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The Role of Affect in the Control of Attention to Monoracial and Racially Ambiguous Faces

A thesis submitted in partial fulfillment of the requirement for the degree of Bachelor of Science in Psychology from The College of William and Mary

by

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Abstract
Studies have shown that contextual factors can influence the person perception process and social categorization process (MacLin & Malpass, 2001; Ito et al., 2011; Newton, Dickter, & Gyurovski, 2011; Bartholow & Dickter, 2008). Contextual factors such as emotional affect and the race of surrounding individuals influence the way in which monoracial and racially ambiguous faces are perceived, which can subsequently affect judgments and behaviors (Bartholow & Dickter, 2008; Hugenberg & Bodenhausen, 2004). Much research has focused on the role of contextual factors in the perception of monoracial individuals (e.g. Bartholow & Dickter, 2008); however, research is lacking on the categorization of racially ambiguous individuals and how perceivers may use available contextual information to help reduce ambiguity and facilitate categorization. To examine the role of contextual factors in the perception and categorization of monoracial and racially ambiguous individuals, two studies were conducted in which White college students completed a modified flanker paradigm with Black, White, and racially ambiguous target faces displaying either a neutral, happy, or angry facial expression surrounded by flanker faces that displayed either congruent or incongruent race and affect. Results from Study 1 and Study 2 indicated that participants demonstrated an attentional bias to both Black faces and angry faces, regardless of compatibility with the target face. These findings suggest that because Black faces and angry faces both represent threatening or unfamiliar stimuli they may capture White perceivers’ attention.
The Role of Affect in the Control of Attention to Monoracial and Racially Ambiguous Faces

Much social psychological research on person perception has demonstrated that upon viewing the face of a novel person, social categorization initially occurs (Fiske et al., 1999). Individuals use a variety of physical attributes to categorize those around them, one of which is skin tone (Brewer & Feinstein, 1999). The processes underlying social categorization are incredibly rapid and often occur in a matter of milliseconds, without the perceiver’s awareness (Dickter & Bartholow, 2007; Banaji & Hardin, 1996; Fiske, 1998). Categorizing people into groups helps to conserve cognitive resources in a world in which there is such a vast amount of social information to process (Bernstein, Young, & Hugenberg, 2007). However, social categorization can also have damaging effects because categorizing people into groups automatically activates the stereotypes associated with these groups in memory, which can lead to subsequent prejudicial behavior (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Fazio, Jackson, Dunton, & Williams, 1995).

Previous research has examined how attention is allocated to faces during the process of racial categorization. Dickter and Bartholow (2007) investigated the focus of attention to faces when there is conflicting information present. The researchers used a modified flanker paradigm in which centrally presented target faces simultaneously appeared amongst distracting “flanker” images on either side of the target which participants were instructed to disregard. In the classic flanker paradigm (Eriksen & Eriksen, 1974), participants respond to a target letter presented among strings of other letters that are either the same as the target (i.e., compatible with correct response) or different from the target (i.e., incompatible with correct response; Bartholow et al., 2003; Sanders and Lamers, 2002). Because compatible flankers elicit the same response as the target, processing compatible flankers should facilitate the correct response. On the other hand,
the response activated by incompatible flankers is the opposite of the one elicited by the target, so participants need to focus on the target in order to make a correct response. Because of this processing conflict, incompatible flankers have been shown to slow participants’ speed in responding to the target, when the distracters are letters (Eriksen & Eriksen, 1974) or words (Dallas & Merickle, 1976). Dickter and Bartholow (2007) used a modified flanker paradigm in which Black and White male and female faces were presented as targets and flankers. Unlike the classic flanker paradigm, the compatibility between target and flanker faces varied by race and gender. Participants were instructed to categorize the gender of the target face and were able to assess the degree to which participants attended to not only the gender compatibility but also the race compatibility of the trials by measuring differences in reaction times. The researchers found that there were slower reaction times when either race or gender (or both) were incompatible relative to trials in which race and gender were compatible. This research demonstrates that individuals have a hard time focusing their attention on one social dimension (e.g. race or gender) and that attention is spontaneously directed to multiple social dimensions when categorizing targets. This study also provided a useful paradigm to study implicit attention to social categories.

Other research investigating racial categorization has suggested that displays of affect also play an important role in the focus of attention during person perception. Research has demonstrated that people have an attentional bias towards faces displaying anger rather than happy, neutral or sad expressions (Fox et al., 2000). However, research has also demonstrated that Black angry faces may capture more attention than White angry faces (Hugenberg & Bodenhausen, 2003). In an experiment in which participants view Black and White faces as their facial expressions morphed from unambiguous anger to unambiguous happiness, results showed
that participants perceived anger as lasting longer on the Black faces compared to the White faces (Fox et al., 2000; Hugenberg & Bodenhausen, 2003). The researchers also found that participants viewing both Black and White faces with identical expressions of anger rated the Black faces as more hostile and angry (Hugenberg & Bodenhausen, 2003). However, both of these results were moderated by the participants’ level of implicit prejudice; that is, participants high in implicit prejudice perceived anger longer on the Black faces, and the Black faces were perceived as even angrier than the White faces.

