OWN AND OTHER RACE FACE RECOGNITION: THE EFFECTS OF INSTRUCTIONS AND OTHER-RACE CONTACT

By

Emily Susan Pica

Approved:

_____	_____
Amye R. Warren Professor of Psychology (Director of Thesis)	David F. Ross Professor of Psychology (Committee Member)
_____	
Richard L. Metzger Professor of Psychology (Committee Member)	
_____	_____
Herbert Burhenn (Dean of the College of Arts and Sciences)	A. Jerald Ainsworth (Dean of the Graduate School)

OWN AND OTHER RACE FACE RECOGNITION: THE EFFECTS OF INSTRUCTIONS AND OTHER-RACE CONTACT

By

Emily Susan Pica

A Thesis
Submitted to the Faculty of the
University of Tennessee at Chattanooga
in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Psychology

The University of Tennessee at Chattanooga
Chattanooga, Tennessee

May 2012

ABSTRACT

The cross-race effect occurs when people are more accurate in identifying members of their own race versus those of other races. An emerging theory of the cross-race effect involves social-cognitive processes such as categorization and individuation (Hugenberg, Miller, & Claypool, 2007). Prior research has examined whether instructions to individuate other-race faces, given at encoding, can improve sensitivity thereby reducing the cross-race effect. Results have been inconsistent. Two experiments sought to examine this social-categorization theory with both White and Black participants. In the first study, individuation instructions did not improve White participants' sensitivity for other-race faces and decreased sensitivity for same-race faces. A second study using the same instructions but different stimuli produced similar results for White participants. Instructions improved both same-race and other-race sensitivity for Black participants. Interracial contact did not appear to relate to the size of the cross-race effect. Overall, results did not support the categorization-individuation model.

DEDICATION

To my mother, grandmother, and aunt for all of their encouragement and support; to my special friend Alexandra for motivating me to achieve my goals more than any other person could, and to Dave for sticking by me throughout everything.

ACKNOWLEDGEMENTS

This thesis could not have been accomplished without the support of key individuals. I would first like to acknowledge my thesis advisor, Dr. Amye Warren who was willing to take this journey with me. I will never be able to repay you for all of the hours you spent helping me achieve this goal. You have helped me become both a better academic and researcher. You have also helped me complete this stage in accomplishing my goal as well as helped me move on to the next stage in my academic career. To my other committee members, Dr. David Ross and Dr. Richard Metzger, thank you for all of the opportunities you have given me throughout my academic career at UTC. Thank you, David, for all of the doors you have opened for me. Because of you, I am going on to the next journey of my life. For that, I could never repay you.

I would like to thank Dr. Andre Kehn for inspiring this research through his past work and also for all the help in the statistical analyses. I would also like to thank my undergraduate advisor, Dr. Karri Verno. Because of her, I became interested in this area of research. Thank you for helping me begin my academic career. I would also like to thank my friends and family who supported me throughout this process throughout both encouragement and allowing me to use your classes for my research.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

CRE, Cross-race effect

CIM, Categorization Individuation Model

LIST OF SYMBOLS

α, Cronbach's alpha

d', sensitivity

C, response criterion

CHAPTER I

INTRODUCTION AND BACKGROUND

In October of 1979 Clark McMillan was convicted of rape and robbery of a sixteen-year-old girl in Memphis, Tennessee (Innocence Project, 2011). The victim was with her boyfriend at the time of the incident. Once the police had been notified, both the victim and her boyfriend were asked to give descriptions of the perpetrator. No DNA was taken from the victim. The victim and her boyfriend are White and McMillan is Black. A photo spread was first used, and McMillan was in one of the photos. Neither the victim nor her boyfriend chose McMillan. The victim did not choose anyone, and her boyfriend chose a filler. Nevertheless, at trial, both identified McMillan.

McMillan gave his alibi and had witnesses confirm this alibi. However, he was convicted of rape and robbery and sentenced to 119 years in prison. All of his appeals were denied. Finally, McMillan contacted the Innocence Project which is a public policy organization dedicated to exonerate wrongfully convicted individuals through DNA testing (Innocence Project, 2011). The Innocence Project accepted this case in 1997 and tracked down his file. The fluids on the victim's clothes were tested for McMillan's DNA. In April 2002, test results revealed that Clark McMillan was excluded as a suspect. He was exonerated of this charge. He had spent over 22 years in prison for a crime he did not commit.

Sadly, there are many cases similar to McMillan's (Innocence Project, 2011). Numerous other examples of mistakenly identifying an innocent individual exist, particularly when the

witness is of another race than the suspect. In 2010 the Innocence Project published their annual report in which they reported that they had helped exonerate 250 people. A majority (76%) of these wrongfully accused people were convicted based on faulty eyewitness identification. This means that 190 people out of the 250 were wrongly identified; 100 of those 190 people, or more than half, were of a different race than the eyewitness.

Background

Eyewitness identification is a common form of evidence to help convict a perpetrator. Face recognition accuracy by adults has been shown to be affected by various factors (Wells & Olsen, 2003). Some of these factors include the amount of time the witness saw the face, whether or not there was a weapon, and the race of the perpetrator. If the witness and the perpetrator are of different races, face recognition is poorer. This phenomenon is known as the cross-race effect (though some refer to it as the other-race effect or the own-race bias). This paper will use the term cross-race effect or CRE. Meissner and Brigham (2001) defined the cross-race effect as the finding that adults are able to more accurately recognize and identify faces of their own race versus faces of another race.

Eyewitness identification is a crucial element in determining the identity of the actual perpetrator. There are numerous eyewitness misidentifications that could be prevented. Research on the CRE tends to utilize one of two paradigms: a facial recognition paradigm or an eyewitness lineup paradigm (Brigham, Bennett, Meissner, & Mitchell, 2007). The current study utilizes the facial recognition paradigm. Examining face recognition and factors influencing it, such as instructions and set size, can help to identify underlying mechanisms behind misidentifications and in turn, possible ways to eliminate the problem.

In a meta-analytic review, Meissner and Brigham (2001) reported that the probability of accurate cross-race identification was less than half that of same-race identification. The meta-analysis examined 39 studies of the cross-race effect. Analyses examined differences in performance on own-race and other-race faces across measures of hits (correct identifications of faces actually seen) and false alarms (incorrect identifications of faces not seen) and across aggregate measures of discrimination (how hard or easy it is to detect that a target stimulus is present) and response criterion (the extent to which one response is more probable than another). Own-race faces produced a higher proportion of hits and a lower proportion of false alarms compared with other-race faces. The race of the face accounted for 15% of the variability in accuracy across studies (k=56), and participants were 2.23 times more likely to accurately discriminate own-face races as new versus old (meaning participants were more accurately in distinguishing faces as whether or not they were seen before) when compared with performance on other-race faces. Meissner and Brigham (2001) also found that the cross-race effect was stronger for White witnesses recognizing Black faces than for Black witnesses recognizing White faces. Meissner and Brigham's meta-analysis is the most recent in a series of meta-analyses confirming the existence of a reliable cross-race effect (Brigham & Malpass, 1985; Chance & Goldstein, 1996).

Kassin, Tubb, Hosch, and Memon (2001) examined the beliefs of eyewitness testimony experts (psychologists). A majority of those surveyed agreed that, "Eyewitnesses are more accurate when identifying members of their own race than members of other races." Ninety percent of the experts agreed that it is reliable effect, 72% agreed they would testify in court concerning the cross-race effect, and 97% agreed there is a research basis for the phenomenon.

Benton, Ross, Bradshaw, Thomas, and Bradshaw (2005) examined the knowledge of factors affecting eyewitness accuracy in a sample of jurors, judges, and law enforcement professionals. Their survey also included a question on cross-race bias. Agreement rates varied among the groups. Although 81% of judges and 79% of law enforcement personnel agreed that cross-race identifications are reliably poorer than own-race identifications, only 47% of jurors agreed. Similarly, Schmechel, O'Toole, Easterly, and Loftus (2006) surveyed potential jurors in the District of Columbia, finding that jurors do not understand the cross-race effect. Almost half of the survey respondents thought cross-race and same-race identifications are of equal reliability, and many other respondents didn't know or thought cross-racial identification was more reliable (Schmechel et al., 2006). Thus, a total of two-thirds of the jurors indicated they are ill-informed about the inaccuracy of cross-racial identification and therefore would begin a criminal trial without any meaningful understanding of the limitations of cross-race identifications.

The cross-race effect seems to appear as early as infancy and progressively grows stronger through adulthood (e.g., Kelly, Quinn, Slater, Lee, Ge, & Pascalis, 2007; Meissner & Brigham, 2001; Pezdek, Blandon-Gitlin, & Moore, 2003). It is not just about race, infants also tend to categorize faces according to gender. Research has shown that infants have a visual preference for the gender of their primary caregiver, whether male or female (Kelly et al., 2007). The early appearance of the own-race bias and its increasing strength suggest that preference for own race faces may be due to the fact that more same-race faces are in the visual field during development leading to a larger collection of own race faces in one's memory. Additionally, the appearance of the CRE so early in life suggests that it may prove difficult to reduce.

Research has established that the CRE is a strong, reliable effect that appears early in life and exists to some degree for individuals of multiple races. Unfortunately, laypeople are not generally aware of the cross-race effect, suggesting that cross-race misidentifications will continue to be made and used to falsely convict innocent people. Any efforts to reduce cross-race identification errors would be helped by an understanding of what produces them in the first place. There are many different explanations of the cross-race effect, but most fall under two major categories: perceptual expertise and social-categorization models.

Explanations of the Cross-Race Effect

Perceptual expertise. There are two major theories for the cross race effect: perceptual expertise models and social-categorization models. The basic idea for the perceptual expertise models is most people have differential experience encoding same-race and other-race faces. This differential expertise in encoding the faces then leads to differential recognition accuracy (Bernstein, Young, & Hugenberg, 2007). Perceptual expertise models posit that we encode facial features in greater detail for same-race faces than we do when encoding features of other-race faces. Many people have greater experience with same-race people which leads them to develop mechanisms for making distinctions between faces (for example, attending to one's eyes) which may not be as useful in distinguishing among other-race people (Meissner & Brigham, 2001). Learning models are in the realm of perceptual expertise models. Learning models propose that infrequent interracial contact results in perceivers developing greater experience distinguishing between and encoding faces belonging to members of their own race relative to those of other races (Hugenberg, Young, Bernstein, & Sacco, 2010). These differential levels of experience then lead to greater recognition of own-race faces relative to other-race faces; however, this contact with cross-race individuals is unlikely to translate into perceptual expertise unless the

person is relatively attentive and puts forth great effort in encoding the faces (Walker & Hewstone, 2006).

Lindsay, Jack, and Christian (1991) examined how perceptual skills specific to identifying faces of particular racial groups contribute to the cross-race effect. Participants included 32 Black and White undergraduate students. Test pairs were created which consisted of faces seen in the sample phase and a similar looking face for the test phase. The face that was used in the test phase was covered up in the sample phase. Half of the participants saw the sample face on the left side of a computer screen while the other half saw the faces on the right side. The test phase faces were the picture opposite of the sample phase. A prominent cross-race effect was evident for White participants. White participants performed significantly better on White faces than on Black faces. However, Black participants performed equally well on White and Black faces (Lindsay et al., 1991). This study suggests that differences in perceptual skills, such as how the face is processed (holistically compared to featurally), specific to processing faces of particular races contribute to the other-race effect in recognition memory (Lindsay et al., 1991).

Tanaka, Kiefer, and Bukach (2004) also suggest that own-race and other-race faces are processed differently. They argue that own-race faces are more likely to be processed holistically, encoding facial features combined with spatial relations to other features, whereas other-race faces are processed featurally (as separate features). Tanaka et al. (2004) examined the holistic hypothesis by asking White and Asian participants to recognize face parts from White and Asian faces in isolation and in the whole face. According to the holistic account, the whole advantage should be greater for own-race faces than other-race faces. White participants demonstrated holistic processing for the recognition of Whtie faces and featural processing for

the recognition of an unfamiliar Asian face. Asian participants demonstrated holistic recognition for both Asian and White faces. The differences in holistic recognition between White and Asian participants mirrored differences in their relative experience with own-race and other-race faces. These results suggest that the own-race effect may arise from the holistic recognition of faces from a highly familiar racial group (Tanaka et al., 2004).

