Self-Protective Biases in Group Categorization:
Threat Cues Shape the Psychological Boundary Between "Us" and "Them"

Saul L. Miller and Jon K. Maner
Florida State University

D. Vaughn Becker
Arizona State University, Polytechnic Campus

Across 6 studies, factors signaling potential vulnerability to harm produced a bias toward outgroup categorization—a tendency to categorize unfamiliar others as members of an outgroup rather than as members of one's ingroup. Studies 1 through 4 demonstrated that White participants were more likely to categorize targets as Black (as opposed to White) when those targets displayed cues heuristically associated with threat (masculinity, movement toward the perceiver, and facial expressions of anger). In Study 5, White participants who felt chronically vulnerable to interpersonal threats responded to a fear manipulation by categorizing threatening (angry) faces as Black rather than White. Study 6 extended these findings to a minimal group paradigm, in which participants who felt chronically vulnerable to interpersonal threats categorized threatening (masculine) targets as outgroup members. Together, findings indicate that ecologically relevant threat cues within both the target and the perceiver interact to bias the way people initially parse the social world into ingroup vs. outgroup. Findings support a threat-based framework for intergroup psychology.

Keywords: intergroup cognition, race, group membership, evolutionary psychology, error management

Group categorization, the process of parsing the social world into ingroup and outgroup—into "us" and "them"—provides the basic cognitive foundation on which virtually all intergroup psychology rests. To understand the way people think and feel about members of particular groups, one must first understand the processes through which people perceive others as belonging to those groups.

In this article, we present a threat-based framework for understanding and predicting biases in the way people categorize others into the ingroup versus the outgroup. We integrate functionalist theories of social cognition and evolutionary psychology to suggest that heuristic cues signaling the presence of possible danger produce an outgroup categorization bias—a tendency to categorize unfamiliar social targets as members of the outgroup rather than the ingroup. In the following sections, we describe a threat-based framework for intergroup categorization and present novel predictions pertaining to specific threat-relevant factors—within both the perceiver and the target—hypothesized to influence the way in which individuals assign group-level categories to other people (cf. Cottrell & Neuberg, 2005).

The Psychological Process of Group Categorization

To simplify the social world's complex structure, perceivers regularly place others into categories (Allport, 1954; Bodenhausen

& Macrae, 1998; Brewer, 1988; Fiske & Neuberg, 1990; Macrae & Bodenhausen, 2001; Richeson & Trawalter, 2005). In doing so, perceivers can use their knowledge of a social category to infer a variety of information about members of that category, such as their social roles, abilities, and personality traits (e.g., Deaux & Lewis, 1984). By categorizing someone as a professor, for example, a perceiver can narrow down the many traits that person might possess (e.g., hostile, intelligent, funny, curious, introverted, wealthy, busy, physically fit, etc.) to a more comprehensible few (e.g., intelligent, curious, busy). Thus, categorization allows people to process information about others in an efficient way, while minimizing the expenditure of limited cognitive resources (Macrae & Bodenhausen, 2000). In turn, categorization strongly influences other forms of social cognition such as encoding (e.g., Bodenhausen, 1988, 1990), memory (e.g., Hamilton & Sherman, 1994; Hugenberg & Sacco, 2008; Srull & Wyer, 1989), and judgment and evaluation (e.g., Brewer, 1988; Gramzow & Gaertner, 2005; Tajfel, 1978). Indeed, the process of group categorization—assigning group-level categories to other people—provides a general foundation for all of intergroup psychology.

Although group categorization can occur quickly and without effort (Brewer, 1988; Devine, 1989; Fiske & Neuberg, 1990), the specific category to which a person is assigned is not inflexible or independent of social context. For example, although seeing a middle-aged man wearing glasses and a sport coat walk into a college classroom might quickly bring to mind the category "college professor," seeing that same person walk into a courthouse building may activate the category "attorney."

Social context can be important for shaping categorization processes even for common social categories such as race. Although some might view race as being inborn, stable, and easily classifiable (see Eberhardt & Goff, 2005), a person's racial category membership often can be ambiguous. Western societies are becoming increasingly multiethnic, and thus placing people into

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simple racial categories has become increasingly difficult. Consequently, even for common categories such as race, contextual factors are likely to play an important role in shaping the categorization process (cf. Castano, Yzerbyt, Bourguignon, & Seron, 2002; Eberhardt, Dasgupta, & Banaszynski, 2003; Hugenberg & Bodenhausen, 2004; see also Quinn & Macrae, 2005). Here, we present a threat-based framework for understanding group categorization. The studies we report test the hypothesis that factors heuristically associated with vulnerability to physical harm influence the categorization of unfamiliar people.[1]

A Threat-Based Framework for Intergroup Cognition

Psychological processes are designed in part to help people avoid forms of peril (Maner, DeWall, Baumeister, & Schaller, 2007; Öhman & Mineka, 2001). One type of peril that has particularly immediate consequences for well-being involves the threat of physical danger. Although danger may come from many places, throughout human evolutionary history one of the most significant threats to people's safety has come from hostile members of other groups (e.g., Baer & McEachron, 1982). Consequently, many psychological processes function to protect oneself from potential dangers posed by outgroup members (Cosmides, Tooby, & Kurzban, 2003; Kurzban, Tooby, & Cosmides, 2001; Schaller, Faulkner, Park, Neuberg, & Kenrick, 2004; Van Vugt, De Cremer, & Janssen, 2007). Indeed, when encountering members of particular outgroups, people often experience anxiety and fear and display behaviors aimed at protecting themselves from harm (Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001; Correll, Park, Judd, & Wittenbrink, 2002; Phelps et al., 2000).

Although people are generally wary of outgroups, self-protective responses are likely to be activated selectively in certain types of circumstances. Acting in a self-protective manner all the time would make normal everyday interactions difficult, and would draw valuable cognitive resources away from the pursuit of other goals. The engagement of self-protective processes, therefore, is likely to be enhanced by the presence of contextual cues that heuristically signal the presence of threat. Indeed, contextual cues that signal possible danger have been shown to increase the likelihood of self-protective biases in intergroup cognition. Schaller, Park, and Mueller (2003), for example, showed that darkness, a cue signaling heightened vulnerability to danger, increased White perceivers' negative threat-related stereotypes of a heuristically threatening racial outgroup (African Americans). Thus, self-protective biases in intergroup cognition tend to be highly selective, becoming most pronounced in circumstances that heuristically connote vulnerability to physical harm.

Although previous research indicates that threat-relevant factors can alter the "cognitively downstream" processing of outgroup members (e.g., increases in stereotyping), few studies have tested the hypothesis that threat-relevant factors influence the earlier-in-the-stream process of initial social categorization. Evaluating social categorization within a threat-based framework suggests several novel hypotheses pertaining to specific factors that might lead people to categorize others as members of the ingroup or outgroup. In the present article, we explored the possibility that factors indicating potential vulnerability to harm may affect the manner in which people categorize others as one of "us" versus one of "them."

Self-Protective Biases in Social Categorization

A functional approach to social cognition implies that, when categorizing others into ingroups and outgroups, people may display biases that, on average, would reduce the chances of being harmed by members of a potentially threatening outgroup. Error management theory (EMT; Haselton & Buss, 2000; Haselton & Nettle, 2006) provides a framework for generating hypotheses about the specific types of biases that might emerge when one is exposed to potentially dangerous situations. Avoiding a possible threat even when it does not actually exist (a false positive) is a less costly error than failing to avoid a threat when one does in fact exist (a false negative). Consequently, EMT implies that when cues signal potential vulnerability to danger, people may be inclined to overestimate the presence of threat (e.g., Schaller et al., 2004).

Applying the logic of EMT to group categorization suggests that, when threat cues are present, perceivers may be biased toward categorizing unfamiliar target persons as members of an outgroup rather than as members of the ingroup. That is, perceivers may err on the side of caution when categorizing unfamiliar others. When there is a need to categorize another person quickly or when a person's group status is unclear, the presence of threat-relevant factors should increase the tendency for outgroup categorization—categorizing the person as a member of an outgroup (and therefore a source of potential harm) rather than as a member of the ingroup.

Ecologically Relevant Threat Cues

What threat-related factors might bias people toward outgroup categorization? An integration of social psychological and evolutionary theories provides a framework for generating hypotheses about specific ecologically relevant factors that might elicit such a bias. We propose that specific factors, associated with both the target and the perceiver, signaling potential vulnerability to harm may bias people toward outgroup categorization.

Factors Associated With the Target

The presence of danger often is assessed by evaluating the threat-relevant characteristics of other people. Here, we describe three factors associated with the target that may lead to biased outgroup categorization.

