ACCURACY AND DECISION-MAKING CRITERIA IN CROSS-RACE EYEWITNESS IDENTIFICATION: A MORE COMPLEX THAN EXPECTED PHENOMENON

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Abstract

ACCURACY AND DECISION-MAKING CRITERIA IN CROSS-RACE EYEWITNESS IDENTIFICATION: A MORE COMPLEX THAN EXPECTED PHENOMENON

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One hundred and nine students from John Jay College participated in a study of cross-racial eyewitness identification using signal detection analysis. No cross-race effect in discriminability was found, but Blacks were slightly better at recognizing Blacks than any other group combination. Two main effects were found on decisional criteria: (a) Blacks used a stricter criterion than White Latinos regardless of the race of the perpetrator, and (b) marginally, all participants used a stricter criterion when identifying White Latinos than when identifying Blacks. This resulted in the stricter criterion been used by Blacks identifying White Latinos, i.e., were less willing to make false positive errors; and the loosest criterion by White Latinos identifying Blacks, i.e., they appeared more willing to commit false positive errors. Unlike many previous studies, overall, more accurate participants were also more confident.

Different measures of contact, "having friends," "hanging out with," and "working closely with" members of another race, had different relationships to discriminability and response criterion. Significantly more Blacks mentioned having White Latinos friends than White Latinos mentioned having Blacks friends. Having

friends and hanging out with individuals of a different race did not relate to discriminability, but was associated with using a stricter criterion. Working closely with members of another race did not relate to discriminability or to decisional criterion. Also, participants who judged that false positive errors were worse than false negative errors, in fact, used a stricter criterion in their eyewitness performance.

Thus, the "cross-race" phenomenon appears to be more complicated than the term "cross-race" effect usually implies. The capacity to discriminate between own- and other-race faces and decisional criteria used to decide "this is the guy" do not necessarily operate in the same direction for different cross-race combinations. Results suggest that same- and cross-race effect is related to and may depend on the *kind* of group interaction, and on the discriminability or decisional criterion that are used to measure performance.

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INTRODUCTION

Over 100 years of research indicates that witnesses to crime often fail to identify the perpetrator, and more disturbingly may make a false identification of a person who did not commit the crime. Cross-race identification is a particularly problematic area for the legal system because many of the identifications in criminal court consist of identifying persons of another race or ethnic group, and a large body of research indicates that recognition of members of another race is particularly problematic. Research has shown that people are far better at recognizing members of their own race than they are at recognizing members of another race. In particular, the evidence suggests that people judge the faces of other races as being more similar to each other than those of their own race.

The term cross-race effect/cross-race deficit refers to these findings that recognition memory tends to be better for faces of members of a witness's own-race than for faces of members of other races (Anthony, Cooper, & Mullen, 1992; Cutler & Penrod, 1995; Kassin, Ellsworth, & Smith, 1989; Lindsay & Wells, 1983; Malpass & Devine, 1983; Meissner and Brigham, 2001; Platz & Hosch, 1988; Smith, Stinson & Prosser, 2004; Sporer, 2001).

Experimental studies on cross-race eyewitness identification performance help to inform us about the rate of mistaken identifications (Anthony et al., 1992; Cutler & Penrod, 1995; Loftus, 1979; Meissner & Brigham, 2001; Smith et al., 2004; Sporer, 2001; Stinson & Prosser, 2004). In such experiments, crimes are simulated in various ways. Experimental designs in cross-race facial recognition are usually divided into two parts. 1) Participants see either a video or a staged event and are then presented with an array of unfamiliar faces of one or another race, which may be presented simultaneously

or one at a time (sequentially). Some studies ask participants to write about the suspect's physical characteristics or to draw a sketch of the suspect's face. Most of the time participants are not told in advance that their memory will be tested. Sometimes there is an interval period between the event and the eyewitness judgments during which participants perform a filler task, which can be a personality questionnaire or other distractor task. 2) Participants then perform the recognition task; they indicate in a yes-no recognition task whether they have previously seen a newly presented face. In many studies, participants view videotapes of crimes and later attempt to identify the perpetrators. In other studies, crimes involving stealing are staged in classrooms, convenience stores, and other places in the view of a large number of participants; sometimes, crimes are even staged for individual subjects.

The cross-race deficit claim is based on the general findings that eyewitnesses are more likely to falsely identify when the perpetrator is of another race, compared to the same race (e.g., Meissner & Brigham, 2001, found a 56% cross-race deficit). Therefore, the chances of an innocent suspect being misidentified may be considerably greater if an eyewitness is from another race versus the same race as the witness.

Searching for answers, psycholegal scholars have conducted a large number of studies examining the cross-race effect. Lindsay and Wells (1983) illustrated three patterns of findings by which a cross-race interaction may occur, findings which have been taken into consideration in studies over time. These patterns have been primarily applied to Black and White participants. The first pattern is *complete crossover*, in which each race is better at recognizing faces of its own than the other race. The second pattern of interaction is *incomplete crossover*, in which (only) Whites are recognized better by

other Whites than by other races, whereas, Blacks are recognized equally well by both races. The third pattern of interaction is *one-way crossover,* where the race of the suspect is only relevant if the witness is White, while Black witnesses are equally accurate for both races of suspect.

Lindsay and Wells (1983) concluded that the cross-race facial recognition literature is far from consistent, but that *complete crossover* interaction does seem to be the most common finding among researchers. Moreover, researchers would agree that the cross-race deficit is a sufficiently reliable phenomenon even to permit scientific experts to testify as to its relevance in court (Kassin et al., 1989). Yet, meta-analyses conducted for the last 15 years (Anthony et al., 1992; Bothwell, Brigham & Malpass, 1989; Meissner & Brigham, 2001; Shapiro & Penrod, 1986) revealed that not all studies show the predicted cross-race recognition effect. Unfortunately, one of the problems is that studies have used diverse methodologies to test cross-race face recognition. The data across studies show complex interactions, but they may be due to artifacts, e.g., differences in the difficulty of the stimuli; different retention intervals, different degree of attention, kind of lineup/photo array construction. Or there may be differences among and within races for both perception and recognition. Also, it may be a combination of many factors during the recognition task.

This paper reviews recent laboratory and field research that addresses the cross-race effect based on several theoretical explanations that have been advanced to account for the cross-race phenomenon. Also, the robustness of the cross-race effect is reviewed in light of several meta-analyses.

SOME EXPLANATIONS FOR THE CROSS-RACE EFFECT

Many factors have been studied to help explain why the cross-race identification phenomenon occurs, and the research literature has offered different hypotheses to explain it. Those most relevant to this study are: a) level of contact with other races – *Contact/Experiential Hypothesis;* b) racially prejudiced attitudes towards other races impairing other-race face recognition - *Differential Attitude Hypothesis*; c) different levels of own- and other race face processing - *Differential Depth-of-Processing Hypothesis;* d) the lack of variability in faces of another race – *Physiognomic Variation Hypothesis* - which involves cognitive and social underpinnings for the cross-race effect such as the perceptual expertise and configural processing hypotheses; and, finally e) different judgments and decision-making during the identification process – *Differential Strategy/Criteria Hypothesis*.

The Contact/Experiential Hypothesis

Early theories of the cross-race deficit proposed that the effect was due to a lack of expertise in processing the faces of the other race members. Research on novice versus expert on other race faces indicates that experience promotes expertise, while novelty negatively impacts perceptual expertise and decreases the ability to differentiate among stimuli (Elliott, Wills & Goldstein, 1973). The contact hypothesis assumes that the amount of cross-race contact and the resulting level of familiarity, strongly influence individual facial recognition ability (Brigham, Snyder & Spaulding, 1982; Chance, Goldstein & McBride, 1975; Ng & Lindsay, 1994).

However, findings on the contact hypothesis seem to be inconsistent. For instance, some studies (Chiroro & Valentine, 1995; Ng & Lindsay, 1994) stated that living among members of another race would reduce the cross-race deficit, while others (e.g, Lavarkis, Buri & Mayzner, 1976) showed that contact with another race can increase the cross-race effect. This comport's with one possible explanation for the contact/experiential hypothesis Allport's (1954) contact theory. Allport argued that increased intergroup contact does not necessarily reduce hostility or lead to interracial friendship. Increase in contact may actually reinforce previously held stereotypes and increase intergroup hostility, especially when the environment provides unequal status for minority and majority groups. That contact may lead to friendship in some settings and conflict in others, depending on how these settings are structured (for a perspective on children's interracial friendship formation see, Hallinad & Teixeira (1987).[1]

On the other hand, researchers have argued that increased contact with other-race individuals increases memory performance. This argument is based on three assumptions: 1) contact increases familiarity with other-race faces (Goldstein & Chance, 1971); 2) because interracial contact may reduce the likelihood of stereotypic responses, it should increase the tendency for individuals to attend to more individuating information (Malpass, 1981); and, finally, 3) increased contact of any kind may influence individuals' motivation to accurately recognize other-race faces (Malpass, 1990).

In line with this hypothesis, Li, Dunning, and Malpass (1998) demonstrated that White "basketball fans" were superior to White "basketball novices' in recognizing Black

1. School environment does create both constraints on and opportunities for interracial friendship formation among school children. Individuals' characteristics that previously were thought to be relevant to children's same-race friendships are also relevant to children's cross-race friendship formation (Hallinad and Teixeira, 1987).

faces. That is, White baseball fans showed no cross-race recognition effect in recognizing Black faces.

The researchers assumed that basketball fans need to differentiate players in order to understand the game and that basketball has mostly Black players, giving fans heightened exposure to Black faces. They assumed that fans were likely to watch National Basketball Association games, and a majority of its basketball players were Blacks. The participants were told they would be tested on their ability to recognize faces viewed (Black and White). Participants completed questionnaires concerning their general level of contact with other ethnic groups, and about the quality and quantity of those contacts. As expected, participants who were fans of professional basketball showed a smaller cross-race deficit than those who were not fans; however, it was never clear what the amount of contact fans had with Black individuals. In contrast, Sporer (2001) suggests that the amount of contact with other races may not be as crucial as the quality of that contact. He argues that the quality of experiences and intimacies are important for accuracy recognition, more than quantity of contacts.

Wright, Boyd and Tredoux (2001) conducted a field study of own-race bias in South Africa (Black and White Africans), and England (Black and White Europeans). They expected English students at Bristol University to have very little contact with Black people because there were very few Black students there whereas White students at Cape Town would have more contact with Black students. However, they found that in both countries, the perpetrators in the mock crime paradigm were better recognized by people of their own-race. The authors first used sequential lineups [each photo shown individually], a procedure suggested by Levin (1998), and afterwards the participants

viewed all of the faces in a simultaneous lineup. The confidence-accuracy relationship was assessed for a simultaneous lineup, and they found that participants who were more confident in the accuracy of their identification were also more likely to be correct in their decision when the target was from the same race group but not when the target was from another race. Similarly, Burgess (1997), Malpass and Kravitz (1969), Ng and Lindsay (1994) and Platz and Hosch (1988) did not find the predicted relationship between contact with and accuracy in recognizing faces of members from different racial groups. Therefore, the cross-race deficit does not seem to be due to differential cross-race experience or contact.

The major problem with this explanation seems to be the inconsistent empirical support for the contact hypothesis, that increased contact with cross-race individuals should increase recognition accuracy. The failure of the contact hypothesis is puzzling. Perhaps only certain kinds of contact will improve cross-race face recognition; perhaps, contact sometimes increases familiarity, but also prejudice.

The measure of contact with another race is also problematic. The amount of contact is often gathered from subjective self-reports, depending a great deal on the operationalization of the construct of "contact frequency". Positive attitude can lead to frequent, repeated contact and subsequent greater interest in another ethnic group, and then to better recognition. For instance, Lindsay, Jack and Christian (1991) did find a significant relationship between self-reported amount of other-race contact and recognition. Black participants indicated the highest amount of interaction with Whites and did not demonstrate an own-race bias, while White participants indicated much less interaction with Blacks and manifested an own-race bias.

The quality and/or quantity of interracial contact (probably) play a vital role in cross-race identification (Slone, Brigham & Meissner, 2000). Yet, the contact or experience hypothesis is only weakly supported according to many authors (Brighman & Malpass, 1985; Ng & Lindsay, 1994; Li et al., 1998). Khmelkov and Hallinan (1999) showed that the quality of interracial interactions and the resulting relationships among students is directly influenced by the context of different organizational practices, and thus schools can promote positive race relations. However, what research measuring contact with other races may provide is a simply description of situations in which cognitive processes happen, but not indicate much about the mechanisms involved in these cognitive processes (e.g., what leads a person to seek different kinds of contact with members of other races, and how different kinds of contacts have different impacts on those cognitive processes, some facilitating and same impairing cross-race identifications).

A recent study by Henry and Hardin (2006) focused on implicit measures of prejudice and intergroup contact between Whites and Blacks in the United States and Christians and Muslims in Lebanon. The results show that intergroup contact *appears to* reduce implicit prejudice among low-status groups. That is, in the United States the implicit prejudice of Blacks toward Whites was reduced as a function of friendly contact; and in Lebanon, the implicit prejudice of Muslims toward Christians also *was lower* as a function of friendly contact. However, the expected bidirectional relation between intergroup contact and subsequent positive implicit attitude/prejudice in out-groups did not occur, which reflects the importance of the *particular* social context in which the attitudes are measured and the particular kind of measure (explicit or implicit) used.

Nevertheless, unless other innate mechanism exist to code other race faces differently, the failure of contact hypothesis is curious. There seems to be a consensus that contact with members of another race alone is insufficient to reduce the cross-race effect. Instead, a person with positive contact experiences may process a cross-race face with a goal of individuation (Levin, 2000). For example, White baseball fans may individuate many Black players faces and therefore may be expected to show no cross-race effect. However, the focus should be on how intergroup contact in various types of situations might reduce the likelihood of differential face identification. Perhaps not all kinds of contact decrease racial attitude and prejudice, and racial attitude probably plays a role on identifications. This leads to another hypothesized explanation for the cross-race effect phenomenon.

Differential Attitude Hypothesis

The rationale behind the differential attitude hypothesis is that the level of contact with other races leads to different kinds of attitude (more or less positive), and these differential attitudes affect contact, and consequently, face recognition. It is, of course, difficult to separate attitudinal influences from the influence of contact.

Historically, earlier studies showed a correlation between racial attitudes and identifying other races, and those were often used in face recognition studies. For example, Whites with positive attitudes toward Blacks recognized Black faces better than White faces (Seeleman, 1940). However, Allport and Kramer's (1946) study with Jewish vs. non-Jewish participant, showed that "more-prejudiced" non-Jewish people often performed better than "less-prejudiced" people in tasks involving identifying other-race

members. However, it should be noted that Jews are not a race and vary greatly in physical characteristics. Early, as well as more recent, research showed that the greater the intergroup contact the lower the intergroup prejudice.

Many researchers have examined prejudicial attitudes and their influence on own-race bias in cross-racial face recognition. Cross-race differences in accuracy are often attributed to *prejudicial* social attitudes. The initial explanation was that less prejudiced people would be more motivated to identify other race members accurately compared to those who were more prejudiced (Allport & Kramer, 1946); however, finding a measure of motivational factor in any experimental setting is problematic.

Indirect support for the hypothesis of prejudice influencing recognition came from a study by Galper (1973) who examined Black and White students enrolled in a Black Study course and compared their performance with a control group of psychology students. She found White participants enrolled in a Black Studies course recognized Black faces more accurately than White faces. She assumed that White students enrolled in Black Studies were less prejudiced or more interested in "Black issues", suggesting that a reduction in the level of prejudice may modify or even eliminate the cross-race effect. Studies using Black, White, and Mexican participants (Platz & Hosch, 1988; Brigham & Meissner, 2000) investigated the effect of contact and inter-race attitude towards own- and other race, and did find a relationship between contact and own-race bias [the more contact with another race the more able to identify another race] but did not find attitude to be related to overall recognition accuracy.

Brigham and Malpass's meta-analysis (1985) suggested that individuals high in prejudice may be more "reluctant/resistant" to process an individual's facial features; that

is, the kind of contact the individual has with another race may not be as important because racial attitudes may act as a moderator between contact and recognition ability. Other studies have failed to find a relation between racial attitudes and memory for other-race faces, and racial attitudes were found to be related to the degree of interracial contact on a cross-race identification task instead (Slone et al., 2000; Platz & Hosch, 1988; Sporer, 2001).

According to Meissner and Brigham's (2001) meta-analysis only two studies (Berger, 1969; Paltz & Hosch, 1988) investigated the effect of racial attitudes on identifications. They suggest that racial prejudice could be both a positive and negative predictor of accuracy. Tropp and Pettigrew's (2005) meta-analytical study examined the relation between contact and prejudice among minority and majority groups. They found the relation to be stronger among members of majority groups than among members of minority groups. Yet, potential mediating mechanisms were not taken into consideration, for example, racial attitude may affect identification accuracy by lowering the decisional criteria for judgments concerning characteristics of the perpetrator. A recent study (Edlund & Skowronski, 2008) examined racial attitudes (measured explicitly and implicitly) and showed different results; when perpetrators were Blacks, implicitly as well as explicitly prejudiced witnesses made more accurate decisions that those who were more egalitarians in their views, but when perpetrators were Caucasians witnesses' implicit and explicit levels of prejudice was unrelated to their identification decisions.

