has already been addressed concerns the piloting of the burglars prior to the onset of the study. Due to time and logistical constraints, the piloting of the burglars and other lineup members was not as extensive as originally planned. Ideally, the average appearance ratings should have been close to the middle of the scales, indicating that the burglars were not too ordinary or too distinctive, too unattractive or too attractive, and too dissimilar or to similar to the other lineup members. In addition, the burglars should not have differed along these dimensions, as these differences may have influenced change detection and identification. However, some average ratings were above or below the center of the scales, and there were differences between the burglars along these dimensions. Thus, it is possible that these differences account for the lack of gender biases in change detection and identification performance.

Altogether, better piloting would help control for any influence these dimensions would have on change detection and identification, and would possibly alter the findings.

One methodological limitation that could be improved upon for future studies concerns the wording of the questions on the content questionnaire. In particular, the questions were worded in a manner that may have led some participants to assume only one burglar was present in the video. Specifically, all questions referred to "the burglar" or characteristics of "the burglar", implying that only one burglar appeared in the video (see Appendix D). If participants were questioning whether they saw two burglars in the video, the wording of these questions may have influenced whether they reported detecting the change. On the other hand, the questions could not be worded to imply that two burglars were present in the video, as it would have disclosed the change detection portion of the study.

With respect to the lineup performance results, an additional limitation of the present study concerns the generalizability of eyewitness identification findings. Within the area of psychology and law, researchers have long debated about whether findings from eyewitness testimony and eyewitness identification studies can be appropriately generalized. Critics of eyewitness research have argued that it is relatively homogenous with respect to sampling, stimuli, and measures. This homogeneity poses a threat to the generalizability of findings from eyewitness research to actual criminal cases (Konecni & Ebbesen, 1986). Despite this criticism, some have argued that eyewitness research can be appropriately generalized, at least across age groups. For instance, O'Rourke et al. (1989) tested the generalizability of eyewitness findings and found that the effects of various eyewitness factors (weapon presence, disguise, and suggestive lineup instructions) were found not only among the college student age group, but also among other age groups (e.g. 18-74 year-olds). From this, the authors concluded that researchers can be fairly confident in the generalizability of eyewitness research across differing age groups.

Implications

The findings from the present study add to the already-existing change blindness literature, further demonstrating the difficulty that individuals show for detecting changes in identities. With respect to the present study, findings revealed poor detection of changes to individuals seen during a brief eyewitness encounter. The present study was also the first to attempt to demonstrate a gender bias in a change blindness situation. Again, males did outperform females in change detection of male burglars and females slightly outperformed males in change detection of female burglars, but not statistically. It is possible that performance differences may widen if better piloted burglars are used. To strengthen this hypothesis, future research could explore whether perceived distinctiveness influences change detection ability. Or, it is possible that males and females simply do not differ in their ability to detect identity changes to individuals of their own gender.

Findings from the present study failed to replicate the existing own-gender bias that has been found in eyewitness identification accuracy. If this bias would have been upheld, females would have shown better accuracy in identifying female perpetrators and less accuracy in identifying male perpetrators, and males would have shown better accuracy in identifying male perpetrators and less accuracy in identifying female perpetrators. Instead, males and females had almost equivalent accuracy in identifying both male and female perpetrators. Despite not finding a gender bias in identification performance, the vast majority of participants were able to correctly identify at least one burglar- even those who did not detect the change. This result implies that during brief eyewitness situations, where identification is made shortly thereafter, eyewitness accuracy can be quite high. This is not surprising, as research has demonstrated that long delays between the time of the crime and the identification process are associated with decreases in identification accuracy (Wright & McDaid, 1996).

Results from the present study also provided additional support for the theory that connections exist between the change blindness and eyewitness literatures. Davies and Hine (2007) suggested that it is possible for cases of misidentification to be the result of change blindness. In particular, it is possible to envision a witness displaying errors akin to change blindness, either by confusing a perpetrator seen entering a building with an innocent bystander seen leaving the building, or by believing one perpetrator was at a crime scene when there were actually two (a case of unconscious transference). The present study illustrates this second type of error, as participants were largely unable to notice that two different people were at the same crime scene.