One factor pertains to the target's masculinity. Throughout history, men (compared with women) have displayed a greater propensity to engage in acts of physical violence (Daly & Wilson, 1994), especially against members of competing outgroups (Wrangham, 1985). Even within males, more masculine men tend to engage in violence and criminality to a greater degree than do less masculine men (Carré & McCormick, 2008; Ellis, Das, & Buker, 2008). As a consequence, signs of masculinity may heuristically signal the presence of possible threat. Indeed, people associate men with aggression and anger more than they do women (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007).

[1] When referring to threat in the present article, we are referring specifically to threats to physical safety. In the General Discussion section, we discuss the possibility of applying the present theoretical framework to other types of threats posed by outgroups (e.g., economic threat).

The stereotypes of criminality and aggressiveness that White Americans apply to certain racial outgroups are directed disproportionately toward the males of those outgroups (e.g., Quillian & Pager, 2001; see also Sidanius & Veniegas, 2000). Moreover, threat cues tend to affect the processing of outgroup men more than outgroup women (Maner et al., 2005; Navarette et al., 2009). Thus, the tendency to categorize unfamiliar target persons as outgroup members may be most likely to occur when the targets are men or when they display cues indicative of masculinity.

A second factor pertains to the direction of the target's movement. An unfamiliar person who is approaching (i.e., moving toward the perceiver) poses more of a potential threat than a person who is withdrawing. Indeed, people show increased defensive responses (e.g., enhanced startle response) when viewing stimuli that appear to be approaching the perceiver (Löw, Lang, Smith, & Bradley, 2008; Mühlerger, Neumann, Wieser, & Pauli, 2008). This is particularly true for stimuli connoting threat. When direction of movement is unclear, for instance, people tend to view threatening (masculine) others as walking toward them (Brooks et al., 2008). Moreover, people are quicker to notice and respond to threatening individuals approaching them than threatening individuals moving away from them (Adams, Ambady, Macrae, & Kleck, 2006). These findings are consistent with cross-cultural evidence suggesting that humans are adept at discerning hostile intentions in others based simply on motion cues (Barrett, Todd, Miller, & Blythe, 2005). Thus, the tendency to categorize others as outgroup members may be particularly pronounced when targets appear to be moving toward the perceiver.

A third target factor that may promote a bias toward outgroup categorization is the presence of an angry facial expression. Facial expressions of anger powerfully signal the presence of interpersonal threat (Ekman, 1982; Öhman & Mineka, 2001). Self-protective concerns lead people to selectively attend to and remember facial expressions of anger, especially when those expressions are displayed by members of a heuristically threatening outgroup (e.g., Ackerman et al., 2006; Hugenberg, 2005). Self-protective motives also lead people to overperceive expressions of anger in outgroup members (Maner et al., 2005). Thus, we hypothesized that perceivers would categorize social targets as outgroup members particularly when those targets display facial expressions of anger.

Factors Within the Perceiver

Factors signaling the possible presence of threat may also involve processes within the perceiver. One such factor is the experience of fear. The emotion of fear signals the presence of danger (cf. Schwarz & Clore, 1983) and promotes psychological responses that facilitate avoidance of danger (Buck, 1999; Haselton & Ketelaar, 2006; Öhman & Mineka, 2001). Moreover, fear has been shown to enhance the processing of perceived outgroup threat (Schaller, Park, & Mueller, 2003). For instance, White perceivers are more likely to perceive threat in the faces of Black men (a racial outgroup for White perceivers) when those White perceivers are currently experiencing a state of fear (Maner et al., 2005). Therefore, the experience of fear is expected to elicit a self-protective bias in group categorization—an increased tendency to categorize unfamiliar individuals as members of an outgroup.

A second factor within the perceiver pertains to chronic beliefs about vulnerability to danger. People differ substantially with regard to whether they believe the world to be a dangerous place in which they must protect themselves from harm. Whereas some individuals generally believe that other people are likely to hurt them, other individuals tend to be less concerned with interpersonal threat. Individuals who believe the world is a dangerous place full of interpersonal peril tend to overperceive threat in members of heuristically threatening outgroups (Maner et al., 2005). Moreover, such individuals tend to be especially responsive to situational cues indicating vulnerability to harm (Schaller, Park, & Faulkner, 2003; Schaller, Park, & Mueller, 2003). The tendency to categorize unfamiliar others as belonging to an outgroup, therefore, may be most likely to occur among individuals displaying high chronic beliefs about the presence of interpersonal danger.

In summary, we propose that factors within both the target (cues to masculinity; movement toward the perceiver; expressions of anger) and the perceiver (the emotion of fear; chronic beliefs about interpersonal danger) may promote a bias in group categorization, leading people to see unfamiliar others as members of the outgroup. Although each of these factors may, by themselves, bias people toward outgroup categorization, combinations of these factors could produce synergistic effects. Categorizing someone as a member of a threatening outgroup is likely to stimulate physiological, cognitive, and behavioral responses to perceived threat. These responses consume limited and energetically costly resources that might otherwise be allocated to other activities. Consequently, it would be most useful to categorize others in a self-protective manner when multiple factors signal the presence of possible danger. That is, any particular self-protective cue (e.g., an angry facial expression) may promote outgroup categorization most strongly when other factors also point to the need for self-protection (e.g., when the perceiver is experiencing fear, and the angry facial expression is worn by a man rather than a woman). Thus, perceivers may be most likely to categorize unfamiliar others as outgroup members when multiple threat-relevant factors are present.

The Role of Group Stereotypes in Outgroup Categorization Bias

What particular kinds of outgroups might be targeted by a threat-based categorization bias? Although an outgroup categorization bias may be a general phenomenon that occurs between members of different groups, this bias is likely to be strongest for outgroups that are heuristically viewed as threatening. Just as self-protective concerns are activated selectively in certain types of circumstances, so too are these concerns likely to be directed most strongly toward outgroups that are heuristically associated with threat (Schaller et al., 2004).

In many contemporary societies, race serves as a salient signal of group membership, and some races (e.g., Black Americans) are stereotypically associated with physical threat (Madon et al., 2001). For more than half of a century, violence and criminality have been typical components of the stereotype of Black Americans (Allport & Postman, 1947; Correll et al., 2002; Devine, 1989; Duncan, 1976). In turn, self-protective biases among White perceivers often are directed selectively toward Black Americans (Cottrell & Neuberg, 2005; Schaller, Park, & Faulkner, 2003).

Therefore, to provide strong tests of our hypotheses, we examined the extent to which threat-relevant factors would lead White participants to categorize unknown others as being Black versus White. We predicted that threat-relevant factors would bias White perceivers toward categorizing unfamiliar others as Black (members of a heuristically threatening racial outgroup) as opposed to White (members of their racial ingroup).

Although a threat-based categorization bias may be strongest for outgroups that are heuristically viewed as threatening, such a bias may also emerge for unfamiliar outgroups. Indeed, unfamiliar outgroups have posed threats to the safety and well-being of one's own group throughout human history (Baer & McEachron, 1982). By default, then, individuals may err on the side of caution and view unfamiliar outgroups as posing possible threats. Thus, in the present investigation, we also used a minimal group paradigm to test the hypothesis that threat cues would elicit a bias toward outgroup categorization for an unfamiliar outgroup (Study 6).

Overview of Present Studies

In six experiments, we evaluated a bias in outgroup categorization, whereby factors signaling potential threat increase the likelihood of categorizing an unfamiliar target as an outgroup member. In Studies 1–4, we examined whether threat cues in the target (signs of masculinity, a target's movement toward the perceiver, an angry facial expression) would bias White participants toward racial outgroup categorization (a tendency to categorize others as Black rather than White). In Study 5, we extended the investigation by examining threat-relevant factors within the perceiver (the experience of fear and beliefs about danger). In Study 6, we moved our analysis beyond racial categorization by examining a bias in outgroup categorization when participants had no prior knowledge about the groups (using a minimal group paradigm).

Study 1

In Study 1, White participants categorized the race (White or Black) of targets that varied in apparent masculinity. Masculinity was conveyed using recorded voices. Men with a low fundamental frequency (vocal pitch) and formant dispersion (vocal timbre) are perceived as particularly masculine and physically threatening (Feinberg, Jones, Little, Burt, & Perrett, 2005; Puts, Gaulin, & Verdolini, 2006; Puts, Hodges, Cárdenas, & Gaulin, 2007). We expected that signs of masculinity would enhance outgroup categorization. Thus, we predicted that, when categorizing the race of male voices, White participants would be more likely to categorize highly masculine voices (lower fundamental frequency and lower formant dispersion) as Black than they would less masculine voices.

Method

Participants. Thirty-nine White undergraduate psychology students (26 women and 13 men) participated in exchange for course credit.