Implicit prejudice is the set of automatic and unconscious negative attitudes and beliefs towards one social group that may affect our behavior (Greenwald & Banaji, 1995). Implicit prejudice is often measured using a task such as the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT involves a series of blocks requiring the participant to categorize stimuli into racial (e.g., Black and White) and valenced (i.e., positive and negative) categories while their reaction time is measured. The IAT measures the strength of the association between concepts that reflect the degree to which a person is biased against a certain social group. The Affect Misattribution Procedure (AMP; Payne et al., 2005) is another measure of implicit prejudice which involves the brief presentation of a priming stimulus (usually a picture of a Black or White individual) which is intended to elicit a positive or negative attitude. Immediately following the presentation of the priming stimulus, participants rate a neutral stimulus (usually a Chinese symbol) as either pleasant or unpleasant than the average stimulus. Research has demonstrated that the positive or negative affect felt towards the primed stimulus will be projected or misattributed onto the neutral stimulus. Individuals high in implicit racial prejudice will be more likely to rate the neutral stimuli as negative following presentation of Black primes. In contrast to implicit prejudice is explicit prejudice, which is the set of conscious
negative attitudes and beliefs that one holds towards a certain social group. Explicit prejudice is often measured by self-report scales such as the Attitude Towards Blacks Scale (Brigham, 1993) which asks questions about outright discrimination and hostile attitudes towards Blacks, which is how prejudice level has traditionally been measured in the social psychological literature. Importantly, previous research has demonstrated that there is no association between explicit prejudice and readiness to perceive anger in Black faces (Hugenberg & Bodenhausen, 2003). However, there was a strong association between implicit prejudice and propensity to perceive anger on Black faces (Hugenberg & Bodenhausen, 2003). This contrast between findings demonstrates the differences between implicit and explicit attitudes, which is an important distinction in the field (e.g., Devine, 1989). Because past research indicates that automatic biases are employed in the process of categorization, future research should continue to investigate the distinct roles that implicit and explicit prejudice play in the racial categorization process and related processes. For example, theories of modern racism suggest that implicit prejudice among White Americans may emerge in the form of racial ambivalence, which is characterized by strong negative affect toward minority groups coupled with egalitarian beliefs (e.g., McConahay, 1986). The result of modern forms of prejudice may not result in overtly racist behavior but instead may take the form of politically conservative behavior, such as not supporting affirmative action and believing that minority groups demand too much from society. Although these actions may be less direct and more rationalizable, the consequences of these actions may be as significant for minorities as the consequences of the traditional, overt forms of discrimination (Dovidio & Gaertner, 2000).

Although much research has examined attention and stereotype activation related to monoracial individuals who can easily be categorized into one racial group, less research has
focused on racially ambiguous individuals who are not as easily categorized and may belong to more than one racial group. This is a particularly important area to study, as the population of biracial and multiracial individuals in the United States is rapidly increasing. According to the 2000 Census Bureau data, there were 6.8 million multiracial individuals in the U.S. and the government estimates that this number has increased 50% since then. Previous research has established that racially ambiguous individuals tend to be categorized into the racial group associated with their more socially subordinate heritage; this mode of categorization has been termed “hypodescent” (Halberstadt et al., 2011; Peery & Bodenhausen, 2008). However, other recent studies illustrate that contextual factors such as stereotypic words, prototypic racial features, and surrounding context such as location or the presence of other individuals influence the categorization of racially ambiguous individuals (Bodenhausen & Peery, 2009; Hugenberg & Bodenhausen, 2004; MacLin & Malpass, 2001; Newton, Dickter & Gyurovski, 2011), leading to variations in social categorization. For example, Dickter, Kittel, and Newton (2012) found that although racially ambiguous faces were categorized more often as racial minorities than racial majorities, racially ambiguous targets were most likely to be categorized into the racial category activated by a primed stereotype. Findings from these studies suggest that contextual information may affect the perception of racially ambiguous individuals.

Subtle contextual manipulations can influence participants’ responses to racially ambiguous faces, as shown by the study of Ito and colleagues (2011). They presented racially ambiguous faces along with White faces, Black faces, or a mixed population of White and Black faces and asked participants to rate the racially ambiguous faces on perceived racial protoypicality considering factors such as skin color, facial features, eye color, and hair texture. Their results showed that when the racially ambiguous targets were presented in the context of a
mixed group of Black and White faces, they were viewed as equally prototypical of both racial
groups. However, when they were presented in the context of only White faces or Black faces,
the targets were perceived as more prototypically White or Black, respectively. In addition,
emotion is another contextual factor that affects the categorization of racially ambiguous faces. 
Hugenberg and Bodenhausen (2004) presented participants with images of ambiguous-race
individuals displaying anger or happiness, and the participants had to classify the images as
White or Black. Their results showed that White participants high in implicit prejudice tended to
categorize the ambiguous-race images displaying anger as Black more often than the participants
low in implicit prejudice. There was no difference in the categorization of the faces with displays
of happiness. That implicit prejudice seems to play a role in the perceptions of racially
ambiguous targets is further supported by findings showing that individuals high in implicit
prejudice rated the intensity of angry emotions displayed on racially ambiguous persons as
greater if the face is categorized as Black rather than White (Hutchings & Haddock, 2008).
Together, these studies demonstrate that social context and facial affect can evoke stereotypes
and biases which influence the categorization of racially ambiguous individuals.

The goal of the current investigation was to examine the influence that emotion and race
as contextual factors have on the categorization of Black and White monoracial targets (Study 1)
as well as racially ambiguous targets (Study 2). In order to investigate the impact of these
contextual factors, a modified flanker task (Eriksen & Eriksen, 1974) was used in order to
examine the allocation of attention. In this paradigm, centrally-presented target faces were
flanked by four other images that varied on both race and emotion displayed (Angry, Happy, or
Neutral). Participants were instructed to categorize the target face as either Black or White, and
reaction time was measured as they completed this categorization task. Because previous work
has demonstrated that attention to race and affect is moderated by implicit prejudice, the Affect Misattribution Procedure (AMP; Payne et al., 2005) was also administered to participants, as well as a series of explicit measures. In this investigation, we expected to find that the race and emotion of the flankers would affect the processing of the target.

**Study 1**

**Method**

**Participants**

Participants were 82 (50 female) white undergraduate students enrolled in Introductory Psychology classes at a medium-sized public liberal arts college, who were given partial fulfillment of course credit. Participants were between the ages of 18 and 22; the mean age was 18.87 (SD = 1.14). All procedures were approved by the college’s Protection of Human Subjects Committee, and written informed consent was obtained from each participant.

