

## Functional Projection: How Fundamental Social Motives Can Bias Interpersonal Perception

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Results from 2 experimental studies suggest that self-protection and mate-search goals lead to the perception of functionally relevant emotional expressions in goal-relevant social targets. Activating a self-protection goal led participants to perceive greater anger in Black male faces (Study 1) and Arab faces (Study 2), both out-groups heuristically associated with physical threat. In Study 2, participants' level of implicit Arab-threat associations moderated this bias. Activating a mate-search goal led male, but not female, participants to perceive more sexual arousal in attractive opposite-sex targets (Study 1). Activating these goals did not influence perceptions of goal-irrelevant targets. Additionally, participants with chronic self-protective and mate-search goals exhibited similar biases. Findings are consistent with a functionalist, motivation-based account of interpersonal perception.

Almost a century ago, Sigmund Freud proposed that people sometimes engage in a process he called *projection*: attributing their own unacceptable emotions and desires to someone other than themselves (Freud, 1915/1957; cf. Newman, Duff, & Baumeister, 1997). The concept of projection shows up in other conceptual guises as well. For instance, activating particular emotions and goals can lead people to overperceive similar emotions

and goals in others (e.g., Kawada, Oettingen, Gollwitzer, & Bargh, 2004; Niedenthal, Halberstadt, Margolin, & Innes-Ker, 2000). One common denominator in these existing approaches to projection is some presumed similarity between self and other. In the present research, we examined a qualitatively different form of emotional projection—one in which the arousal of specific motivational states leads people to perceive emotions in others that are not necessarily identical to their own (in fact, they often may be quite different) but that are nonetheless functionally related to their own motivational states. We refer to this phenomenon as *functional projection*.

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### The Functional Projection of Emotion

The logic underlying this hypothesized phenomenon is rooted in theory and research pertaining to the functions, physiological concomitants, and cognitive consequences of human emotions. The capacity for specific emotional experiences evolved in humans and other animals because these specific emotional experiences helped their ancestors navigate the challenges of everyday existence. Thus, the experience of specific emotions has been functional to the survival of individuals and the reproduction of their genes (Buck, 1999; Darwin, 1872; Ekman, 1982; Panksepp, 1982; Plutchik, 1980; Tomkins, 1982). Emotional experiences are

functional, in part, because they serve as salient forms of information, signaling specific problems to be solved or goals to be attained. Emotions promote specific motivational states (defined by the engagement of goal-consistent physiological and cognitive reactions) facilitating behavioral responses that are functionally relevant to the solution of those problems or satisfaction of those goals (Carver & White, 1994; Watson, Wiese, Vaidya, & Tellegen, 1999).

Some emotional states act as signals that specific kinds of agonistic or avoidant behaviors would be functional in the current situation. For example, fear is associated with a self-protective motivational state; it signals the presence of a potential threat to be avoided and promotes psychological responses that help individuals to reduce their vulnerability to that threat (Buck, 1999). Other emotional experiences signal the functional utility of specific affiliative or approach behaviors. For instance, the affective experience of sexual/romantic arousal promotes psychological responses that increase the likelihood of intimate interpersonal contact (e.g., Stephan, Berscheid, & Walster, 1971). Functionally speaking, therefore, emotions and motivations are intrinsically linked—they are, in one sense, two sides of the same coin.

Many different types of motives can influence cognition (e.g., Kruglanski, 1989; Kunda, 1990). Indeed, the temporary activation of goal-relevant emotions can shape the way people attend to, encode, and interpret information about others. Among the many kinds of social perceptions that may be functionally influenced by one's emotions are perceptions of other persons' emotional states. People are adept at "reading" faces—at inferring others' emotional states from the specific expressions observed on those individuals' faces (Ekman, 1982). The emotions expressed by others can act as rich sources of information, indicating, for example, whether those people intend to harm us, hide from us, or befriend us. Nevertheless, there is abundant evidence that the detection of other people's emotions may be biased by various kinds of "top-down" influences, including the affective state of the perceiver (Niedenthal & Halberstadt, 2003; Niedenthal, Halberstadt, & Innes-Ker, 1999).

Taken together, these lines of inquiry suggest that people may perceive emotions in others that are functionally related to their own emotional states: When a specific emotion (and its allied motivational state) is aroused, a perceiver may be especially likely to detect in others' faces whatever emotions could inspire goal-consistent reactions on the part of the perceiver. Sometimes those functionally relevant emotions may be similar to their own (e.g., the arousal of some affiliative affective state may motivate perceivers to detect a similar affiliative emotion in others), but sometimes that functionally relevant emotion may be qualitatively different.

A functional approach to emotional projection demands that we bear in mind the possibility that different target persons may not be equally relevant to the satisfaction of specific goal states. Consequently, depending on the specific emotional-motivational state of the perceiver, it is possible to deduce hypotheses identifying specific categories of individuals to whom the functional projection of emotion is particularly likely to apply.