Stimulus materials. Five White males were recorded saying 20 short statements (e.g., "Stay here"; "I got it"). Written versions of the statements were prerated by 17 participants on threat (1 = *not at all threatening*; 7 = *very threatening*) and valence (1 = *very*

negative; 7 = *very positive*). On average, statements were considered nonthreatening (*M* = 1.9, *SD* = 0.66) and neutral in valence (*M* = 3.9, *SD* = 0.47). Thus, the statements themselves did not contain cues to threat.

For each statement, two versions were created: the original (unaltered) version and a masculinized version. Masculinized versions were created using Praat v5.0.31 voice software (Boersma & Weenink, 2009). Previous research suggests that participants become aware of a difference in vocal masculinity when fundamental frequencies are shifted by 1.2 semitones and formant dispersion is shifted by 4% (Puts et al., 2007). Thus, each original statement was lowered 1.2 semitones in fundamental frequency and lowered 4% in formant dispersion to create a masculinized version of each voice. Additionally, consistent with previous research (Puts et al., 2007), parameters were set to a time step of 0.01, a minimum pitch of 75 Hz, and a maximum pitch of 300 Hz.

Procedure. Participants were told that the study investigated accuracy in perceptions of race using vocal cues and that they would be listening to recordings of White and Black men. Participants listened to 20 recorded statements on a computer. The computer randomly selected each statement with the following constraints: (a) Each target was heard four times, (b) two of the four recordings for each target were masculinized versions and the other two were original (unaltered) versions, (c) no statement was heard twice. After hearing each statement, participants indicated via key press whether they believed the person speaking was White or Black.

Results and Discussion

A paired *t* test compared the percentage of masculinized voices categorized as Black with the percentage of original (unaltered) voices categorized as Black.[2] Consistent with our hypothesis, masculinized voices were categorized as Black (*M* = 36.7%, *SD* = 20.4%) more often than were the original voices (*M* = 22.5%, *SD* = 15.0%), *t*(38) = 3.99, *p* < .001, Cohen's *d* = 0.64.

Results of Study 1 suggest that signs of masculinity increased the likelihood of a target being categorized as a racial outgroup member. White participants were more inclined to categorize as Black male voices that communicated a high degree of masculinity (compared with unaltered voices). Study 1 thus provides initial evidence that a target cue signaling the possible presence of threat (masculinity) biases individuals toward outgroup categorization.

Study 2

In Study 2, White participants again categorized the race (White or Black) of targets that varied in apparent masculinity. In Study 2, however, we used computer-generated point-light displays of human walkers to vary signs of masculinity. Males (as compared with females) tend to have broader shoulders, narrower hips, and greater upper-body lateral sway (Mather & Murdoch, 1994), all of which communicate masculinity and can be observed using point-light walkers. We predicted that, when categorizing the race of male walkers, White participants would be biased toward catego-

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[2] Unless noted otherwise, examination of the present (and subsequently reported) data confirmed that distributional assumptions were satisfied for inferences on the basis of significance values.

rizing highly masculine walkers as Black, as opposed to White. Additionally, to rule out the possibility that outgroup categorization might be caused by targets displaying gender-stereotypical cues (as opposed to masculine cues), participants also categorized female walkers varying in cues to femininity. We expected that an outgroup categorization bias would be observed for walkers displaying exaggerated signs of masculinity, but not femininity.

Method

Participants. Sixty White undergraduate psychology students (44 women and 16 men) participated in exchange for course credit.

Materials. Computer-generated point-light walkers were created using BMLgender v2.0 (Troje, 2002a, 2002b). This program is based on analysis of sex-specific differences in walking styles and allows one to generate point-light walkers displaying different degrees of femininity and masculinity. One-minute movie clips were created of four point-light walkers: a slightly masculine walker (1 *SD* above the mean in masculinity), a highly masculine walker (2 *SD*s above the mean in masculinity), a slightly feminine walker (1 *SD* above the mean in femininity), and a highly feminine walker (2 *SD*s above the mean in femininity). To maximize cues of masculinity/femininity, sex-specific structural cues (e.g., shoulder and hip width) and dynamic cues (e.g., shoulder and hip sway) were manipulated together (see Troje, 2002a).

Procedure. Participants were run on individual computers. Participants were told that, using biomotion lab equipment, the experimenters were able to capture the motion of actual individuals walking. They were told that these individuals varied in sex (i.e., some were men and some were women) and race (i.e., some were White and some were Black). Participants were told that they would see point-light displays creating outlines of these walkers and that they would be asked to identify the sex and race of these walkers.

Participants first saw two point-light walkers (the slightly masculine walker and the slightly feminine walker). Walkers were displayed simultaneously—one on the left side of the computer screen and one on the right side. The side of the screen on which walkers were presented was randomized. Participants were informed that the walkers differed in sex and were asked to identify which walker was male and which was female by pressing a number on the keyboard (*1* if the walker on the left was male and the walker on the right was female; *2* if the walker on the right was male and the walker on the left was female). This task was performed first simply to confirm that participants were able to clearly distinguish male and female walkers.

Participants then saw two new point-light walkers (the slightly masculine walker and the highly masculine walker). Again walkers were displayed simultaneously—one on the left side of the computer screen and one on the right side (randomized across participants). Participants were told that the walkers differed in race (i.e., one walker was Black and one walker was White). Participants were asked to identify which walker was Black and which was White by pressing a number on the keyboard (*1* if the walker on the left was Black and the walker on the right was White; *2* if the walker on the right was Black and the walker on the left was White). Finally, participants saw two more point-light walkers (the slightly feminine walker and the highly feminine walker) and were

again asked to identify which of the walkers was Black and which was White using the same instructions as in the previous task.

Results and Discussion

We performed a binomial test for each judgment with the proportion test value set to 0.5 (i.e., the null hypothesis assumed any given judgment would be made 50% of the time). For the sex categorization judgment, 92% of participants categorized the slightly masculine walker as male and the slightly feminine walker as female. Thus, participants were quite able to distinguish male walkers from female walkers ($z = 6.45$, $p < .001$; note that this was a conservative test, as only the slightly masculine and feminine walkers were presented).

A binomial test on the racial categorization judgments of male walkers revealed a significant bias toward perceiving the highly masculine walker as Black ($z = 4.13$, $p < .001$). Seventy-seven percent of participants categorized the highly masculine walker as Black and the less masculine walker as White, whereas only 23% of participants categorized the walkers in the reverse manner. Thus, consistent with our hypothesis, the presence of masculine cues biased people toward greater outgroup categorization.

To demonstrate that this effect was not due simply to a gender stereotypicality bias whereby participants associated outgroup members with more gender stereotypical walkers, we performed a binomial test on the racial categorization judgments of female walkers. Fifty-five percent of participants categorized the more feminine walker as Black and the less feminine walker as White, whereas 45% of participants categorized them in the reverse manner. This difference did not approach significance ($z = .77$, $p = .52$), suggesting that the outgroup categorization bias was specific to male targets. A McNemar test comparing the percentages attained from the racial categorization of male targets to the percentages attained from the racial categorization of female targets confirmed that the proportions were significantly different from one another, $\chi^2(1, N = 60) = 6.26$, $p = .02$. Thus, we observed an outgroup categorization bias for masculine targets but not for feminine targets. Therefore, Studies 1 and 2 provide converging evidence to suggest that cues of threat (in these cases, target masculinity) produced a bias toward outgroup categorization.

Study 3

Study 3 improved on the previous studies in a number of ways. First, in addition to examining the effect of target masculinity, we also examined effects associated with a target's direction of movement. A target moving toward the perceiver connotes a potential source of imminent danger. Thus, in addition to varying cues of masculinity and femininity of point-light walkers, we also varied the direction in which they appeared to be walking. Some participants viewed walkers appearing to walk directly toward the perceiver. Other participants viewed walkers appearing to walk to the side. We predicted that masculine cues would bias White participants toward outgroup categorization but that this effect would be limited to walkers that appeared to be moving toward the perceiver.

Second, participants in Study 2 assigned racial categories to pairs of targets and were told that one of the targets was Black and the other was White. In Study 3, we used a more natural response format, in which participants viewed targets one at a time and

assigned racial categories without any constraints on the number of Black versus White responses.

Method

Participants.   Seventy-five White undergraduate psychology students (52 women and 23 men) participated in exchange for course credit.

Materials.   To create front walkers (i.e., walkers walking toward the perceiver), the same 1-min movie clips of the four point-light walkers used in Study 2 were again used in Study 3. To create side walkers, 1-min movie clips were created of these same point-light walkers walking toward the right side of the computer screen.

Procedure.   Participants were run on individual computers. As in Study 2, participants were told that, using biomotion lab equipment, the experimenters captured the motion of various individuals walking. They were told that these individuals varied in sex (some were men and some were women) and race (some were White and some were Black). Participants were told that they would see point-light displays creating outlines of these walkers and that they would be asked to identify the race of these walkers.