APPENDICES

Appendix A
Consent Form

You are invited to participate in a study examining perceptions of crime committed in suburban residences. If you would like to continue participation in this study, please read the following information carefully. Further, if you choose to participate, please sign and date the bottom of this form. The second copy is yours to keep for your records.

If you choose to participate, you will view a video depicting a simulated home burglary and then complete follow-up questionnaires. The total expected participation time is 20 minutes. The results obtained will be used in data analysis of the previously described study.

Results from this study will benefit the research already developed in the area of psychology and law. There is little anticipated risk for you in participating in this study. Some participants may experience mild discomfort when viewing the video of the simulated crime. If you experience extreme discomfort, I suggest you contact the Counseling Center on campus at 777-2127 for assistance.

Participation is completely voluntary and participating or not participating in this study will not adversely affect your standing at UND. You may choose to discontinue your participation in this study at any time for any reason without penalty by indicating to the researcher that you wish to discontinue.

Confidentiality: The consent forms and all data generated from this study will be protected in a locked filing cabinet. Consent forms and data will be stored separately. Your name will not be connected with any of the data generated and will not be used in any reporting of this data. Your NAID and Social Security numbers also will not be obtained, and you will be assigned a random number instead. Data and consent forms will be stored for a minimum of three (3) years, after which they will be destroyed by shredding. Only Alison Finstad, Dr. Ric Ferraro, and individuals that audit IRB procedures will have access to the data.

This study has been reviewed by the University of North Dakota Institutional Review Board. In the unlikely event that you experience adverse effects as a result of your participation within this study, you may contact the Counseling Center (777-2127), or Alison Finstad (777-4779) for direction. If you have any questions about the research, please call Alison Finstad at 777-4779 or Dr. Ric Ferraro at 777-2414. If you have any other questions or concerns, please call the Institutional Review Board at 777-4279.

By signing below, you are consenting to participate in the present study. Thank you for your willingness to participate.

____________________________ ______________

Signature of Participant Date

Appendix B
Female Photo Lineup

Who from this lineup did you see in the video? (Please circle)

1


2


3


4


5


6


How confident are you in your judgment on a scale of 1-7 (with 1 = not very confident and 7 = very confident)? ________

Appendix C
Male Photo Lineup

Who from this lineup did you see in the video? (Please circle)

1 

2 

3 

4 

5 

6 

How confident are you in your judgment on a scale of 1-7 (with 1 = not very confident and 7 = very confident)? ________

Appendix D
Content Questionnaire

Content Questionnaire

Instructions: Please answer the following questions to the best of your knowledge. Please try to be as accurate as possible.

---

1. Please provide a short physical description of the burglar in the video.

2. Did you notice anything unusual about the burglar? If so, please describe.

3. Were there bricks on the outside of the house the burglar entered? (Circle One)

Yes No

4. Did the burglar leave the house through the same door as they entered? (Circle one)

Yes No

5. What were the colors of the burglar's backpack? (Circle One)

a) Red and Black
b) White and Black

c) Green and Black
d) Blue and Black

6. After entering the house, which direction did the burglar go? (Circle One)

To their Left To their Right

7. How many rooms did the burglar steal items from?

8. What type of clothing did the burglar wear on their upper body?

9. Did the burglar steal the following items? (Circle Yes or No for each)

a) Nintendo Gaming System	Yes	No
b) Laptop	Yes	No
c) Wallet	Yes	No
d) Guitar	Yes	No
e) Jewelry	Yes	No
f) Clock	Yes	No

10. Did you notice anything change about the burglar throughout the film? If so, please describe.

Appendix E
Background Questionnaire

Demographic Questionnaire

Instructions: Please provide responses to the following questions.

---

1. What is your gender? _____ Male _____ Female

2. What is your age? ______

3. Class Year (circle one): Fr Soph Jr Sr Other

4. Do you normally wear glasses or contact lenses?

Yes No

A) If yes, are you currently wearing them?

Yes No

1) If no, what is your prescription strength? _______

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