Depth of processing has also been considered a cognitive mechanism involved in face recognition (Brigham et. al, 2007). Same-race faces are hypothesized to be cognitively processed at a deeper level which would lead to better recognition. Craik and Lockhart's (1972) concept of depth of processing may play a role in the CRE. They believe that deeper processing reflects the degree of meaning attributed to the stimulus and occurs when subjects are asked to draw inferences about characteristics of the people shown (e.g., nice, angry, etc.). Shallow processing is a limitation of encoding to the stimulus itself and occurs when judgments of apparent, purely perceptual aspects of the face are made, such as sex, race, age, etc.

Meissner, Brigham, and Butz (2005) examined the cross-race effect within a dual-process framework which suggests that two qualitatively distinct processes appear to be operating for both perception and recognition of own-race and other-race faces. In the first experiment, participants were shown 160 Black and White faces (80 each) and were asked to rate the faces on distinctiveness, likeability, attractiveness, memorability (how easily remembered), and familiarity; each variable was rated on a 7 point scale. Own-race faces were perceived as having greater perceptual memorability (whether or not the face is easy to remember) and familiarity (whether or not the face was confusable with someone the participant knew) than other-race faces. These results support the idea that superior encoding leads to increases in both recollection and familiarity-based responding; furthermore, the greater familiarity that was perceived for

own-race faces may also be indicative of configural, holistic processes that operate in own-race face recognition (Meissner et al., 2005).

Experiment two looked at how recognition influenced the cross-race effect. The participants were shown faces and later asked to indicate whether each face was new or old in the test phase and were asked to rate their confidence in their answer. Participants also had to rate the faces on the same features used in Experiment 1. Own-race faces showed a numerical increase in familiarity-based responding when compared with other-race faces meaning that participants were more likely to rate the faces based on familiarity than the other answer choices. These two experiments help demonstrate that the cross-race effect appears to be due to a greater reliance upon recollection for own-race faces in which the participants qualitatively encode more information about own-race faces (Meissner et al., 2005).

Contact. One of the most common psychological hypotheses for the cross-race effect appeals to the quantity of experience people have with faces of their own race versus faces of other races, which is known as the contact hypothesis (e.g., Furl, Phillips, & O'Toole, 2002). The contact hypothesis suggests that the amount of contact that an individual has with another race is positively correlated with the accuracy of recognizing individuals from that race (Jackiw, Arbuthnott, Pfiefer, Marcon, & Meissner, 2008). For example, Wright, Boyd, and Tredoux (2003) examined the cross-race effect and interracial contact in South Africa and England. Cross-race identification accuracy for Black participants was positively correlated with self-reported interracial contact. No significant effects were found for White participants. Hancock and Rhodes (2008) examined the role of contact and how it influences the cross-race effect in White and Chinese people with varying levels of contact with members of a different race. The stimuli used were of both White and Chinese faces. As predicted, the cross-race effect was

evident in both race groups. Results also indicated that for both White and Chinese participants, those who reported having higher levels of other-race contact exhibited a smaller CRE.

Meissner and Brigham (2001) examined 29 studies that looked at interracial contact. They proposed that increased contact with other-race individuals may increase memory performance by reducing the likelihood of stereotypic responses which in turn increases the likelihood that individuals make look for more individuating information. It could also influence individuals' motivation to accurately recognize other-race persons through social rewards and punishments. Across the 29 studies, Meissner and Brigham (2001) found that contact appears to play a small, yet reliable, mediating role in the cross-race effect, accounting for approximately 2% of the variability in the cross-race effect across participants. A number of studies have found that those with more prejudiced attitudes report less contact with other-race members (Meissner & Brigham, 2001; Slone et al., 2000). Racial attitudes can influence the amount of interracial contact a person may have which will influence their ability to recognize a person of a different race (Meissner & Brigham, 2001).

A number of studies have shown general support for the differential experience hypothesis, which suggests that the ability to recognize faces of another race is a function not just of the quantity of contact, but the quality (whether or not these interactions were positive or negative) of contact (MacLin & Malpass, 2001). Slone, Brigham, and Meissner (2000) examined social factors that influence the cross-race effect in White people. They hypothesized that participants would improve in the area of cross-race identification when they experienced more, positive interracial contact. Scores on The Attitudes towards Blacks scale (Slone et al., 2000) were not related to other-race face recognition accuracy rates. However, scores on the Social

Experiences Questionnaire used to measure the amount and quality of interracial contact were related to overall face recognition (Slone et al., 2000).

Meissner and Brigham (2001) also found that the amount of interracial contact can be influenced by one's racial attitudes. They examined 14 studies which looked at racial attitudes. No evidence was found for a direct influence of racial attitudes on the cross-race effect. Instead, they found that racial attitudes play a mediating role by way of their relation to an individual's social experience with other-race persons (Meissner & Brigham, 2001). Those who reported having positive attitudes towards other races experienced more interracial contact, and those who reported having negative attitudes experienced less interracial contact. This could be a bidirectional relationship in such a way that a person's attitudes about members of a different race could influence how much they interact with members of a different race. Also, how much or how little contact people have with members of a different race could influence their attitudes about them. The attitudes-interracial contact relationship accounted for 13% of the variability in the cross-race effect across the studies examined.

Social Categorization. Social-categorization models focus on how faces are categorized into either in-group status or out-group status at encoding. In-group people are in a shared category such as same race, same university affiliation, or same socioeconomic status whereas out-group people would be in an unshared category such as a different race, university affiliation or a different socioeconomic status. According to the in-group/out group model, the cross-race effect is due to differences in social cognitions elicited when processing in-group versus out-group members (Sporer, 2001a). Sporer (2001b) claims that when one first encounters a face, the first step is acknowledging the ethnicity of the person; this is termed social perception. When one sees an out-group face, the first step is to trigger an out-group cue, then categorize the individual

by their ethnicity. This is the first reaction to how members from an in-group or out-group are different from one another. This model implies that once people have recognized a person as belonging to the out-group, they no longer concern themselves with encoding and storing the face because it is not as important to them as members of their own in-group.

Levin (2000) argues for a feature-selection model which posits a tendency to think categorically about out-group members, but to individuate in-group members. This leads to an asymmetrical search for features in same-race versus other-race faces. These asymmetries are believed to translate into differential recognition accuracies, thus generating the cross-race effect. Levin (1996) finds that participants are faster at classifying other-race faces by race when compared to own-race faces. Furthermore, Levin (2000) has found that when individuals see faces of another race they are faster at categorizing the face based upon race (the out-group) at the expense of encoding other individuating features.

The Categorization-Individuation Model (CIM) proposes that there are two different ways of processing faces during encoding: categorization and individuation. Categorization is the act of classifying exemplars into a group along shared dimensions (Hugenberg et al., 2010). In the context of the cross-race effect, categorization requires attending to the facial characteristics diagnostic of category membership. Individuation is the act of discriminating among exemplars of a category. In the context of the cross-race effect, individuation requires attending to facial characteristics that are identity diagnostic, rather than to characteristics that are group diagnostic. The CIM attributes the cross-race effect to the tendency to selectively attend to identity-diagnostic characteristics among same-race faces but to attend to category-diagnostic features of other-race faces (Hugenberg, Miller, & Claypool, 2007). The CIM proposes that everyone has the ability to individuate other-race faces; however, most people are not utilizing this ability.

Furthermore, the CIM proposes that greater individuation experience (interracial contact) can translate into superior face memory and when combined with motivation to individuate faces through instructions, face memory should be effectively improved (Hugenberg et al., 2010; Young & Hugenberg, 2012).

Factors Affecting the Cross-Race Effect

As previously discussed, many researchers have tried explaining the cross-race effect with different models: perceptual expertise, learning, holistic versus configural processing, and social categorization. There have been various attempts to reduce the CRE based on hypotheses developed to test these models (e.g., Johnson & Fredrickson, 2005; MacLin, MacLin, & Malpass, 2001). Some of these attempts have been successful whereas most attempts have not. This inconsistency in the literature is reason for researchers to continue examining the cross-race effect and how to reduce it.

Many studies examining the CRE have investigated timing characteristics such as viewing time (exposure) and the delay between viewing a face and being asked to recognize it. MacLin et al. (2001) hypothesized that recognition performance should be best in situations in which the participant has maximum exposure and minimal delay time between learning and recognition phases. MacLin et al. (2001) used two exposure times (.5 seconds or 5 seconds) and two delays (none versus 30 minutes). Recognition performance was superior for longer exposure time compared to the brief presentation time, but the length of the delay had no effect on recognition performance. Valentine and Bruce (1986) also found that increased exposure time reduces the cross-race effect.

Marcon, Meissner, Frueh, Susa, and MacLin (2010) also examined enoding or viewing time as well as set size. The set size is the amount of faces that the participants are shown and

required to remember. The more faces there are to remember the harder it will be to differentiate old from new faces when mixed in with foils. As expected, the CRE was exacerbated when the encoding time was brief and the set size was increased. These findings suggest that the shorter the encoding time is and the larger the set size, the harder it will be to diminish the cross-race effect. Experiment two looked at retention interval. Results indicated that the CRE is more pronounced when the retention interval is lengthened (Marcon et al., 2010), unlike Maclin et al. (2001) who found length of delay had no impact on recognition.

Johnson and Fredrickson (2005) attempted to reduce the CRE by manipulating emotions. Their sample included White participants that viewed Black and White faces for a recognition task. Experiment 1 consisted of viewing videos eliciting joy, fear, or neutrality before the learning phase. Participants marked their emotions on a self-reported measure, then viewed the learning phase, a second emotion-induction video, and the testing phase (Johnson & Fredrickson, 2005). Results indicated that positive emotions before learning faces improved participants' recognition of Black faces and eliminated differences in recognition of Black and White faces. Induced positive emotion (through the video) significantly improved other-race recognition, but had no effect of same-race recognition. Johnson and Fredrickson (2005) deduced that the broadening of positive emotions may boost recognition of cross-race faces by promoting a more holistic perceptual process. Social categorization may also play a role in that the positive emotions may elicit more inclusive social categorizations and decrease the salience of racial categories.

Reducing the Cross-Race Effect

Training. Malpass, Lavigueur, and Weldon (1973) examined verbal training and its effects on facial recognition for both Black and White participants. Experiment one examined

verbal description training on visual recognition in which participants were to give a verbal description of the face they had seen. There was no effect; the verbal training had no impact on visual recognition for both Black and White participants. Experiment two examined recognition performance feedback in only White participants. Participants were in one of three groups: no feedback, verbal feedback, or electric shock feedback. Those in the electric shock feedback group were warned that if they chose a face they did not see in the learning phase they would receive a shock (although no shocks were actually given). While results indicated that there was no effect for race of stimulus, it was found that the type of feedback did matter. Shock feedback was superior to verbal feedback. Furthermore, results indicated that performance was better on recognition for White faces than Black faces.

Brigham, Bennett, and Butz (2005) specifically examined training and its effect on the recognition of faces. Participants were assigned to two different groups in which they either played a memory game or a control game. The memory game consisted of turning over cards with faces on the back, and participants had to match the faces after seeing them briefly when they chose a card. Participants played these games several times before the cross-race effect was tested. The results showed that participants who played the memory game with cross-race faces did not significantly differ from the control group in regards to the cross-race effect; however, participants who played with same-race faces did show a decrease in the cross-race effect. Furthermore, participants also had a decrease in same-race recognition which could have led to the decreased cross-race effect.

Categorization. Kehn (2010) examined how social categorization influences the cross-race effect. Participants were presented with photographs of Black and White faces in the learning phase that had different background colors that represented an in-group status (the same

university affiliation) and an out-group status (a different university affiliation). Participants were divided into two groups: one group was told the faces were of students, while the other group was told the faces were of student-athletes. The hypothesis was that creating an in-group for Black faces (different race but same university affiliation) would reduce the cross-race effect. Categorizing faces as either in-group or out-group did not reduce the CRE. Participants were more likely to state other-race faces were previously seen resulting in an increase of the number of correct responses. Results showed that neither group affiliation nor target affiliation had an effect on recognition memory (Kehn, 2010). University affiliation did not create a sufficient "in-group" to overcome the CRE, however, it did increase recognition of own-race faces.

Bernstein, Young, and Hugenberg (2007) examined the in-group/out-group bias through university affiliations. White, male faces were put on either green or red backgrounds to depict university affiliation (the participants' own university or a rival university). A second experiment used personality as a categorizing feature. For some participants, the red background was their own personality type and green was a different personality type. For other participants it was reversed. Both studies found that faces that were perceived as the in-group were better recognized than faces that were perceived as the out-group.