Participants were randomly assigned to one of two conditions: a front walker condition ($n = 36$) or a side walker condition ($n = 39$). In the front walker condition, participants saw four point-light walkers walking toward them (a highly masculine walker, a slightly masculine walker, a highly feminine walker, and a slightly feminine walker). For each point-light walker, they were asked to indicate via key press whether the walker was Black or White. In the side walker condition, participants performed the same task; the walkers in this condition, however, appeared to be walking toward the right side of the computer screen. Pretesting with an independent sample of participants ($n = 17$) confirmed that masculinity cues were equally visible in both conditions. For both front walkers and side walkers, participants were able to correctly identify which of two walkers (the highly masculine walker vs. the slightly masculine walker) was more masculine ($ps < .05$), and there was no difference in the proportion of participants correctly identifying the highly masculine front walker versus the highly masculine side walker ($p > .99$).

In both conditions, each walker was presented one at a time on the computer screen. The order in which point-light walkers were presented was randomized across participants.

Results

Table 1 presents the percentages of participants categorizing point-light walkers as Black across the two conditions. Chi-square

Table 1
Study 3: Percentage of Participants in Each Condition Categorizing the Point-Light Walkers as Black

Masculinity/femininity	Front walker	Side walker
Highly masculine	61%	36%
Slightly masculine	41%	36%
Highly feminine	31%	36%
Slightly feminine	25%	26%

tests indicated that the percentage of participants who categorized the highly masculine walker as Black was greater in the front walker condition (61%) than in the side walker condition (36%), $\chi^2(1, N = 75) = 4.77, p = .03$. Categorization responses did not differ across conditions for the slightly masculine walker, highly feminine walker, or slightly feminine walker (all $ps > .60$).

Additional comparisons revealed that, among participants in the front walker condition, there was a significant difference in categorization responses across the four different walkers, Cochran's $Q(3) = 10.13, p = .02$. An a priori contrast confirmed that participants in the front walker condition categorized the highly masculine walker as Black more often than they did the other walkers combined, Friedman's test $\chi^2(1, N = 36) = 2.94, p = .08$. No differences were found among participants in the side walker condition, Cochran's $Q(3) = 1.20, p = .75$.

Discussion

Results of Study 3 replicate and extend those of the previous studies. When White participants saw highly masculine walkers moving directly at them, they tended to see those walkers as Black (rather than as White). Indeed, the highly masculine front walker was the only target for which outgroup categorization was the modal response. This outgroup categorization bias did not extend to walkers that appeared to be moving in a direction other than toward the participant. This is consistent with the idea that individuals moving toward the perceiver afford greater immediate threat than do individuals moving in a different direction. The findings did not reflect differences in how visible the masculinity cues were in front-walking versus side-walking targets; masculinity cues were equally apparent across conditions as judged by an independent sample of participants. Rather, the movement of the walker vis-á-vis the participant was the crucial moderating variable. Finally, as in Study 2, no outgroup categorization bias was found for female walkers, confirming that it was masculinity, rather than gender-stereotypicality, that produced the effects. These findings thus further support the hypothesis that heuristic threat cues bias people toward outgroup categorization.

Study 4

In Study 4, we examined an outgroup categorization bias by manipulating a different target factor indicating threat: the facial expression of anger. Anger serves as a relatively clear sign of interpersonal threat, and thus may bias people toward categorizing others as outgroup members. Study 4 also builds on the previous studies by examining a racial categorization bias in response to targets whose racial membership is relatively clear. Whereas we used stimuli that were ambiguous with regard to race in the previous studies, in Study 4 we examined racial categorization biases when people were exposed to stimuli that connoted concrete racial cues. Even in circumstances in which a target's race appears to be relatively unambiguous, threat cues were still expected to predispose people toward outgroup categorization by eliciting an initial bias toward categorizing the target as a member of the outgroup.

White participants in this study quickly categorized White and Black faces according to their race. The faces varied in emotional expression (angry or happy) and sex (male or female). We pre-

dicted that signals connoting possible threat (an angry facial expression and a target who is male) would elicit an initial bias toward categorizing the target as an outgroup member. As in Study 3, we predicted that, although each of these threat cues may by themselves promote outgroup categorization, a categorization bias should be most pronounced when a combination of threat cues exists (i.e., the face is both angry and male).

We predicted that the initial bias toward outgroup categorization would be reflected in both the accuracy and latency with which participants categorized targets. Our main hypotheses were that angry Black males would be categorized more accurately than other targets, whereas angry White males would be categorized less accurately than other targets. Both of these responses would be consistent with an initial bias toward categorizing angry males as Black rather than as White. Additionally, for those trials on which the target was categorized accurately, we predicted that the initial bias to categorize an angry male target as Black would lead to quicker responses when the target was actually Black, but slower responses when the target was actually White; this latter effect would arise because the initial bias toward a categorization of Black would have to be overridden and replaced with the correct categorization. The hypotheses for response time thus paralleled those for response accuracy.

Method

Participants. Sixty-six White undergraduate psychology students (44 women and 22 men) participated in exchange for course credit.

Materials. Stimuli consisted of eight male and eight female prototypes from Poser 4, a software package widely used in the graphic arts for its ability to create lifelike figures (see Hugenberg & Bodenhausen, 2003, 2004). Half of the faces had African features and coloration, whereas the other half had Caucasian features and coloration. As in previous research, expressions of anger or happiness were constructed using standard controls that deflect the mouth and brows such that the two expressions were clearly identifiable as angry and happy. Expressive intensity was equated across all exemplars, regardless of race or sex. Expressions were correctly identified without error by 33 pilot participants in a nonspeeded expression identification task.

Procedure. Participants were instructed to rapidly identify the race (White or Black) of each face presented individually on the computer screen. On each trial, the participant viewed a fixation point (a plus sign) in the center of the screen for 1 s, followed by a randomly selected image of a face that remained visible until the participant made a racial categorization judgment by pressing the *a* key for "African American" or the *5* key for "European American." To enhance participants' motivation for accuracy and speed, accuracy and latency feedback were provided for 1 s following each judgment. Each White and Black exemplar was shown twice: once with an angry expression and once with a happy expression. Target faces were shown in random order, in two blocks of 32 trials each.[3]

Measures. For each trial, accuracy (correct vs. incorrect categorization) and reaction time were recorded. For each participant, total number of correct and incorrect categorization responses and mean reaction times (for correct trials) were computed for each combination of target race, target sex, and target emotion (see Table 2).

Table 2

Study 4: Mean Accuracy and Reaction Times for Racial Categorization by Target Type

Target	Accuracy (% correct) M (SD)	Latency (ms) M (SD)
Angry Black male	98.73% (3.72)	491 (90)
Happy Black male	96.70% (6.96)[a]	512 (122)
Angry White male	84.68% (14.32)	626 (150)
Happy White male	89.35% (13.94)	578 (118)[b]
Angry Black female	95.58% (7.35)[a]	543 (136)[a]
Happy Black female	96.73% (5.39)[a]	561 (153)[a,b]
Angry White female	95.76% (7.31)[a]	557 (106)[a,b]
Happy White female	96.50% (7.38)[a]	548 (112)[a]

Note. Means sharing similar superscripts are not significantly different from one another at $p < .05$.

Results

Accuracy. To test the hypothesis that Black male faces exhibiting an angry expression would be categorized more accurately than other targets, and that angry White male faces would be categorized less accurately, we predicted number of incorrect categorization responses from target emotion (angry vs. happy), target sex (male vs. female), and target race (Black vs. White) using a generalized estimating equation with a negative binomial distribution; emotion, target sex, and target race were all within-subject factors.[4] Note that, because correct and incorrect were dichotomous response possibilities, they were perfectly correlated, and therefore analyses conducted on either measure are identical. Results revealed significant interactions between target sex and target race and between emotional expression and target race (ps $< .05$). However, these were qualified by the predicted three-way interaction between emotional expression, target sex, and target race, Wald $\chi^2(1, N = 66) = 6.20$, $p = .01$.

To interpret this interaction, subsequent analyses focused on the effect of emotional expression and target race separately for male and female targets. Among female targets, there were no significant effects of emotion or race (all ps $> .15$). Among male targets, there was a significant main effect of race, Wald $\chi^2(1, N = 66) = 43.81$, $p < .001$, and a significant two-way interaction between race and emotional expression, Wald $\chi^2(1, N = 66) = 10.31$, $p = .001$. This interaction was driven by the fact that angry Black males were categorized more accurately than happy Black males, Wald $\chi^2(1, N = 66) = 6.98$, $p = .008$; angry White males, Wald $\chi^2(1, N = 66) = 46.94$, $p < .001$; and happy White males, Wald $\chi^2(1, N = 66) = 28.73$, $p < .001$. Indeed, out of all targets, angry

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[3] Participants also performed a third trial block. Substantial practice effects were observed, however, and analysis of this block revealed no significant effects. Because our interest was in spontaneous categorization processes, primary analyses were restricted to the first two blocks of trials. Analyses including all three blocks produce equivalent but slightly attenuated results.