**Materials**

**Stimuli.** Digital images of black and white individuals were created using the Poser 9 software. This software produces computer-generated facial displays and permits the user to manipulate and control settings for ethnicity, racial features, and intensity of emotion. Thus, the faces had identical emotions while differing only on skin tone (i.e., race). A pilot test was carried out to ensure that participants perceived the stimuli as the intended race (i.e., black or white) and emotion (i.e., happy, neutral, or angry). In an online survey, 30 participants viewed the 32 digitally created images of white and black faces of which 24 faces were chosen by the following selection criteria. The participants were asked to identify the race of the faces and the emotion displayed in an open-ended format. Nine black and nine white faces were selected from the
digital faces; for each racial category, three faces displayed anger, three displayed happiness, and three displayed a neutral expression. For both the black and white faces that were included in this study, participants responded with the correct race more than 90% of the time and the correct emotion more than 90% of the time.

**Flanker Paradigm.** A modified flanker task presented the stimuli in 5-picture arrays (Eriksen & Eriksen, 1974). Each trial consisted of the following sequence: a 200ms pre-stimulus baseline period, followed by a stimulus array in which a centrally presented target picture was flanked by two pictures on the left and two pictures on the right. Arrays appeared on the screen for 250 ms with an inter-trial interval of 1000 ms. Participants completed 6 blocks of 120 trials each, in which their task was to categorize the target’s race as either black or white by pressing one of two designated keys (counter-balanced across participants). Participants were instructed to ignore the flanker faces. There was equal and random distribution of four types of trials. 

*Compatible race, compatible emotion* (CRCE) trials were those in which the target and flankers showed individuals of the same race and emotional state. *Compatible race, incompatible emotion* (CRIE) trials were those in which the race of the flankers was the same as the target, but the emotional state differed. *Incompatible race, compatible emotion* (IRCE) trials showed flankers of a different race than the target but displaying the same emotional state. Lastly, *incompatible race, incompatible emotion* (IRIE) trials were those in which flankers differed from the target in both race and emotional state. Participants were seated approximately 90 cm from the screen, yielding a visual angle of approximately $30^\circ$.

**Affect Misattribution Procedure.** The Affect Misattribution Procedure (Payne, 2005) was used as an implicit measure of prejudice. The task consisted of a prime image, either a White or Black face, presented for 200ms which is then followed by a blank screen for 125ms,
and finally a randomly selected Chinese pictograph. Using indicated compute keys, participants were instructed to rate the Chinese pictograph are either “pleasant” or “unpleasant” depending on whether they thought the stimulus was more visually appealing than the average neutral stimulus. Research has demonstrated that participants who are not familiar with the Chinese language will implicitly project their biases and attitudes about the preceding prime onto their rating of the Chinese pictograph (Payne, 2005).

**Individual Difference Measure.** A series of questionnaires were administered to participants to measure several aspects of prejudice, as identified by the social psychological literature. The first measure was social dominance, which was assessed through the Social Dominance Orientation Scale (SDO6; Sidanius & Pratto, 1999; \( \alpha = .92 \)). The measure consists of 16 items measuring group-based discrimination and domination (e.g., “Some groups of people are simply inferior to other groups.”). The participants provided ratings for each question from 1 (very negative) to 7 (very positive). High scores on this scale indicate a higher tendency to view the world as a hierarchy.

Need for closure was assessed through the Need for Closure Scale (NFCS; Kruglanski, 1993; \( \alpha = .86 \)). The measure consists of 42 items measuring an individual’s preference of order and predictability. An individual with a high need for closure is uncomfortable with ambiguity and is decisive. Items include “I like to have friends that are unpredictable” which participants rated from 1 (Strongly Disagree) to 6 (Strongly Agree). High scores on this scale indicate a higher preference for structure and certainty.

Internal and external motivations to respond without prejudice were measured using the Motivation to Respond without Prejudice Scale (MRPS; Plant & Devine, 1998; \( \alpha = .74 \) for internal, \( \alpha = .76 \) for external). The measure consists of two separate scales each having 5 items (10
items total) measuring an individual’s internal and external level of motivation to appear non-prejudiced. Items on the scale measuring internal level of motivation to respond without prejudice include “I attempt to act in non-prejudiced ways toward Black people because it is personally important to me.” Items on the scale measuring external level of motivation to respond without prejudice include “I try to act non-prejudiced toward Black people because of pressure from others.” Participants rated all items from 1 (Strongly Disagree) to 7 (Strongly Agree). High scores on the internal level of motivation to respond without prejudice indicate a tendency for those individuals to be motivated by personal belief systems and values to respond without prejudice towards blacks. High scores on the external level of motivation to respond without prejudice indicate a tendency for those individuals to motivated by social norms and pressures to respond without prejudice towards blacks.

The Attitudes Towards Blacks Scale (ATB; Brigham, 1993; α=.88) consists of 20 items measuring an individual’s conscious knowledge of negative attitudes and bias towards blacks. Items include “I would rather not have blacks live in the same apartment building I live in.” Participants rated all items from 1 (Strongly Disagree) to 7 (Strongly Agree). High scores on this scale indicate a tendency for higher levels of explicit prejudice and bias towards blacks.