Instructions. Reynolds and Pezdek (1992) examined recognition of different facial features and how encoding instructions affect recognition. In the learning phase participants were given instructions to look at all features of the face and decide if the set of features includes typical or unusual features. Another group was not given these instructions, but was instead asked to judge the age of the person. The test phase consisted of seeing the same faces along with new ones. The participants were then asked to identify which faces were seen before. Participants who were instructed to look at all of the facial features were more accurate in

identifying the faces, which is in line with the CIM because participants are individuating the faces through looking for unique facial features versus looking at a category-diagnostic feature (age).

In a series of studies directly leading to the present research, Hugenberg et al. (2007) examined motivational factors that could diminish the cross-race effect. It was hypothesized that if instructions were provided to the participants to attend to the individual (rather than common) features of cross-race faces, the cross-race effect would be reduced because identifying facial features that distinguish one face from another leads to better recognition. Hugenberg et al. (2007) conducted three studies (1a, 1b, and 2). Experiment 1a and 1b included thirty White participants. Each experiment employed identical procedures but used different sets of stimulus faces. Half of the participants were in the control group and half were in the experimental group that received the instructions. Instructions to individuate the features of the faces were presented on the computer screen. The instructions specifically told the participants about the cross-race effect and why it occurs; even more so, the participants were told to pay close attention to and to individuate faces of a different race (out-group) (Hugenberg et al., 2007). The learning phase consisted of seeing 40 faces (20 Black; 20 White) that they would later be asked to recognize. After completing the learning phase, a distractor task was given until the test phase began. There were 40 new faces (20 Black; 20 White) added to the old 40 faces for the recognition phase. Participants in the control group displayed the typical cross-race effect. Furthermore, the cross-race effect was eliminated for those participants who received the instructions.

Experiment two was designed to test the alternate explanation that a general accuracy motivation, not specifically concerning the cross-race effect, may be sufficient to eliminate the cross-race effect (Hugenberg et al., 2007). Experiment two employed the same procedure as

experiments 1a and 1b with the exception of an additional instructions group. The instructions in this third group were general accuracy motivation instructions designed to increase participant's motivation to attend closely to all of the stimuli in the learning phase. Consistent with experiment 1, the control group displayed the cross-race effect. However, the cross-race effect was not eliminated in the experimental group that received general accuracy motivation instructions.

Recently, Young and Hugenberg (2012) tested their assumption that interracial contact moderates the effects of the individuation instructions; individuation instructions work best for those who have higher levels of interracial contact. Participants were either given the specific CRE instructions or general recognition instructions. Participants then completed an interracial contact questionnaire developed by Hancock and Rhodes (2008) after the recognition phase. Results showed that the specific individuation instructions did eliminate the CRE; furthermore, those participants with a high amount of interracial contact and the instructions showed a decrease in the cross-race effect (Young & Hugenberg, 2012). Those participants in the control condition who did not receive the specific individuation instructions but reported having contact with members of a different race still exhibited the CRE. Young and Hugenberg (2012) concluded that interracial contact alone is not sufficient enough to elicit strong cross-race recognition. Limitations to these experiments are that they only test these instructions on White participants; furthermore, others have not been able to replicate these findings (Laub, Bornstein, Susa, Marcon, & Meissner, 2009).

Rhodes, Locke, Ewing, and Evangelista (2009) examined how instructions influenced the other-race effect. Two experiments were conducted that examined different types of instructions. In experiment one it was hypothesized that requiring participants to code race-specifying

information for all faces should eliminate the other-race effect. According to the race-coding hypothesis, the other-race deficit results from a spontaneous bias to code race-specifying information, at the expense of individuating information, in other-race faces (Rhodes et al., 2009). Participants were assigned to three different encoding conditions: no-rating, race-coding, and attractiveness rating. Participants went through a learning phase in which they saw 15 faces. The test phase consisted of these previous 15 faces in addition to 15 new faces. Depending on which encoding instructions they were given, they either race-coded, rated attractiveness, or did nothing. A significant cross-race effect was found. The results revealed that the race coding condition had a marginally higher cross-race effect than the no-rating control condition; also, the attractiveness rating also increased the other-race effect.

In their second study, Rhodes et al. (2009) assigned participants to one of three encoding conditions: control condition, race-categorize condition, and an individuation condition. The race-categorize condition told the participants to categorize faces as either Black or White. The individuation condition replicated the instructions used in Hugenberg et al. (2007) which explicitly told the participants about the CRE, to individuate other-race faces, and to specifically pay attention to faces of a different race. The learning phase consisted of seeing 20 faces followed by seeing 40 faces in the test phase. The cross-race effect was eliminated in the group who were given specific instructions about the cross-race effect, replicating Hugenberg et al., 2007), but not for the other two encoding conditions (Rhodes et al., 2009). Participants who were in the race coding condition still exhibited the cross-race effect which could be due to the fact they were focusing on category defining features.

Young, Bernstein, and Hugenberg (2010) examined instructions at the encoding and post-encoding stages. Their first hypothesis was that if the own-race bias occurs post-encoding, then

instructions to individuate at post-encoding should be sufficient to eliminate it. This experiment had three instruction conditions: pre-encoding, post-encoding, and no instructions control. The learning phase consisted of seeing 40 (20 Black; 20 White) faces and instructions which explicitly told the participants about the CRE and to individuate other-race faces (see Hugenberg et al., 2007, for full instructions) if they were in the pre-encoding instructions condition. The test phase consisted of seeing these 40 faces in addition to 40 new faces (20 Black; 20 White) for a total of 80 faces and instructions to individuate the faces if they were in the post-encoding instructions condition (see Hugenberg et al., 2007). Participants in the no instructions control condition showed a significant own-group bias (Young et al., 2010). Pre-encoding instructions eliminated the own-group bias which replicates Hugenberg et al. (2007). Participants in the post-encoding instructions group showed the typical own-race bias in face recognition. These results do not support their hypothesis that post-encoding instructions help eliminate the own-group bias like the pre-encoding instructions do.

However, other studies have been unsuccessful in replicating the CRE instruction effect even when the instructions were given at encoding. For example, Laub, Bornstein, Susa, Marcon, and Meissner (2009) found that CRE instructions similar to those used by Hugenberg et al. (2007) did not significantly reduce the other-race effect in White or Hispanic participants. . Some participants received the specific cross-race effect instructions (see Hugenberg et al., 2007) while the control group received instructions to just attend to the faces. Participants viewed 40 faces during the learning phase (20 Black; 20 White), participated in an unrelated filler task, and then participated in the recognition phase which consisted of 80 faces (the previously seen 40 faces among 40 foils). Results show that the specific cross-race effect instructions did not reduce

the cross-race effect for those participants. Instructions at retrieval did not reduce the CRE, but they increased the response criterion which reduced the amounts of false alarms.

Rationale for the Present Studies

Research investigating the CIM account of the cross-race effect has generated contradictory results. Hugenberg and his colleagues (2007) consistently find that motivation to individuate other-race faces, whether through direct instructions or other methods to influence their out-group status (e.g., increasing their perceived power or creating a different in-group affiliation) reduces the cross-race effect in participants. However, studies conducted in several other laboratories (Laub et al., 2009; Kehn, 2010) have been unable to reduce the CRE via instructions or other means designed to increase individuation. It is critical for the categorization-individuation model to establish that individuation instructions at encoding can reliably reduce the CRE. Additionally, the instructions effect has not yet been examined in Black participants, or in conjunction with measures of interracial contact. The current study examined both quality and quantity of interracial contact.

Hypotheses

Instructions. Based on past literature (Meissner & Brigham, 2001; Hugenberg et al., 2007; Lindsay et al., 1991), we hypothesized that there would be a main effect of instructions. Specific instructions informing the participants to individuate other-race faces were predicted to improve other-race sensitivity. We also hypothesized that there would be an interaction between participant race and instructions. Instructions were expected to reduce the CRE more so for White participants than Black participants because Black participants would exhibit a smaller CRE even in the control condition.

Contact. Past research on the contact hypothesis informs future researchers to evaluate not only the quantity of contact but the quality of contact with another race as well. The quality of the contact should be positive or neutral in nature; negative contact might have a different impact on the cross-race effect (Brigham, 2008). In prior research, the two methods of assessing interracial contact are self-reports by the participants and examination of groups of individuals differing in their degree of other-race contact. The current study used the self-report method.

We hypothesized that there would be a race difference in the amount of contact reported with Black participants having more interracial contact than White participants. It was also hypothesized that interracial contact would correlate with other-race sensitivity. Past literature has found that contact moderates the CRE so we found it reasonable to hypothesize that interracial contact would moderate the instructions effect on other-race sensitivity. This hypothesis follows from perceptual expertise theories.

A somewhat different hypothesis comes from the CIM approach. Young and Hugenberg (2012) proposed that both contact and motivation (instructions) to individuate would be needed to reduce the cross-race effect. We hypothesized the CRE would be reduced more for those participants who report higher levels of interracial contact and receive the specific CRE instructions.

These hypotheses were tested in two different studies. One study (Study 1) used the stimuli used from one of the experiments conducted by Hugenberg et al. (2007) and the second study (Study 2) used stimuli obtained from Bennett-Day (2007). It is important to note that both of the present studies included both White and Black participants.

CHAPTER II

STUDY ONE

Study one sought to replicate Hugenberg et al. (2007) by using stimuli they have used in prior studies. We predicted that the typical cross-race effect would be shown in the control condition, in which recognition for own-race faces is better than other-race faces. Of particular interest was whether or not the group of participants that received instructions specific to the cross-race effect would not exhibit the cross-race effect. Studies that have not replicated Hugenberg have used different stimuli and have shaped their studies into recognition tasks, with changes in the stimuli from encoding to retrieval (e.g., different clothing), rather than memory tasks. It is important for theory and practice to determine whether or not these instructions can reliably eliminate the other-race effect. Until a reliable method for reducing or eliminating the cross-race effect is found, mistaken cross-race identifications will continue to be made.

Methods

Participants

The sample consisted of 124 students (94 White; 30 Black) from The University of Tennessee at Chattanooga. Participants included 32 males (29 White; 7 Black) and 87 females (64 White; 23 Black) with age of participant ranging from 18-55. The average age for this sample was 22.83 (*SD*=5.39). There were also two participants who identified themselves as Asian and three participants who identified themselves as another race; these participants were

not included in the analyses due to the small samples and the lack of stimulus faces for these racial groups. Participants came from introductory psychology courses and upper level psychology courses and received extra credit in their class for participating. Participants were randomly assigned (by classroom) to one of the two instructions conditions. A total of 52 participants were assigned to the CRE instructions group (from three classes) and 67 were assigned to the control group (from three classes).

Materials

Five different tasks were used for this study: a demographics questionnaire, the learning phase consisting of 40 faces, the filler task, the recognition phase consisting of 80 faces, and an interracial contact questionnaire.

Demographics questionnaire. A basic demographics questionnaire was used to collect information on the race of the participant. This questionnaire asked participants for their age, gender, race, and level in college (see appendix B). A manipulation check question was also on this questionnaire asking the participants to write the instructions they heard prior to the learning phase.

Learning phase. The stimuli consisted of digitized, gray scale pictures of 80 male faces (40 Black; 40 White), 6x4 cm in size, displaying only face and hair (see Hugenberg et al., 2007). Stimuli were obtained directly from Dr. Kurt Hugenberg and rearranged into a different order. Half of these faces were presented in the learning phase, and the entire 80 were presented in the recognition phase. The 40 faces presented in the learning phase were randomly pulled from the pool of 80 faces. Faces were pulled from the middle of the distribution of faces first, then the end

of the distribution, and finally the beginning so that the order of faces for the study was different than the order in which they were received.

Filler task. The filler task consisted of a vocabulary task in which participants were asked to determine a word that matched three words grouped together. This task was used by Bennett-Day (2007) (see appendix C). For example, participants were presented with three words such as salt, deep, and foam. They were then asked to determine a word that matched all three. In this case, the matching word was sea for the words: sea salt, deep sea, and sea foam. This task was used to distract participants from the faces they had just seen in the learning phase and to prevent a recency effect for the last few faces viewed.

Recognition phase. Faces in the recognition phase were randomly mixed in with the remaining 40 faces that were not used in the learning phase so that they would not be seen in the same order as the learning phase. Each face had a number on it that corresponded to the number on the recognition sheet which was used to record whether or not they had seen the face before (see appendix D). Participants had two options to choose from: seen before or not seen before.