[4] The accuracy data were highly negatively skewed with a modal response of zero incorrect categorization responses. Moreover, there was evidence of overdispersion as the variance was greater than the mean. Thus, a negative binomial distribution was used to fit the data.

Black males were categorized the most accurately. In contrast to the results for Black male targets, angry White males were categorized less accurately than happy White males, Wald $\chi^2(1, N = 66) = 4.94$, $p = .03$; angry Black males, Wald $\chi^2(1, N = 66) = 46.94$, $p < .001$; and happy Black males, Wald $\chi^2(1, N = 66) = 34.04$, $p < .001$. Angry White males were categorized the least accurately out of all the targets.

Latency. Additional analyses tested the hypothesis that, during trials on which participants correctly categorized the race of the target, Black male faces exhibiting an angry expression would be categorized more quickly than other targets, whereas angry White male faces would be categorized more slowly. We subjected participants' mean reaction times to a 2 (target emotion: anger vs. happy) $\times$ 2 (target sex: male vs. female) $\times$ 2 (target race: Black vs. White) analysis of variance (ANOVA). Results revealed a main effect of target race, an interaction between target race and target sex, and an interaction between target race and emotion (all $ps < .01$). However, these were all qualified by a trend toward the predicted three-way interaction between target race, target sex, and emotion, $F(1, 65) = 2.66$, $p = .10$.

The pattern for response latency mirrored that for response accuracy. For female targets, there were no significant effects of race or emotional expression (all $ps > .19$). For male targets, there was a main effect of target race, $F(1, 65) = 76.81$, $p < .001$, which was qualified by a significant two-way interaction between race and emotion, $F(1, 65) = 14.63$, $p < .001$. As predicted, this interaction was driven by the fact that angry Black males were categorized more quickly than happy Black males, $t(65) = -2.18$, $p = .033$, $\omega^2 = .01$; angry White males, $t(65) = -8.52$, $p < .001$, $\omega^2 = .23$; and happy White males, $t(65) = -7.77$, $p < .001$, $\omega^2 = 15$. Angry Black male faces were categorized more quickly than all other faces combined, $F(1, 65) = 88.68$, $p < .001$, $\omega^2 = .11$. In contrast, angry White males were categorized more slowly than happy White males, $t(65) = 3.20$, $p = .002$, $\omega^2 = .03$; angry Black males, $t(65) = 8.52$, $p < .001$, $\omega^2 = .23$; and happy Black males, $t(65) = 6.68$, $p < .001$, $\omega^2 = .15$. Angry White male faces were categorized more slowly than all other faces combined, $F(1, 65) = 37.45$, $p < .001$, $\omega^2 = .10$.

Discussion

Results of Study 4 suggest that target characteristics connoting possible threat (being a man and exhibiting an expression of anger) interacted to bias participants toward outgroup categorization, leading to quicker decisions and greater accuracy when those targets were in fact racial outgroup members, but slower decisions and lower accuracy when those targets were members of one's racial ingroup. That is, Black male targets exhibiting an angry expression were categorized by White participants more accurately and quickly than were other targets, whereas White male targets exhibiting the same expressions of anger were categorized less accurately and more slowly. These biases in accuracy and latency appear to reflect an initial tendency toward outgroup categorization in response to target cues indicative of threat. Thus, Study 4 provides further evidence that target attributes signaling the possible presence of threat can bias people toward categorizing targets as members of the outgroup.

Study 5

In Studies 1–4, cues of threat in the target biased people toward categorizing unfamiliar others as members of the outgroup. In Study 5, we extended our investigation to include threat-relevant factors within the perceiver. First, we manipulated the affective state of the perceiver. In one condition, participants were primed with fear; in a control condition, participants were primed with a neutral state. Second, we measured individual differences in chronic beliefs about interpersonal danger. Individuals who believe the world is full of interpersonal dangers tend to be most responsive to situational threat cues, and thus were expected to display the strongest tendency toward outgroup categorization in response to such cues.

To examine categorization bias, White participants categorized racially ambiguous, male faces that varied in emotional expression. (Given that effects in the previous studies were found only for male targets, Study 5 focused on male faces.) We predicted an interaction such that the fear manipulation would bias people toward outgroup categorization (categorizing ambiguous male faces as Black, rather than as White) when the targets exhibited an angry facial expression (as opposed to a neutral or happy expression), and consistent with previous research (e.g., Schaller et al., 2004), we expected that this effect would be most pronounced among individuals with strong beliefs about vulnerability to interpersonal danger. Thus, we predicted the greatest outgroup categorization bias when (a) perceivers were primed with fear; (b) they displayed strong chronic beliefs about danger; and (c) they viewed targets displaying an angry facial expression.

Method

Participants. Fifty-eight White undergraduates participated for course credit. One participant was excluded because he turned on the overhead lights while undergoing the fear-inducing film manipulation. Fifty-seven participants remained for analysis (31 women, 26 men).

Materials. A film clip/ambient lighting manipulation was used to elicit either a fearful, self-protective state or a neutral state. In the fear condition, participants watched a 7-min clip from *Silence of the Lambs* (Bozman, Saxon, Utt, & Demme, 1991), in which a White female FBI agent is stalked by a White male serial killer through a dark basement. This film has been shown to produce a fearful, self-protective state (Gross & Levenson, 1995; Maner et al., 2005). To boost the power of the manipulation, participants sat in a relatively dark room with no windows during presentation of the clip; ambient darkness is an ecologically relevant contextual cue associated with vulnerability to harm and has been shown to promote self-protective biases in intergroup cognition (Schaller, Park, & Mueller, 2003). In the control condition, participants viewed 7 min of time-lapsed videography of urban living from the film *Koyaanisqatsi* (Reggio & Coppola, 1983); participants viewed this clip in a well-lit room. Although the control film clip has been shown to elicit levels of arousal equivalent to those elicited by the fear clip, this arousal is not connected to any particular affective state (see Maner et al., 2005).

Target stimuli consisted of 42 male, racially ambiguous faces. Faces were created using FaceGen Modeller 3.1 (Singular Inversions, 2006), which allows the user to vary systematically a tar-

get's skin tone, facial structure, and emotional expression. All faces were created such that skin tone and facial structure reflected the midpoint between "European" and "African American." Three versions of each face were created (angry, happy, and neutral). To verify that the faces were perceived as racially ambiguous, each neutral target face was prerated by 62 undergraduates on a Likert-type scale (1 = *Very White*; 7 = *Very Black*). Average ratings ranged from 3.2 to 4.8 (*M* = 4.0). For each participant, the computer randomly selected targets with different facial expressions with the rule that each expression must be displayed 14 times and that once a target appeared with a given facial expression, the same target could not be chosen to appear again with a different facial expression (this was done to reduce possible carryover effects). All faces were pictured with identical gray backgrounds.

Procedure. Participants were greeted and brought into a lab room with no windows. Participants were run in individual sessions and were told that the purpose of the study was to investigate how perspective taking might affect how people notice subtle aspects of other people. Participants were randomly assigned to either a fear condition or control condition. In the fear condition, the room was dimly lit with a single shaded 60-W bulb; in the control condition, the room was lit by overhead fluorescent lights. Participants then watched the clip from either *Silence of the Lambs* (fear) or *Koyaanisqatsi* (control) and were instructed to imagine what the characters in the clip were feeling; these instructions were intended to boost the power of the manipulation. In the fear condition, the lamp was turned off while the participants watched the film. In the control condition, the overhead lights remained on the entire time.

After viewing the film clip, participants completed the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988) in order to assess their current affective state. Participants indicated the extent to which they currently felt a variety of emotions, including happy, grouchy, tired, nervous, calm, and the like (1 = *not at all*; 5 = *very much*). In addition to the items included in the BMIS, participants also indicated the extent to which they currently felt scared and frightened.