Brigham and Meissner (2000) and Slone et al. (2000) also showed that people with more prejudiced attitudes report having less contact with people of other races. However, there is no clear empirical support for a relation between inter-racial attitudes

and recognition of other races. Racial attitudes and familiarity due to differences in contact may be confounded. Drawing on Signal Detection Theory (SDT), sensitivity/capacity to discriminate and response bias are separable processes that together produce one judgment (Barrett & Swim, 1998). Response bias may be affected by racial attitudes, while the capacity to discriminate between faces may be affected by contact. Thus, the criterion used to say "yes this is the one" may be different from the individual capacity to discriminate – the face may be familiar but still hard to discriminate. However, SDT may provide a framework for understanding judgmental processes that likely influence or are influenced by prejudice. SDT may also help differentiate psychological factors (e.g., sensitivity, decisional criteria, costs of false negative and false positive errors, etc) that impacted by racial attitudes/prejudice. As Brigham and Malpass (1985) suggested, it might be a question of differential depth-of-processing between own- and other-race faces which makes the individual cease processing a face as a face once it is categorized as belonging to a different ethnic/race group; yet, we don't know to what extent prejudice affects the way faces are processed, which leads to the next hypothesis to explain the cross-race effect.

Categorizing and Processing Faces – Depth-of-Processing and Configural Hypotheses

The main idea behind the depth-of-processing hypothesis is that there are different levels of processing a face. Research addressing the hypothesis has focused on error patterns as a function of encoded characteristics of same- and cross-race faces. For example, many studies (Chance & Goldstein, 1981; Devine & Malpass, 1995; Sporer, 1991) manipulate depth-of-processing via instructions to make superficial or deeper

judgments. Shallower processing focuses on superficial, isolated physical characteristics (e.g., race, nose size, gender), and so may be involved only in categorizing an individual (e.g., Black male), which may affect recognition of own- and other-race faces. Deeper processing which involves inferences about personality (e.g., honesty, intelligence). The main claim is that deeper processing, which inferences about individual aspects of a person, results in a more elaborate kind of memory which consequently increases face recognition. However, these studies did not find that the deeper-processing instructions affected the cross-race effect, but findings showed that shallow-processing instructions impaired memory for all faces, not only other-race faces. Chance and Goldstein (1981) posited that naturally-occurring shallow processing of other- race-faces is due to lack of exposure (e.g., contact) which, in turn, may enhance the cross-race effect. (For a different perspective see Brainerd and Reyna (1996), that deeper processing of verbal material by older children leads to more false positives than for younger children).

The configural processing hypothesis potentially provides another explanation for cross-race effects. This hypothesis posits that members of a different race make up a relatively novel stimulus class [more stereotypes or schemata], so that individuals are not sensitive to the variation in that *novel class*, which makes it difficult for them to recognize other-race faces. The findings related to this hypothesis mostly come from studies examining the inversion effect, that is, when faces are inverted, recognition becomes more difficult. Face-inversion is a phenomenon first identified by Yin (1969) which reveals the "processing disadvantage" for inverted-face recognition compared to inversion for objects and animals, suggesting that face processing is qualitatively different from processing other visual stimuli. One explanation for greater difficulty in

the face-inversions is that the processing of configural, rather than featural information of faces disrupts the perceptual task (Leder & Bruce, 2000). "The term featural information has been used for facial elements that are perceived as distinct parts of the whole, such as the eyes, mouth, nose or ears. The term configural information has been referred to as the spatial interrelationship of facial features" (Schwaninger & Mast, 2005, p.217).

Individualization information is necessary for accurate out-group identifications. Indeed, Levin (2000) and MacLin and Malpass (2001) have suggested that there is an automatic inclination to categorize other-race faces into superordinate categories (such as race or class) which may distract from the encoding of individualized information leading to more shallow processing and poorer performance for other race-faces.

Levin (2000) investigated face-coding of same and cross-race faces, testing the hypothesis that faces can be processed individually or categorically. Individualization involves more specific information about the face, leading to a better capacity to discriminate among faces (e.g., same race identifications). On the other hand, categorization leads to category-related information of faces (e.g., cross-race effects). Levin (2000) based his conclusions on visual search and perceptual discrimination task for same and cross-race faces and found that participants emphasized visual information specifying racial features at the expense of individualizing information when identifying cross-race faces.

Motivation to attend to a stimulus and the resulting attention are also prerequisites for good memory. For example, little is known about the nature of the quality of attention paid to people's features. Rodin (1987) addresses this issue in an article called "Who is memorable to whom". Some people can be almost invisible to other people (e.g.,

strangers may be noticed only on a categorical level: as attractive, Black, or female) and not at a more individualized deeper level. A number of authors have argued that contact inevitably involves greater individuation of cross-race faces (Shepard, 1981; Valentine, Chiroro, & Dixon, 1995). Li et al. (1994) argued that many interactions that characterize living among members of another race do not require that individuals be remembered. Therefore, measures of contact that do not require individuation might have minimal effect on recognition, but contact requiring individuation may enhance recognition.

MacLin and Malpass's (2001) study used "ambiguous faces:" the same face was used differently, a face without hair, a face with Hispanic hairstyle and a face with African American hairstyle. They demonstrated that racial markers (e.g., hair) can cause a face to be perceived differently; with other-race faces perceived on a more categorical level (e.g., attractive Hispanic male). Ellis (1975) showed that their White British participants often used hair color and style as a cue to distinguish faces. These results imply that a cross-race deficit does not necessarily happen simply because of contact with another race, as perceptual learning theories would predict, but by the way individuals perceive and categorize other race vs. same-race faces, as a more functional theory would predict.

Perceptual expertise researchers have been interested in differences in perceptual performance in face recognition. Gibson (1987) defined perceptual learning as "an increase in the ability to extract information from the environment, as a result of practice and experience with the stimulation coming from it" (p.3). Two studies (Elliott et al., 1973; Goldstein & Chance, 1985) have found that that training can reduce the cross-race effect. For example, Goldstein and Chance (1985) demonstrated that participants with

poor memory for Japanese faces improved recognition when they were assigned to train to learn Japanese features compared to a no-training control condition.

Goldstein and Chance (1978) found the search time and accuracy similar for both targets, Japanese and White. Rhodes, Brake, Taylor, and Tan (1989) examined Chinese and White perceptual expertise and bias, using complex visual spatial stimuli and target faces of both races. They found that White participants showed an own-race bias but Chinese participants were equally adept at identifying both races.

Hugenberg, Miller and Clayplool (2007) further explored this social-cognitive explanation to the cross-race effect. Hugenberg et al. (2007) induced participants to individualize rather than categorize cross-race faces during encoding; the cross-race effect was eliminated when participants received instructions to individualize cross-race faces. Results by Levin (2000) and Hugenberg et al. (2007) are different from those who addressed the expertise hypothesis, which states that training can make individuals more able to discriminate between cross-race and same race faces. Levin (2000) and Hugenberg et al., (2007) argue that the cross-race effect is due to differential social-cognition towards in- and out-group members rather than to differences in perceptual expertise.

Clark (2003) argues that the memory of the suspect includes but is not limited to information about the face. Face recognition is based on both feature and configural patterns of the faces (Tanaka & Farah, 1993). Race-specific perceptual expertise studies on encoding and recognition of faces have used both feature characteristics, and more complex configural (holistic) patterns (e.g., the proportional relationship between features).

Valentine and Bruce (1986) used the inversion paradigm to examine the cross-race effect, and found an inversion effect for other race faces, that is, inverted-other-race faces were less recognized than inverted-own-race faces. They suggested their participants may have relied more or less on configural aspects of African Americans faces and that that may explain the cross-race effect. Valentino and Bruce's (1986) study did not find the expected inversion effect on own-race face recognition, but they did find that White participants were, in general, less able to identify inverted other race (Black) faces. Rhodes et al. (1989) also looked at the configural aspects in cross-race and same race face recognition and found that individuals are experts with same-race and novices with other-race faces. They assumed that the same-race faces are processed configurally and are more susceptible to inversion while other-race faces are processed featurally and not as susceptible to inversion. However, a recent study (Blair, 2006) stated that the extraction and processing of social cues, specially those related to race, (e.g.., Afrocentric facial, features and attractiveness) are not affected by the face inversion paradigm, suggesting that different processes underlie face recognition and extraction of social cues about faces.

Representations of face categories and the process of categorizing individual faces have a number of implications both for general models of classification and for understanding face identification. The focus of this kind of research lies in its apparently paradoxical finding that participants are faster in classifying faces they have difficulty recognizing. Studies on face perception (Levin, 1998; Valentine & Endo, 1992) have demonstrated that other-race faces are racially classified more quickly than own-race faces. For example, White participants classify Black or Asian faces faster than they do White faces.

Payne (2001) and Payne, Lambert and Jacoby (2002) proposed that racial identification may be automatic, under limited conscious control. Johnson and Fredrickson's (2005) study used an emotion-induction manipulation (fear, joy, neutral) and found that positive emotion, such as that elicited by a video clip of a stand-up comedian, reduced the own-race bias in facial recognition. Whites improved their recognition abilities for Black faces after a positive emotion had been induced. The increased correct recognition rate for Black faces in the joy condition was due to significantly higher hit rates compared to the fear and neutral condition. Maclin and Malpass (2003) stated that positive emotion facilitates more accurate memory for other race faces by reducing memory distortions due to categorizing the faces by race. Positive emotion seems to eliminate the highly robust own-race bias in face recognition, but there is no effect on recognition of own-race faces. Johnson and Fredrickson (2005) suspect that this lack of effect on own-race recognition was due to a ceiling effect; they also suggest that crosscategory biases in face recognition may be due to social categorization and not perceptual-expertise. More investigation is needed to know how perceptual-expertise and social-categorization act together to elicit bias in face recognition.

However, an interesting path to understand what happen in terms of face processing, is to explore how decisional criteria/criteria placement (more influenced by social factors and more affected by racial attitudes) interact and might even affect the way a face is processed leading to a cross-race misidentification. Another path towards understanding the cross-race effect is the physiognomic variation hypothesis.

Physiognomic Variation Hypothesis

The physiognomic variation hypothesis posits that people have difficulties discriminating people from a race other than their own race because there are differences in physiognomic variation across races. Malpass and Kravitz (1969) developed this hypothesis when they found own-race recognition bias only for White participants; what today is called one way or not complete cross-race effect. After their study, Lindsay et al. (1991) found that White subjects performed significantly more poorly on trials involving Black faces than on trials involving White faces, while no such difference was found among Black participants. Similarly, based on a large set of studies, Anthony et al. (1992) concluded that the cross-race effect appears to be stronger for Whites than for Blacks. However, those findings imply that Black faces vary less than White faces, which is difficult to justify.

On the other hand, other researchers used different races. Luce (1974a, 1974b) compared Asians (Chinese and Japanese) with White participants and found that Whites performed better at both own- and other race identification, while only the Asians showed an own-race bias. Ferguson, Rhodes, Lee and Sriram's study (2001) with both Chinese and Caucasian participants found that Caucasian faces were more correctly identified than Chinese faces by Caucasian, but this was not the case for Chinese participants. Chinese participants showed a non-significant difference between Caucasian and Chinese recognition accuracy. Ng and Lindsay (1994) found that White Canadians judged Asians as being similar to each other, while Asians judged Whites as more similar to each other. Also, Teitelbaum and Geiselman (1997), and Valentino and Endo (1992) showed the cross-race effect in the recognition of Asian faces by White participants. Sporer (1999)

studied White German and Turkish participants and found White German participants only slightly better at identifying Turkish participants than Turkish participants identifying White German participants.

Platz and Hosch's (1988) study was one of the first eyewitness identification experiments to employ Mexican-Americans as both participants and target individuals. Participants (store clerks) were asked to identify three customers, one Anglo-American, one Black, and one Mexican-American who had visited stores two hours earlier. The results for all three racial ethnic groups showed a significant "own-group" bias in identification accuracy.

Research examining in-group/out group biases have shown that in-group members tend to assume that the facial features of in-group members are more idiosyncratic than those of out-group members (Cross, Cross & Daly, 1971). That is, members of one race may assume that members of another race are more homogeneous (in terms of facial features) than are members of their own race. Thus, the subjective assumption is that other-race faces are or at least look more "alike" than same race faces. Goldstein and Chance (1976) challenged this assumption by arguing that if Japanese faces do resemble each other more than White faces, participants would make more errors with Japanese faces, but they found similar responses/errors rates for both groups. One possible explanation for these disparate findings is that the less powerful (minority) group needs to be better able to differentiate members of the more powerful (higher status) group.

It remains unknown if the effect holds for participants of other ethnic groups, such as Native Americans, people from different parts of Europe, India, Australia and other

countries. However, the assumption is that there is a variation among different race faces (e.g., Blacks vary less than Whites) and that this would affect cross-race identifications.

Differential Strategy/Criteria Hypothesis

Assumptions about judgment strategies when making identifications come from research on lineups. There are two major kinds of photo-array lineup: sequential and simultaneous. In a *sequential* lineup, photos are presented one at a time, and identification decisions are made about each photo before witnesses see the next photo. In a *simultaneous* lineup, the photos are presented at the same time and the eyewitness must decide which one of the photos is of the perpetrator, if any. Linsday and Wells (1985) showed that with sequential lineups, participants make fewer false positive errors and posited that sequential lineups may be superior to simultaneous. In general, simultaneous lineups facilitate *relative* judgment strategies, because participants can compare photos to each other, choosing the one that most resembles their memory of the perpetrator. In contrast, an *absolute* judgment strategy is one in which the eyewitness compares the photo with their memory alone, deciding whether or not each photo is the photo of the suspect. Lindsay and Bellinger (1999), and Smith, Lindsay and Pryke, (2000) stated that a relative strategy produces more false positive errors than an absolute judgment strategy. In a non-cross-race identification analysis Clark (2003) posits that identification decisions are based on a combination of relative and absolute match.

A body of research has supported the importance that judgment strategies may have in improving the criminal justice system ability to predict identification errors. Smith et al. (2004) attempted to understand the cognitive processes underlying

eyewitness decision-making in cross-race identification. They used open-ended and close-ended measures of decision-making to in order to explain the cross-race deficit. This study, as well as other studies (e.g., Shapiro & Penrod, 1986; Smith, Lindsay, Pryke & Dysart, 2001) showed a clear cross-race effect, that is, cross-race choosers were more error-prone than the same race choosers. However, they also found that the cross-race effect was unrelated to the way eyewitnesses remembered the faces of the criminals. They found few differences between the same race and cross-race participants in terms of how they arrived at this lineup decision. The process of deciding also was not related to superior memory.

More recently, Meissner, Tredoux, Parker and MacLin (2005) and Gronlund (2004) investigated the relationship between lineup kinds and shift in criterion (how lax or strict the criterion used to decide on guilt). Results using a signal detection framework/analysis showed that sequential lineups may affect response criterion, but have no effect on capacity to discriminate between foil and perpetrator faces (accuracy). The aim of this line of research has been to see if sequential or simultaneous lineup types improve discriminability or merely affect a shift in criterion. Gonlund (2004) argued that the sequential lineup advantage in accuracy occurs because a sequential lineup elicits an absolute decision strategy. However, we still do not know the effect of lineup types on discrimination and decision criterion in cross-race eyewitness identifications.

Many studies also have examined the relation between accuracy and confidence. The confidence expressed by eyewitnesses in the accuracy of their decisions is often used by juries as an indicator of accuracy. Contrary to this assumption, Loftus (1979), Cutler and Penrod's meta-analysis (1995), and Meissner and Brigham's meta-analysis (2001)

have shown that the relationship between an eyewitness's confidence and the accuracy of identification is generally weak or non-existent (e.g., it is common for a witness to be very sure about her/his *false positive* identification). Once a witness identifies someone in a lineup, they are usually asked how certain they are about their decision. Meissner et al.'s (2005) review study shows that false recollections with high ratings of confidence occurred more often when participants tried to identify unfamiliar other-race faces. Olsson (2000) argued that a better measure of confidence is calibration where participants are asked to indicate their confidence that their identification decision was correct on a percentile scale. A good calibration is when the percentage correct in each grouping equals the group's confidence level (e.g., 80% of the witnesses in the 80% confidence group made the correct decision).

Decision-making is a promising area of investigation as it might account for cross-race identification effects. Yet, not much is known about eyewitness's decision-making and different strategies that may come into play when witnesses are confronted by persons from different racial/ethnic groups. The use of a decisional analysis to study face recognition helps one to look closely into mechanisms underlying decision-making (e.g., explore perceptual processes, which tap familiarity with members of other races; and social processes, which tap decisional processes reflecting attitudes toward and beliefs about different racial groups).

Studies Using Response Criteria and Sensitivity/Accuracy Measures

Measures derived from Signal Detection theory were first used by Malpass and Kravitz (1969) in their first study of cross-race face recognition. The method of signal

detection theory (SDT) was chosen because it differentiates the hypothesized bias towards or away from *false positive* or "over-guessing" (i.e., decisional criterion) from sensitivity or the ability to discriminate signal (perpetrator) from noise (foils).

The distinction between sensitivity/accuracy and decisional criterion is an important one. A cross-race effect may not only be the result of factors like differential familiarity but also may reflect differences in the decisional standards used. Many studies have not made this distinction in analyzing the phenomenon, and most of the studies do not report data for the response criteria, and consequently can not be included in an analysis into sensitivity (discriminability) and decisional criterion.