Interracial contact questionnaire. The Social Experiences Questionnaire (SEQ) was used to examine the quantity and quality of both past and present interracial contact (see appendix E). The SEQ was used in Brigham (1993), and we adapted it to fit our population. We took out the subsection on business setting (which examined interracial contact in a business-type setting) and changed it into school setting so that it better fit our college population. We asked about their experiences at school with people of a different race and how positive these interactions were. General questions were first asked about how many people of a different race were in their neighborhood and schools. The questionnaire was then broken up into four distinct

subsections: school setting, social/public setting, intimate/personal setting, and work setting. Participants were asked questions regarding how much time was spent with people of a different race in these settings as well as to rate their happiness with these interactions.

Procedure

After providing informed consent (see Appendix A), participants began the experiment. All instructions and stimuli were presented on an overhead projector. Prior to the learning phase, those participants in the instructions condition were read the cross-race effect specific instructions used in Hugenberg et al., 2007, p. 336, which state:

> Previous research has shown that people reliably show what is known as the Cross-Race Effect (CRE) when learning faces. Basically, people tend to confuse faces that belong to other races. For example, a White learner will tend to mistake one Black face for another. Now that you know this, we would like you to try especially hard when learning faces in this task that happen to be of a different race. Do your best to try to pay close attention to what differentiates one particular face from another face of the same race, especially when that face is not of the same-race as you… Remember, pay very close attention to the faces, especially when they are of a different race than you in order to try to avoid this Cross-Race Effect.

Those in the control condition were simply told to attend to the faces they were about to see because they would later be asked to recognize them. After receiving instructions, all participants began the learning phase which consisted of 40 faces (20 Black; 20 White), each of which were displayed for 5 seconds.

Participants then completed the unrelated 5-7 minute filler task which consisted of a vocabulary exercise. After all participants finished, the recognition phase began which consisted of seeing the previously seen 40 faces among 40 foils (40 Black; 40 White) in a randomized order displayed for 7 seconds. Participants were asked to distinguish whether or not they had seen the face before by circling “seen before” or “not seen before” on a recognition sheet.

Following the recognition phase, participants then completed the Social Experiences Questionnaire. The participants were able to fill this questionnaire out at their own pace, and once they finished they were thanked for participating and then debriefed.

Results

Data were collected from a total of 173 participants. A manipulation check was used to see if participants had followed directions: participants were asked to write out the instructions they were given prior to viewing the faces. If the participants did not write down the correct instructions, their data were not used for analyses. Correct instructions included key words from the instructions they were given prior to the learning phase. Data from participants who did not follow instructions during the recognition phase (i.e., did not circle whether or not they had seen the faces before) also were excluded. A total of 32 participants' data were discarded (17 participants did not follow directions; 15 did not write down correct instructions). An additional 17 participants' data were discarded because they were outliers with either 0-5% or 95-100% rates for hits and/or false alarms in two of those areas (for example, high same-race hits, low other-race false alarms). Outliers were taken out to adjust for empty cells for the use of signal detection theory; these adjustments yielded similar results. Data from 16 White participants and 5 Black participants in the instructions group were discarded while 21 White participants and 7 Black participants in the control group were discarded.

Scoring

Recognition task. The recognition task was scored by examining whether or not the participant circled "seen before" or "not seen before." Hits and false alarms were calculated separately for Black and White faces. Hits were calculated by seeing how many faces were

correctly identified as seen before out of the total 20 faces that were presented in the learning phase for each race. False alarms were then calculated by seeing how many faces were wrongly identified as seen before when they were not (20 Black foils; 20 White foils).

Interracial contact questionnaire. Participants rated their agreement with the statements on the SEQ on a 1-7 or 1-9 scale. The interracial contact questionnaire was broken down into three subsections: past quantity, present quantity, and present quality. Total scores were calculated by taking the mean for each participant on each subsection. Internal consistency was examined for the scale as a whole (α= .698) and for each subsection. The past quantity subsection consisted of seven questions that involved how many people of a different race participants had interaction with while growing up both in school and in their neighborhood (α=.588) (see Appendix E) . There were originally eight questions in this subsection, but one question about number of other-race friends in high school was deleted to raise the overall scale reliability to .803. The present quantity subsection consisted of 11 questions that involved how many people of a different race the participants have interaction with currently in their neighborhood, in school, in social settings, in intimate settings, and at work (α=.829). The present quality subsection consisted of six questions that involved their ratings of their happiness with these interactions (α.=731). Based on Young and Hugenberg (2012) we also created a contact composite score that comprised all three subscales. The overall reliability of the composite scale was .841. If participants did not fully answer all questions on a subscale, their data are not included in analyses of that subscale or the composite score.

Hits and False Alarms

To test the hypothesis that instructions would improve performance on cross-race recognition, particularly for White participants, repeated measures analyses of variance (ANOVAs) were conducted to examine any effects for race or instructions group. The independent variables were participant race and instruction group; the dependent variables in the first analysis were same- and other-race hits and in the second analysis they were same and other-race false alarms. There were no significant effects of either race or instructions on hits (see Table 1).

In the analysis of false alarms, there was a significant difference in own- and other-race false alarms, F (1,109) = 16.958, p =.000. Overall, there were higher rates of false alarms for other-race faces than same-race faces. Furthermore, this pattern differed by race of participant. The interaction of target race and participant race was significant, F (1,109) = 39.307, p =.000. Black participants committed more own-race false alarm errors than White participants did, but White participants made more other-race false alarms than Black participants. Finally, there was a trend (p=.074) for a three way interaction between participant race, target race, and instructions. Black participants in the control condition demonstrated the lowest level of other-race false alarms and the highest level of same-race false alarms whereas own- and other-race false alarms did not significantly differ for Black participants in the instructions condition. White participants in the instruction condition had higher false alarms of both types compared to the control.

Table 1 Proportion Hits and False Alarms

		Hits		False Alarms	
Participant Race	Group	Same-race	Other-race	Same-race	Other-race
White	Instructions	.68 (.16)	.70 (.15)	.22 (.14)	.42 (.15)
	Control	.74 (.11)	.68 (.19)	.15 (.17)	.37 (.17)
Black	Instructions	.70 (.11)	.63 (.29)	.29 (.22)	.31 (.17)
	Control	.68 (.19)	.64 (.23)	.32 (.19)	.21 (.20)

Note. Standard deviations are in parentheses.

There has been some suggestion in the literature that there could be a cross-gender effect when participants are of a different gender than the faces presented (Zhao & Bentin, 2008). The current study uses male faces for the stimuli. We wanted to make sure females did not have lower accuracy rates than males. Results indicated there was no main effect of gender, but an interaction between race and gender, $F(1, 106)= 7.030$, $p=.009$. White females had higher hit rates than White males, but Black females had lower hit rates than Black males. A similar analysis was conducted on false alarms; there were no significant main effects or interactions involving gender.

Signal Detection Measures

Signal detection analyses were used to further examine the hypotheses. A cross-race effect is evident when there are lower sensitivity scores for other-race faces compared with same-race faces. Sensitivity was calculated by first calculating the proportion of hits and false alarms for each participant. We then calculated the z-scores for these proportions. Finally, the z-

scores of the false alarms were subtracted from the hits. Sensitivity was calculated separately for same- and other-race faces.

In a repeated measures analysis of variance with own- and other-race *d'* as the dependent measures, there was no main effect of instructions, but a three way interaction between race of participant, instructions, and race of target, F (1, 92) = 9.332, $p < .003$. As predicted, White participants exhibited the cross-race effect in the control condition with mean *d'* scores being lower for other-race faces than same-race faces. White participants in the instructions condition demonstrated no improvement in sensitivity for other-race faces compared to the control, and instructions appeared to decrease sensitivity for *own*-race faces (see Table 2).

However, Black participants did not exhibit the cross-race effect in the control condition. Their mean *d'* scores were actually significantly higher for other-race faces when compared to same-race faces, $F(1, 93) = 32.382$, $p=.000$. Black participants in the instructions condition were roughly equivalent in their *d'* scores between same-race and other-race faces (see Table 2). Same-race sensitivity was lower for Black participants than for White participants; other-race sensitivity was higher for Black participants than for White participants, as predicted.

Following Young and Hugenberg (2012), a *d'* difference score was calculated. Other-race d' was subtracted from same-race d'. The difference score is an indicator of the cross-race effect (higher same-race than other-race sensitivity). These differences scores were used in subsequent analyses of interracial contact.

Table 2 Sensitivity Means across Groups

Participant Race	Group	Same-race	Other-race	Difference
White	Instructions	1.39 (.65)	.78 (.48)	.61 (.59)
	Control	1.82 (.51)	.88 (.54)	.94 (.61)
Black	Instructions	1.01 (.81)	1.03 (.96)	-.02 (.97)
	Control	1.10 (.60)	1.43 (.63)	-.34 (.58)

Note. Standard deviations are in parentheses.

Again, potential gender differences in other-race sensitivity were examined. There was a significant gender effect, but instead of a cross-gender effect, females actually had higher mean sensitivity scores than males, $F(1, 89)= 8.431$, $p=.005$. There were no significant interactions between gender and race or gender and instructions group.

Response bias (response criterion) (*C*) was also examined. Response bias is the level of familiarity necessary for an individual to categorize a given stimulus as "old" versus "new," the extent to which one response is more probable than another. Those with a conservative response bias are more likely to say they have not seen a face (whether they have or not), so they have fewer false alarms but also fewer hits. Those with a lenient response bias are more likely to say they have seen a face, whether or not they have (more hits, but more false alarms). Response bias is measured by multiplying the sensitivity scores (z-scores for hits minus z-scores for false alarms) by -.5. White participants were somewhat more conservative when judging same-race faces in both the instructions and control group while Black participants were more conservative to other-race faces in both the instruction and the control group (see Table 3). No significant effects were found; however, there were slight differences between groups.

Table 3 Response Criterion Means between Groups

Participant Race	Group	Same-Race	Other-Race
White	Instructions	.18 (.39)	-.16 (.36)
	Control	.19 (.29)	-.11 (.41)
Black	Instructions	-.07 (.27)	.10 (.27)
	Control	-.12 (.39)	.13 (.49)

Note. Standard deviations are in parentheses.

A similar analysis was done to see if gender played a role in the participants' response bias. There was a significant race by gender interaction, $F(1, 89)= 8.215$, $p=.005$. White males were more conservative in their choices than White females, but Black females were more conservative in their choices than Black males.

Interracial Contact

As predicted, mean contact scores for Black participants were higher than means for White participants on all three subsections (see Table 4). Compared to White participants, Black participants had a significantly higher mean for past quantity, $F(1, 94) = 9.140$, $p=.003$, as well as present quantity, $F(1, 94) = 7.988$, $p=.003$, but not quality. Black participants also reported significantly higher means on the composite score, $F(1, 109)= 4.972$, $p=.003$. Table 4 compares these means. A significant difference was also found for Black participants means when comparing the instructions and control group, $F(1, 111)= 7.709$, $p=.006$ (see Table 5), which indicates a preexisting difference between groups. This preexisting difference could complicate interpretations of an instruction effect.

Table 4 Race Differences in Interracial Contact Social Experiences Questionnaire Means

Race of Participant	Past Quantity	Present Quantity	Present Quality	Contact Composite
White	2.14 (2.47)	3.23 (1.13)	5.27 (.94)	3.55 (1.18)
Black	3.75 (1.93)	4.13 (1.29)	5.56 (.74)	4.47 (1.00)

Note. Standard deviations are in parentheses.

Table 5 Race and Group Differences for SEQ Subscales

SEQ Subscale	Race	Instructions Group	Control Group
Past Quantity	White	2.16 (1.84)	2.10 (2.65)
	Black	3.79 (2.03)	3.69 (2.04)
Present Quantity	White	3.45 (1.25)	3.56 (1.22)
	Black	3.15 (.95)	3.86 (1.34)
Present Quality	White	5.19 (1.02)	5.33 (.89)
	Black	5.80 (.60)	5.35 (.75)

Note. Standard deviations are in parentheses.