The experimenter then told the participant that he or she would perform a task involving the perception of subtle differences among other people. To disguise the true purpose of the study, participants were told that they would be categorizing faces along a randomly determined dimension (race, sex, or emotional expression) and that the computer would randomly assign them to one of these dimensions. In fact, the computer always assigned participants to categorize targets on the basis of race. Participants were told that they could ignore other aspects of the face (sex and emotional expression) and focus on the racial characteristics of the face. Participants were told that the faces had been computer generated to vary in their skin tone and features and that the faces had been created by combining different percentages of prototypically White and Black characteristics (e.g., 10% White, 90% Black or 60% White, 40% Black); in reality, all faces were 50% White and 50% Black. Participants were informed that they would see each face for a brief moment (1,000 ms) and then be asked to rate how Black or White the person was, using a 9-point scale (1 = 10% Black, 90% White; 9 = 90% Black, 10% White). Participants then rated the 42 faces (14 of each emotion). Average ratings were obtained for targets displaying each emotional expression (happy,

angry, and neutral). These ratings served as the primary dependent measures.[5]

Last, participants completed the Belief in a Dangerous World scale (BDW; Altemeyer, 1988), a 12-item measure used in several previous studies (e.g., Maner et al., 2005; Schaller, Park, & Mueller, 2003) to assess chronic beliefs about interpersonal danger. High scores on this measure indicate greater beliefs that the world is a dangerous place where one must protect oneself from harm (e.g., "There are many dangerous people in our society who will attack someone out of pure meanness, for no reason at all"). Average scores, after reverse scoring appropriate items, were calculated (α = .85). BDW scores did not vary by condition, indicating that responses to this scale were unaffected by the fear manipulation, *t*(55) = 1.06, *p* = .29.

Results

Manipulation check. To evaluate the effectiveness of the fear manipulation, we assessed differences between conditions on the emotion items from the BMIS. The only significant differences were observed for "frightened" and "scared,": Compared with control participants (frightened: *M* = 1.03, *SD* = 0.19; scared: *M* = 1.03, *SD* = 0.19), participants in the fear condition reported being more frightened (*M* = 1.79, *SD* = 1.10) and scared (*M* = 2.00, *SD* = 1.25; both *p*s ≤ .001). In addition to item-level comparisons, we calculated overall measures of affective valence and arousal (see Mayer & Gaschke, 1988). We did not observe differences between conditions for overall valence or arousal, *t*(55) = 0.14, *p* = .89; and, *t*(55) = 1.55, *p* = .13, respectively. Thus, effects of the manipulation were limited to increases in fear, specifically.

Omnibus analysis. A mixed-design general linear model tested the hypothesis that the fear condition (compared with the control condition) would lead to greater categorization of angry faces (but not happy or neutral faces) as Black and that this effect would be most pronounced among individuals who feel chronically vulnerable to interpersonal dangers (i.e., a three-way interaction between condition, emotional expression, and BDW). Condition and BDW served as between-subjects variables (with BDW included as a continuous independent variable); emotional expression served as a within-subjects variable.

Results revealed a significant main effect of emotional expression, *F*(2, 52) = 11.61, *p* < .01. However, this was qualified by the predicted three-way interaction between condition, emotional expression, and BDW, *F*(2, 52) = 4.27, *p* = .019. This three-way interaction was subsequently probed within a multiple regression framework.

Categorization bias as a function of threat-relevant factors. For each of the three emotional expressions, we performed multiple regression analyses in which categorization scores were predicted from experimental condition, BDW, and their centered interaction. Results confirmed the predicted pattern: For angry faces, there was a significant interaction between experimental condition and BDW (β = .28, *p* = .04). We subsequently assessed the simple effect of the fear manipulation at high (1 *SD* above the

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[5] Similar continuous measures have been used previously to measure racial categorization. Effects tend to mirror those found for "categorical" forced-choice dependent measures (Hugenberg & Bodenhausen, 2004).

mean) and low (1 *SD* below the mean) levels of BDW (*SD* = 0.60; see Aiken & West, 1991). As can be seen in Figure 1, the fear manipulation (relative to control) caused participants with high BDW scores to rate angry faces as more Black (β = .34, *p* = .08, partial r^2 = .06). Participants scoring low on the BDW scale, in contrast, showed no such effect (β = −.22, *p* = .24, partial r^2 = .03).

For happy and neutral faces, no significant main effects or interactions emerged (all *ps* > .15). Analysis of simple slopes also revealed no significant effects. Among high-BDW participants, the fear manipulation (relative to control) had no significant effects on either happy or neutral faces (happy: β = .22, *p* = .26, partial r^2 = .02; neutral: β = .12, *p* = .52, partial r^2 < .01), although the direction was the same as for angry faces. Nor were any effects of the fear manipulation observed among participants low in BDW (happy: β = −.17, *p* = .37, partial r^2 = .01; neutral: β = .15, *p* = .43, partial r^2 = .02).[6]

Discussion

Study 5 extends the previous findings by demonstrating that outgroup categorization can result from interactions among factors within the perceiver and factors within the target. The arousal of a fearful state led to increased categorization of threatening (i.e. angry), racially ambiguous male faces as Black, but only among White participants who thought they were highly vulnerable to interpersonal danger. This effect was not present among individuals less concerned about interpersonal danger. Moreover, this effect was only significant for angry faces, not for nonthreatening (i.e., happy or neutral) faces. The pattern thus supports the highly specific hypothesis that factors associated with heightened perceptions of vulnerability to harm bias people toward categorizing ambiguous others as members of the outgroup.
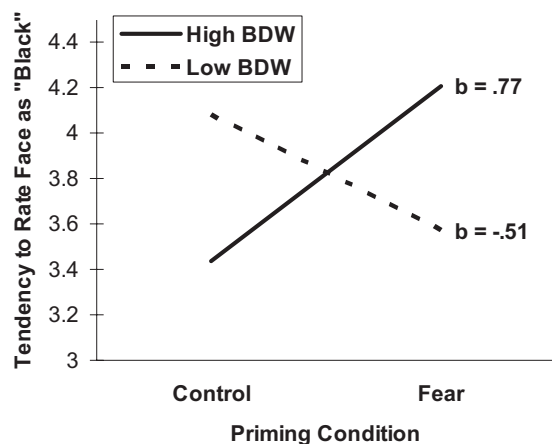

Figure 1. Study 5: Among participants with strong beliefs about vulnerability to interpersonal danger (high BDW), the arousal of a fearful, self-protective state increased the tendency to categorize racially ambiguous, angry faces as Black. No such effect was observed among participants low in BDW or for targets displaying other emotional expressions. The b statistic refers to the unstandardized regression coefficient. BDW = Belief in a Dangerous World scale.

Study 6

Thus far, our studies have focused on racial categorization. Studies 1–5 provided evidence for an outgroup categorization bias whereby threat-relevant factors led White perceivers to categorize others as Black. These findings are consistent with the hypothesis that group categorization functions, in part, to help people protect themselves from potential harm by erring on the side of caution and assuming that potentially threatening others are members of an outgroup. These findings are limited, however, by the exclusive focus on race as a basis for group categorization. Racial groups are linked with salient stereotypes, and it is possible that the findings from these studies reflect the activation of stereotypes, in addition to a more fundamental bias toward outgroup categorization. An abundance of evidence suggests that Blacks are stereotypically viewed as threatening, so priming people with threat-related cues could have activated threat-related Black stereotypes, increasing the likelihood that targets would be categorized as Black. Thus, although these findings are consistent with a functional evolutionary perspective, they might also be consistent with a pure social learning perspective involving activation of group stereotypes.

The purpose of Study 6 was to test for an outgroup categorization bias that could not be explained by a pure social learning perspective. Minimal group paradigms (e.g., Gramzow & Gaertner, 2005) afford opportunities to test for biases in intergroup cognition in the absence of learned stereotypes. From a pure social learning perspective, one would expect threat cues to increase categorization only into groups for which preexisting threat stereotypes exist. From a functional evolutionary perspective, however, one would expect threat cues to increase categorization into even an unfamiliar outgroup, particularly because unfamiliar outgroups have been a source of threat throughout history (e.g., Baer & McEachron, 1982).

Participants in Study 6 completed the same voice categorization task as in Study 1, categorizing highly masculine and slightly masculine voices into different groups. However, in the present study, instead of categorizing target voices according to race, participants categorized them according to newly formed minimal group membership. Additionally, as in Study 5, we measured individual differences in chronic beliefs about interpersonal danger. We predicted that highly masculine targets would be categorized as outgroup members more frequently than would slightly masculine targets; moreover, as in Study 5, we expected that this effect would be most pronounced among individuals with strong beliefs about vulnerability to danger.

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[6] Because previous research suggests that implicit levels of prejudice can lead to a categorization bias for faces displaying angry facial expressions (Hugenberg & Bodenhausen, 2004), we also measured implicit prejudice at the end of the session using an Implicit Associations Task (Greenwald et al., 1998). Including measures of implicit prejudice in the overall model revealed an interaction between implicit prejudice and emotional expression of the target, *F*(2, 51) = 2.48, *p* = .09, replicating previous findings (Hugenberg & Bodenhausen, 2004). Notably, however, including the implicit measure of prejudice in the model did not affect our other findings. The predicted three-way interaction between condition, emotional expression, and BDW remained significant, *F*(2, 52) = 4.25, *p* = .02, after controlling for implicit levels of prejudice.