Familiarity with outgroups, in particular blacks and multiracial individuals, was assessed through a variety of questions. One question, adapted from Greenwald, McGhee, & Schwartz (1998), asked participants to list the initials of their 20 closest friends and then indicate the race of those individuals. To calculate familiarity with Black and multiracial individuals, the number of Black and multiracial close friends participants reported was divided by the total number of friends they identified to create a proportion of close Black and multiracial friends. The same was done to create a proportion for the number of close White friends participants reported.
Three additional questions assessed childhood outgroup exposure. These questions asked participants to estimate the percentage of Black, White, and multiracial students in their elementary and high school, and estimate the percentage of each racial group in the neighborhood in which they grew up. In order to evaluate social contact with blacks and individuating experience, thirteen questions were used from Walker et. al’s (2008) Social Contact (α=.87) and Individuating Experience (α=.94) questionnaires (e.g. “I often talk to Black people in college”). Participants rated all items from 1 (Strongly Disagree) to 5 (Strongly Agree). High scores indicate a tendency to be more familiar and have more contact with blacks. A follow-up question compared participants’ amount of contact with individuals of their same race and Black and Multiracial individuals to their classmates’ contact. On a scale of 1 (Much Less Contact) to 7 (Much More Contact) participants answered the following question: “Comparing yourself to classmates of your own race, how would you rate the extent of your contact with Black/White/Multiracial individuals?”.

Feelings and attitudes towards black, multiracial, and white males and females were assessed through the Feeling Thermometer Scale. Participants were asked a single question about each males and females of each racial group: “Using the following feeling thermometer, please indicate how you feel towards each group,” with a score of 0 = very cold and 100 = very warm.

Procedure

Participants completed the study in groups of 2-4 individuals. First, participants were given a paper informed consent form to complete before beginning the computer portion of the study. Then, participants were seated in front of a computer and received verbal instructions about the study. Following the verbal instructions, participants received instructions on the computer screen and then began the flanker paradigm. After completion of the flanker task,
participants were given a short break and were then instructed to complete the AMP. Once the participants finished the AMP, they followed instructions to open another screen on the computer desktop which contained the online survey with the individual difference measures. Finally, after each participant finished the online survey, he or she was taken outside the computer room and debriefed by the experimenter about the nature of the study.

Results

**Modified Flanker Paradigm**

Behavioral data from two participants were discarded because of failure to follow instructions, leaving the sample for analyses at 82. Greenhouse–Geisser-adjusted $p$ values are reported for all analyses involving multiple numerator degrees of freedom.

Response time data from correct response trials were subjected to a 2 (Target race: Black, White) X 3 (Target emotion: Angry, Happy, Neutral) X 2 (Flanker race: Black, White) X 3 (Flanker emotion: Angry, Happy, Neutral) repeated measures analysis of variance (ANOVA). This analysis revealed a main effect of target race, $F(1, 83) = 13.14, p < .001, \eta^2 = .137$ such that reaction times were faster for Black targets ($M=333.54, SE=21.19$) than White targets ($M=341.62, SE=21.78$). There was also a main effect of flanker race, $F(1, 83) = 5.12, p = .026, \eta^2 = .058$ such that reaction times were faster for White flankers ($M=335.44, SD=21.34$) than Black flankers ($M=339.74, SD=21.62$). There was also a main effect of flanker emotion $F(2, 166) = 9.71, p < .001, \eta^2 = .165$, such that reaction times were fastest for neutral flankers ($M=335.54, SD=21.31$) compared to happy flankers ($M=337.85, SD=21.49$) and angry flankers ($M=339.38, SD=21.59$). This analysis also revealed a significant Target race X Flanker race interaction $F(1, 83) = 3.60, p = .061, \eta^2 = .042$. All of these effects were qualified by two higher order interactions described below.
There was a significant Target Race X Target Emotion X Flanker Race interaction $F(2, 166) = 5.07, p = .010, \eta^2 = .058$. To understand this interaction, it was broken down into separate Target Emotion x Flanker Race repeated measures ANOVAs to examine the effects of the flankers on Black and White targets separately. For Black targets, there was a main effect of Target emotion, such that reaction times were faster for Black angry faces ($M=329.91, SE=20.99$) than Black happy ($M=333.69, SE=21.23$) and Black neutral faces ($M=337.01, SE=21.43$) (see figure 1). Simple main effects analyses revealed that reaction times were significantly faster for Black angry faces ($M=329.91, SE=20.99$) than Black happy faces ($M=333.69, SE=21.23$), $t(83)=2.33, p=.022$, and significantly faster compared to Black neutral faces ($M=337.01, SE=21.43$), $t(83)=4.81, p<.001$. Reaction times were also significantly faster for Black neutral targets ($M=333.69, SE=21.23$) compared to Black happy targets ($M=337.01, SE=21.43$), $t(83)=2.035, p=.045$. This effect was qualified by a significant Target emotion X Flanker race interaction $F(1,83)=14.12, p<.001, \eta^2=.145$ (see figure 2). Simple main effects analyses revealed that reaction times were significantly slower for angry targets with Black flankers ($M=337.64, SE=21.55$) than angry targets with White flankers ($M=331.51, SE=21.12$), $t(83)=2.15, p=.035$. Reaction times were also significantly slower for happy targets with Black flankers ($M=342.15, SE=21.86$), $t(83)=5.16, p<.001$ (see table 1 for means and standard errors). For White targets, there was a main effect of target emotion, $F(2,166)=6.70, p=.002, \eta^2=.075$, such that reaction times were faster for White angry faces ($M=339.23, SE=21.65$) than White happy ($M=340.21, SE=21.73$) and White neutral faces ($M=345.49, SE=22.04$) (see figure 3). Simple main effects analyses revealed that reaction times were significantly faster for White angry targets ($M=339.23, SE=21.65$) than White neutral targets ($M=345.49, SE=22.04$), $t(83)=3.95, p<.001$. Reaction times were also significantly faster for White happy targets...
(M=340.21, SE=21.73) than White neutral targets (M=345.49, SE=22.04), t(83)=2.59, p=.045. There was also a significant main effect of flanker race, F(1,83)=8.40, p=.005, η2=.092, such that reaction times were faster for White targets (M=338.20, SE=21.58) than Black targets (M=345.09, SE=22.04) (see figure 4).