Nevertheless, response bias (decisional criterion) and accuracy measures together have been shown to have important implications for person identification (e.g., pilot study Da Silva 2004; Meissner & Brigham, 2001; Shapiro & Penrod 1985; Slone, et. al., 2000; Sporer, 2001).

In three experiments, Sporer (1992) found that White German participants used more lax criteria with Black faces than with White faces. Slone et al. (2000) also found that White participants used a less stringent criterion when identifying Black faces than White faces; however, they only used White participants in this study. Also, the study showed that the response criterion changes as a function of gender of the faces; a particularly lax criterion was applied to Black male faces.[2]

[2] All discrimination tasks involve decisional criteria. Participants for whatever reason prefer one response type over others, and this may not even be part of a conscious process of discriminating; in this sense, response criterion is nothing but a personal criterion for response. In this study I am mainly interested in how response criteria affect or are related to the participants' capacity to discriminate between own-and cross-race stimuli (faces).

Meissner and Brigham's (2001) meta-analysis included a response criterion measure, unfortunately only six studies calculated response criteria across participants. However, they concluded that if Whites tend to use a more lax response criterion with faces of Blacks, this may not only result in an increase in incorrect identifications but also in particular, an increase in false-positive identifications. They suggested that the own race bias effect stems largely from false-alarm responses, indicated by the more lax criteria used in this kind of cross-race identification. Therefore, this shift in response in the direction of a less strict criterion for out-group faces, leads to a higher proportion of false alarms, which has serious implications for the legal system that often relies on cross-race eyewitness identifications. However, as Da Silva (2004) showed in a pilot study when Whites (White Caucasians and White Latinos) identified Blacks they used a stricter criterion (i.e., made fewer false positive judgments) than any of the other three combinations (e.g., Whites identifying a White; Blacks identifying Whites). An attorney James Doyle (2001) urged researchers in social science to show deeper theoretical interest in issues of decisional bias. The issues of how to prevent errors are expressed as follows:

> Is it possible that the cultural situation of contemporary White witnesses has persuaded them that they are less likely to be wrong if they identify a Black suspect? Or convinced them that they can be less concerned by the harm that results if they do misidentify a Black suspect? Do Whites see the probability of error as lower in cross-racial situations and the cost of error as easier to accept? Nothing in the data gathered in this issue establishes the truth of those conjectures, but nothing has yet ruled them out either, and there are more than a few findings that suggest that an inquiry is in order. The picture is a depressing one. (p.12)

Along with many researchers working in this area, Doyle (2001) believes in the possibility of preventing errors before they occur by knowing more about the use of

relaxed criteria among different race/ethnic backgrounds. Clearly, a decisional criterion rests on *how* decisions are made, which taps more social processes affecting cross-race identifications. However, it is not clear how aware individuals are of their criteria placement and how other perceptual and cognitive processes act together (or mediate) to get to a final judgment.

Signal Detection Analysis and its Relation to this Study

The signal detection method has been used for more than 50 years in psychophysics and other decision research. Signal Detection Theory (SDT) (Green & Swets, 1966) is a mathematical model depicting how decisions are made in the face of uncertain evidence. It was initially developed in psychophysics to overcome the problem of contamination of measures of sensory capacity (sensitivity) by non-sensory factors (decisional bias) in research into sensory and decision-making processes. Signal detection theory postulates that because the system is always active, when a signal impinges on the system, a person engages in a decision-making process as to whether or not the signal occurred. The person does this by setting some criterion level of sensory activity for deciding whether or not the signal has occurred. SDT (Swets, 1986; Macmillan & Creelman, 1991) thus contains a measure of sensitivity (d') and a separate measure of bias (c). That is, signal detection provides distinct and theoretically independent measures for sensitivity and decisional criteria (bias).[3]

[3] The measure of sensitivity or recognition performance d' is considered very similar to a non-parametric measure called A', and other researchers preferred to use A' instead of d'. Both measures offer *hits scores*: saying a face was seen before and when in fact was seen before; and *false alarms scores*: when a person says that the face was seen before when it was not. Both measures, A' and d' provide an estimate of recognition accuracy that is not contaminated by observers' response bias. (Misses and correct rejections are complements of hits and false alarms and are ignored in the analysis). A High d' or A' value is associated with increased recognition.

The distinction between changes in decisional criteria and sensitivity (capacity to discriminate) is a theoretically important issue in face recognition. In *decision-making analysis* there are four kinds of outcomes in any identification: a) the eyewitness successfully identifies the person who committed the crime, termed a *positive hit.* b) The eyewitness may correctly state that the person did not commit the crime, termed a *negative hit*. c) The eyewitness incorrectly identifies an innocent suspect as the perpetrator, which is called a *false positive* error or false alarm. d) The eyewitness incorrectly states that the *perpetrator* did *not* commit the crime, which is called a *false negative.* Both *false positive* (the eyewitness say "yes, that's the person who commited the crime", when in fact he/she did not), and *false negative* (the eyewitness say "no, that's not the person who commited the crime", when in fact was) have especially important implications for the legal system. To accuse a person of a crime that he/she did not commit is a serious error, but it is also a significant error to fail to identify a perpetrator who did commit the offence. Each error has its special costs to the accused and to society.

The signal detection approach has been rigorously tested and proved to be successful and useful in face discrimination research (McCarthy & Davison, 1981; Macmillan, 2002; Kornbrot, 2006).

Signal Detection Analysis (SDA) is an effective way of analyzing eyewitness recognition data; it offers an important advantage of providing separate measures of accuracy (sensitivity), and lax-strict decisional criteria (bias). *Sensitivity* measures the ability to discriminate between signal and signal plus noise. The higher the sensitivity score (ability to discriminate) the more individuals are able to discriminate between the perpetrator and the foils (faces other than the perpetrator). *Decisional criterion* is the

individual willingness to commit one kind of error, False positive or False negative, over another. *Decisional criterion* indicates whether the criterion used to decide (to identify or not identify) is stricter or more lax. Lax criteria indicate that the individual is willing to identify someone as the perpetrator even at the risk of making a false positive identification. Strict or stringent criteria indicate the individual is less willing to identify someone as the perpetrator (e.g., commit false positive) in order to maximize positive hits. The higher the decisional criterion score the stricter the criteria used to discriminate between signal and signal noise; the lower the decisional criterion score, the laxer the criterion. The usual assumption is that sensitivity is more likely to be affected by non-social factors like familiarity with other faces, and decisional criterion, on the other hand, is assumed to be more affected by social factors, such as attitudes held by the witness (e.g., towards the accused's race or ethnicity).

The procedural and analytic techniques of signal detection theory provide indices of a subject's capacity to discriminate one stimulus from another. S*ensitivity* is an index of how well the subject can discriminate stimuli, here *perpetrator* from *foil*. *Decisional criterion* measures where the decision maker sets the decision criterion, which indicates whether the subject favors one type of error over another, i.e., false positives over false negatives, or vice-versa, independent of accuracy. This measure of decisional criterion reflects attitudinal factors and familiarity with the capacity to discriminate. The aim of this study is to investigate cross-race identifications by means of signal detection analysis in order of get separate measures of sensitivity and decisional criteria.

The present study and research questions

The cross-race effect seems to be a robust phenomenon, as suggested by meta-analysis results (Anthony et al., 1992; Bothwell et al., 1989; Meissner & Brigham, 2001; Shapiro & Penrod, 1986; Sporer, 2001), however, over 85% of the participants in the existing meta-analyses were Whites and Blacks. Only a few published studies used Hispanic sample. Platz and Hosch (1988) found a complete cross-race effect between Mexican Americans and Blacks; and MacLin, MacLin and Malpass (2001) found that Hispanics were better able to recognize other Hispanic than Black faces. Even though the cross-race effect is commonly accepted among experts in the areas of law and forensic psychology, we do not have a clear answer concerning what kinds of mechanisms are involved in cross-race identifications. It is clear that a better theoretical understanding of the cross-racial identification phenomenon should help resolve some of the inconsistencies in empirical findings. Based on a large body of research that confirms the existence of this phenomenon, and given the important role eyewitness identifications can play, the current research investigated the following questions:

1) Are there same- versus cross-race differences (a) in *sensitivity* or the ability to discriminate *perp* from *foils* and (b) independently, in *decisional criteria* or the relative preponderance of *false positive* to *false negative* errors in same- versus cross-race face identifications?

2) Is the participants' performance in the recognition task (both sensitivity and decisional criteria) correlated with answers to the questions about (a) level of confidence, (b) beliefs about the relative seriousness of false positives and false negatives errors, (c)

frequency of contact with members of the other racial group, (d) friendship with members of the other group, or (e) work relationship with members of the other group?

3) Is how the participants describe (code) the events depicted in the witnessing event, in particular their reference to race, correlated with their recognition performance (capacity to discriminate and their decisional criteria)?

4) In general, what kinds of cues and strategies do participants report using while trying to remember own- and other race faces? Are these correlated with (a) the ability to discriminate (accuracy) and (b) decisional criteria in same and cross-race conditions?

Results from a Previous Pilot Study

A pilot study (Da Silva, 2004), with 96 high school participants (mean age = 17.2 years; Caucasian (n=33), White Latino (n=21), Blacks (Blacks and Afro-Caribbean) (n=22), and Asians (Japanese, Korean, Chinese and Indian) (n=20), recruited from a Roman Catholic high school, was conducted using the same procedure (Signal Detection Analysis) with confidence intervals, results showed no direct/complete cross-race vs. same-race effect for sensitivity (accuracy) or decisional bias. Rather, Blacks were significantly more sensitive (better able to discriminate between perpetrator and foils) than were White Caucasians and White Latinos regardless of the race of the photos. Whites (White Caucasians and White Latinos) identifying Blacks employed a stricter criterion (i.e., made fewer false positive judgments, or in another words were more cautious in their identification) than any of the other three combinations (e.g., Whites identifying a White Latino "perpetrators" and "foils."

Based on the findings from this 2004 study, two counter-hypotheses are tested:

a) As found by previous investigators (Slone et al., 2000; Meissner & Brigham's meta analysis, 2001), Whites will use a more lenient bias criterion with Blacks and Blacks with Whites in comparison to Whites identifying other Whites and Black identifying other Blacks, or

b) as found in the pilot study, Whites (White Latinos and Caucasians) will use a more stringent criterion, indicated by a higher decisional criterion score, than any of the other three combinations, i.e., Whites identifying Whites, Blacks identifying Blacks, or Blacks identifying Whites.

LITERATURE REVIEW - METHODS

Accuracy and Decisional Criterion (Bias Response) Analysis

As mentioned in the procedure section, each participant saw five trials of 15 photos each, for a total of 75 photos. For each photo they needed to choose among four responses: *very sure it is not the man in the video; a little bit sure it is not the man in the video; a little bit sure it is the man in the video, very sure it is the man in the video*. These four responses were needed, in signal detection parameters, to obtain a ROC (receiver operating characteristics) curve with fewer trials, while having three criterion points better fit a (d') parameter. Verde, Macmillan and Rotello (2006) stated that ROC is a useful tool based on SDT. ROC plots the hit rate (*HR*) against the false alarm rate (*FAR*) at different degrees of decisional response as sensitivity stays constant. "….The ROC connects (*FAR, HR*) points calculated by accumulating response proportions from the most conservative to most liberal decision rules. Discrimination is accurate to the extent

that the hit rate exceeds the false alarm rate, and as the difference between hits and the false alarms increases…"(p.643).

Participants' responses were entered into SPSS and calculated in terms of signal noise (sn), which are the positive and negative hits; and noise (n), which are the false positive and false negative errors. Each participant had a sum of hits and errors and these were entered into a signal detection program using an equal-variance normal distribution model. Based on parametric measures reviewed by Macmillan and Creelman (1991), the signal detection measures of sensitivity and criterion bias/decisional criterion can be separately calculated. The sensitivity (d') (which is referred to as accuracy or capacity to discriminate between *perpetrator* and *foil* faces) measure corresponds to:

$$d' = Z(HR) - Z(FAR)$$

where: z-score of the *false alarm rates* (FAR) is subtracted from the z-score of the *hit rates* (HR). The more able an individual is to discriminate between new and old items (in this study *perpetrator* and *foil faces*) the larger the *d*' will be; for instance, if an individual is unable to discriminate, his hit rate will be equal to his false alarm rate, and *d'* will be zero (Green & Swets, 1974; Macmillan & Creelman, 1991). That is, the difference between the mean amount of sensory activity generated by noise and signal + noise will equal sensitivity (d') measures in z-score (standard deviation) units.

Participants adopt a criterion for dealing with those (d') values of sensory activity that could result from either noise alone or signal plus noise (the area where the noise and signal + noise overlap) (see Appendix D). Response criteria or response bias is the tendency to respond more frequently with "yes" or "no" on the basis of a looser or stricter response criterion ((Macmillan & Creelman, 1991); a response bias equation is:

$$c = -\frac{1}{2}\,(Z(HR) - Z(FAR))$$

where "c" is defined as the distance between the criterion and the neutral point, where neither response (yes or no) is favored. Therefore, a negative c value signifies a bias towards responding "yes" and a positive c value signifies a bias towards responding "no".

Sensitivity (d') is assumed to be a relatively stable property of the sensory process, but the decision criterion used by a person can vary. Decision criteria can be influenced by three main factors: a) The instructions given to the participant; b) The frequency of signal trial and no-signal trial; and c) The relative cost of making errors (false alarms and misses) and the relative benefit of making correct responses (hits and correct rejections). These factors can lead individuals to adopt different criteria when deciding guilt.

While the procedure includes only have one measure of sensitivity (d') across the recognition task, there are three measures of decisional criteria for each participant, which are called c1 (criteria 1), c2 (criteria 2) and c3 (criteria 3) (see Appendix D3) . The three point decisional criterion scale better fits the *d prime* curve parameter. The reason there are three measures of decisional criteria is because respondents did not make "yes-no" responses, but used a four responses scale: *very sure it <u>is not</u> the man in the video; a little bit sure it <u>is not</u> the man in the video; a little bit sure it <u>is</u> the man in the video, very sure it <u>is</u> the man in the video.* The c3 criterion corresponds to the difference between "very sure this is the man" responses and the rest of the responses. Although Three decisional criteria corresponding to each subject have been analyzed, only the c3 scores will be reported, since results using this measure were clearer and more consistent than the other two. Also, the criterion placement (c3 value) makes more sense in terms of

literature findings differences between those who are definitely sure and those who are not, making it more relevant to real life eyewitness identification cases.

Individual measures of accuracy (d') and decisional criterion (c3) were obtained. Problem arise when either the hit or false alarm rate equal zero; this required adding a "1" constant to "0" choices in any of the four judgment categories, e.g., "very sure it is the man". Individual scores of (d') and (c3) enabled calculation of the correlation between the performance and individual measures from the questionnaire (e.g., different measures of contact, measures of choice between false positive and negatives, judgments, etc).

Exposure Time/Encoding Time

Researchers generally report that increasing *exposure duration* to the perpetrator increases accurate identifications. Shapiro and Penrod (1986) concluded that exposure time influence correct identifications but not false alarms. However, there also are inconsistencies in the literature and findings among studies of the effect on accuracy of exposure duration. The time of exposure or time spent with the perpetrator is not always a good predictor of accuracy probably because of the many other factors involved during a real crime, e.g., level of stress-arousal, presence of weapon, level of attention paid to the assailant, and others (Lindsay & Wells, 1983).

Meissner and Brigham's (2001) meta-analysis noted that encoding time may moderate the strength of cross-race effect. That is, longer encoding times lead to a decrease in the magnitude of the cross-race effect in discrimination accuracy; this decrease was noted to be larger on false alarms responses. The exposure-time in the Da Silva (2004) pilot study and also in the current study was 30 seconds, a duration that has

been has been used by other studies (Gronlund, 2004; Meissner, Brigham & Butz, 2005). The time exposure appears to be a realistic time in which a person would be exposed to a crime in real life.

Retention Interval

Berhman and Davey (2001); Tollestrup, Turtle and Yuille (1994), and Valentine, Pickering and Darling (2003) examined the effect of retention interval on eyewitness identification and found that the longer the retention interval or time-delay (the time from exposure to the event until the eyewitness identifies) the worse the performance on face recognition, Shepherd (1983) showed that the retention interval between the crime and the identification influences identification accuracy, but that the false identification rate is relatively stable across this temporal variable. This conclusion was not however entirely supported by Malpass and Devine (1981), who found that time-delay does influence correct identifications, as well as false positives. Shapiro and Penrod (1995) included retention interval in their meta-analysis and found retention interval to be an important determinant of correct identifications. That is, longer delays led to fewer correct identifications and more false identifications. However, Meissner and Brigham (2001) noted that longer retention intervals have been shown to increase the proportion of false identification for other-race faces to a greater extent than for own-race faces. Based on the previous pilot study, the retention interval in this study was 30 minutes. The choice of 30 minutes was a way to avoid ceiling or floor effects, given the nature of the face recognition task using signal detection analysis.