Method

Participants. One hundred twelve undergraduates (69 women and 43 men; 81 White, 13 Black, three Asian, one American Indian, nine multiracial, and five who did not report race) participated for course credit. Five participants were excluded because they did not recall their group assignment.

Materials and procedure. Participants were informed that the purpose of the study was to investigate perceptual ability. Participants first completed a perceptual judgment task on the computer that, in reality, was used as the basis for assigning participants to minimal groups (as in Gramzow & Gaertner, 2005). Participants estimated the number of times a target symbol appeared among an array of other neutral symbols on the computer screen. Previous work suggests that participants are unaware of their level of accuracy on this task (Gramzow, Gaertner, & Sedikides, 2001). There were 12 estimation trials, with the target and the array of symbols changing across trials. Following all 12 trials, participants were told that they were either a chronic overestimator (someone who overestimated the number of targets on 10 out of 12 trials) or a chronic underestimator (someone who underestimated the number of targets on 10 out of 12 trials). The feedback they received (overestimator vs. underestimator) was randomly assigned by the computer. To increase group distinctiveness, participants were told that psychologists often classify people into overestimators and underestimators because these group memberships relate to a variety of personality characteristics (although the specific personality characteristics associated with each group were not specified).

Participants then completed the same voice categorization task used in Study 1, in which they heard male voices that were manipulated to sound more masculine and other male voices that were unaltered. Instead of categorizing voices according to race as in Study 1, participants categorized voices according to whether they believed the person was an overestimator or underestimator. To assess chronic beliefs about interpersonal danger, participants then completed the BDW ($\alpha = .83$). Last, participants completed a demographic form indicating their race, gender, and group membership (overestimator vs. underestimator).

Results

A mixed-model GLM tested for outgroup categorization—the number of times participants categorized masculinized versus unaltered voices as members of their outgroup (e.g., as overestimators if the participant was assigned to be an underestimator). Vocal masculinity (masculinized vs. unaltered) served as a within-subjects variable, and BDW served as a continuous between-subjects variable. As predicted, we observed an interaction between vocal masculinity and BDW, $F(1, 105) = 8.36$, $p = .005$, partial $\eta^2 = .08$ (see Figure 2). No main effects were observed.

We subsequently assessed the simple effects of vocal masculinity at high (1 *SD* above the mean) and low (1 *SD* below the mean) levels of BDW ($SD = 0.60$), as well as the simple effects of BDW among masculinized and unaltered voices. Consistent with predictions, participants with high BDW scores were significantly biased toward categorizing masculinized voices (relative to unaltered voices) as outgroup members, $F(1, 105) = 4.69$, $p = .03$, partial $\eta^2 = .04$. Moreover, as predicted, there was a positive correlation
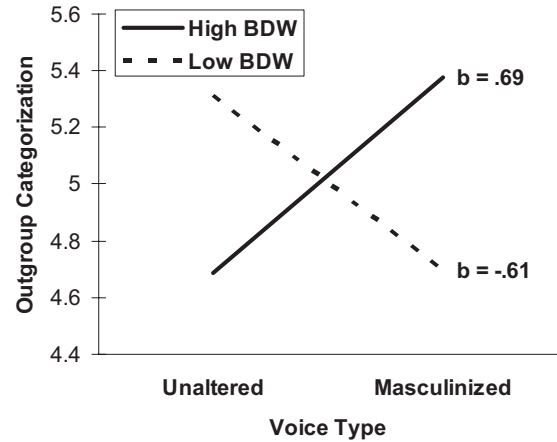

Figure 2. Study 6: Participants with high BDW scores were biased toward categorizing masculinized voices (relative to unaltered voices) as outgroup members. Participants with low BDW scores displayed a nonsignificant trend in the opposite direction. The b refers to the unstandardized regression coefficient. BDW = Belief in a Dangerous World scale.

between BDW and the number of times masculinized voices were categorized as outgroup members ($r = .24$, $p = .01$).

Unlike participants high in BDW, those scoring low in BDW displayed a nonsignificant bias toward categorizing masculinized voices (relative to unaltered voices) as ingroup members, $F(1, 105) = 3.73$, $p = .06$, partial $\eta^2 = .03$. We also found a negative correlation between BDW and the number of times unaltered voices were categorized as outgroup members ($r = -.22$, $p = .02$). This latter correlation might simply reflect a negative relationship between outgroup categorization for masculinized voices and unaltered voices ($r = -.43$, $p < .001$) such that categorizing masculine voices as outgroup members was associated with a lower likelihood of categorizing unaltered voices as outgroup members.

Discussion

Study 6 extends the previous findings by demonstrating an outgroup categorization bias even for unfamiliar, arbitrarily formed groups. In a minimal group paradigm, people who harbored beliefs about interpersonal danger responded to masculine vocal cues by displaying a bias toward outgroup categorization. Because minimal groups were used, the tendency to categorize highly masculine targets as outgroup members could not have been influenced by preexisting group stereotypes. Moreover, as in Study 5, the outgroup categorization bias was observed only among people with strong chronic beliefs about interpersonal danger. Thus, the bias again emerged as an interactive function of threat-related variables within both the target (masculinity) and the perceiver (beliefs about danger). Findings support the hypothesis that, even in the absence of group stereotypes, people display self-protective biases in outgroup categorization.

General Discussion

Categorizing the social world into ingroup and outgroup provides the basic foundation for intergroup psychology. The present

research provides new evidence that the initial categorization of other people is fundamentally influenced by the presence of factors associated with perceived vulnerability to physical danger. In these studies, threat-related factors produced a bias in outgroup categorization—a tendency to categorize others as members of an outgroup rather than as members of the ingroup. Studies 1–4 demonstrated that threat cues in the target (masculinity, movement toward the perceiver, and expressions of anger) increased White participants' tendency to categorize unfamiliar others as Black (i.e., as a member of a heuristically threatening racial outgroup). Studies 5 and 6 highlighted the additional role of factors within the perceiver (the experience of fear, chronic beliefs about interpersonal danger). We used a minimal group paradigm in Study 6 to show that the outgroup categorization bias generalized to unfamiliar groups and was not merely a function of preexisting outgroup stereotypes. In the present studies, we thus used a variety of different methods, manipulations, and dependent variables. Nevertheless, they produced a consistent pattern of findings wherein factors that heuristically signal vulnerability to physical harm elicited self-protective biases in group categorization.

Integrating Social Learning and Functional Approaches to Intergroup Psychology

This research illustrates the complementary nature of evolutionary and social cognitive approaches to intergroup psychology. The overarching hypothesis that signals of threat promote outgroup categorization stemmed primarily from an evolutionary perspective. Throughout human history, outgroup members have posed potentially dire threats to physical safety. Humans, in turn, may display psychological mechanisms designed to help deal with the possibility of outgroup threat, such as erring on the side of caution by assuming an unfamiliar person is an outgroup member and thus a potential threat, even if he or she is not.

Indeed, the psychological residue of intergroup conflict can be observed in contemporary psychological processes. The present studies suggest that the mind is especially sensitive to ecologically relevant social cues (e.g., masculinity, angry facial expressions) and internal factors (e.g., the experience of fear) that, throughout human history, signaled the presence of potential danger. The presence of these factors appears to modify the manner in which others are categorized, thus altering the psychological boundary between "us" and "them."

Study 6 demonstrated the outgroup categorization bias for unfamiliar, arbitrarily formed groups—groups for which stereotypes were not available. The findings thus cannot be explained by a pure social learning perspective, which focuses on the activation and application of group stereotypes. It is important to note, however, that although we have ruled out a *pure* social learning perspective, we do believe that social learning provides important psychological inputs into the phenomenon. The role of social learning, for example, becomes apparent when comparing the findings of Study 6 with the findings of Study 1. In Study 6, we observed the minimal group categorization bias only among people with strong beliefs about danger; in Study 1, which pertained to racial group categorization, a bias was observed among the sample as a whole. With a familiar racial outgroup (Blacks), there is a well-formed threat-related stereotype of which most White people are aware. In the absence of any stereotype (as in minimal

groups), there may be greater room for the role of individual differences in threat-related schema. This is similar to Maner et al. (2005), who found a bias against Blacks (a relatively familiar outgroup) among White participants generally, but a bias against Arabs (a relatively less familiar outgroup) only among individuals inclined to associate Arabs with threat. Thus, with familiar outgroups, socially learned stereotypes about threat may lower the general threshold at which observers display self-protective cognitive biases.

Social learning also plays a critical role in determining the specific markers that define group memberships. Indeed, although people may display a universal tendency to perceive the social world in terms of coalitional ingroups and outgroups (Van Vugt et al., 2007), how one defines those groups depends on local learning environments (Cottrell & Neuberg, 2005; Kurzban et al., 2001). For example, it is unlikely that people are "hardwired" to categorize others on the basis of race, given that distance and geographical boundaries would have prevented morphologically dissimilar ancestral groups from coming into contact. Rather, local environments and cultural norms designate the particular cues that signal group membership (Cosmides et al., 2003).