In addition, there was also a significant Target Emotion X Flanker Race X Flanker Emotion interaction, F(4, 332) = 2.74, p = .036, η2 = .032. For angry targets, there was a significant main effect of flanker emotion, F(2,166)=4.02, p=.021, η2=.046, such that reaction times were slowest when the angry targets when surrounded by angry flankers (M=334.65, SE=21.32) compared to happy flankers (M=333.39, SE=21.39) and neutral flankers (M=332.68, SE=21.20) (see figure 5). Paired sample t-tests were conducted to further investigate this main effect of Flanker Emotion, which revealed that angry targets surrounded by angry flankers (M=336.39, SE=21.39) had significantly longer reaction times than angry targets surrounded by neutral flankers (M=332.68, SE=21.20), t(83)=3.06, p=.003. There was also a significant main effect of Flanker Race for angry targets, F(1,83)=4.60, p=.035, η2=.053, such that reaction times were faster for White flankers (M=331.51, SE=21.12) than Black flankers (M=337.64, SE=21.55). For happy targets, there was a significant main effect of Flanker Emotion, F(2,166)=4.10, p=.022, η2=.050, such that reaction times were slowest for happy targets surrounded by angry flankers (M=339.63, SE=21.69) than compared to happy flankers (M=336.83, SE=21.43) and neutral flankers (M=334.39, SE=21.74) (see figure 6). A paired sample t-test was conducted to further investigate this main effect of Flanker Emotion on happy targets, which revealed that reaction times were significantly slower for happy targets with angry flankers (M=339.63, SE=21.69) than happy targets with happy flankers (M=336.83, SE=21.23), t(83)=2.31, p=.024. Reaction times were also significantly slower for happy targets with angry
flankers (M=339.63, SE=21.69) than happy targets with neutral flankers (M=334.39, SE=21.27), t(83)=2.56, p=.012. In addition, there was also a significant main effect of Flanker Race for happy targets, F(1,83)=26.65, p<.001, η²=.243, such that reaction times were faster to White flankers (M=331.54, SE=21.06) than Black flankers (M=342.35, SE=21.86). There was also a marginal Flanker emotion X Flanker race interaction for happy targets, F(2,166)=2.80, p=.074, η²=.033. For neutral targets, there was a marginal main effect of Flanker Emotion, F(2,166)=3.02, p=.054, η²=.035, such that reaction times were slowest for neutral targets surrounded by angry flankers (M=342.12, SE=21.77) than compared to happy flankers (M=342.07, SE=21.79) and neutral flankers (M=339.55, SE=21.56) (see figure 7).

**AMP**

Implicit affective responses to white and black were determined by calculating the average proportions of pleasant responses for white and black for each participant. These proportions were subjected to a repeated measures ANOVA with target (white and black) as the independent variable. Analyses indicated that there was not a main effect of race.

**Relationships between variables**

A difference score for the AMP was calculated to examine relative implicit preference for one racial group over another (M=-0.03, SD=0.22). The difference score was calculated by proportion of pleasant responses to Black targets from the proportion of pleasant responses to White targets (Black-White). Higher scores indicate a greater implicit preference for White over Black individuals. Bivariate correlational analyses were calculated between the AMP difference score and the individual difference measures to examine potential relationships between implicit bias towards certain groups relative to others and the individual difference variables. No
significant correlations were found, nor were there any relationships between responses on the flanker task and implicit or explicit measures of prejudice.

Discussion

The results from Study 1 indicated that participants had significantly faster reaction times when both the Black targets and the White targets had angry displays of facial affect than when the targets had happy or neutral affect. In addition, the results also revealed that reaction times were the slowest when the angry targets and happy targets were surrounded by angry flankers. There were marginally slower reaction times for neutral targets surrounded by angry targets. Overall, participants’ reaction times were slowest for angry targets, regardless of the race of the target or flanker information. Taken together, the results described above show a trend for participants to have faster reaction times when the targets display anger and slower reaction times when the flankers display anger, suggesting that angry faces, whether targets or flankers, captured attention. Previous research has demonstrated that people tend to have an attentional bias towards displays of anger relative to other emotional displays (Fox et al., 2000; Ohman et al., 2001; Cothran et al., in press). Thus, when the targets display anger the participants’ attention is being captured immediately which facilitates faster categorization. However, when the flankers display anger the participants’ attention is being drawn away from the target and the categorization process is slowed.

Results from Study 1 also demonstrated that participants’ reaction times were significantly faster for black targets than white targets. In addition, results also indicated that reaction times were significantly faster when targets were surrounded by White flankers compared to Black flankers. Reaction times were significantly faster when White targets were surrounded by White flankers, and when angry and happy targets were surrounded by White
flankers. The results of Study 1 thus seem to indicate that White participants’ attention is being captured by Black targets and Black flankers, leading to faster reaction times with Black targets and slower reaction times with Black flankers. These findings are in line with previous research that has demonstrated that Black faces tend to quickly capture attention from White participants (e.g., Dickter & Bartholow, 2007; Donders, Correll, & Wittenbrink, 2008). Levin (2000) found that participants are more easily able to search for and identify Black than White faces in a display of both races, suggesting that attention is drawn to the Black faces. The same attentional capture effect can be seen when there are Black flankers because the participants’ reactions times are slower, suggesting that their attention is being drawn out to the race of the flanker and it is taking the participants longer to categorize the target stimuli.

Study 1 examined the attentional focus of participants in response to White and Black targets and flankers. However, in an increasingly racially and ethnically diverse world, it is important to examine control of attention in response to other racial groups in order to better understand the perception and social categorization of these groups. In light of this, Study 2 will examine the control of attention in response to racially ambiguous targets embedded within strings of monoracial and racially ambiguous flankers.