Photo-array Lineup Construction

Eyewitness research has shown that certain methods of conducting lineups or photo arrays are particularly likely to promote false identification of innocent people by eyewitnesses (Malpass & Devine, 1983). As noted earlier, there are two major kinds of lineups or photo-array: sequential and simultaneous. In a *sequential* procedure, the eyewitness is presented with one individual suspect at a time, and the eyewitness must decide whether that person is the perpetrator prior to being allowed to view the next person. In contrast, with a *simultaneous* procedure, the eyewitness is presented with all suspects together and must decide which one is the guilty party. Many studies investigated which procedure is more effective. The general conclusion is that *sequential procedures* lead to be more accurate judgments because they force the eyewitness to use a more absolute criterion (i.e., Is this the perpetrator present or not?) rather than the relative-judgment criterion (i.e., Is the person more similar to the perpetrator than the other lineup members?). A meta-analysis (Steblay, Dysart, Fulero, & Lindsay, 2001) also revealed that sequential lineups were superior to simultaneous lineups.

Earlier studies such as those by Loftus (1979) and Wells and Lindsay (1980) showed how biased lineups dramatically increase the rate of false identifications of innocent persons. In theory, a lineup or a photo array is fair to the suspect when it contains a sufficient number of foils who are similar in appearance to the description of the suspect. In the United States, the lineup/photo array containing a minimum of five members (the suspect and four foils) is generally acceptable as a fair lineup size (Wells, Smeall, Penrod, Malpass, Fulero & Brimacombe, 1998).

Recent studies, such as Flowe (2006), McQuiston-Surret, Malpass and Tredoux, (2006), and Gronlund (2005) investigated the sequential lineup superiority and tend to agree that the sequential versus simultaneous lineup effect depends on the fairness of the lineup, and certainly varies across methodologies and research designs. The McQuiston at al. (2006) meta-analysis affirms that it is too early to recommend sequential lineups to police practice, arguing that a better understanding of mechanisms that underline the advantages and disadvantages of both lineups types is needed.

This study used a *sequential photo-array lineup*, following some of Wells et al., (1998) rules of procedure used to help the criminal justice system on eyewitness identifications, including: a) there should be at least 5 persons in a photo-array lineup. b) The suspect should not stand out in the photo-array lineup as being different from the foils, the picture should all be with the same background and the person in the lineup should be wearing the same kind of clothing. c) A clear statement should be taken from the eyewitness at the time of the identification and prior to any feedback, as to his or her confidence that the identified person is the actual culprit.

Furthermore, many studies addressed the importance of choosing the right lineup photos in face recognition research. Two models for the selection of lineup foils in identification lineups have been discussed: description-matched selection, based on match to the description of the suspect given by the witness; and suspect-matched selection, based on suspect similarity. Both models have their advantages and their problems as demonstrated by Clark (2003). Clark used a computer simulation of eyewitness identification called "Witness Model" to fit the data from different experiments to compare suspect-matched to description-matched lineups. The correct and

incorrect identifications were considered, and even though the model provided a good fit to each data set, the patterns of results varied considerably across experiments. Nevertheless, the model confirms that the relationship between description, memory and identification is far from understood and needs much more research.

This study used a suspect-matched selection. The sample foil (seven photos of White Latinos, and 7 photos of Blacks – all sharing physical characteristics) was piloted to 26 people (16 Whites and 10 Blacks) not involved in this study. Individuals needed to tell from a scale of 1 to 10 how similar the foils were to the perpetrator. Five from the seven (the ones found to be more similar to the perpetrator) were chosen to be in the photo sequence. They also compared the two sets of photos stating the level of similarity among faces (e.g., the two sets of photos are equally similar, Black set of photos is more similar, etc.). The same foil selection has been used in the Da Silva (2004) pilot study, and was shown not to have significant differences between the two sets of photos in terms of foil vs. perpetrator similarities.

Reaction Time

Decision can be changed with the passage of time even over milliseconds. Given the complexity of using the signal detection analysis to the face recognition task, whereby participants need to see repeated trials (5 trials of 15 photos) which can be tiring for some; and also to avoid ceiling or floor effects. However, 8 seconds reaction time between photos presentation was sufficient time for participants to look at photos projected and make their judgments.

RESEARCH METHODS

Participants

One hundred and nine undergraduate students, mean age of 21.8, enrolled at John Jay College of criminal Justice - CUNY) participated in this study. The participants sampled diverse race/ethnic backgrounds, but for data analysis only those who designated themselves as Blacks (African-Americans and Afro-Caribbean) (n=45) and White Latino (n=43) were included. White Caucasians (n=17) were included in some analyses and Asians (n=4) were not included in any analyses because there were only a few of them. Participants received credits for their participation and were informed that they would be participating in a study to see how people make decisions about events they see, that they would be viewing a short video, and answering questions about the video.

Since self-designated race is a major variable in this study, it is important to give a definition for race as well as how race is used as one of the main variables. For this research race was based on self-designation, e.g., participants wrote down their race/ethnic background and we (myself and a research assistant) coded when they gave us back the questionnaire, only in two cases there was a discrepancy between what we (experimenters) thought their races were and what they wrote in the questionnaire (see questionnaire appendix); however, in those two cases, the race assigned was the one race participants wrote down.

Design

Findings about the cross-race effect have been replicated not only in laboratories, but also in more naturalistic settings showing that own-race identification is more accurate than

cross-race identification (Brigham, Maass, Snyder, & Spaulding, 1982; Platz & Hosch, 1988). This research is designed to bring a decision-making analysis to the task, in particular, Signal Detection Analysis (SDA), which provides separate measures of *accuracy* (capacity to discriminate) and *decisional criteria* (how lax or stringent the criterion is). The design of this study is a (2X2), two races of perpetrator and foils (White Latino and Black) by two participants' race (White Caucasian, White Latino). (A signal detection analysis (SDA) using aggregate data with confidence intervals was performed). Also an ANOVA was performed using individual measures of accuracy (d') and decisional criteria (c3) from SDA and correlated to the questionnaire responses.

Procedure and Material

The participants were tested at John Jay College facilities. The data were collected on six different days. First, participants watched a brief video in which a man entered into a classroom and took a wallet from the table. In three sessions, participants saw a video with a White Latino actor, and in the other three sessions participants saw a video a Black actor (taking the wallet).

The Video Watching (Stimulus)

The video lasted approximately 30 seconds. It depicted a young man entering a large classroom and taking a wallet lying on the center table of a lecture room. The film showed the man from his left and right profiles, and looking straight, after which he left (see methods). Before seeing the video, participants were instructed*: "You are going to see a video, and later today, I am going to ask you questions about what happened*." *And,*

after they have seen the video they were asked to write down (2-3 minutes) as many details as they could what they saw in the video. These descriptions were coded as to whether the race of the perpetrator was mentioned.

The Face Recognition Task

After the participants saw the video, and have written about what they saw in the video, they did a well known Japanese puzzle called Sudoku. They were instructed to: "*Take your time to do the Sudoku game, for those who are not familiar with the game you should fill in the grid so that every row, every column, and every 3x3 box contains the digits 1 through 9".* Participants were told that it was okay if they did not finish the Sudoku, and that there was no need to put their names on if they did not want to. After doing the Sudoku puzzle for half hour they performed the face recognition task and completed a short questionnaire (see Appendix C). The instructions before the face recognition were be: *"As you saw in the video, someone left the wallet on the table and a person who works in the building stole it. I am going to show you some photos of people, one at a time, and I want you to tell me whether you think that person in the photo was the one who stole the wallet".*

In the face recognition task, the face-photos were presented in power point format. Each participant saw 5 trials of 15 photos each (3 photos of the perpetrator, and 12 photos of foils), for a total of 75 photos. The photos were used before in a pilot study with 96 subjects, and were designed to constitute a good combination of facial features in both sets (Black and White Latino faces).

Participants were told that the same photo would be shown many times in a different order, and from different perspectives, which are: center, left and right (for more detail see methods literature review). The participants also were told that they would need to make a decision from among four responses: *very sure <u>it is not</u> the man in the video; a little bit sure <u>it is not</u> the man in the video; a little bit sure <u>it is</u> the man in the video, very sure <u>it is</u> the man in the video* (see example attached). As mentioned above, this study adopted a sequential photo-array (picture by picture), projected in power point with a *time reaction period (time to make decision)* between pictures of 8 seconds.

Questionnaire

After completion of the recognition task, the participants answered a short questionnaire. The questionnaire included questions about (a) their level of confidence (e.g., how sure are you that you were accurate in identifying the person in the video); (b) their own racial/ethnic identification (e.g., White or Caucasian, Black or Black, Afro-Caribbean, Latino Hispanic, Asian, etc.); (c) frequency of contact with own and other racial groups (e.g., how often do they hang out with people of different race or ethnic backgrounds); (d) their degree of friendship with members of other racial/ethnic groups (e.g., name your best three friends, and (afterwards, e.g., on the next page) indicate their gender, race, age and time of friendship), and (e) their decision-making strategies (e.g., what kind of strategy they used to identify) (see Appendix C).

Racial-self identifications were made by each participant after completion of the identification task, at the end of the questionnaire together with other personal information (e.g., are you a US citizen? How many years have you being living in the

US?). Only White Latinos, Blacks, and in some analysis Caucasians were included in this sample; volunteers from other ethnic/racial groups (e.g., Asians) were not included.

At the end of each session, participants were thanked and told in more detail about the purpose of the study, in particular, about the cross-race aspect of the study. They also were provided with ample time to ask questions about the research, and encouraged to offer their opinions of the procedures and purposes of the study.

RESULTS

For this analysis, only two "races," White Latinos and Blacks, were included, leaving out the White Caucasians because (a) there was no video showing a non-Latino White perpetrator, and (b) there were a relatively small number of Caucasian participants in this sample (see Table 1). The choice of only considering Blacks and White Latinos was because of the demographics of John Jay College, a larger number of Blacks (African-Americans and African-Caribbean) and White Latinos, and a relative scarcity of non-Latino Caucasians) and also because there are a very few cross-race studies including White Latino samples.

Table 1

Mean for Sensitivity/Accuracy (d'), (*n* = 105)

Groups	n	M	SD
B→B	22	1.72	.80
WL→WL	20	1.60	.71
B→WL	23	1.48	.72
WL→ B	23	1.68	.86
C→B	9	1.14	.62
C→WL	8	.75	.40

B = Black; WL = White Latino; C = Caucasian

Analysis of Sensitivity/Accuracy (d') Across Groups

As explained in the method, a measure of sensitivity/accuracy (d') was calculated for each individual participant. Means for each group are shown in Table 1. A one-way Analysis of Variance (ANOVA) was conducted on these individual measures of sensitivity (d') as a function of group membership (Blacks viewing Blacks; Blacks viewing White Latinos; White Latinos viewing White Latinos and White Latinos viewing Blacks) and the results were shown not to be significant (see Table 2).

Table 2

One-Way-ANOVA- for- Accuracy/Sensitivity (d') by the Four Groups

Source	df	SS	MS	F
Between groups	3	.67	.22	.37 *
Within groups	84	50.84	.60	
Total	87	51.51		

* p > .05

A two-way ANOVA on sensitivity/accuracy with race of participants and race of the perpetrator as a factors, showed no significant main effects or interaction.

Analysis of Decisional Criteria (c3) across Groups

As described previously, a measure of decisional criteria was calculated for each individual participant. Means for each group are shown in Table 3. A one-way ANOVA was conducted on these individual measures of decisional criteria as a function of the four groups (Blacks viewing Blacks; Blacks viewing White Latinos; White Latinos

viewing White Latinos and White Latinos viewing Blacks) and the results were significant, F-(3, 84) = 2.67, *p* =.04 (see Table 4).

Table 3

Mean for Decisional Criteria (c3), (*n* = 88)

Groups	n	M	SD
B→ B	22	1.31	.57
WL→WL	20	1.28	.38
B→WL	23	1.51	.38
WL→ B	23	1.11	.51

B = Black; WL = White Latino

Table 4

One-Way Analysis of Variance for Decisional Criteria (c3) by the Four Groups

Source	df	SS	MS	F
Between groups	3	1.92	.64	2.67 *
Within groups	84	18.80	.22	
Total	87	20.73		

* p < .05

A Post Hoc – Tukey analysis of group paired comparison (see Table 5) showed that Blacks used a stricter criterion when identifying White Latinos than when White Latinos identified Blacks.

Table 5

Decisional Criteria Group Paired Comparisons - Tukey HSD

(I) groups	(J) groups	Mean difference	95% CI	
			Lower limit	Upper limit
B→WL	B→B	.18	.54	-.18
B→WL	WL→WL	.26	.64	-.12
B→WL	WL→B	.41 *	.76	.03
WL→B	B→B	-.22	-.58	.14
WL→B	WL→WL	-.14	-.52	.24
B→B	WL→WL	.79	-.31	.46

* The mean difference is significant at the .05 level

An alternative way to analyze the data is to look at the main and interaction effects of race of the perpetrator and race of the participants. A two-way ANOVA on decision criteria showed two main effects: (a) Blacks used a stricter criterion than White Latinos regardless of the race of the perpetrator, F-(3,19) = 4.56, p = 0.03, (b) and marginally, all participants used a stricter criterion when identifying White Latinos than when identifying Blacks, F-(3,84) = 3.36, p = 0.07) (see Figure 1).

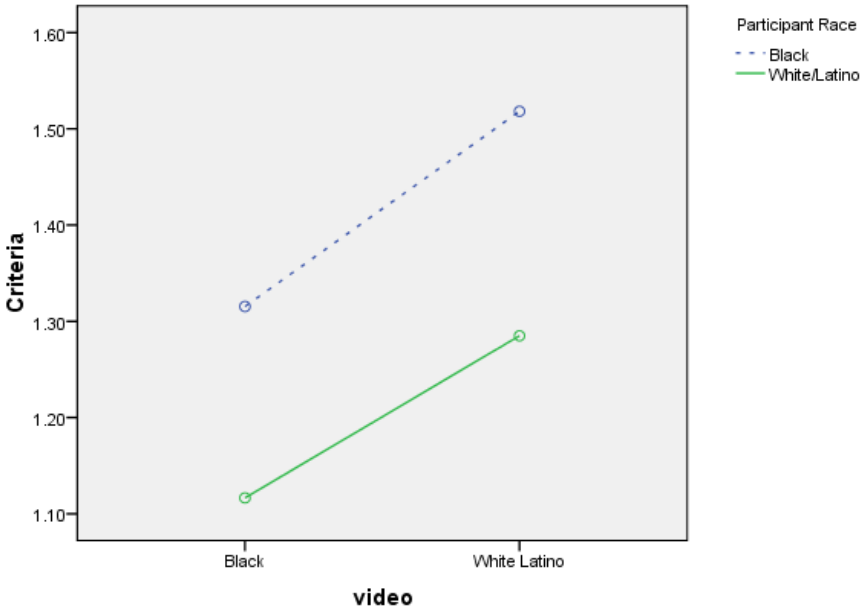


Figure 1. Main effects for race of perpetrator and race of the participants on decision criteria, (n = 88).

A signal detection analysis using aggregated data (where by the individual scores for each group are combined and the level of significance between groups is calculated in terms of confidence intervals) also showed no cross-race vs. same-race effect between Blacks and White Latinos participants for sensitivity/accuracy (d'); but a partial cross-race effect was found for decisional criterion. Consistent with the two-way ANOVA results, Blacks used a stricter criterion when identifying White Latinos than did White Latinos when identifying Blacks (see Appendix E1).

Analysis of Written Responses to the Video

After participants viewed the video, they were asked to describe the event they had witnessed. In general, participants mentioned the *race* of the person in the video

significantly more often when the video featured an Black than when the video featured a White Latino. This trend did not differ for cross- and same race conditions or among any other group combination. That is, Blacks mentioned the race of the *perpetrator* when he was Black as frequently as White Latinos did. The overall difference was significant by Chi-square, χ^2 (1, N = 88) = 14.77, $p < .001$ (see Table 6).

Table 6

Mentioned Perpetrator's Race by Group, (*n*=88).

	Mentioned Perpetrator's Race	
Groups	No	Yes
B→ B	10	12
WL→ B	5	18
Total	15	30
WL → WL	14	6
B → WL	17	6
Total	31	12

B = Black; WL = White Latino

The partition Chi-square results, χ^2 (1, N = 88) = 13.24, $p < .001$, comparing groups confirmed that when participants saw the Black video they mentioned the race of the person more than when they saw the White Latino video independently of who was the viewer. That is, when Blacks and White Latinos watched the Black video they more often mentioned the race of the person than they did when they watched the White Latino video.

When Caucasians viewed the Black video, five of nine participants mentioned the perpetrator's race, but when they viewed the White Latino video only one of eight participants mentioned the perpetrator's race.

Analysis of Sensitivity (d') and "Post Identification" Confidence Level

Sensitivity/accuracy and confidence level after identification were positively correlated, r-(86) = .388, p <.01. In general, the more accurate the participants were, the more confident they were about their identification choices (see Figure 2).