Socially learned stereotypes may also play a role in determining what groups are relatively immune to threat-related biases in intergroup cognition. The present studies provided evidence for outgroup categorization targeting both novel groups and groups for which there were threat-related stereotypes. Yet, some groups may be associated with stereotypes that specifically designate the group as nonthreatening. It seems unlikely that threat cues would lead people to categorize others as belonging to a group (e.g., kindergarten teachers) heuristically associated with nonthreatening traits (e.g., nurturance and warmth). Thus, although social learning perspectives and evolutionary perspectives have often been (mis-)portrayed as contradictory, there are many reasons to believe that they are, in fact, quite complementary. An integration of these two perspectives is likely to provide a broader understanding of social cognition.

Distinctions Between the Present Work and Other Threat-Based Approaches

The study of intergroup processes has produced a number of theories pertaining to how perceptions of group membership can shape cognition and behavior, and some of these theories are based on some form of threat-related framework (Stephan et al., 2002; Stephan & Stephan, 2000). Social identity theory (Brewer, 1979; Tajfel, 1978; Tajfel & Turner, 1979), social dominance theory (Pratto, Sidanius, Stallworth, & Malle, 1994; Sidanius & Pratto, 1999), and realistic group conflict theory (Campbell, 1965; Levine & Campbell, 1972; Sherif, 1966), for example, all presume that intergroup processes are shaped in part by the threats that outgroups potentially pose. Such theories have tended to focus on how particular kinds of threat (e.g., threats to self-esteem or social dominance) serve as a source of intergroup conflict, stereotyping, and prejudice.

The present framework, in contrast, focuses specifically on the role of physical conflict among groups and ties the psychological importance of such conflict to a long evolutionary history of recurrent intergroup rivalry. In doing so, the present framework enabled us to derive novel hypotheses about the particular kinds of

ecologically relevant physical threat cues that may affect the categorization of other people into ingroup and outgroup. Moreover, whereas previous approaches have tended to focus on how self-threats may shape "downstream" forms of social cognition (e.g., stereotyping and prejudice), the present research focused on the hypothesis that physical threat cues engage basic lower order perceptual processes aimed at reducing vulnerability to harm (cf. Castano et al., 2002; Leyens & Yzerbyt, 1992). The framework developed in the present article, therefore, complements and significantly extends previous conceptualizations of intergroup threat.

Person × Situation Interactions in Outgroup Categorization

A large literature suggests that goal-directed cognitive processes are fundamentally shaped by interactions between aspects of the person and the situation (e.g., Maner, Miller, Rouby, & Gailliot, 2009; Schaller, Park, & Faulkner, 2003). Consistent with this theme, in two of the present studies, personal beliefs about danger moderated the degree to which situational threat cues elicited a bias toward outgroup categorization. These findings fit with theory and evidence suggesting that, although all people may possess psychological mechanisms designed to help them avoid forms of threat, contextual factors that activate these mechanisms can interact with a person's chronic social schemas to guide self-protective responses.

Individuals with strong beliefs about vulnerability to physical danger responded to threat cues by categorizing unfamiliar others as outgroup members. Interestingly, we noted an opposite (though weaker and less consistent) trend among individuals especially low in perceived vulnerability to danger. Among those individuals, threat cues tended to decrease (not increase) the likelihood of outgroup categorization. Others have documented similar effects among individuals displaying low levels of perceived vulnerability to harm (Schaller, Park, & Faulkner, 2003; Schaller, Park, & Mueller, 2003). Schaller, Park, and Mueller (2003), for instance, reported that, among such individuals, threat cues reduced the activation of negative threat-related stereotypes about Blacks. One possible explanation is that, just as individuals high in perceived vulnerability to danger may (perhaps unrealistically) overestimate the degree to which interpersonal threats exist, individuals at the other end of the spectrum may (perhaps unrealistically) underestimate the degree to which interpersonal threats exist. Among those individuals, the presence of heuristic threat cues might activate a schema associated with safety rather than with danger. This speculation would benefit from direct examination in future research.

Implications for Higher Order Intergroup Processes

Intergroup psychology is firmly grounded in the process of group categorization. Categorizing an individual as belonging to a particular group provides an impetus for subsequent forms of intergroup cognition such as stereotyping and prejudice. As such, the outgroup categorization bias identified here may have important implications for downstream psychological and behavioral processes associated with intergroup interaction. Many studies document negative prejudices directed at members of particular outgroups (e.g., Crosby, Bromley, & Saxe, 1980; Devine, Plant, &

Harrison, 1999; Greenwald, McGhee, & Schwartz, 1998). To the extent that self-protective factors increase the likelihood of categorizing someone as an outgroup member, these factors may pave the way for increased prejudice and discriminatory behavior.

The present research has particular implications for behavior within situations that evoke self-protective concerns. The judicial and law enforcement systems, for example, are often rife with situations that can make a person feel unsafe. A jury member sitting through a murder trial and a police officer chasing a criminal suspect are likely to be primed with a strong desire to protect him- or herself from harm. Previous research has shown that responses in these situations can be influenced by a target's race. The more stereotypically Black a criminal defendant appears, the more likely White individuals are to sentence him to death (Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006). Moreover, Whites are likely to mistakenly shoot an unarmed criminal suspect if the suspect is Black (Correll et al., 2002; Plant, Peruche, & Butz, 2005). The present findings suggest that self-protective motives could amplify perceptions of others as Black, thus increasing the likelihood of such responses. This process could have negative consequences for defensive responses in real-life situations involving perceptions of physical threat. Future research would benefit from directly exploring this possibility.

The present findings also have implications for responses to the growing number of multiracial individuals. The son or daughter of a racially mixed couple may exhibit a blend of phenotypic characteristics, making racial categorization of that individual relatively difficult. Several studies have begun to explore how such individuals are perceived and categorized by others (Eberhardt et al., 2003; Hugenberg & Bodenhausen, 2004; Peery & Bodenhausen, 2008). The present research adds to this literature by suggesting that threat-relevant factors may increase the likelihood that those individuals are initially perceived as members of a racial outgroup, which could have important implications for their self-esteem and perceptions of discrimination (Herman, 2004). Additional research is needed to examine this possibility directly.

Limitations and Future Directions

Limitations of the present research provide useful avenues for future research. One limitation involves our focus on a limited number of social groups. In contemporary American society, many Whites heuristically associate Blacks with hostility and physical threat (e.g., Madon et al., 2001). The use of Black targets in the majority of these studies therefore constituted strong tests of our hypotheses. However, Blacks are not the only racial/ethnic group associated with threat. Arab Americans, for example, have become increasingly associated with threat (Maner et al., 2005), and therefore it is plausible that the outgroup categorization bias identified in these studies would generalize to Arab Americans. Moreover, the present research suggests that the bias investigated here is not unique to groups defined by race or ethnicity (as demonstrated by the minimal group findings in Study 6). Future studies would benefit from exploring the extent to which the present findings generalize to a range of social groups.

A second limitation pertains to the specific threat cues we examined in the present studies. The factors that can indicate threat are numerous and potentially complex. For example, although expressions of anger can communicate interpersonal threat, a tar-

get's eye gaze (whether the person is looking at or away from the perceiver) can dramatically alter the meaning of a person's angry facial expression (Richeson, Todd, Trawalter, & Baird, 2008). We have examined only a subset of the possible cues that communicate physical threat, and future research would benefit from investigating effects associated with a wider range of heuristic threat cues.

A third limitation involves our focus on only one particular type of threat—the threat of physical harm. As others have pointed out (e.g., Cottrell & Neuberg, 2005), outgroups can pose a multitude of different threats, ranging from economic threats to threats involving social coordination. The framework developed in the present article paper could be profitably applied to a range of different types of threat. For example, to the extent that a certain threat (e.g., economic threat) is reliably signaled by particular cues (e.g., imbalance in group resources; resource scarcity), the presence of those cues could shape the psychological boundary used to delineate one's own group from outgroups heuristically associated with that type of threat (e.g., increasing categorization of others into an economically threatening outgroup).

Conclusion

Humans are a highly social species, and, at any given time, one may encounter a complex diversity of other people. The present research indicates that how people initially categorize others into ingroup and outgroup is influenced by ecologically relevant factors—associated with both the target and the perceiver—suggesting a need to protect oneself from harm. In the present studies, threat-relevant factors produced an outgroup categorization bias—a tendency to see other people as members of the outgroup rather than as members of the ingroup. This tendency reflects a psychological mechanism designed to protect the self from harm. Thus, just as physical walls, barriers, and borders have been used throughout history to protect ourselves from interpersonal threats, the psychological boundaries we place between "us" and "them" may serve a similar purpose.

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