To test the hypotheses regarding relations between other-race sensitivity, contact, race, and instructions, correlations were computed separately by race and instruction group. Analyses revealed that present quantity of interracial contact was significantly correlated with other-race sensitivity (r= .257, p=.005). For White participants, the contact composite score was significantly related to other-race sensitivity in the instructions condition only (r=.329, p=.033), similar to Young and Hugenberg (2012). There was no relationship between past quantity or present quality and other-race sensitivity (see Tables 6 and 7 for relationships between the three subscales of contact).

To test the hypothesis that interracial contact would act as a moderator of the race difference in the cross-race effect, a regression analysis was conducted. It was expected that those who reported higher amounts of contact would display a reduced cross-race effect, regardless of their own race. The regression analysis looked at other-race sensitivity as the dependent variable with participant race and the contact composite as predictors. The second hypothesis was not supported; contact did not act as a moderator.

Furthermore, we tested the hypothesis that contact would moderate the effect of instructions. The regression analysis examined instructions and the contact composite as the predictors and a *d'* difference score (sensitivity for other-race faces subtracted from sensitivity for same-race faces) as the outcome. The hypothesis was not supported; there was no contact by instructions group interaction. To compare our results to those of Young and Hugenberg (2012), a median split for the contact composite was done for White participants only to examine if there were any differences in the *d'* difference scores between those with high and low levels of interracial contact in the instruction group but not in the control group. No significant main effects or interactions were found.

Table 6 Correlations between SEQ and Recognition Accuracy Measures and Response Criterion by Instructions Condition for White Participants

	Social Experiences Questionnaire (SEQ) Responses					
	Past Quantity		Present Quantity		Present Quality	
	Instructions	Control	Instructions	Control	Instructions	Control
Hits						
White faces	.406**	.212	.122	.342*	.018	.030
Black faces	.096	-.081	.137	.107	.180	-.089
False Alarms						
White faces	.111	-.085	-.139	-.035	-.228	-.096
Black faces	-.16	.104	-.176	.181	-.063	-.037
d'						
White faces	.273	.183	.282	.313	.229	.343*
Black faces	.289	-.262	.390*	-.014	.216	.075
C						
White faces	-.319*	-.076	-.006	-.217	.151	.245
Black faces	-.003	-.007	-.045	-.221	-.062	.031

Note. ** Correlations significant at the .01 level (two-tailed). * Correlations significant at the .05 level (two-tailed).

Table 7 Correlations between SEQ and Recognition Accuracy Measures and Response Criterion Instructions Condition for Black Participants

	Social Experiences Questionnaire (SEQ) Responses					
	Past Quantity		Present Quantity		Present Quality	
	Instructions	Control	Instructions	Control	Instructions	Control
Hits						
White faces	-.366	-.140	.109	.243	-.392	-.044
Black faces	-.126	-.376	.142	.142	-.190	-.092
False Alarms						
White faces	.051	-.163	-.011	-.196	.359	-.043
Black faces	.317	-.203	.275	-.01	.034	-.019
d'						
White faces	-.303	-.066	.383	.359	-.343	.076
Black faces	-.371	-.085	-.237	.115	-.216	-.029
C						
White faces	-.016	.249	-.335	.039	.055	.014
Black faces	-.003	-.007	-.045	-.221	-.062	.031

Note. ** Correlations significant at the .01 level (two-tailed). * Correlations significant at the .05 level (two-tailed).

Discussion

The purpose of Study 1 was to replicate the results of Hugenberg et al. (2007) with White participants and test the instructions with Black participants. As hypothesized, White participants exhibited the cross-race effect in the control condition. The instructions decreased own-race recognition, similar to Hugenberg et al. (2007). However, instructions did not increase other-race recognition.

Additionally, Black participants did not exhibit the cross-race effect in the control condition. This may be partly due to the fact they reported having a higher amount of interracial contact, and is consistent with the literature as noted in Meissner and Brigham (2001). This higher amount of interracial contact could lead to their ability to be able to individuate faces of a different race. Black participants were actually more correct when recognizing White faces than Black faces when they were *not* warned of the cross-race effect. These findings could be due to the possibility that Black participants do not categorize White faces as the out-group because Whites are the majority race. Because Whites are viewed as the majority or higher status group, Black participants may categorize White faces as the in-group, thus leading to an increased recognition of other-race faces, similar to what the CIM predicts. Results must be taken with caution because there were differing amounts of contact between Black participants in the instructions group and the control group. Also, in the regression analyses, contact did not account for much of the variance in other-race sensitivity, meaning other-race sensitivity is not due to contact alone.

Participants in the instructions condition did not exhibit a diminished cross-race effect. These results actually suggest a different pattern. White participants in the instructions condition exhibited a decrease in own-race recognition which could be because they were instructed to pay close attention to the other-race faces. This finding is similar to past literature in which researchers attempted to reduce the effect (Brigham et al., 2002; MacLin et al., 2001). Because participants were instructed to only pay attention to other-race faces, they may have just disregarded all same-race faces. Results of Study 1 do not support the categorization-individuation model fully. However, the CIM does predict a decrease in same-race recognition when participants focus their attention on category-diagnostic information for same-race faces.

Similar results could have occurred in the current study because participants were repeatedly told to individuate *other*-race faces which could have led them to perceive other-race faces as the in-group and same-race faces as the out-group, thus leading them to categorize the White faces as looking the same.

Comparing our results to that of Hugenberg et al. (2007) must be done with caution since means and standard deviations are not reported in that study; we estimate the means from the graphs given. One difference is the level of same-race sensitivity in the control group, which is slightly lower in the current study. A larger difference is seen in the instructions group for other-race sensitivity; again the rate in the current study is much lower than that of Hugenberg et al. (2007). They also do not report hits and false alarms which makes it difficult to compare our findings to theirs.

As predicted, participants' present amount of interracial contact (quantity) was related to their other-race sensitivity. This could be because the more they see other-race faces the more likely they are to be able to individuate other-race faces. However, if they have little interracial contact, individuation would not be as easy. Higher interracial contact may allow better processing, as in perceptual expertise models. Most prior studies have not reported mean levels of interracial contact, which makes it difficult to compare across studies and to determine the amount of interracial contact that might be necessary or sufficient to allow individuation or other forms of better processing. Compared to samples in prior studies, there may be greater diversity in the area from which our participants were selected. For example, racial composition at UTC is more diverse than some other areas. For the purpose of this study only White and Black persons are considered. White students make up the majority at UTC (71.7%) and Black students account for 11.8% of the student population. Chattanooga is located in Hamilton County, TN. According

to the 2010 Census, the city of Chattanooga had 167,647 residents while 336,463 lived in Hamilton County. White people make up 58% of the population in Chattanooga and 73.9% in Hamilton County while Black people make up 34.9% in Chattanooga and 20.2% in Hamilton County. Other studies (e.g., Hugenberg et al., 2007; Rhodes et al., 2009) only used White participants, possibly because only White participants were available. Greater diversity in the area may produce more contact between different races, which may in turn reduce the CRE. Levels of interracial contact may interact with instructional and other manipulations. In the present study, Black participants who had higher levels of interracial contact had higher sensitivity scores for other-race faces. Instructions and interracial contact together did not influence the CRE in White participants. Interracial contact does not fully explain the cross-race effect; a significant race effect was still present after contact was controlled..

One reason for the lack of an instructions effect in the present study could be the features of the stimuli used; there were not many contextual features for the participants to use to be able to distinguish one face from another. The faces in Study 1 were black and white head shots which could have led to a decreased ability to individuate them. Although Hugenberg et al. (2007) used similar stimuli and did find an instructions effect, we chose to examine different stimuli in Study 2 to see whether we would achieve different results.

CHAPTER III

STUDY TWO

Study two was identical to Study 1 with one exception. Different stimuli were used to test for any methodological differences in the past literature. The results we found in Study 1 were contradictory to what was found in Hugenberg et al. (2007). Other studies have also tried replicating Hugenberg and colleagues' (2007) findings to no avail which could be partly due to the use of different stimuli (Laub et al., 2009) that included more than just a head shot. We were interested in why the replication attempts did not work. The stimuli used in Study 2 were color shots that included the shoulders and neck in addition to the face. We thought that since these pictures were much different than those used in Study 1 they would be easier for participants to individuate, especially with the specific instructions to individuate, thus leading to a reduced cross-race effect.

Methods

Participants

The sample consisted of 142 students (108 White; 34 Black) from The University of Tennessee at Chattanooga. Participants included 45 males (28 White; 16 Black) and 107 (80 White; 19 Black) females. Participants ranged in age from 17-47; the average age for this sample was 20.36 (*SD*=4.04). There were also three participants who identified themselves as Asian, three participants who identified themselves as Hispanic, and three who identified

themselves as other; these participants were not included in the analyses due to the small samples and the lack of stimulus faces for these racial groups. Participants came from introductory and upper level psychology courses and received extra credit in their class for participating. Participants were randomly assigned (by classroom) to one of the two instructions conditions. A total of 90 participants were assigned to the CRE (from three different classes) instructions group and 62 were assigned to the control group (from three different classes).

Materials and Procedure

All materials and the procedure in Study 2 were the same as Study 1 except for the stimuli. Faces shown to participants were computer images of photographs of Black and White college-age males. All were full-color, head and shoulder photographs that had been used previously with CRE research at Florida State University and other universities (Bennett-Day, 2007). Each photograph showed the target individual dressed in a maroon sweatshirt against a neutral background.

Results

Data were collected from a total of 162 participants. The same manipulation check used in Study 1 was used in Study 2. Data from the participants who did not remember the correct instructions as well as those who did not follow the instructions in the recognition phase were discarded. Data from 15 participants were discarded due to these reasons (8 did not remember instructions, 7 did not follow instructions during the recognition phase). An additional 5 participants were discarded because they had either 0-5% hits or 95-100% rates for hits and/or false alarms in two of those areas (for example, high same-race hits, low other-race false alarms). Outliers were taken out to adjust for the empty cells that would prevent calculation of signal

detection measures. Data from 9 White participants and 3 Black participants in the instructions group were discarded while 5 White participants and 3 Black participants in the control group were discarded.

Scoring

Recognition task. The recognition task was scored by examining whether or not the participant circled "seen before" or "not seen before." Hits and false alarms were calculated separately for Black and White faces. Hits were calculated by seeing how many faces were correctly identified as seen before out of the total 20 faces that were seen presented in the learning phase for each race. False alarms were then calculated by seeing how many faces were wrongly identified as seen before when they were not actually presented (20 Black foils; 20 White foils).

Interracial contact questionnaire. Participants rated their agreement with the statements on the SEQ on a 1-7 or 1-9 scale. The interracial contact questionnaire was broken down into three subsections: past quantity, present quantity, and present quality. Total scores were calculated by taking the mean for each participant on each subsection. Internal consistency reliability (α) was examined for the scale as a whole (α= .698) and for each subsection. The past quantity subsection consisted of seven questions that involved how many people of a different race participants had interaction with while growing up both in school and in their neighborhood (α=.588) (see Appendix E) . One question about number of other-race friends in high school was deleted to raise the overall scale reliability to .803 for the remaining six questions. The present quantity subsection consisted of 11 questions about how many people of a different race the participants have interaction with currently in their neighborhood, in school, in social settings, in

intimate settings, and at work (α=.829). The present quality subsection consisted of six questions that involved their ratings of their happiness with these interactions (α.=731). Based on Young and Hugenberg (2012) we also created a contact composite score that comprised all three subscales α= .717.

Hits and False Alarms

To test the hypothesis that instructions would improve performance on cross-race recognition, particularly for white participants, a repeated measures analysis of variance (ANOVA) was conducted to examine any effects for race or instructions group. The independent variables were participant race and instruction group; the dependent variables in the first analysis were same- and other-race hits and in the second analysis they were same and other-race false alarms. In the analysis of hits, there were no main effects or interactions for own and other-race hits.

In the analysis of false alarms, there was a significant difference in own and other race false alarms, F (1,138) = 13.726, p =.000. Overall, there were higher rates of false alarms for other-race faces than same-race faces. Furthermore, this pattern differed by race of participant. The interaction of target race and participant race was significant, F (1,138) = 9.797, p =.002. Black participants committed more own-race false alarm errors than White participants did, but White participants made more other-race false alarms than Black participants. Table 8 displays the means for each race between each group.

Table 8 Hits and False Alarm Rates

		Hits		False Alarms	
Participant Race	Group	Same-race	Other-race	Same-race	Other-race
White	Instructions	.67 (.15)	.65 (.14)	.21 (.15)	.38 (.17)
	Control	.69 (.14)	.62 (.17)	.23 (.15)	.33 (.15)
Black	Instructions	.68 (.16)	.67 (.20)	.20 (.18)	.22 (.20)
	Control	.54 (.13)	.58 (.15)	.32 (.15)	.32 (.20)

Note. Standard deviations are in parentheses.