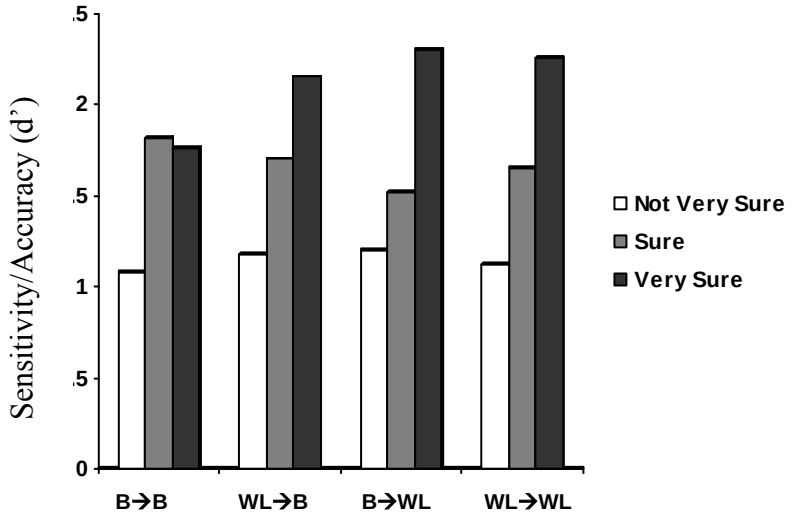


Figure 2. B= Black; WL=White Latino.
Sensitivity (d') and confidence level relationship. The greater the capacity to discriminate between faces (d'), the higher the confidence level (n = 88).

Correlation within groups showed a clear trend that the more confident, the more accurate the participants were. Blacks identifying an Black perpetrator, r-(20) = .197, p < .38; White Latinos identifying a White Latino perpetrator, r-(18) = .603, p < .005;

Blacks identifying a White Latino perpetrator, *r*-(21) = .384, $p < .06$; White Latinos identifying a Black perpetrator, *r*-(21) = .334, $p < .11$. Also, when participants viewed a White Latino perpetrator they tended to report being more confident in their identifications (*r*-(42) = .499, $p = .001$) than when participants viewed a Black perpetrator (*r*-(42) = .273, $p = .06$).

Analysis of Decisional Criterion (c3) and "Post Identification" Confidence Level

Decisional criterion was negatively correlated with confidence level, *r*-(86) = -.266, $p < .05$. That is, in general, those who used a stricter criterion in deciding tended to report that they were less sure about their identification choices than those with a less strict decisional criterion (see Figure 3).

Correlations were calculated between confidence level and decisional criterion for each group, and none of the groups approached significance.

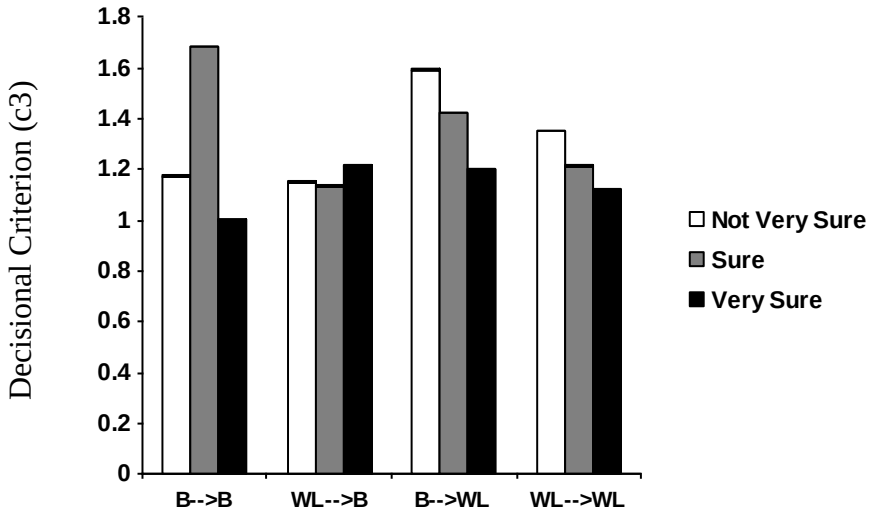


Figure 3. B= Black; WL=White Latino.
Decisional criteria and confidence level relationship. The stricter or higher the decisional criterion used to decide, the lower the confidence level, (*n* = 88).
When Caucasians were included in the analysis (*n* = 105) the results showed that

Sensitivity/Accuracy (d') [*r*-(104) = .438, $p < .01$], and Decisional Criterion (c3) [*r*-104 = -.315, $p < .01$] were both correlated with confidence level.

Analysis of Racial Contact

Racial contact measures were gathered from participants' responses to the questionnaire. (a) Participants were asked to mention the name of their three best friends, and then (on the next page) to write down to which race/background their three best friends belonged. The reason why their friends' races were only mentioned "on the next page" was to not prime them for race and therefore avoid socially desirable responses. Also, they were asked to write their friends' ages, genders and for how long they have been friends. (b) Participants were also asked to indicate how often they "hang out" with people of various races or ethnic backgrounds, on four-point scales from "almost never" to "very often." They were asked specifically about hanging out with Asians, Blacks, Caucasians and Latinos/Hispanics. (c) Participants were asked to mention how closely they worked with members of another race/ethnic background on three-point scales from "not close at all" to "very close." They were asked specifically about working closely with Asians, Blacks, Caucasians and Latinos/Hispanics. For the contact measures "having cross-race friends; working or hanging out with members of other race" only referred to White Latinos mentioning contact with Black and Blacks mentioning contact with White Latinos.

Analysis of Mentioned Friendship with Members of Another Race

Participants, in general, (i.e., despite the condition or group they were in) mentioned that most of their friends were the same race as themselves. However, significantly more Blacks (44.5%) mentioned having White Latinos as friends than White Latinos (18.6% of all White Latinos) mentioned having Black friends. The difference was significant by Chi-square, χ^2 (1, N = 88) = 6.76, $p < .01$ (see Table 7).

Table 7

Mentioned Cross-Race Friends by Race, (*n* = 88)

	Mentioned Cross-race Friends		
	No cross-race friend	Cross-race friend	Total
Black	25 (55.5%)	20 (44.5%)	45
White Latino	35 (81.4%)	8 (18.6%)	43

Cross-race friends = Blacks having White Latinos friends and vice versa.

Mentioning having cross-race friends [White Latinos mentioning having Black friends and Blacks mentioning having White Latino friends] was not associated with better sensitivity (d'), but was significantly correlated (*r*-(86) = .223, $p < .05$. with a stricter criterion (c3). That means, in general, participants who mentioned having cross-race friends used a stricter decisional criterion to decide on the face recognition task.

Analysis of Mentioned "Hanging out" with Members of Another Race

White Latino and Black participants' reports of "hanging out" with members of another racial group were also examined. Seventy-three percent of Black participants

mentioned often hanging out with White Latinos, while only thirty five percent of White Latinos reported often hanging out with Blacks (see Table 8). The difference was significant by Chi-square, χ^2 (1, N = 88) = 7.10, $p < .01$

Table 8

Hanging Out with Members of Another Race

	How often do you hang out with members of another race?	
	Not Very Often	Often
WL (Hanging out with B)	15 (65.2%)	8 (34.8%)
B (Hanging out with WL)	6 (26%)	17 (74%)
Total	21	25

B= Black; WL=White Latino

Analysis of Hanging out and Having Cross Race Friends Combined (Friendship)

Neither the friendship contact measure nor hanging out contact measures was related to sensitivity (d'). They were, however, related to decisional criteria (c3). The two contact measures were combined into a new measure of contact called Friendship. The variables were recoded into (0) = Low cross-race contact (almost never hanging out with members of another race, and having no cross-race friends), (1) = Some cross-race contact (either hanging out with members of another race, often or very often, or having cross-race friends), and (2) = High cross-race contact (hanging out with members of another race often and very often and having cross-race friends).

The results from one-way ANOVA within each group showed that reported friendship did not predict sensitivity/capacity to discriminate between the perpetrators

and foils (d'), but was related to decisional criteria, but only in cross-race conditions (see Table 9). When the cross-race conditions (B-WL and WL-B) were combined and examined as a function of cross-race contact (see Table 10), participants who were in the cross-race conditions and mentioned having cross-race friends and hanging out with members of another race used a stricter criterion to decide on the face recognition task than did those with low race contact (see Table 11 and Figure 4).

Table 9

Decisional Criteria by Friendship across the Four Groups, (*n* = 88).

Variable and Source	n	M	F
B→B	22	1.34	.360
WL → WL	20	1.26	1.33
B → WL	23	1.52	4.45 *
WL → B	23	1.12	3.60 *

* p < .05. B = Black; WL = White Latino

Table 10

Decisional Criteria as a Function of Friendship Category in the Combined Cross Race Groups (B→WL and WL→B, (*n* = 46).

Variable and Source	n	M	SD
Low cross-race contact	14	.89	.28
Some cross-race contact	21	1.44	.45
High cross-race contact	11	1.31	.44

Table 11

Post Hoc - Tukey HSD, Decisional Criteria and Friendship for Cross Race Groups (B→WL and WL→B, n = 46).

(I) groups	(J) groups	Mean difference	95% CI	
			Lower limit	Upper limit
Low cross-race contact	Some cross-race contact	-.37 *	-.64	-.09
Low cross-race contact	Lots of cross-race contact	-.53 *	-.83	-.23
Some cross-race contact	Lots of cross-race contact	-.16	-.39	.06

* The mean difference is significant at the .05 level

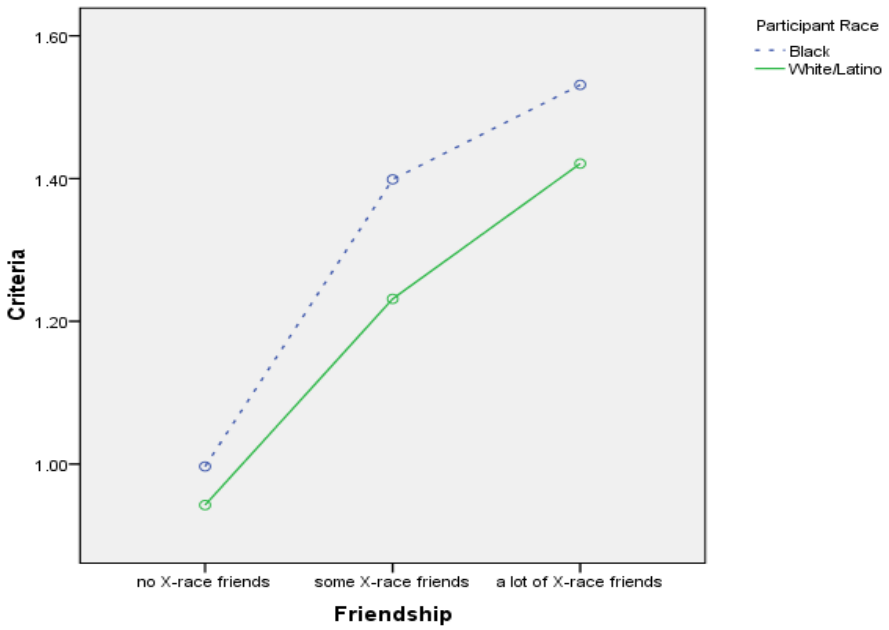


Figure 4. Relationship between mentioned cross-race contact and decisional criteria. The greater the degree of the cross-race contact, the greater and thus stricter the criteria used to decide, (*n* = 46).

Analysis of Mentioned Working with Members of Another Race

White Latino and Black participants' responses to cross-race contact with Blacks and White Latinos through work were also examined (see Table 12). Most of the

participants from both group backgrounds, Black and White Latino, mentioned that they work *somewhat close* or *very close* to members of the other race. No significant relationship was found between reported frequency of work contact and capacity to discriminate (d') or with decisional criterion (c3), as hanging out and having cross-race friends did.

Table 12

Mentioned Cross-race Work-Place Contact, (*n* = 46).

	How closely participants work with members of cross-race (WL vs. AA)		
	Not close at all	Somewhat close	Very close
WL (working with B)	2 (8.7%)	11 (47.8%)	10 (43.5%)
B (working with WL)	0	14 (60.8%)	9 (39.2%)
Total	2	25	19

B = Black; WL = White Latino

Analysis of Beliefs about False Positive and False Negative Errors.

Eighty-two percent [82%] of all participants thought that the false positive error was worse than a false negative error (Table 13). Participants beliefs about false positives and false negative errors did not relate to discriminability (d'), but those who thought *false positive errors* were worse than *false negative errors* did use a stricter criterion to decide both in the same- and cross-race conditions (see Table 14 and Figure 5).

Table 13

Beliefs about False Positive and False Negative Errors, (*n* = 88).

	False Positive Errors Worse	False Negative Errors Worse
Cross-race Condition	35	7
Same-race Condition	37	9
Total	72 (82%)	16 (18%)

Table 14

One-Way ANOVA for Sensitivity (d') and Decisional Criteria (c3) and Beliefs about F+ and F- Errors, (*n* = 88).

Variable and Source	df	SS	MS	F
Sensitivity (d')				
Between groups	1	.58	.58	.98
Within groups	86	50.93	.59	
Decisional Criteria (c3)				
Between groups	1	2.00	2.00	9.16 * *
Within groups	86	18.74	.21	

** p < .01

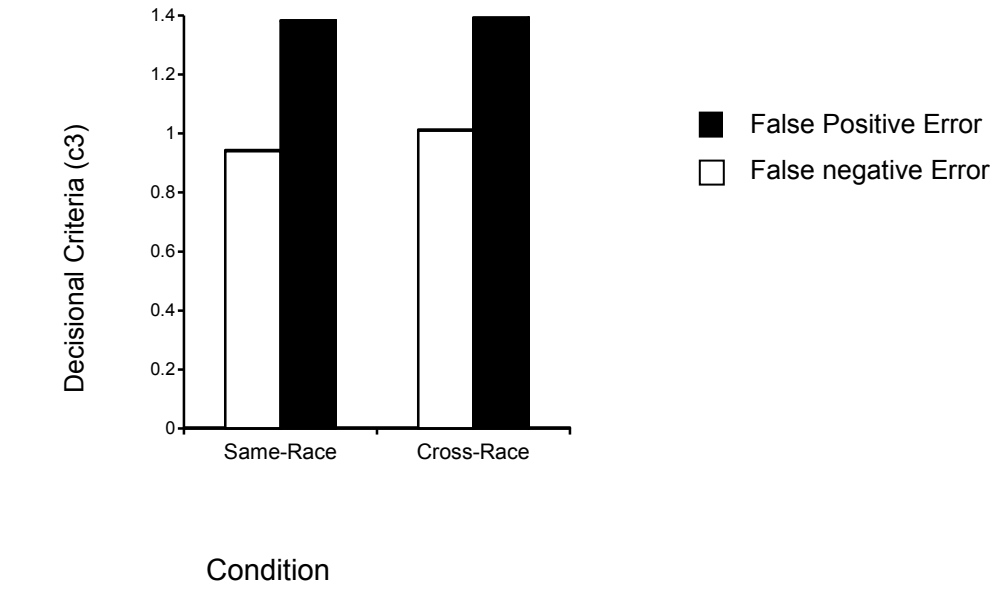


Figure 5. Which kind of error is worse: False negative or false positive? Decisional Criteria relationship with beliefs about false positive and false negative errors (*n* = 88).

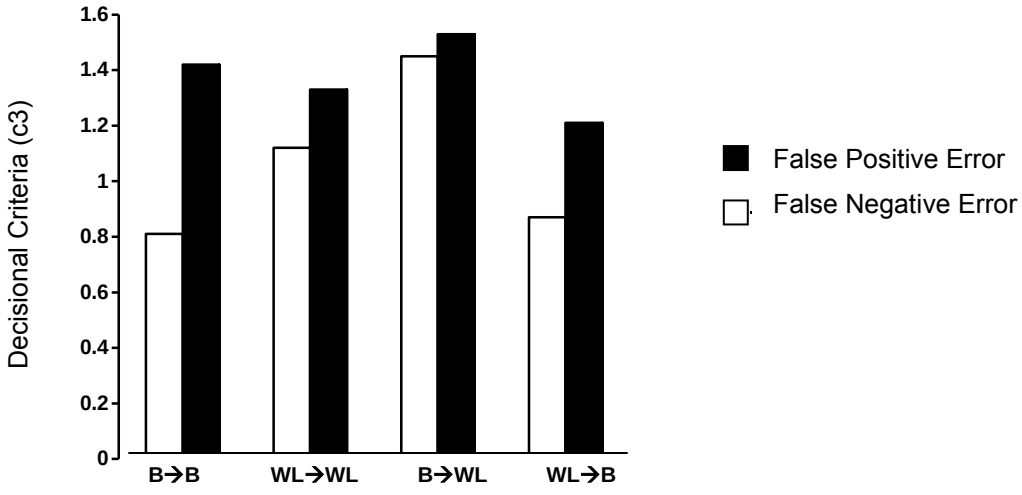


Figure 6. B= Black; WL=White Latino. Which kind of error is worse by group: False negative or false positive? Decisional Criteria relationship with beliefs about false positive and false negative errors (*n* = 88).

When cross- and same race conditions were divided by group (see Figure 6) it can be seen that what may have made the difference was the video participants watched. That is, the belief that false positive error is worse than false negative error tended to be true when participants saw a film of and made judgments of an Black perpetrator. Note that the majority of participants [82%] thought *false positive errors* were worse than *false negative errors,* compared to the remainder [18%] who thought that *false negative errors* were worse than *false positive errors*.