**Study 2**

**Method**

**Participants**

Participants were 60 (30 female) White undergraduate students enrolled in Introductory Psychology classes at a medium-sized public liberal arts college, who were given partial fulfillment of course credit. Participants were between the ages of 18 and 22; the mean age was
18.86 (SD = 1.56). All procedures were approved by the college’s Protection of Human Subjects Committee, and written informed consent was obtained from each participant.

**Materials**

**Stimuli.** The same digitally created and pilot-tested images of white and black faces that were created for Study 1 were used for Study 2 as targets and flankers. As in Study 1, Poser 9 software was used to create digital images of biracial individuals with three different facial expressions (i.e. neutral, happy, and angry). A pilot test was conducted to determine that participants perceived the digitally created stimuli as racially ambiguous. Eight out of the 12 racially ambiguous images pilot-tested were chosen based off of a cutoff of 40% of the pilot test participants rated them as neither black nor white.

**Flanker Paradigm.** A modified flanker task identical to the flanker paradigm used in Study 1 was used for Study 2. However, racially ambiguous faces were used in addition to monoracial black and white faces for the targets and flankers.

**Affect Misattribution Procedure.** The same primes and neutral stimuli that were used for Study 1 were administered for Study 2. However, racially ambiguous faces were also used as additional primes preceding the Chinese pictographs.

**Individual Difference Measures.** The same individual difference measures that were used for Study 1 were administered for Study 2.

**Procedure**

The same procedure that was used for Study 1 was applied for Study 2.

**Results**

**Modified Flanker Paradigm**
Behavioral data from 4 participants were discarded because participants scored greater than 18 on the Lie Subscale of the Need For Closure Scale (Kruglanski, Webster & Klem. 1993), leaving the sample for behavioral analyses at 60. Greenhouse–Geisser-adjusted \( p \) values are reported for all analyses involving multiple numerator degrees of freedom.

Given that previous research has focused on the control of attention to monoracial individuals, only racially ambiguous targets were used for data analysis in Study 2. Response time data from trials in which racially ambiguous targets were categorized as Black were subjected to a 2 (Flanker race: Black, White) X 3 (Flanker emotion: Neutral, Angry, Happy) X 3 (Target Emotion: Neutral, Angry, Happy) repeated measures analysis of variance (ANOVA). This analysis revealed a significant Flanker race x Flanker emotion interaction, \( F(2, 46) = 4.59, p = .015, \eta^2 = .166 \). To further investigate this interaction, separate repeated measures analyses were conducted for trials with racially ambiguous targets with White and Black flankers, respectively. For trials with White flankers, the Flanker emotion effect was not significant, \( F(2, 96) = 0.042, p = .959 \). However, for the Black flanker trials, this effect was significant, \( F(2, 92) = 5.02, p = .010 \). Simple main effects analyses were conducted to see which means differed from one another. These analyses revealed that Black neutral trials had significantly longer RTs than Black happy trials, \( t(46) = 2.98, p = .005 \). In addition, Black angry trials had longer RTs than Black happy trials, \( t(49) = 1.86, p = .070 \), although this difference did not reach statistical significance. The difference between Black neutral and Black angry flankers was not significant.

See Table 2 for means and standard errors.

**AMP**

Implicit affective responses to white, black, and biracial faces were determined by calculating the average proportions of pleasant responses for white, black, and biracial target
trials for each participant. These proportions were subjected to a repeated measures ANOVA with target (white, black, biracial) as the independent variable. Analyses indicated that there was a main effect of race, $F(2, 112) = 3.59$, $p = .039, \eta^2_p = 0.60$. Simple main effects tests indicated that there was a higher proportion of pleasant responses to the black targets ($M=0.61, SE=0.03$) than to the biracial targets ($M=0.55, SE=0.03$), $t(56)=1.859, p = .068$, and a marginally significant higher proportion than the white targets ($M=0.55, SE=0.03$), $t(56)=1.859, p = .068$.

**Relationships between variables**

To examine potential relationships between implicit affective responses to the racial primes and the individual difference variables, bivariate correlational analyses were conducted between the AMP scores for each of the three racial categories and the individual difference measures. The proportion of pleasant responses to White primes was positively correlated with Contact with Whites ($r = .29, p = .029$). The proportion of pleasant responses to White primes was marginally positively correlated with Individuating Experience with Whites ($r = .27$ and $p = .056$), indicating that more positive affect towards Whites is marginally associated with more experiences with Whites. The proportion of pleasant responses to Black primes was negatively correlated with scores on the Feeling Thermometer for Black Males ($r = -.313$ and $p = .019$), indicating that more implicit positive attitudes towards Blacks were associated with more negative explicit ratings of Black males. No other correlations were significant.

Three difference scores were calculated examining relative implicit preference for one racial group over another. The first difference score was calculated by subtracting the proportion of pleasant responses to Black targets from the proportion of pleasant responses to White targets (White – Black). Higher scores indicate a greater implicit preference for White over Black individuals. The second difference score was calculated by subtracting the proportion
of pleasant responses to Biracial targets from the proportion of pleasant responses to White targets (White – Biracial). Higher scores indicate greater implicit preference for White over Biracial individuals. The third difference score was calculated by subtracting the proportion of pleasant responses to Biracial targets from the proportion of pleasant responses to Black targets (Black – Biracial). Higher scores indicate a greater implicit preference for Black than Biracial individuals. Bivariate correlations were calculated between each AMP difference score and the individual difference measures to examine potential relationships between implicit bias towards certain groups relative to others and the individual difference variables. In addition, the AMP difference score for Black–Biracial was negatively correlated with Individuating experience with Blacks, \((r=-.321, \ p=0.019)\) demonstrating that individuals with a higher implicit preference for Blacks over Biracial individuals had less individuating experiences with Blacks. The AMP difference score for Black – Biracial were negatively correlated with both the Feeling Thermometer for White Males \((r=-.318, \ p=0.017)\) and the Feeling Thermometer for Black Males \((r=-.306, \ p=0.021)\), demonstrating that individuals with a greater implicit preference for Black over Biracial individuals had a more explicitly negative rating of White males and Black males. In addition, the correlation between the Feeling Thermometer for White Males and Feeling Thermometer for Black Males is statistically significant \((r=.674, \ p=.000)\), indicating that people are consistent in their ratings, explaining this somewhat puzzling correlation. No significant relationships between the responses on the flanker paradigm and any of the explicit or implicit measures were found.