Gender was examined to see if there were any differences between males and females and their rates of hits and false alarms. There were no significant main effects or interactions involving gender.

Signal Detection Measures

Signal detection theory was used again to further examine the cross-race effect. There was a significant difference in own- and other-race sensitivity, $F(1, 123)= 11.194$, $p= .001$. Same-race sensitivity was higher than other-race sensitivity. Furthermore, this pattern differed by race of participant. The interaction of target race and participant race was significant, $F(1, 123)= 11.510$, $p= .001$. White participants exhibited higher same-race sensitivity than Black participants, but Black participants exhibited higher other-race sensitivity than White participants.

As predicted, White participants exhibited the cross-race effect in the control condition meaning their sensitivity for other-race faces was lower than their sensitivity for same-race faces. Instructions did not influence the cross-race effect for White participants. As in Study 1, Black

participants did not exhibit the cross-race effect in the control condition. The CRE was not evident in the instructions group for Black participants; they were more sensitive to both other- and same-race faces in the instructions condition versus the control condition (see Table 9). No significant gender differences were found.

Response bias was examined to see if participants were more conservative or liberal in their choosing different faces. No significant differences were found between either race or instructions group. Both Black and White participants' same-race response bias was relatively similar in the instructions and control group, averaging roughly .15. Other-race response bias was lower than same-race for both Black and White participants. Both Black and White participants were more conservative to same-race faces across groups (see Table 10). No significant gender differences were found.

Table 9 Sensitivity Means across Groups

Participant Race	Group	Same-race	Other-race	Difference
White	Instructions	1.30 (.70)	.83 (.55)	.47 (.65)
	Control	1.37 (.58)	.81 (.46)	.55 (.63)
Black	Instructions	1.19 (.71)	1.19 (.70)	-.00 (.67)
	Control	.57 (.56)	.58 (.64)	-.01 (.98)

Note. Standard deviations are in parentheses.

Table 10 Response Criterion Means between Groups

Participant Race	Group	Same-Race	Other-Race
White	Instructions	.16 (.34)	-.01 (.35)
	Control	.13 (.38)	.04 (.43)
Black	Instructions	.14 (43)	.11 (.58)
	Control	.13 (.26)	.07 (.31)

Note. Standard deviations are in parentheses.

Interracial Contact

Total scores were calculated by taking the mean for each participant on each subsection. Means for Black participants were significantly higher than means for White participants on all three subsections (see Table 12). Compared to White participants, Black participants had a significantly higher mean for past quantity, $F(1, 116) = 2.645$, $p=.037$, present quantity , $F(1, 116) = 3.571$, $p=.009$, and present quality, $F(1, 116) = 9.355$, $p=.000$. Black participants also reported significantly higher means on the composite, $F(1, 116)= 6.212$, $p=.000$. No significant instruction group differences were found. Further analyses revealed no relationship between the subscales of the SEQ as well as the contact composite and other-race sensitivity (see Tables 11 and 12). Even more so, analyses revealed no relationship between the subscales of the SEQ and contact composite with the *d'* difference score.

Because there was no relation between contact and other race sensitivity, the moderated regression analyses were not pursued. However, to compare results to Young and Hugenberg (2012), a median split was performed for White participants only to examine if there were any

differences in sensitivity for those with high and low levels of interracial contact between groups. No significant effects or interactions were found.

Table 11 Race Differences in Interracial Contact Social Experiences Questionnaire Means

Race of Participant	Past Quantity	Present Quantity	Present Quality	Contact Composite
White	2.70 (2.57)	3.86 (1.32)	5.09 (.93)	1.38 (.49)
Black	4.31 (3.39)	5.40 (1.31)	5.67 (1.00)	1.42 (.44)

Note. Standard deviations are in parentheses.

Table 12 Correlations between SEQ and Recognition Accuracy Measures and Response Criterion by Instructions Condition for White Participants

	Social Experiences Questionnaire (SEQ) Responses					
	Past Quantity		Present Quantity		Present Quality	
	Instructions	Control	Instructions	Control	Instructions	Control
Hits						
White faces	.043	-.191	.056	-.184	-.174	-.075
Black faces	-.054	-.066	-.010	.119	-.108	-.346*
False Alarms						
White faces	-.126	.070	-.078	.002	-.310*	-.240
Black faces	-.153	.058	-.080	-.118	-.109	-.293
d'						
White faces	.135	-.182	.085	-.081	.033	.203
Black faces	.105	-.172	.092	.176	.031	-.178
C						
White faces	.131	.588	.922	.149	.303*	.234
Black faces	.123	.015	.062	-.003	.132	.378*

Note. * Correlations significant at the .05 level (two-tailed).

Table 13 Correlations between SEQ and Recognition Accuracy Measures and Response Criterion Instructions Condition for Black Participants

	Social Experiences Questionnaire (SEQ) Responses					
	Past Quantity		Present Quantity		Present Quality	
	Instructions	Control	Instructions	Control	Instructions	Control
Hits						
White faces	-.212	.052	.367	-.022	-.191	-.122
Black faces	-.184	-.322	-.017	.421	-.169	.482
False Alarms						
White faces	-.138	-.687**	.346	-.083	.233	-.099
Black faces	.150	-.422	.130	.128	.407	-.552
d'						
White faces	-.008	.045	.121	.037	-.297	-.285
Black faces	-.085	.201	.731	.107	-.405	.744**
C						
White faces	.319	.338	-.229	-.027	.248	-.166
Black faces	-.112	.548	-.077	.350	-.264	.124

Note. ** Correlations significant at the .01 level (two-tailed). * Correlations significant at the .05 level (two-tailed).

Discussion

The purpose of Study 2 was to determine if the findings in Study 1 were due to methodology, specifically the stimuli used. Study 2 found support for the cross-race effect being evident in the control group for White participants only. Black participants did not exhibit the cross-race effect which could be partly due to their high levels of interracial contact. One major difference between Study 1 and Study 2 is that Black participants did not exhibit the cross-race effect in the instructions group, which in Study 1 they did exhibit the CRE in the instructions

group. However, instructions still did not reduce the effect for White participants in the instructions group. The instructions may have helped Black participants improve both same- and other-race sensitivity in conjunction with the different stimuli. These stimuli are much different than those used in Study 1. More features are seen which could be why the Black participants were able to individuate the faces, regardless of race.

Also, Black participants in the instruction condition showed an improved sensitivity for same-race faces. This could be influenced by Black participants in this area not perceiving themselves as the in-group; rather they perceive themselves as the out-group since White participants are the majority race in the location the study took place. Instructions could have increased their motivation to individuate both Black and White faces. Furthermore, the instructions are tailored to specifically focus on Black faces, "For example, a White learner will tend to mistake one Black face for another." p. 336.

There was a significant effect for race on interracial contact, Black participants reported higher means of interracial contact compared to White participants, which could have been influenced by location of the study. The area is diverse and Black participants have more contact with members of a different race. However, interracial contact did not have any relationship with other-race sensitivity. Results indicated that contact does not moderate the relationship between participant race and other-race sensitivity. Similar to Young and Hugenberg (2012), there were White participants in the instructions group with high amounts of interracial contact; however, in the current study, when paired with motivation to individuate, for those with higher amounts of interracial contact, sensitivity for other-race faces did not decrease.

CHAPTER IV

GENERAL DISCUSSION AND CONCLUSION

The two reported studies resulted in different findings. The cross-race effect was not evident in the control group for Black participants in either study which is similar to findings of prior research regarding the difference in magnitude of the CRE between Black and White participants (Meissner & Brigham, 2001). This could be because these studies took place in a diverse area. Black participants are more often around other-race people in various settings such as school and work.

As predicted, White participants in the control condition did display the cross-race effect in Study 1. However, White participants did not benefit from the specific CRE instructions. Results indicated that the instructions actually decreased same-race recognition for White participants in Study 1, perhaps due to the instruction that "pay very close attention to the faces, especially when they are of a different race than you" p. 336.

The current study does not directly support the CIM; participants did not perform better when receiving instructions to individuate the faces of a different race. However, the CIM does predict that when White participants are told to categorize same-race races, same-race recognition decreases. Even though our participants were not told to categorize same-race faces, the instructions specifically warning them about the CRE repeatedly told them to individuate Black faces which could have led White participants to categorize the White faces as out-group. Out-group categorization of the White faces could have led to the decrease in same-race

recognition which is in line with the CIM. Furthermore, Hugenberg et al. (2007) found a slight decrease in same-race recognition for White participants given the CRE instructions

Neither Black nor White participants in the instructions condition in Study 1 displayed a reduced cross-race effect. Black participants may not have benefited from the instructions because the instructions are tailored to the White participants, "for example, a White learner will tend to mistake one Black face for another" p. 336. These instructions may imply to Black participants that Black faces are harder to distinguish from one another than White faces. Furthermore, since the Black participants did not exhibit a cross-race effect in the control condition, the instructions would not have had any effect on their performance.

Study 2 used different stimuli to see if the lack of instruction effect in Study 1 was due to the stimuli used. Similar to Study 1, White participants in Study 2 displayed the CRE in the control condition and Black participants did not. A major difference in these findings was there was there were higher levels of both cross-race and same-race recognition in the instructions group for Black participants. However, there was also no CRE in the control condition for Black participants, so the instructions were not really reducing a cross-race effect. Perhaps the stimuli are easier to individuate combined with the higher levels of interracial contact, supporting the CIM.

The current studies have several limitations in application to actual eyewitness identifications. First, the CIM focuses on estimator variables. Estimator variables are out of control of the legal system such as sex, age, and gender of the witness whereas system variables are in control of the legal system such as time of lineup, how many people are in a lineup, and instructions given at the time of the lineup (Wells & Olsen, 2003). Prior to or during a crime, witnesses a crime will not be told to carefully examine the suspect if he or she is of a different

race; furthermore, this study does not support that these instructions will work. One way future researchers can attempt to remedy this is to do a lineup study in which participants are given instructions after the crime but prior to viewing the lineup. Investigating this system variable would be more applicable to eyewitness identification. However, Young et al. (2010) did not find the specific individuation instructions to work at retrieval. Laub et al. (2009) found that when they used instructions at retrieval, their participants exhibited a change in response bias; there was a slight trend toward a reduced CRE.

Future research could examine if these individuation instructions have any effect on Black participants since past research has focused primarily on White participants. Furthermore, different instructions at retrieval should be used such as general accuracy or different individuation instructions. Also, lineups do not consist of 80 faces to pick out a suspect. The set size in this study could be one reason why the cross-race effect was not diminished. Past research has shown that smaller set sizes reduce the size of CRE (Marcon et al., 2010). The current studies used a large set size in both the learning and recognition phases. The learning phase contained 40 faces and the recognition phase had a set size of 80 faces. During debriefing, participants mentioned that the number of faces they were required to remember was overwhelming and they may have done better had there been fewer faces.

Few real world studies have been done to test whether the CRE occurs in eyewitness line-ups (e.g., Wright et. al, 2003; Valentine, Pickering, & Darling, 2003). Wright et al. (2003) found that their participants were more likely to choose a person of a different race than their own when asked to choose someone out of a lineup. These findings are similar to the face recognition literature. Valentine et al. (2003) examined many variables that affect the CRE in the eyewitness identification paradigm. Their study included White European and Black Caribbean participants.

Results showed that witnesses were more likely to identify someone of their own race versus those of a different race. This doesn't appear to apply to actual lineups because they were more likely to choose same-race suspects which would lead to a higher amount of same-race errors than other-race errors. This data does not correspond with the face recognition literature. These inconsistencies in the literature provide reason to further examine the cross-race effect in a lineup situation rather than a facial recognition paradigm.

The demographics of the samples in both studies are also a limitation. A larger sample of Black participants would give a better idea of the magnitude of the cross-race effect in that population. Furthermore, an equal number of males and females would be preferable. The current studies had more female participants than male participants. In addition to participant gender, future research could test the CIM with female White and Black faces to see if there is any difference between female and male target faces. During debriefing some participants commented that female faces may be more easily remembered due to more individuating features. These individuating features in addition to the specific individuation instructions may reduce the CRE in the participants (Wright & Sladden, 2003).