ADDITIONAL RESULTS

Analysis of Mentioned Task Difficulty

Participants were asked to rate how difficult the face recognition task was on a three-point scale ranging from not difficult at all to very difficult. A one-way ANOVA was conducted on individual measures of sensitivity (d') by task difficulty and the results were significant: F-(2, 85) = 6.10, p =.003. Those who were *better* able to discriminate between faces (indicated by a higher d' rate) found the task to be more difficult (see Table 15). However, one-way ANOVAs for sensitivity/accuracy (d') within the four groups showed that the capacity to discriminate was related to how difficult the task was, but only for same race conditions, White Latinos identifying a White Latino perpetrator, F-(2, 20) = 4.46, p =.025, and African-Americas identifying an Black perpetrator (F-(2,18) = 3.55), p = 05.

Table 15

One-Way ANOVA for Sensitivity/Accuracy (d') and Task Difficulty, (n=88).

Source	df	SS	MS	F
Between groups	2	6.46	3.23	6.10 *
Within groups	85	45.05	.53	
Total	87	51.51		

* p < .05.

An ANOVA was also conducted for decisional criteria (c3) and the result was marginally significant, *F*-(2, 85) = 2.22, *p* =.11. Although, decisional criteria had no significant relationship to task difficulty in general (see Table 16), there was a trend such that those who used a stricter criterion to decide tended to report that they found the task easier, but only among those who viewed a White Latino perpetrator. White Latinos identifying a White Latino perpetrator, *F* -(2, 20) = 2.45, *p* =.11, and Blacks identifying a White Latino perpetrator, *F* -(2, 18) = 2.49, *p* =.10.

Table 16

One-way ANOVA for Decisional Criteria (c3) and Task Difficulty (n=88).

Source	df	SS	MS	F
Between groups	2	1.03	.51	2.22 *
Within groups	85	19.7	.23	
Total	87	20.73		

* p < .11

One-way ANOVA showed that rating the task of difficulty was also associated with race of the perpetrator, *F*-(2, 85) = 3.12, *p* =.047. When participants viewed a White

Latino perpetrator they found the face recognition task more difficult than when they viewed an Black perpetrator.

Analysis of Decisional Strategy

Participants were also asked to rank a list of decision strategies (from 1, the most used, to 6, the least used) during the identification task. *Relative* and *absolute* kinds of judgments were randomly arranged in the list of decision strategies (see Appendix C). Fifty-two per cent of the participants mentioned they *"tried to match each photo to their initial memory of the man who stole the wallet*". No relation between reported decision strategy and accuracy or decisional criteria was found (see Table 17).

Table 17

Strategy Used to Decide (n = 88).

	Strategy used to decide				
	Initial memory	I just recognized him	Process of elimination	Face as whole	Physical features
Same-race Condition	24	4	8	1	5
Cross-race Condition	22	8	6	1	9
Total	46	12	14	2	14

Note: Same-race = White Latinos viewing White Latinos and Blacks viewing Blacks. Cross-race = White Latinos viewing Blacks, and African-Americas viewing White Latinos. The other two conditions, Caucasians viewing or Blacks or White Latinos, were not included because of small cell size.

DISCUSSION

A major problem with cross-race identification research has been the potential confounding of the effects of familiarity and of racial bias. Based on a large body of research that confirms the existence of cross-racial identification phenomenon, including a pilot study, this research was designed to bring a decision-making analysis to the task, in particular, Signal Detection Analysis. Therefore, the following will be discussed: the differential effects of race of eyewitness and race of perpetrator and foils on *Sensitivity (d')* and on *decisional criterion (c3);* the relationship between accuracy and post-confidence level relation; the relationship of eyewitness performance to cross-race contact, and judgmental strategy and decision- making.

Sensitivity (d') and Decisional Criterion (c3)

This study found no simple cross-race effect for sensitivity which is the capacity to discriminate between "perpetrators" and "foils". Blacks were better at recognizing other Blacks (distinguishing *perpetrators* from *foils*) than any other combination. A specific but atypical cross-race effect was found for decisional criterion. While there were no differences in criterion placement in same-race conditions (White Latinos identifying White Latinos and Blacks identifying Blacks), Blacks used a significantly stricter criterion when identifying White Latinos than White Latinos did when identifying Blacks. In addition, two main effects indicated that Blacks used a stricter criterion than White Latinos overall and all participants used a marginally stricter criterion when identifying White Latinos than when identifying Blacks.

The Da Silva (2004)'s pilot study, as well as the current study showed no simple cross-race effect for sensitivity (d'), even though Blacks were better at recognizing other

Blacks than recognizing White Latinos (i.e., their d' rates were higher). No differences were found when White Latinos identified Blacks or other White Latinos. Again, what was found in the 2004 study was a partial cross-race effect for decisional criteria, where White Latinos and White Caucasians used a stricter criterion when identifying Blacks. Thus, neither study (2004 pilot nor the current) showed the typical cross-race effect for sensitivity (see Appendix G).

Both studies did show a cross-race effect for decisional criteria, whereby particular cross-race differences operate in different directions. In the present study, Blacks used a stricter criterion when identifying White Latinos than White Latinos used in identifying Blacks. In the 2004 pilot's study, White Latinos and Caucasians used a stricter criterion when identifying Blacks.

In part, this study supports findings reported by earlier researchers (see Meissner & Brigham's (2001) meta-analysis), counterhypothesis 1) that Whites would use a more lenient bias criterion with Blacks and Blacks with Whites in comparison to Whites identifying other Whites and Blacks identifying other Blacks. However, previous studies compared Whites with what they called "Blacks" and this compared Blacks with White Latinos only. Counterhypothesis 2) was not supported, that Whites (Caucasians and White Latinos) (would) use a more stringent criterion, indicated by a higher decisional criterion score, than any of the other three combinations (i.e., Whites identifying Whites, Blacks identifying Blacks, or Blacks identifying Whites). However what was found was another complex relationship across combinations, with Blacks overall using a stricter criterion. This may reflect a different kind of interracial contact, and race distribution at different schools. Participants in the present study were from John Jay College

(population overall is 32% White Latinos, and 27.8% Blacks), and participants in the 2004 study were from a Roman Catholic High School (population overall is 18% White Latinos and 23% Blacks). Further, it is possible that the relations among ethnic groups were different in a relatively small parochial high school and a large public college.

The cross-race effect has been found in many studies and meta-analyses, with a variety of proposed explanations. Most recent Hugenberg et al., (2007) presented evidence that favored *social categorization models* over *perceptual expertise models*. The former explanation is that merely categorizing faces as members of in- and out-groups is sufficient to elicit recognition differences in cross-race identifications. However, findings from the two studies reported here (2004 pilot and current), show that something more complex than a direct cross-race effect seems to be operating, and the social context and, in particular, interracial relationships, in which the study took place might make a difference. Social categorization and also perceptual expertise effects on the cross-race effect may not operate as static mechanisms, but they may elicit different "biases" in face recognition depending on the context of a population studied in a certain situation in time. For instance, it is possible that a recent widely-reported event ("White Latina John Jay student"- was murdered by a "Black male", could have influenced the outcome of this study.

The John Jay College population, in particular, has been exposed to people of a diverse racial/ethnic background in New York City. People in New York have also been primed to pay attention – If you see something, say something. The priming towards other race targets evolved as events happen over time. When the events of 9/11 happened, Arabic faces became a target, more recently the "Virginia Campus shooting," has called

attention to Asians faces. Thus, findings from the two studies suggest that individuals may develop different interracial relationships in different contexts (schools). For example, John Jay College and Saint Frances Catholic High School may promote interracial relationships differently and with differential success. Also, individuals' beliefs about their interracial relationships may vary across context, which could affect sensitivity/discriminability (d') and decisional criterion placement differently.

Results from the current study show how Blacks as group may be disadvantaged in the current legal system compared to White Latinos. For example, when participants were asked to describe what they saw in the video, they mentioned the race of the perpetrator almost three times more often when the perpetrator was Black than when he was White Latino. White Latinos also used a laxer criterion when identifying Blacks than any other group combination. Also, Black more often mentioned having White Latinos as friends than White Latinos mentioned having Black friends.

Accuracy and Post-Confidence Level Relationship

Meissner et al.'s (2005) review showed that false recollections with high ratings of confidence occurred more often when participants encoded and responded to unfamiliar other-race faces. Sporer's (2001) study presented some evidence that the relationship between accuracy and confidence-level may not be obtained in a cross-racial identification. However, the weak or nor-existent relationship between confidence level and accuracy (see Cutler & Penrod's (1995) meta-analysis; Loftus, 1979; and Meissner & Brigham's (2001) meta-analysis, was not found in this study. What was found was that participants who stated that they were "*very sure*" or "*sure*" about their identification

actually had better sensitivity (d') than those who stated they were not sure about their identifications.

Brigham et al. (1982), Platz and Hosch (1988), and Wright et al. (2001) used a target present lineup and provided some evidence that accurate witnesses tend to be more confident than inaccurate witnesses; however, it is not clear whether the confidence-accuracy relationship operates in the same manner in cross-race identifications as in other studies. The present study suggests that participants who reported being *sure* or *very sure* about their identifications, in fact, discriminated more accurately between the *perpetrators* and the *foils* than those who reported they were *not sure.* No significant differences in this relationship were found between same- and cross-race identifications. Rather, differences were found for decisional criterion. In general, participants who used a stricter criterion in deciding tended to report that they were less sure about their identification choices. However, when Blacks identified other Blacks and reported being *sure* about their identification, they actually had used a stricter criterion to decide. It may be that the use of a signal detection analysis, whereby participants need to give judgments of each photo that they see, makes them more aware of their decisional criterion placement than in a typical face recognition task. However, not much is known about witnesses' beliefs and assumptions about their own decisional abilities, as well as how "thinking" about their identifications might strengthen confidence level.

Cross-Race Contact

The contact hypothesis is that the amount of cross-race contact and the resulting level of familiarity, predicts and (strongly) influences individual facial recognition ability (Brigham et al., 1982; Chance, Goldstein & McBride, 1975; Ng & Lindsay, 1994). As in

past research which has addressed how degree of contact with other races relates to accuracy, the current study suggests that mere contact may not be sufficient to eliminate the cross-race recognition effect. Similarly, Burgess, (1997), Malpass and Kravitz, (1969), Ng and Lindsay, (1994) and Platz and Hosch (1988) did not find the predicted relationship between contact with and accuracy in recognizing faces of members from different racial groups. Therefore, the cross-race deficit does not seem to be due to differential cross-race experience or contact. However, when the measure was of response bias/decisional criterion, the results were different than when the measure was of overall accuracy.

Having cross-race friends, and hanging out with members of another race did not have a general relationship to sensitivity/discriminability (d'), but both kinds of contacts were related to decisional criterion (c3). Those who mentioned having cross-race friends and hanging out with members of another race used a stricter criterion to decide on guilt, but only in the cross-race conditions.

Allport's (1954) contact theory argues that increased intergroup contact does not necessarily reduce hostility or lead to interracial friendship. It appears that frequency of interaction with members of another race among individuals is influenced by the specific context of the interaction settings (and how those may or may not promote cross-race interactions). This study shows that having cross-race friends as well as hanging out with members of another race did not necessarily increase discriminability, but was related to criterion placement. As Allport suggested, contact may increase or decrease prejudice, which may affect one's decisional criterion. Also, the amount and kind of inter-group

personal contact and resulting friendship are believed to be keystones in the reduction of prejudice (Aboud et al., 2003).[4]

This study did not have a measure of racial attitudes/prejudice, but the fact that contact (hanging out with members of another race and having cross-race friends) predicted decisional criterion, and not the capacity to discriminate between perpetrator and foils, suggests a relation between contact and more *implicit* racial attitudes. However, implicit racial attitudes have typically been measured differently (Fazio, Jackson, Dunton, & Williams, 1995; Greenweld, McGhee, & Schwarz, 1998). Researchers draw on connections between a set of "racial primes" and a set of target words to measure individuals' implicit cognition. Thus, participants are asked to relate positive or negative words to Black or White faces and their decisions are used as indicators of racial attitudes. However, whether racial attitudes were explicit and/or implicit, they were related to criterion placement. The current study further suggests that some, but not all kinds of contact are related to racial attitudes, (e.g., no relation to contact with another race in the work place).

Findings suggest that just having contact at work with members of another race most probably indicates a different kind of interracial interaction than friendship, because individuals may have no choice in interacting with members of other races in work settings. Interestingly only two participants mentioned that they did not work close at all to members of another race, and the rest of the participants mentioned that they work *somewhat close* or *very close* to members of another race, which could partially account

[4] Cross-race friendships became an important tool for the reduction of segregation and prejudice in elementary schools. Aboud et al., (2003) examined same and cross-race peer relations as a function of grade, gender, and race; as well as, the relationship between peer relations and racial attitudes. Cross-race mutual friendships decline with grade (as children get older). Children with less biased attitudes had more cross-race interactive companions, and more positive perceptions of their friends

for the lack of relation. However, when participants mentioned working *somewhat close* to members of other race they tended (although not at a statistically significant level) to have *higher* discriminability (d') than those who mentioned working *very close* to members of another race.

Participants' beliefs about false positive and false negative errors were also not related to sensitivity/discriminability (d'), but might be related to racial attitudes. This study showed that participants who thought false positive errors (i.e., false identifications) were worse than false negative errors (i.e., missing the perpetrator) did use a stricter decisional criterion in both same- and cross-race conditions. But, this pattern was somewhat stronger (although not statistically significant) when the perpetrator was Black than when the perpetrator was White Latino. Similarly, participants who reported having cross-race friends and hanging out with members of another race used a stricter decisional criteria to decide.

These findings show that some, but not all kinds of contact are related to decisional criteria. This suggests that, in cross-race recognition, the capacity to discriminate between faces is not (necessarily) the best predictor of how decisions are made. Different mechanisms are involved in making a decision, versus simply recognizing a cross-race face, and contact and attitudes likely influence those decisions.

It is also true that, even though participants' contact with other-races was assessed by more than one measure, it is still difficult to know (through a questionnaire) exactly how much actual contact and exposure to other-race-faces has occurred, and the nature of that contact. Nevertheless, research on cross-race relationships (Aboud et al., 2003; Tropp & Pettigrew, 2005) has shown that contact with different races can reduce

prejudice in both children and adults. Because, cross-race personal relationships are increasing as we move towards a more multi-ethnic and multicultural era, perhaps more sophisticated measures of quality of such relationships are needed.

Judgment Strategy and Decision- Making

Sequential lineup procedures have been found to elicit an absolute decision strategy and subsequently to enhance witness discriminability (Meissner et al., (2005), while simultaneous lineups might elicit a relative strategy (Lindsay & Wells, 1985). strategy. This study used a sequential, target-present-lineup (perpetrator was in the lineup) and showed that participants reported a large preference for an absolute *decision strategy* in both same- and cross-race conditions. Gronlund (2004) and Meissner et al., (2005) further argue that, within sequential lineups eyewitnesses tend to adopt a more conservative response criterion, thereby affecting decisional criterion (c3) but not discriminability (d'). Meissner et al., (2005) also found a negative relationship between decisional criterion and accuracy (d'). Clearly individual measures of decisional criterion (c3) and discriminability (d') do not always move in the same direction. For example, *having cross-race friends* does not increase accuracy in cross-race conditions, but having cross-race friends was significantly associated with a stricter decisional criterion. Also, participants' beliefs about false positive and false negative errors did not relate to discriminability, but were associated with decisional criterion.[5]

Cross-race differences in accuracy are sometimes attributed to *prejudicial* social attitude or to differential *familiarity* with members of one's own race and of other races.

[5] A study using signal detection analysis and a simultaneous, target-absent lineup alternative would not be possible. Also, from the research literature, the effect of lineup types on cross-race eyewitness identifications is not clear.

The use of signal detection analysis in the present study was chosen to help answer the question of whether the so called "social" or "non-social" factors were more critical. The assumption guiding the research is that sensitivity/accuracy is more likely to be affected by non-social factors like familiarity, whereas decisional criterion is assumed to be more affected by social factors, such as attitudes held by the witness (e.g., towards the accused's race or ethnicity). The kind of decisional strategy reported by participants in the present study was not related to discriminability (sensitivity) or to decisional criteria (bias). The current study used a sequential, target-present lineup, and sequential lineups have been found, in general, to elicit an "absolute decision strategy" and to increase discriminability. For example, the kind of strategy participants chose most often *(…I tried to match each photo to their initial memory of the man who stole the wallet…)* was an "*absolute decision strategy."*

However, the expected relationship between participants' decision strategies and their accuracy level and decisional criterion was not found. It may be that choosing a decisional strategy from a list of choices in the questionnaire is not the best way to measure the strategy used to decide. It is known from the literature (see Nisbett & Wilson, 1977) that people often do not know/cannot explain how they make decisions. Asking participants to mention strategies used to decide in a questionnaire seems problematic, especially because social desirability has a significant impact on the validity of self-reports. Even though it is known that social desirability effects often are associated with questions of race, it is not clear about the psychological mechanisms involved in social desirability or how conscious these effects are.

As mentioned above, the decisional strategy "post face recognition" measure used in this study did not offer much information about the decision-making process, therefore the challenge to find what happens in the process of cross-race identifications continues. Intrigued by the fact that almost half of the sample in this study chose one decisional strategy, a brief analysis comparing decisional criteria across 5 trials was conducted. The results indicated that something may happen in the process of deciding. That is, the study used 5 trials of 15 photos - each participant made 75 decisions; if the study only had 3 trials – each participant would have made only 45 decisions, and, the results might have been very different (for more details see Appendix H).