**Study 2 Discussion**

The results from Study 2 indicated that participants had significantly longer reaction times when the racially ambiguous targets were surrounded by black angry flankers. Research
has shown that angry faces quickly capture and retain an individual’s attention (Fox et al., 2000; Ohman et al., 2001) in what researchers have termed a “vigilance effect” (Cothran et al., in press). Furthermore, previous research has demonstrated that Black faces are associated with threat for White perceivers due to stereotypes connecting Blacks to violence and danger (Devine, 1989). These stereotypes and prejudices can be automatically activated when viewing a Black face (Maner et al., 2005; Payne, 2001), and the association between the category “Black” and notions of danger led perceivers to be more likely to shoot at Black targets than White targets, regardless of whether they were holding a gun or a harmless object (Greenwald, Oakes, & Hoffman, 2002; Correll, Park, Judd, Wittenbrink, 2002; Correll, Urland, & Ito, 2006). Because of these pervasive and ingrained cultural stereotypes about Blacks and threat, it makes sense that participants would have an attentional bias towards the Black flankers with angry affect. Thus, this preferential attention towards fear-relevant stimuli would explain why reaction times are significantly longer when the racially ambiguous faces are surrounded by angry Black faces.

In addition, reaction times were much faster for the biracial faces surrounded by the Black happy faces. In a dot-probe attentional bias paradigm with neutral, angry, and happy faces, results showed that participants had an attentional bias towards the Black neutral and angry faces for the first 30 ms (Richeson & Trawalter, 2008). However, this attentional bias disappeared for the Black happy faces. Therefore, in Study 2, one possible explanation for the faster reaction times with Black happy flankers is that there was not any attentional capture and the participants were able to focus on categorizing the target whereas the Black angry flankers served to initially capture the participants’ attention before they could attend to the task of categorizing the flankers.
General Discussion

These studies explored the effects of race and emotion as contextual factors on the categorization of Black, White, and racially ambiguous targets. In Study 1, participants categorized a target image of either a Black or White individual displaying a neutral, happy, or angry emotion. This target image was surrounded by flanker images of either a Black or White individual displaying neutral, happy, or angry facial affect. Study 2 was identical to Study 1, except participants were also presented with racially ambiguous targets and flankers displaying either neutral, happy, or angry facial affect.

The findings of Study 1 revealed that participants had significantly faster reaction times to Black targets than to White targets, and that reaction time was significantly slower in the presence of Black flankers. The results of Study 1 also revealed that reaction times were significantly faster for Black and White targets displaying anger. However, reaction times were significantly slower for angry and happy targets with angry flankers and marginally slower for neutral targets with angry flankers. Overall, regardless of target race and emotion, reaction times were slowest for angry flankers. The findings of Study 2 revealed that participants had significantly longer reaction times when the racially ambiguous targets were surrounded by Black angry flankers and significantly faster reaction times when the racially ambiguous targets were surrounded by Black happy flankers. Taken together, these results suggest that the participants are exhibiting an attentional bias to both Black faces and displays of anger.

These findings are in accordance with previous research which has demonstrated that White individuals have an attentional bias towards Black faces, which act as a fear-relevant stimulus. Prior research has demonstrated that searching for a fear-relevant stimulus amongst neutral stimuli occurs more quickly and effortlessly than searching for a nontreating stimulus.
amongst fear-relevant stimuli (Öhman, Flykt, & Esteves, 2001). Dominant cultural stereotypes associate Blacks with danger and violence, and many studies have shown that this negative association between Blacks and threat can cause people to alter their judgment or behavior (Duncan, 1976; Devine, 1989; Sagar & Schofield, 1980). Because of this link between Blacks and threat, studies have shown that individuals are faster to attend to Black faces (Donders, Correll, & Wittenbrink, 2008; Levin, 2000; Levin; 1996). In addition, research on the neural processing of race has examined the role of the amgydala, a brain structure involved in the fear response and revealed that there is greater activation of the amgydala in the 30ms after viewing Black faces compared to White faces (Cunningham et al., 2004). Thus, one potential explanation for the participants’ attentional bias towards the black faces and displays of anger is that they are acting as a fear-relevant stimulus and causing the implicit activation of racial stereotypes.

Another potential explanation for the participants’ attentional bias towards Black faces is due to a lack of familiarity with racial outgroup members. Previous research has demonstrated that individuals with limited outgroup contact demonstrate a memory bias for ingroup members (Walker & Hewstone, 2006). Furthermore, research has demonstrated that familiarity with outgroups moderates attentional bias (Dickter, Gagnon, & Gyurovski, in press). Dickter, Gagnon, and Gyurovski found using a dot-probe paradigm that White participants showed that White participants’ attentional bias to Black compared to White faces was moderated by their familiarity with outgroup members, which was measured by number of close friendships with Blacks. Thus, in the current studies, it is possible that the attentional bias to Black faces is due to a lack of familiarity with this racial outgroup.