Interracial contact was examined in addition to individuation instructions. The CIM proposes that we all have the ability to individuate faces; we just do not do it automatically. The more contact a person has with members of a different race the easier it is for him or her to individuate, especially when receiving instructions. In addition, Black participants may not categorize White faces as out-group because they are involved with White people on a daily basis, especially in a campus setting. We also speculate that the area in which Hugenberg et al. (2007) conducted their study is not as diverse as where the current study took place which leads us to believe that their amount of interracial contact was probably less than what the participants

had in the current study. It is hard to determine whether or not this is true because Hugenberg et al. (2007) did not measure interracial contact, and Young and Hugenberg (2012) did not report any means for interracial contact in their sample.

Present quality and the amount of interracial contact in one's past did not influence participants' accuracy in identifying other-race faces. Thus, this study does not fully support the contact hypothesis. Present quantity, defined in this study as the amount of interracial contact currently in one's life, and was significantly related to participants' accuracy. This could be due to the diversity of the area. Many participants spend time with members of a different race on a daily basis. They may not have quality interactions, but the amount of time spent together has an influence on their ability to recognize members of a different race. Black participants reported higher means of interracial contact on all three subscales which could be because they are a minority in the area, and they are around members of a different race in different settings throughout the day. Particular to this sample, Black participants are surrounded by White people throughout the classes used in this study

At the time the present study was designed there were no published reports examining the CIM and interracial contact. Since then, Young and Hugenberg (2012) examined the role of contact in White participants only. They found that White participants in their instructions group who reported high levels of interracial contact did not display the CRE. In the first of our two studies, the contact composite score did significantly correlate with other-race sensitivity for White participants in the instructions condition and not control which is similar to the findings for Young and Hugenberg (2012). However, in their study, participants in the instructions group did not display the cross-race effect, whereas in the present study there was no instructions effect. These findings show that participants do not have to individuate faces completely for

contact to play a role in other-race sensitivity. These results do not support the CIM, but they do not fully support perceptual expertise either. In order for perceptual expertise to be supported, the contact composite should also be related to other-race sensitivity in the control condition.

The cross-race effect is a serious problem that leads to many wrongful identifications which in turn leads to innocent people being incarcerated. The present study examined one proposed mechanism underlying these errors: categorization of other-race individual as out-group members, which leads to a failure to process other-race faces individually. Individuation instructions were given at encoding to encourage better processing for other-race faces, with the goal of reducing the cross-race effect. . The current studies were consistent with previous literature, demonstrating the cross-race effect in White participants and a much smaller CRE Black participants. On the other hand, neither of the current studies replicated the effectiveness of the specific instructions to individuate that successfully reduced the CRE in a limited amount of studies (e.g., Hugenberg et al., 2007; Rhodes et al., 2009; Young & Hugenberg, 2012). Future research should examine different instructions that may help participants individuate in both the face recognition and eyewitness paradigms so that they can be applicable to the legal system. The CRE is a strong effect that is difficult to eradicate, even at the encoding stage. Unfortunately, until a reliable method for reducing or eliminating the cross-race effect is found, mistaken cross-race identifications will continue to be made.

REFERENCES

Bennett-Day, B. (2007). *The role of processing strategy in the cross-race effect.* (Unpublished doctoral dissertation) The Florida State University, Tallahassee, Florida.

Benton, T., Ross, D., Bradshaw, E., Thomas, N., & Bradshaw, G. (2005). Eyewitness memory is still not common sense: Comparing jurors, judges, and law enforcement to eyewitness experts. *Applied Cognitive Psychology, 20,* 115-129. doi: 10.1002/acp.1171

Bernstein, M., Young, S., & Hugenberg, K. (2007). The cross-category effect: Mere social categorization is sufficient to elicit an own-group bias in face recognition. *Psychological Science, 18,* 706-712. doi: 10.1111/j.14679280.2007.01964x

Brigham, J. (2008). The role of race and racial prejudice in recognizing other people. In C. Willis-Esqueda, (Ed.). *Motivational aspects of prejudice and racism* (pp. 68-110). New York, NY: Springer Science.

Brigham, J., Bennett, B., & Butz, D. (2005). *The effect of raining in face recognition: When practice does not make perfect.* Symposium Presentation, American Psychology-Law Society, La Jolla, CA.

Brigham, J., Bennett, B., Meissner, C., & Mitchell, T. (2007). The influence of race on eyewitness memory. In Lindsay, R., Ross, D., Read, D., Toglia, M. (Eds.) *The Handbook of Eyewitness Psychology, Vol II: Memory for people* (257-281). Mahwah, NJ: Lawrence Erlbaum Associates

Brigham, J. & Malpass, R. (1985). The role of experience and contact in the recognition of own- and other-race persons. *Journal of Social Issues, 41,* 139-155. doi: 10.1111/j.1540-4560.1985.tb01133.x

Chance, J. & Goldstein, A. (1996). The other-race effect and eyewitness identification. In Sporer, S., Malpass, R., & Koehnken, G. (Eds). *Psychological Issues in Eyewitness Identification* (153-176). Hillsdale, NJ: Lawrence Erlbaum Associates.

Craik, F. & Lockhart, R. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11,* 671-684.

Furl, N., Phillips, P.J., & O'Toole, A. (2002). Face recognition algorithms and the other-race effect: Computational mechanisms for a developmental contact hypothesis. *Cognitive Science, 26,* 797-815. doi: 10.1016S0364-0231(02)00084-8

Hancock, K. & Rhodes, G. (2008). Contact, configural coding, and the other-race effect in face recognition. *British Journal of Psychology, 99,* 45-56.

Hugenberg, K., Miller, J., & Claypool, H. (2007). Categorization and individuation in the cross-race recognition deficit: Toward a solution to an insidious problem. *Journal of Experimental Social Psychology, 43,* 334-340.

Hugenberg, K., Young, S., Bernstein, M., & Sacco, D. (2010). The categorization-individuation model: An integrative account of the other-race recognition deficit. *Psychological Review, 117,* 1168-1187.

Innocence Project. (2011). *Clark McMillan.* Retrieved from: http://www.innocenceproject.org/Content/Clark_McMillan.php

Jackiw, L., Arbuthnott, K., Pfiefer, J., Marcon, J., & Meissner, C. (2008). Examining the cross-race effect in lineup identification using Caucasian and First Nations samples. *Canadian Journal of Behavioural Science, 40,* 52-57.

Johnson, A., & Fredrickson, J. (2005). "We all look the same to me": Positive emotions eliminate the own-race bias in the other-race effect. *Bulletin of the Psychonomic Society, 23,* 211-214.

Kassin, S., Tubb, V., Hosch, H., & Memon, A. (2001). On the "general acceptance" of eyewitness testimony research: A new survey of the experts. *American Psychologist, 56,* 405-416. doi: 10.1037/0003-066X.56.5.405

Kehn, A. (2010). *The impact of social categorization on own- and other-race face processing.* (Unpublished doctoral dissertation). The University of Wyoming, Laramie, Wyoming.

Kelly, D., Quinn, P., Slater, A., Lee, K., Ge, L., & Pascalis, O. (2007). The other-race effect develops during infancy: Evidence of perceptual narrowing. *Psychological Science, 18,* 1084-1089. doi: 10.1111/j.14679280.2007.02029.x

Laub, C., Bornstein, B, Susa, K., Marcon, J., & Meissner, C. (2009, May) *The effect of instructions on the cross-race effect: Does the type of task matter?* Paper presented at the annual meeting of The Law and Society Association, Denver, Colorado.

Levin, D. (1996). Classifying faces by race: The structure of face categories. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 22,* 475-481.

Levin, D. (2000). Race as a visual feature: Using visual search and perceptual discrimination tasks to understand face categories and the cross-race recognition deficit. *Journal of Experimental Psychology: General, 129,* 559-574.

Lindsay, D., Jack, P. & Christian, M. (1991). Other-race face perception. *Journal of Applied Psychology, 76,* 587-589. doi: 10.1037/00219010.76.4.587

MacLin, O., MacLin, M., & Malpass, R. (2001). Race, arousal, attention, exposure, and delay: An examination of factors moderating face recognition. *Psychology, Public Policy, and Law, 7,* 134-152.

MacLin, O. & Malpass, R. (2001). Racial categorization of faces: The ambiguous race face effect. *Psychology, Public Policy, and Law, 7,* 98-118. doi:10.1037/10768971.7.1.98

Malpass, R., Lavigueur, H., &Weldon, D. (1973). Verbal and visual training in face recognition. *Perception and psychophysics, 14,* 330-334.

Marcon, J., Meissner, C., Frueh, M., Susa, K., & MacLin, O. (2010). Perceptual identification and the cross-race effect. *Visual Cognition, 18,* 167-779.

Meissner, C. & Brigham, J. (2001). Thirty years of investigating the own-race bias in memory for faces: A meta-analytic review. *Psychology, Public Policy, and Law, 7,* 3-35.

Meissner, C., Brigham, J., & Butz, D. (2005). Memory for own- and other-race faces: A dual-process approach. *Applied Cognitive Psychology, 19,* 545-567. doi: 10.1002/acp.1097

Pezdek, K., Blandon-Gitlin, I., & Moore, C. (2003). Children's face recognition memory: More evidence for the cross-race effect. *Journal of Applied Psychology, 88,* 760-763. doi: 10.1037/00219010.88.4.760

Reynolds, J. K., & Pezdek, K. (1992). *Face recognition memory: The effects of exposure duration and encoding instructions*. *Applied Cognitive Psychology, 6,* 279-292.

Rhodes, G., Locke, V., Ewing, L., & Evangelista, E. (2009). Race coding and the other-race effect in face recognition. *Perception, 9,* 232-241.

Schmechel, R., O'Toole, T., Easterly, C., & Loftus, E. (2006). Beyond the Ken? Testing jurors' understanding of eyewitness reliability evidence. *Jurimetrics, 46,* 177-214.

Slone, A., Brigham, J., & Meissner, C. (2000). Social and cognitive factors affecting the own-race bias in Whites. *Basic and Applied Social Psychology, 22,* 71-84. doi: 10.1207/S15324834BASP2202_1

Sporer, S. (2001a). Recognizing faces of other ethnic groups: An integration of theories. *Psychology, Public Policy, and Law, 7,* 36-97.

Sporer, S. (2001b). The cross-race effect: Beyond recognition of faces in the laboratory. *Psychology, Public Policy, and Law, 7,* 170-200.

Tanaka, J., Kiefer, M., & Bukach, C. (2004). A holistic account of the own-race effect in race recognition: Evidence from a cross-cultural study. *Cognition, 93,* B1-B9.

Valentine, T., Pickering, A., & Darling, S. (2003). Characteristics of eyewitness identification that predict the outcome of real lineups. *Applied Cognitive Psychology, 17,* 417-439.

Walker, P. & Hewstone, M. (2006). A developmental investigation of other-race contact and the own-race face effect. *British Journal of Developmental Psychology, 24,* 451-463.

Wells, G. & Olsen, E. (2003). Eyewitness Testimony. *Annual Review of Psychology, 54,* 277-95. doi: 10.1146/annurev.psych.54.101601.145028

Wright, D., Boyd, C., & Tredoux, C. (2003) Inter-racial contact and the own-race bias for face recognition in South Africa and England. *Applied Cognitive Psychology, 17,* 365-373. doi: 10.1002/acp.898

Wright, D. & Sladden, B. (2003). An own gender bias and the importance of hair in face rcognotion. *Acta Psychologia, 114,* 101-114.

Young, S., Bernstein, M., & Hugenberg, K. (2010). When do own-group biases in face recognition occur? Encoding versus post-encoding. *Social Cognition, 28,* 240-250. doi: 10.1521/soco.2010.28.2.240

Zhao, L. & Bentin, S. (2008). Own- and other-race categorization of faces by race, gender, and age. *Psychonomic Bulletin & Review, 15,* 1093-1099. doi: 10.3758/PBR.15.6.1093

Young, S. & Hugenberg, K. (2012). Individuation motivation and face experience can operate jointly to produce the own-race bias. *Social Psychological & Personality Science, 3,* 80-87.

APPENDIX A

INFORMED CONSENT

APPENDIX A

PROTOCOL TITLE: THE EFFECTS OF INSTRUCTIONS AND PRIOR CONTACT ON RECOGNITION OF FACES

Please read this consent document carefully before you decide to participate in this study. This research has been approved by the University Institutional Review Board.

Purpose of the research study:

The purpose of this study is to examine the recognition of photographs.