Perhaps future studies can look into techniques that provide more information about how decisions are made, such as these based on meta-memory: *intrinsic cues,* based on reflection on the memory process; *extrinsic cues,* based on reflection on the conditions surrounding memory formation and retrieval, and *self-credibility cues,* based on reflection on one's memory skills and experiences (for more details see Leippe & Eisenstadt, 2007).

GENERAL DISCUSSION

This study not only demonstrates the usefulness of a signal detection analysis of eyewitness performance across White Latinos and Blacks racial groups, but also points to implications for the legal system. The cross-race effect should not be presented to the legal system as a singular and general problem, because the cross-race effect does not always occur. What does happen is probably a more complex phenomenon depending on the particularity of *eyewitness-perpetrator'* combination, whereby other variables such as *context* (e.g., the context in which relations take place, and how those promote or not

interracial relationships) and individuals' beliefs and constructed meanings of interracial relationships need to be carefully considered.

Having cross-race friends, and hanging out with members of another race were found to have a positive relationship with decisional criterion (stricter criteria to decide on guilt). This highlights the importance of investigating different kinds of contact with other races, how those happen, and the degree to which of cross-race/ethnic interactions diminish segregation, particular in schools, and encourage institutions to promote interracial relations that may lead to better decisional criteria placement and awareness about false positive errors.

CONCLUSION

The current research brings a decision-making analysis (Signal Detection) to exploration of the cross-race identification phenomenon. Signal detection analysis provides a separate measure for *sensitivity*, which can be called accuracy or capacity to discriminate between *foils* and *perpetrator,* and *decisional criterion,* that is, the individual willingness to commit one kind of error, False positive or False negative, over the other. In this study the decisional criterion (c3) is the difference between "very sure this is the guy" identification confidence responses and the other three alternatives (i.e., very sure it <u>is not</u> the man in the video; a little bit sure it <u>is not</u> the man in the video; a little bit sure it <u>is</u> the man in the video).

The study showed no complete same- versus cross-race effect for sensitivity/accuracy, but a partial cross-race effect for decisional criteria. No difference in terms of criteria placement was found when Blacks identified Blacks or when White

Latinos identified White Latinos but when White Latinos identified Blacks they used a significantly laxer criteria than when Blacks identified White Latinos. This appeared to be the result of two main effects: (1) Blacks used a stricter criterion than White Latinos regardless of the race of the perpetrator, and, (2) marginally, all participants used a stricter criterion when identifying White Latinos than when identifying Blacks.

Unlike many previous studies, a significant relationship was found between confidence level and accuracy for most of the groups. Participants who reported being *very sure* or *sure* about their identifications, in fact, discriminated better (*higher d'*) between the *perpetrators* and the *foils* than those who reported they were *not sure*. However, the results showed that the confidence level and decisional criterion relationship changed accordingly to the particular *eyewitness-perpetrator* combination. That is, when Blacks identified other Blacks and reported being *sure* about their identifications, they actually used a stricter criterion, but when White Latinos identified Blacks, their reported confidence levels had no relation to their decisional criteria.

Measures of contact bore specific relationships to sensitivity and to decision criterion. The present study has three different measures of contact: (a) measure of "having cross-race friends", (b) "hanging out with members of another race", and (c) "working with members of another race". No significant relationship was found between sensitivity (d') and mentioning having cross-race friends or hanging out with members of another race. However, having cross-race friends and hanging out with members of another race was significantly associated with a stricter criterion in cross-race conditions. That is, participants who mentioned having cross-race friends and/or mentioned often hanging out with members of another race were more careful about their decisional

choices. They used a stricter decisional criterion to decide on guilt. However, work place contact did not significantly related to sensitivity (d') or decisional criteria (c3) across conditions or group combinations.

In summary, differences in performance depended on (a) the particular *eyewitness-perpetrator* combination (i.e., whether White Latinos were viewing Blacks or the reverse), and (b) the particular performance parameter, sensitivity or decisional criterion. These atypical results may alternatively be due to the use of signal detection analysis and/or to the particular population combinations studied, White Latinos and Blacks, rather than the more typical White Caucasians and Black combinations. However, the research demonstrated the usefulness of a signal detection analysis of eyewitness performance across ethnic-racial groups. Findings point to implication for the legal system whereby not only sensitivity/accuracy but also decisional criteria/response bias can have its consequences in real-world identifications.

Da Silva's (2004) pilot study, together with this study, constitutes a step forward towards a deeper understanding of the decision-making process in cross-race identifications. The starting point to be considered is that nearly all reasoning and decision-making in a process of deciding takes place in the presence of some uncertainty, and that social and non-social factors may affect the outcome at different point in the decisional process. Therefore, future research should incorporate decision-making measures to better assess cross-race identifications.

LIMITATIONS

This is laboratory study, and its main limitation is the ecological validity. Also, the sample may not be representative of the general population. Most John Jay students

have a great interest in pursing Law, Criminal Justice or Forensic carriers. However, in the future, it would be more informative to have more than two race/ethnic groups, and to also have different contexts (schools) participating.

In any event, more needs to be known about eyewitnesses' decision-making abilities and different strategies that may come into play when witnesses are confronted by persons from different race/ethnic groups. The use of signal detection to analyze face recognition is limited to sequential-target-present-lineup; and, it is true that this study does not have a target-absent lineup whereby accuracy and decisional criterion could be analyzed separately for choosers and non-choosers.

In summary, I believe that cross-racial eyewitness identification is an important research area, which may provide guidance for forensic procedures in an effort to further a fairer criminal justice system. Signal detection analysis is *definitely* a useful tool in this study because it helped to assess the relationship between individuals' capacity to discriminate and bias (criterion used). Perhaps, more qualitative procedures and measures, such as talk-out loud protocols or structured interviews, may help to identify patterns and uncover important interactions in order to pursue research designs towards more informative factors affecting facial identifications.

FUTURE RESEARCH

The present research has demonstrated the complexity and the multifaceted arena of identification regarding race. However, there are many avenues where this line of study could be extended and applied. The current study demonstrated the effects of cross-race identification on discriminability by the witness as well as on decisional criterion. There are most certainly other factors that can interact with the cross-race dynamic**.** Two

distinct lines of research are suggested by these findings. First, continuing the investigation of how different kinds of contact with individuals of a different race relate to decisional criteria across different contexts. Second, to investigate how the severity of the crime is related to the outcomes of making cross-race identifications. For example, when making identification a witness may be aware of the potential repercussions of their correct or incorrect selection, affecting the criterion applied as well as discriminability.

When a witness identifies a perpetrator, there may be many factors, in addition to race, that affect how strict or lax a criteria they apply. It is also possible that these factors may interact with the cross-race dynamic to produce complex effects. For example, what needs to be examined empirically is how the severity of the crime affects the criterion applied by the witness. Are individuals who make identifications for a robbery more prone to use a different criterion and discriminability than individuals who are identifying a suspect in a murder case? While the severity of the crime may vary the criterion used, the cross-race dynamic between the witness and the suspect may interact with severity to affect the outcome.

For example, while White Latinos may use a progressively lax criterion as the severity of the crime increases for a suspect of an out group ethnicity; they may use an increasingly strict criterion as the severity of the crime increases for a suspect of the same ethnicity. A finding such as this could be argued to be the result of competing increasing desires to err of the side of punishing the guilty or freeing the innocent, as the severity of the crime increases.

Witnesses may have a general sense of the potential penalty to the suspect when making identifications, however there are some situations where the witnesses are more

certain. In states that have the death penalty, when a witness is making an identification of a person suspected of murder, the criterion used may be modified by their attitudes towards the death penalty, as well as factors in interracial relations. What needs to be examined is whether the decisional criterion and discriminability of participants who are aware that the death penalty as a possible penalty differs from those who believe it not to be an option. Further, how interracial contact can affect decisional criteria as well as severity of crime together with the death penalty factor may interact with the cross-race dynamic to produce varying results which are crucially relevant to the future of the cross-race eyewitness testimony in the criminal justice system.

APPENDIX

Appendix A

July, 2007

Consent Form for Students

My name is Juraci Da Silva, and I am a doctoral student in Developmental Psychology at The Graduate Center of the City University of New York (CUNY), and principal investigator of this project, entitled "*Towards an Understanding of Eyewitness Identification."* I am doing research on how people make decisions about events they witness, and I believe that this study has the potential of contributing to our better understanding of how individuals notice and remember events they see.

You are going to see a short video of a person engaging in a role-play situation, and later you will answer some questions about what you saw in the video. The procedure should take approximately 50 minutes. The information you provide will be confidential, and the data will be stored in a locked file cabinet, to which only the research staff and I will have access. Your participation in this study is completely voluntary. At any time you can refuse to answer any questions or end the task without any penalty.

There is no risk involved in participating in this study, and I think you will find it interesting. Your participation may contribute to a better understanding of how people remember and make decisions about events they see. If you would like a copy of the study, please provide me with your address and I will send you a copy in the future.

If you have any questions about this research, you can call me at (212) 625-1649 or Juracci@hotmail.com, David Barnard Jr. at (917) 209 0535 or ddavidbarnard@yahoo.com, or my advisor, Herbert Saltzstein at (212) 817-8717 or hsaltztein@gc.cuny.edu. If you have questions about your rights as a participant in this study, you can contact Dr. Martin Wallenstein, IRB Chair, at John Jay College of Criminal Justice – CUNY, 899 Tenth Avenue, Room 336-13, New York, NY 10019, (212) 237- 8364.

Thank you for your participation in the study.

If you agree to be part of my research, please sign below:

_____	_____	_____	_____
Participant's signature	Date	Investigator's signature	Date

Appendix B

Face Recognition Trial Sheet.

Name:_____**Date:____/_____ TRIAL 1**

Photos	Very Sure it **IS NOT** the man in the video	A Bit Sure it **IS NOT** the man in the video	A Bit Sure it **IS** the man in the video	Very Sure it **IS** the man in the video
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Appendix C

Questionnaire

Name:_____ Age:_____
Gender:_____Grade:_____

<u>You are going to answer some questions about what you just did.</u>

1) In general, how sure are you that you were right in identifying the person that you saw in the video?
   ( ) Very sure ( ) Sure ( ) Not sure ( ) Not sure at all

2) Let's say, *the person* you said stole the wallet **<u>was not</u>** the one who did? How bad is it to make this kind of mistake?

   ( ) Very bad ( ) Bad ( ) Not so bad

3) Let's say, *the person* in the video **<u>really was</u>** the one who stole the wallet, and you said he did not? How bad is this kind of mistake?

   ( ) Very bad ( ) Bad ( ) Not so bad

4) Which kind of mistake do you think is worse? **<u>Just pick one.</u>**
   ( ) Saying someone stole the wallet when he/she really did not, or
   ( ) Saying someone did not steal the wallet when he/she really did.

<u>We are interested in knowing how people make decisions in cases of eyewitness identification, and we are going to ask you some questions.</u>

5) Bellow is a list of decision strategies which you may have used. Please mark (1) in the strategy you used most, (2) in the strategy you used next most, and so on. If you did not use the strategy mentioned bellow <u>*at all*</u>, just mark (N).

( ) I just recognized him, I can't explain how. The face of the man who stole the wallet just kept "popping up".
( ) I looked at physical features of the faces such as: nose, hairline, mouth, and kept those in mind when deciding if that was the man who stole the wallet.
( ) I compared each face with those which have already been shown and decided on the person by a process of elimination, which face was closer to the face of the man who stole the wallet.

( ) I looked at the face as a whole and tried to match the photos with the person who stole the wallet
( ) I remembered thinking about the thief's traits such as:
strong/shy/sweet/mean/sneaky/kind/angry....
( ) I tried to match each photo to my initial memory of the man who stole the wallet without comparing one photo to another.

Others:
_____
_____
_____

6) Overall, how difficult do you find this task of facial recognition to be?
( ) Very difficult
( ) Somewhat difficult
( ) Not difficult at all.

7) **(Optional**) Have you ever testify as an eyewitness in real life?
( ) Yes ( ) No
If yes, briefly explain:
_____
_____

8) **(Optional)** Have you ever been a victim of a crime?
( ) Yes ( ) No
If yes, briefly explain:
_____
_____

9) Please list the first name of your three best friends.

Best Friend 1:_____

Best Friend 2:_____

Best Friend 3:_____

10) Now that you listed the name of your 3 best friends, write down who they are, and how long have you been friends? For example (Male, Asian American, 21 years old, and we are friends for the last 5 years).

Best Friend 1:

Gender:_____Age:_____Race:_____

How long have you been friends?_____

Best Friend 2:

Gender:_____Age:_____Race:_____

How long have you been friends?_____

Best Friend 3:

Gender:_____Age:_____Race:_____

How long have you been friends?_____

We are interested on how often you have contact with members of another race/ethnic groups, and we are going to ask you some questions.

11) How close do you work with members of each of the following race/ethnic groups?

Asian Americans:
( ) Very Close ( ) Somewhat Close ( ) Not al All
Latinos/Spanish:
( ) Very Close ( ) Somewhat Close ( ) Not al All
Blacks (Africans, Blacks, Caribbean Blacks)
( ) Very Close ( ) Somewhat Close ( ) Not al All
Caucasian/Whites:
( ) Very Close ( ) Somewhat Close ( ) Not al All
If others (specify)_____

12) How often do you "hang out" with people of various races or ethnic backgrounds such as:

Asian Americans:
( ) Very Often ( ) Often ( ) Not very often ( ) Almost never
Latinos/Spanish:
( ) Very Often ( ) Often ( ) Not very often ( ) Almost never
Blacks (Africans, Blacks, Caribbean Blacks)
( ) Very Often ( ) Often ( ) Not very often ( ) Almost never
Caucasian/Whites:
( ) Very Often ( ) Often ( ) Not very often ( ) Almost never

If others (specify)_____

13) Any suggestions or comments:

_____
_____
_____
_____

Thank You very much for your time!

PARTICIPANT'S INFORMATION

NAME:_____

AGE:_____

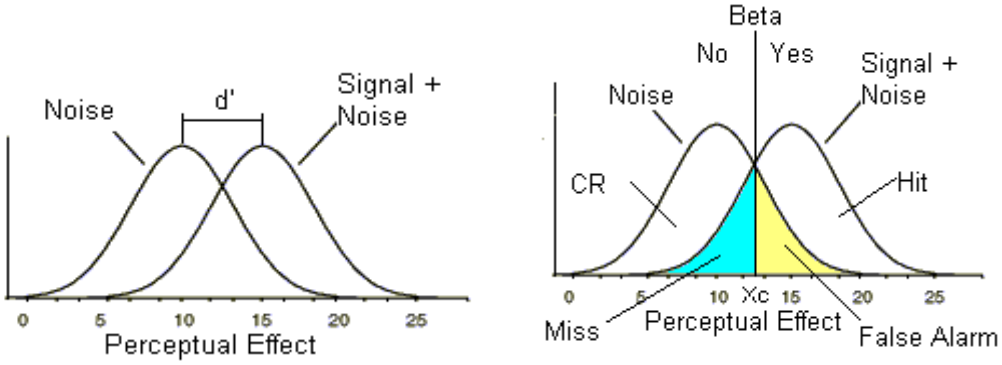
GENDER:_____

RACE/ETHNIC BACKGROUND:_____

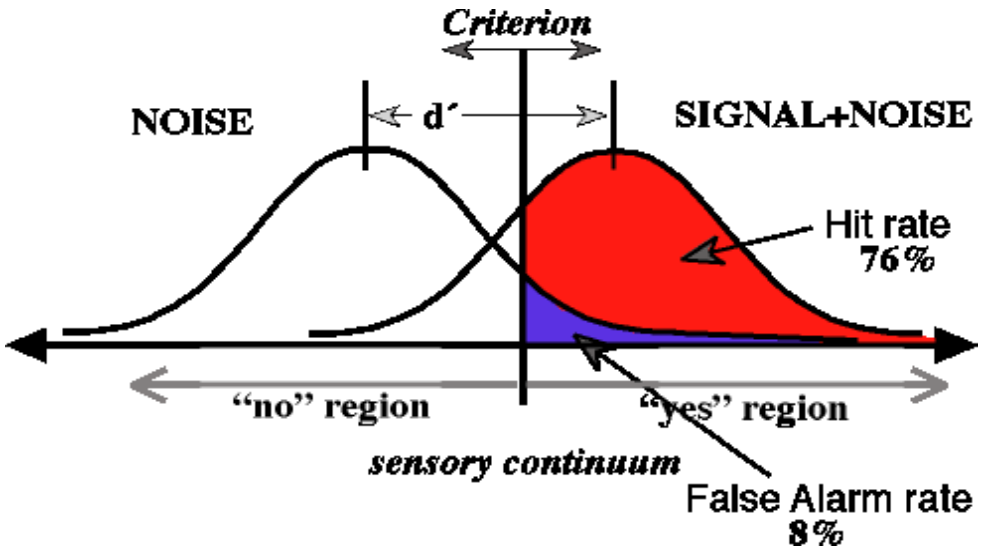
ARE YOU A U.S CITIZENSHIP? ( ) YES ( ) NO

Appendix D

D1. Theory of Signal Detection



Note: Beta corresponds to Decisional criterion (c)



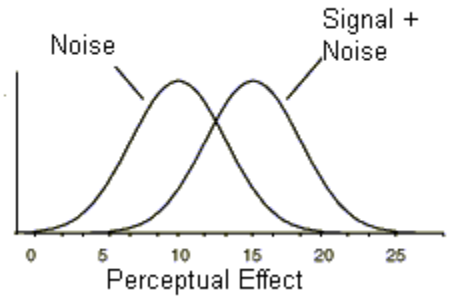
Note: *D-prime (d')* corresponds to the proportion of *false alarm rates* (FAR) subtracted from the proportion of *hit rates* (HR). The more able an individual is to discriminate

between new and old items [in this study *perpetrator* and *foil faces*] the larger the *d*'; for instance, if an individual is unable to discriminate at all, his hit rate will be equal to his false alarm rate, and *d'* will be zero.