For these two studies, the modified flanker paradigm was a very useful tool to examine the control of attention in these racial categorization tasks. Previous studies have shown that
participants are often unable to focus their attention solely on the task of categorizing the target and attention may spontaneously be directed to unnecessary or conflicting flanker information (Dickter & Bartholow, 2007; Gratton et al., 1992; Bartholow et al. 2005; Bartholow and Dickter, 2006). Because the modified flanker paradigm allows for the examination of the spontaneous control of attention, it was a valuable method to use in these studies to examine implicit attentional biases. Even though the task at hand was to categorize the race of the target, results revealed that participants were still attending to both the race and emotion of the flanker faces. These results are in congruence with past modified flanker studies which demonstrate that participants are unable to consciously control the direction of their attention and are influenced by irrelevant contextual information (Dickter & Bartholow, 2007).

A second goal of the study was to examine implicit affective biases for Black and Biracial faces compared to White faces. The results from the AMP in Study 2 demonstrated that individuals with a higher implicit preference for Blacks over Biracial individuals had less individuating experiences with Blacks, a more explicitly negative rating of White males and Black males, and tended to rate both White and Black Males consistently on the Feeling Thermometer. There were no associations between the AMP in Study 1 and individual difference measures. Furthermore, there were no associations in either study between the reaction times on the flanker task and implicit or explicit measures of prejudice. These results suggest that the factors that affect social categorization processes may be unrelated to those associated with prejudice, whether it be implicit or explicit prejudice (Devine, 1989). However, future research should continue to investigate the associations between attentional biases and implicit and explicit prejudice to better understand individual variability in racial processing.
Whereas previous research has focused on the categorization of monoracial individuals, the current research is important because it extends past research to include biracial individuals. Furthermore, the current research also employed a novel approach to study the influence of contextual factors (i.e. race and emotion) in the categorization of biracial individuals by using the modified flanker paradigm. However, one possible limitation to generalizability of the findings from the current studies was the use of digitally created images. The decision to digitally create the stimuli was made in order to maintain the greatest level of internal control since this was a preliminary study. The software allowed for settings of emotional intensity, skin tone, and race and these settings were kept consistent throughout the creation of the stimuli. Future research should examine alternatives such as using images of actual Black, White, and biracial individuals. Another possible limitation of the current studies was the use of only male stimuli. We chose to include only male faces because previous research has demonstrated that attention to male and female faces varies with race (Dickter & Bartholow, 2007) and because adding gender would have complicated the study design and analysis further. However, future research should examine the effects and implications that gender may have on the categorization of race and emotion. Finally, an additional limitation of the present studies was the use of only Black, White, and Black/White biracial faces as stimuli. Research suggests that individuals process other races differently (Chance et al., 1975) and we live in a diverse world, so an interesting avenue for future research would be to examine the influence of contextual factors on the categorization of other races, such as Asian or Hispanic individuals.

Understanding how individuals perceive and process the faces of biracial individuals is becoming increasingly important as the number of biracial and multiracial individuals in the United States steadily increases (King & DaCosta, 1996; Root, 1996). The current studies
demonstrate that contextual cues can impact the way categorization decisions are made, which may alter the way judgments are made about these individuals during later stages of person perception. This research suggests that individuals implicitly rely on contextual cues about emotion and the race of surrounding individuals in the process categorization of the target. While using these contextual clues may facilitate the categorization process, the use of these contextual cues can activate certain negative racial stereotypes and cause individuals to act in a prejudiced or discriminatory manner. Although the current work is preliminary, the results of the current work indicate that emotion and racial context can serve as powerful influences in the person perception process. Future work should continue to investigate how monoracial and biracial individuals are perceived, and further examine the impact that contextual factors play in person perception.
References


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Personality and Social Psychology, 69(6), 1013-1027.


Table 1: Reaction time to targets as a function of target emotion and flanker race (Study 1).

<table>
<thead>
<tr>
<th>Target and Flanker Pair</th>
<th>Mean (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AngryTarget_BlackFlanker</td>
<td>337.64 (21.55)</td>
</tr>
<tr>
<td>AngryTarget_WhiteFlanker</td>
<td>331.51 (21.12)</td>
</tr>
<tr>
<td>HappyTarget_BlackFlanker</td>
<td>342.35 (21.86)</td>
</tr>
<tr>
<td>HappyTarget_WhiteFlanker</td>
<td>331.54 (21.06)</td>
</tr>
<tr>
<td>NeutralTarget_BlackFlanker</td>
<td>339.24 (21.55)</td>
</tr>
<tr>
<td>NeutralTarget_WhiteFlanker</td>
<td>343.26 (21.92)</td>
</tr>
</tbody>
</table>

Table 2: Reaction time to biracial targets as a function of flanker race and emotion (Study 2).

<table>
<thead>
<tr>
<th>Target and Flanker Pair</th>
<th>Mean (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biracial_BlackNeutral</td>
<td>382.56 (15.98)</td>
</tr>
<tr>
<td>Biracial_BlackAngry</td>
<td>371.96 (12.50)</td>
</tr>
<tr>
<td>Biracial_BlackHappy</td>
<td>361.72 (13.19)</td>
</tr>
<tr>
<td>Biracial_WhiteNeutral</td>
<td>368.47 (11.84)</td>
</tr>
<tr>
<td>Biracial_WhiteAngry</td>
<td>370.10 (11.44)</td>
</tr>
<tr>
<td>Biracial_WhiteHappy</td>
<td>370.87 (11.28)</td>
</tr>
</tbody>
</table>

Figure 1: Reaction time to black targets as a function of target emotion (Study 1).
Figure 2: Reaction time to black and white targets as a function of target emotion and flanker race (Study 1).

Figure 3: Reaction time to White targets as a function of target emotion (Study 1).
Figure 4: Reaction time to White targets as function of flanker race (Study 1).

Figure 5: Reaction time to angry targets as a function of flanker emotion (Study 1).
Figure 6: Reaction time to happy targets as a function of flanker emotion (Study 1).

Figure 7: Reaction time to neutral targets as a function of flanker emotion (Study 1).