What you will be asked to do in the study:

You will view a series of faces in the beginning of this study that you will be later asked to remember. After viewing these faces you will answer some trivia questions. Once everyone has answered the trivia questions you will view more faces and will be asked if you recognize any of them. After all the faces have been viewed, you will answer some questions.

Time required:

45 minutes or less.

Risks and Benefits:

Answering some of the questions may produce mild discomfort, but your answers will not be connected to your name and no one besides the researchers will see your answers. Your participation in this research will assist us in better understanding the face recognition process and how to improve accuracy.

Compensation:

Your instructor may choose to give you extra credit for participating. If so, your instructor will determine how much credit you have earned.

Confidentiality:

Your identity will be kept confidential to the extent provided by law. Your information will be assigned a code number. Your name on the informed consent form will not be connected with your responses. No names or other information identifying individuals will be used in any report.

Voluntary participation:

Your participation in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study:

You have the right to withdraw from the study at anytime without consequence.

Whom to contact if you have questions about the study:

Emily Pica at ddn947@mocs.utc.edu. You can also contact the faculty advisor Dr. Amye Warren at Amye-Warren@utc.edu.

Agreement:

I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description.

Participant: _____ Date: _____

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact Dr. Bart Weathington, Chair of the Institutional Review Board, at 423-425-4289. Additional contact information is available at www.utc.edu/irb

****If you have participated in this research project already, please let the researcher know.**

APPENDIX B

DEMOGRAPHICS QUESTIONNAIRE

APPENDIX B

1. Age: _____
2. Gender: _____
3. Race:
    a. Caucasian (White)
    b. African American (Black)
    c. Hispanic
    d. Latino
    e. Asian
    f. Other:_____
4. Level in college:
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
5. Please write the instructions you were told to follow at the beginning of this experiment:

_____
_____
_____
_____
_____
_____

APPENDIX C

FILLER VOCABULARY TASK

APPENDIX C

Fill in the blank with the word that relates to the first three. See the three examples below.

Examples:

Salt
Deep } SEA (sea salt, deep sea, and sea foam)
Foam

Rock
Times } HARD (rock hard, hard times, and hard as steel)
Steel

Falling
Actor } STAR (falling star, actors are referred to as stars, and stardust)
Dust

Here are yours to try. Some may be challenging, but please do your best.

Broken
Clear } _____
Eye

Speak
Money } _____
Street

Widow
Bite } _____
Monkey

Measure
Desk } _____
Scotch

Cracker
Union } _____
Rabbit

Puss
Tart } _____
Spoiled

Playing
Credit } _____
Report

Ticket
Shop } _____
Broker

Chamber
Staff } _____
Box

APPENDIX D

RECOGNITION ANSWER SHEET

APPENDIX D

Answer Sheet: Please circle whether or not you have seen the face before and how confident you are.

1. Seen before Not seen before

How sure are you that your answer is correct?

1 2 3 4 5 6 7

(Just guessing) (Very sure)

---

2. Seen before Not seen before

How sure are you that your answer is correct?

1 2 3 4 5 6 7

(Just guessing) (Very sure)

---

3. Seen before Not seen before

How sure are you that your answer is correct?

1 2 3 4 5 6 7

(Just guessing) (Very sure)

---

4. Seen before Not seen before

How sure are you that your answer is correct?

1 2 3 4 5 6 7

(Just guessing) (Very sure)

---

5. Seen before Not seen before

How sure are you that your answer is correct?

1 2 3 4 5 6 7

(Just guessing) (Very sure)

APPENDIX E

INTERRACIAL CONTACT QUESTIONNAIRE

APPENDIX E

We'd like to know about your experiences with people from other races. If you are White, please answer these questions about Black individuals. If you are Black, please answer these questions about White individuals. If you are a race other than Black or White please specify which race (other than your own) you are answering these questions for: _____

Please circle only one choice for each question.

I am: (circle one) Black White Other :_____

I will be answering the following questions about: (circle one) Black White individuals.

I. Past experiences. Please read each question carefully and circle one choice.

1. Approximately what percentage of the students in the elementary school you attended were of a different race?

(0) = 0-9%
(1) = 10-19%
(2) = 20-29%
(3) = 30-39%
(4) = 40-49%
(5) = 50-59%
(6) = 60-69%
(7) = 70-79%
(8) = 80-89%
(9) = 90-100%

2. Out of your closest friends, how many friends of a different race did you have in elementary school?
   (9 = 9 or more)

   0 1 2 3 4 5 6 7 8 9

3. Approximately what percentage of the students in middle school or junior high school you attended were of a different race?

(0) = 0-9%
(1) = 10-19%
(2) = 20-29%
(3) = 30-39%
(4) = 40-49%
(5) = 50-59%
(6) = 60-69%
(7) = 70-79%
(8) = 80-89%
(9) = 90-100%

***More questions on the next page.**

4. Out of your closest friends, how many friends of a different race did you have in middle school or junior high school?
   (9 = 9 or more)

   0 1 2 3 4 5 6 7 8 9

5. Approximately what percentage of the students in the high school you attended were of a different race?

   (0) = 0-9%
   (1) = 10-19%
   (2) = 20-29%
   (3) = 30-39%
   (4) = 40-49%
   (5) = 50-59%
   (6) = 60-69%
   (7) = 70-79%
   (8) = 80-89%
   (9) = 90-100%

6. Out of your closest friends, how many friends of a different race did you have in high school?
   (9 = 9 or more)

   0 1 2 3 4 5 6 7 8 9

7. Approximately what percentage of the people in the neighborhood in which you grew up were of a different race?

   (0) = 0-9%
   (1) = 10-19%
   (2) = 20-29%
   (3) = 30-39%
   (4) = 40-49%
   (5) = 50-59%
   (6) = 60-69%
   (7) = 70-79%
   (8) = 80-89%
   (9) = 90-100%

***More questions on the next page.**

II. Now, think of your current experiences. The next set of questions will involve your current everyday experiences with members of a different race.

8. Approximately what percentage of the people in your current neighborhood are of a different race?

(0) = 0-9%	(5) = 50-59%
(1) = 10-19%	(6) = 60-69%
(2) = 20-29%	(7) = 70-79%
(3) = 30-39%	(8) = 80-89%
(4) = 40-49%	(9) = 90-100%

9. In an average week's time, approximately how many people of a different race do you have conversations with? (9 = 9 or more)

0 1 2 3 4 5 6 7 8 9

10. In an average week, how many people of a different race do you have conversations with in the following five places: (9 = 9 or more)

a. On campus
0 1 2 3 4 5 6 7 8 9

b. In recreational activities
0 1 2 3 4 5 6 7 8 9

c. At your job
No Job 0 1 2 3 4 5 6 7 8 9

d. In stores
0 1 2 3 4 5 6 7 8 9

e. In dorms/apartment complexes/immediate neighborhood
0 1 2 3 4 5 6 7 8 9

11. Think about your 10 closest friends. How many of your 10 closest friends are of a different race? (9 = 9 or more)

0 1 2 3 4 5 6 7 8 9

12. How many people have you dated that are of a different race? (9 = 9 or more)

0 1 2 3 4 5 6 7 8 9

***More questions on the next page.**

13. How often do you talk to people of a different race?
(Please Check)

____ Daily ____ Weekly ____ Monthly

14. How often do you see people of a different race?
(Please Check)

____ Daily ____ Weekly ____ Monthly

15. Of the following activities, which ones do you do with people of a different race?
(Place a check next to the ones you do)

____ Go shopping
____ Go out to eat
____ Go to the movies
____ Go to their house
____ Invite them to your house
____ Go on vacation
____ Go to parties
____ Work with them
____ Play sports
____ Go to sporting events
____ Study with them
____ Work out with
____ Go to night clubs/bars/dancing
____ Attend religious services
____ Belong to/regularly attend campus organizations/functions with them (e.g., Greek organization, service fraternity, honor society)
____ Belong to/regularly attend other (non-college related) organizations/functions with them

College Setting:

We would like to know about your experience with people of a different race at your school. This might include interactions with classmates or professors. Please read each question carefully and circle one number on the scale provided for each question.

16. In general, how much interaction have you had with people of a different race in a college setting?

1 2 3 4 5 6 7
(None) (Extensive)

***More questions on the next page.**

(College setting continued)

17. On average, how pleasant or unpleasant were these interactions?

1 2 3 4 5 6 7
(Very unpleasant) (Very Pleasant)

18. Comparing yourself to classmates of your own race at your school, how would you rate the extent of ***your*** contact with those of a different race?

1 2 3 4 5 6 7
(Much less contact) (Much more contact)

19. How much experience do you have in working on group/team projects in college with people of a different race?

1 2 3 4 5 6 7
(None) (Extensive)

20. How would you rate your experiences in group projects with those of a different race?

1 2 3 4 5 6 7
(Bad) (Good)

Private/Personal Setting

We would like to know about your experience with people of a different race within a personal/private setting (dinner at home, private conversation). This might include interactions with a close friend or significant other. Please read each question carefully and circle one number on the scale provided for each question.

21. In general, how much interaction have you had with a person of a different race in a private/personal setting?

1 2 3 4 5 6 7
(None) (Extensive)

22. On average, how pleasant or unpleasant were these interactions?

1 2 3 4 5 6 7
(Very Unpleasant) (Very Pleasant)

***More questions on the next page.**

Social/Public Settings

We would like to know about your experiences with people of a different race within the context of various social/public settings. This might include interactions with neighbors, health professionals, fellow club members, or teammates in sports. It may also include interactions with people at concerts, churches, stores or restaurants, at parties, or while on vacation. Please read each question carefully and circle one number on the scale provided for each question.

23. In general, how much interaction have you had with a person of a different race in an intimate/personal setting?

1	2	3	4	5	6	7
(None)						(Extensive)

24. On average, how pleasant or unpleasant were these interactions?

1	2	3	4	5	6	7
(Very Unpleasant)						(Very Pleasant)

Work Setting

We would like to know about your experience with people of a different race within a work setting. This might include interactions with a supervisor, coworker, or customer. Please read each question carefully and circle one number on the scale provided for each question.

25. In general, how much interaction have you had with a person of a different race in an intimate/personal setting?

1	2	3	4	5	6	7
(None)						(Extensive)

26. On average, how pleasant or unpleasant were these interactions?

1	2	3	4	5	6	7
(Very Unpleasant)						(Very Pleasant)

27. Have you heard of the cross-race effect before? Yes No

APPENDIX F

IRB APPROVAL LETTER

APPENDIX F

MEMORANDUM

TO: Emily Pica **IRB # 11-092**

Dr. Amye Warren

FROM: Lindsay Pardue, Director of Research Integrity

Dr. Bart Weathington, IRB Committee Chair

DATE: June 27, 2011

SUBJECT: IRB # 11 – 092: The Effects of Instructions and Prior Contact on Recognition of faces

The Institutional Review Board has reviewed and approved your application and assigned you the IRB number listed above. You must include the following approval statement on research materials seen by participants and used in research reports:

The Institutional Review Board of the University of Tennessee at Chattanooga (FWA00004149) has approved this research project # 11-092.

Please remember that you must complete a Certification for Changes, Annual Review, or Project Termination/Completion Form when the project is completed or provide an annual report if the project takes over one year to complete. The IRB Committee will make every effort to remind you prior to your anniversary date; however, it is your responsibility to ensure that this additional step is satisfied.

Please remember to contact the IRB Committee immediately and submit a new project proposal for review if significant changes occur in your research design or in any instruments used in conducting the study. You should also contact the IRB Committee immediately if you encounter any adverse effects during your project that pose a risk to your subjects.

For any additional information, please consult our web page http://www.utc.edu/irb or email instrb@utc.edu

Best wishes for a successful research project.

VITA

Emily Pica is a Pennsylvania native who completed her Bachelor of Science degree at Mansfield University of Pennsylvania in Developmental Psychology. After graduation she attended the University of Tennessee at Chattanooga to complete her Masters degree in Research Psychology under the supervision of Drs. Amye Warren and David Ross. Her interests are a combination of developmental psychology and psychology and the law. She worked as a graduate assistant at United Way of Greater Chattanooga's Project Ready for School. While at the University of Tennessee at Chattanooga she presented research findings at three conferences and wrote two book chapters. She will be continuing her education at Carleton University in Ottawa, Ontario in the doctoral program in Forensic Psychology under the supervision of Dr. Joanna Pozzulo.