Decisional Criterion (c) corresponds to the distance between the criterion and the neutral point, where neither response (yes or no) is favored. Therefore, a negative c value signify a bias towards responding "yes" and a positive c value signify towards responding "no".

D2. Response Criterion Analysis

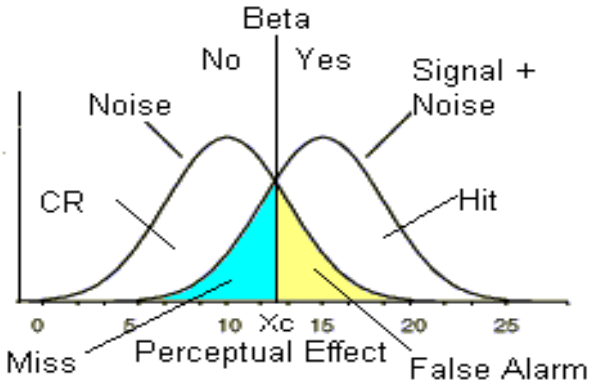
Response criterion refers to a relationship of probability, possible responses, and stimulus in the environment.



- The curve on the left represents the probability that the detection of the signal is due to noise alone.
- The curve on the right represents the probability that the detection of the signal is to the presence of the signal.
- The point in the center of the intersection represents the point where the detection of the signal is equally probable both to the presence of noise or signal plus noise.
- The area of overlap is where an error occurs, either miss or false alarm.

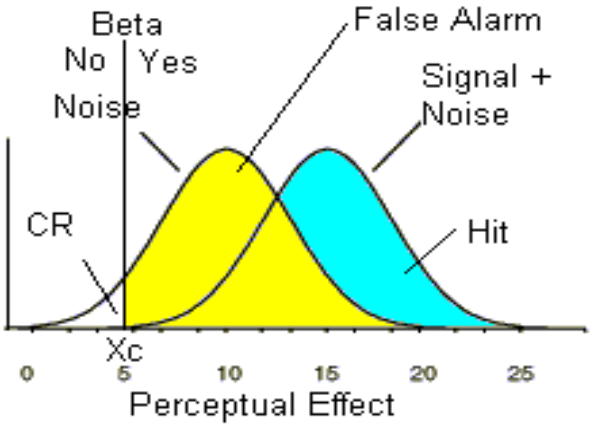
There are three types of response criterion (Beta or c) in which an operator may adopt each with their own implications: Neutral criterion, liberal criterion and Conservative criterion.

Neutral Criterion



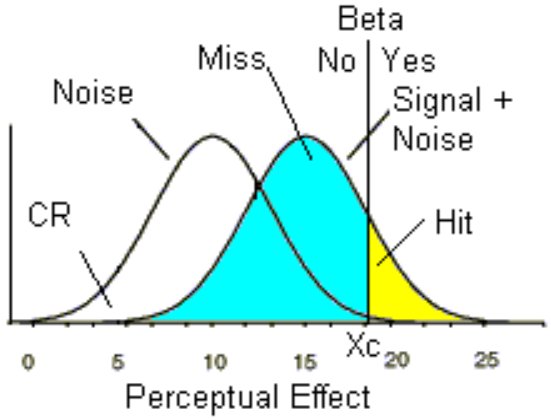
Note: Beta corresponds to decisional criterion (c); there is an equal probability of getting either a miss or a false alarm, c = 0

Liberal Criterion



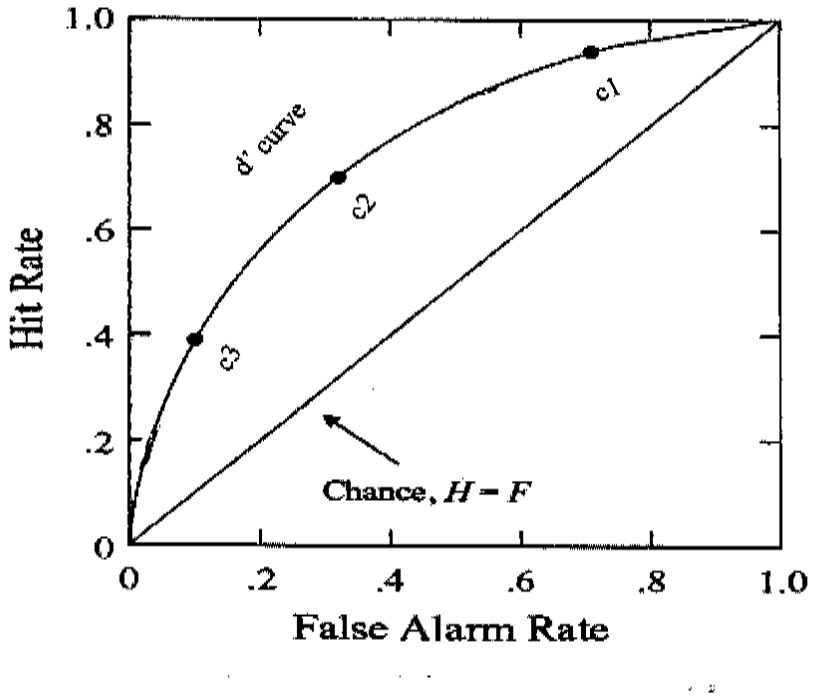
Note: Beta corresponds to decisional criterion (c); the participant says "yes, signal present" all the time leading to high rate of false alarms and a high rate of hits, c < 0.

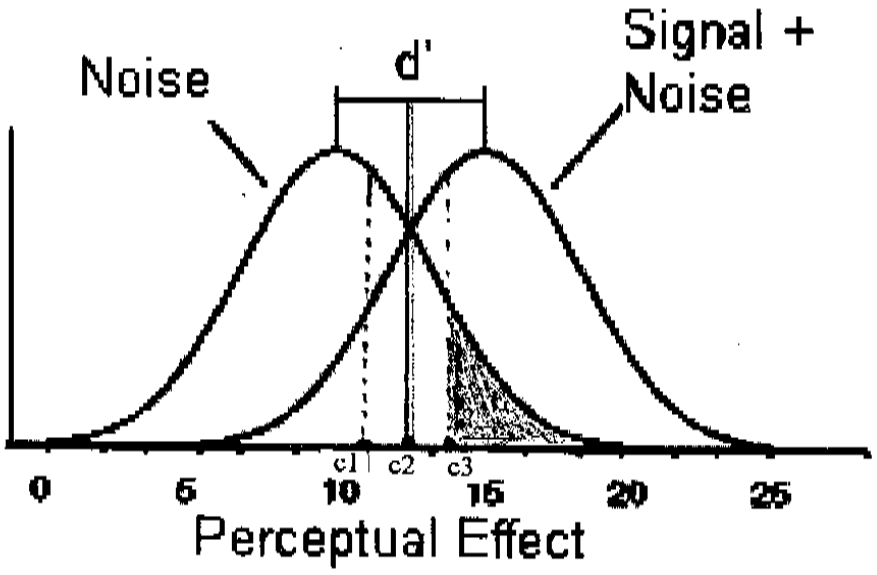
Conservative Criterion



Note: Beta corresponds to decisional criterion (c); The participant says "no, there is no signal present" most leading to a low number of hits & high number of misses yet few false alarms, c > 0.

D3. Response Criterion Analysis with Three-Points (c1, c2 and c3).





Note: The two graphs above show the decisional criterion (c3), where Z is equal to where the person puts the criterion in relation to the mean of the noise distribution. Note that the value of *d'* is constant while the decisional criteria change, because different criteria have different *Z values*. Therefore, *d' measure* is theoretically independent from *c measure*. Statistically *"c" values* are only related to *"d' values"* in a way that both measures are derived from *Z value.*

Appendix E

Sensitivity/Accuracy (d') and Decisional Criterion Results with Aggregated Data - SDA

a) Sensitivity (d') (n=88).

Even though no general cross-race effect was found, White Latinos were significantly better at recognizing Blacks than were Blacks recognizing White Latinos (Table E2). Also, Blacks were better at recognizing other Black faces than any other group combination (see Tables E1 and E2).

Table E1

E1. Sensitivity/Accuracy (d') and Decisional Criterion (c3) for Same-Race Identifications by Ethnicity of Identifier and "Perpetrator" - (SDA) Aggregated Data (n = 88).

Ethnicity Identifier → Perp	n	(d')	(d')-95%CI	Decisional Criteria	DC-95%CI
B→B	22	2.01	(1.91-2.11)	1.21	(1.12-1.30)
WL→ WL	20	1.57	(1.47-1.67)	1.21	(1.12-1.30)

B = Black; WL = White Latino; C = Caucasian

Note: Aggregated data = added sensitivity/accuracy (d') and decisional criteria (C3) scores by groups**.**

Criteria (c3).

In contrast to the results (SDA) of the pilot study, these data show that Blacks used a stricter criterion when identifying White Latinos than did White Latinos when identifying Blacks (Table E2).

Table E2

E2. Sensitivity (d') and Decisional Criterion (c3) for Same-Race Identifications by Ethnicity of Identifier and "Perpetrator" - (SDA) Aggregated Data (n = 105).

Ethnicity Identifier → Perp	n	(d')	(d')-95%CI	Decisional Criteria	DC-95%CI
B→WL	23	1.47	(1.38-1.56)	1.50	(1.41-1.59)
WL→ B	23	1.73	(1.63-1.82)	1.05	(0.97-1.13)
C→ B	8	.70	(0.55-.85)	1.40	(1.28-1.52)
C→ WL	9	1.15	(1.01-1.29)	1.23	(1.12-1.34)

B = Black; WL = White Latino; C = Caucasian

Note: Aggregated data = added sensitivity/accuracy (d') and decisional criteria (c3) scores by groups**.**

When Caucasians were added to the analysis; Caucasians identified better Blacks than White Latinos, and they tend to use a stricter criterion when identifying White Latinos than when identifying Blacks (see Table A2).

Table E3

E3. Mean for Sensitivity/Accuracy (d'), (n = 105)

Groups	n	M	SD
B→B	22	1.72	.80
WL→WL	20	1.60	.71
B→WL	23	1.48	.72
WL→ B	23	1.68	.86
C→B	9	1.14	.62
C→WL	8	.75	.40

B = Black; WL = White Latino; C = Caucasian

Table E4

E4. Mean for Decisional Criteria (c3), (n = 105)

Groups	n	M	SD
B→B	22	1.31	.57
WL→WL	20	1.28	.38
B→WL	23	1.51	.38
WL→ B	23	1.11	.51
C→B	9	1.29	.45
C→WL	8	1.54	.40

B = Black; WL = White Latino; C = Caucasian

Appendix F

Table F1

F1. One-Way Analysis of Variance for Sensitivity/Accuracy (d') by Task Difficulty Across the Four Groups, (n=88).

Variable and Source	df	SS	MS	F
Group One – B→ B				
Between groups	2	4.16	2.08	4.46 *
Within groups	20	9.43	.47	
Group Two – WL → WL				
Between groups	2	2.92	1.46	3.55 *
Within groups	20	6.57	.41	
Group Three – B→ WL				
Between groups	2	.26	.131	.232
Within groups	20	11.27	.564	
Group Four – WL → B				
Between groups	2	1.79	.89	.117
Within groups	20	14.51	.72	

* $p < .05$.

Table F2

F2. One-Way Analysis of Variance for Decisional Criteria (c3) by Task Difficulty Across the Four Groups, (n=88).

Variable and Source	df	SS	MS	F
Group One – B→ B				
Between groups	2	.578	.29	.864
Within groups	20	6.68	.33	
Group Two – WL → WL				
Between groups	2	.60	.30	2.45 †
Within groups	20	1.96	.12	
Group Three – B→ WL				
Between groups	2	.63	.31	2.49 †
Within groups	20	2.53	.13	
Group Four – WL → B				
Between groups	2	.06	.03	.117
Within groups	20	5.76	.29	

† $p < .10$

Appendix G

Table G1

G1. Decisional Criterion (c3) for Same- and Cross-Race Identifications by Ethnicity of Identifier and "Perpetrator" - (SDA) Aggregated Data - ***2004***

Ethnicity Identifier → Perpetrator	n	Decisional Criteria (C3)	DC-95%CI
B→B	9	1.12	(.98-1.26)
WL→WL	9	1.13	(1.01-1.25)
WL→ B	12	1.17	(1.05-1.29)
B→WL	13	1.28	(1.31-1.50)

B = Black; WL = White Latino

Table G2

G2. Decisional Criterion (c3) for Same- and Cross-Race Identifications by Ethnicity of Identifier and "Perpetrator"- (SDA) Aggregated Data - ***2006.***

Ethnicity Identifier → Perpetrator	n	Decisional Criteria (C3)	DC-95%CI
B→B	22	1.21	(1.12-1.30)
WL→WL	20	1.21	(1.12-1.30)
WL→B	23	1.50	(1.41-1.59)
B→WL	23	1.05	(.97-1.13)

B = Black; WL = White Latino

Appendix H

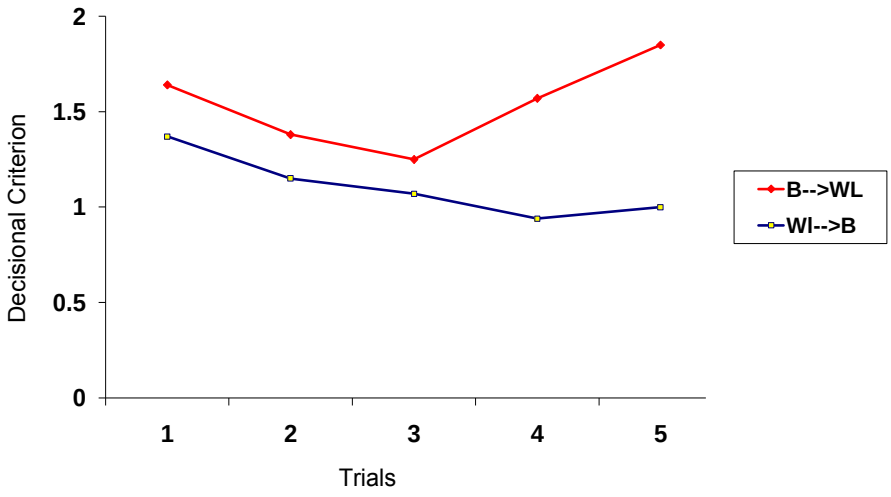


Figure H1. Cross-race conditions, trials 1 to 5. If the face recognition had only three trials, the results would be different. By the beginning of the face recognition task both groups (B→WL and WL→B) started by using a stricter criterion to decide, and by the end of the trial 3 both groups switched to a laxer criterion. By the end of the trial 5, Blacks used a significant stricter criterion when identifying White Latinos than when White Latinos identified Blacks.

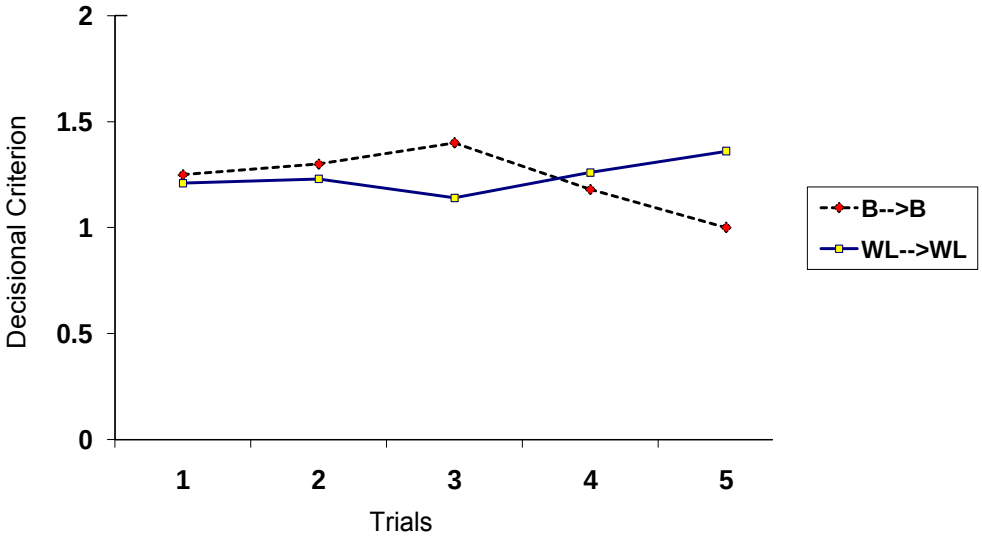


Figure H2. Same-race conditions, trails 1 to 5. This figure shows that both groups (B→B and WL→WL) started the face recognition task by using the same criteria placement, and by the trial 4 they switched to the opposite direction.

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