### Fundamental Social Motives

What specific emotions and goals might engender the functional projection of emotion, and what specific types of social targets might elicit this type of perceptual bias? There are many concep-

tual frameworks that might be used to derive testable hypotheses to address these questions. One useful metatheoretical framework is that of evolutionary psychology. From an evolutionary perspective, the goals having the most immediate impact on the perception of other people are likely to be those that over the course of human evolutionary history have been most closely linked to adaptive outcomes in social groups (Bugental, 2000; Kenrick, 1994; Kenrick et al., 2002; Kenrick, Li, & Butner, 2003; McArthur & Baron, 1983). Given their centrality to evolutionary processes, one might expect that motivational states linked to survival and reproductive success would often direct the selective processing of social information. Most empirical investigations based on this reasoning, however, have addressed hypotheses pertaining to behavior or to conscious and deliberate higher order social-cognitive processes—logical reasoning, overt judgment, and behavioral decision making (e.g., Buss, 1989; Cosmides & Tooby, 1992; Kenrick, Neuberg, Zierk, & Krones, 1994). There has been relatively less empirical research examining the impact of survival- and reproduction-relevant goal states on the lower order processing of social information (e.g., processing of others' emotional states).

Evolutionary perspectives can also help bring to light the specific social targets onto which functionally relevant emotions might be projected (e.g., Schaller, Park, & Mueller, 2003; Stevens & Fiske, 1995). Research inspired by these perspectives suggests that the processing of social stimuli is often domain specific—particular motives lead certain classes of social stimuli, but not others, to be selectively processed (e.g., Kenrick, Maner, & Li, in press). These perspectives, therefore, can help generate predictions about what specific types of social targets might be selectively encoded when particular motives are activated (Kenrick & Maner, in press).

Because evolutionary perspectives highlight the specific social affordances communicated by particular emotional expressions (Ekman, 1982; Plutchik, 1980), these perspectives can also help generate predictions about which emotions might be projected onto others when specific motivational states are activated. These perspectives suggest that the emotions one might project onto others should be quite specific—they are likely to be predominantly those that are functionally relevant to one's own motivational states.

From an evolutionary perspective, the processing of others' emotions might frequently be shaped by a number of key social motives, including self-protection, seeking and maintaining romantic relationships, coalition building, and striving for status (Bugental, 2000; Kenrick, Becker, et al., 2003). The present research focused on two of these motives: protecting oneself from harm and seeking a romantic partner. Each of these motives is intimately tied to a specific, phenomenologically rich affective state: Self-protection is associated with fear, and mate search is associated with sexual arousal. In the following sections, we consider the potential consequences of these fundamental emotional-motivational states for the functional projection of emotion. In doing so, we draw further on the logic of evolutionary psychology to derive hypotheses that specify (a) the specific emotion that is likely to be projected onto others and (b) specific categories of targets that are likely to be the focus of these functional projection effects.

### Self-Protective Motivation and the Functional Projection of Anger

The Greek playwright Sophocles once wrote, "To a man who is afraid, everything rustles." Indeed, research and theory have suggested that self-protection goals might lead people to selectively process signals of potential physical threat. For example, abundant evidence has suggested that people selectively attend to angry faces (e.g., Hansen & Hansen, 1988; for a review, see Öhman & Mineka, 2001). Furthermore, physically abused children who have experienced high levels of hostility and who are therefore attuned to potential threat in the social environment are particularly adept at identifying facial displays of anger (Pollak & Sinha, 2002).

Numerous studies, then, have suggested a link between self-protection motives and perceptual hypervigilance to the emotion of anger in others. This is consistent with a functionalist perspective: To avoid potential harm, individuals must first recognize signs of harm-doing potential in others, and facial expressions of anger offer a powerful signal of that potential (Ekman, 1982). Moreover, following the adaptive reasoning of error management theory (Haselton & Buss, 2000), a failure to identify an actual threat (a *false negative*) is generally a more costly error than the assumption of threat when none exists (a *false positive*), and so there may be a tendency to perceive anger even in the absence of any clearly angry facial expression.

Indeed, fear-inducing circumstances (e.g., walking down a dark alley in an unfamiliar part of town) are often ambiguous—it is not always clear whether a true threat exists, what form it will take, or where it will come from. Experiencing fear should thus engage a cognitive strategy characterized by a biased vigilance to potential threats in the environment, which at times might even lead one to perceive danger where none is actually present. This bias should, on average, reduce the likelihood that one will fall victim to harm. There is evidence that similar biases—seeing a person holding a gun, for example, when no gun is actually present—can lead people to engage in self-protective behavior (Correll, Park, Judd, & Wittenbrink, 2002).

Detecting anger in others is not without costs, however. The detection of anger in others is likely to stimulate physiological, cognitive, and behavioral responses to that perceived threat; these responses consume limited and energetically costly resources that might otherwise be allocated to the satisfaction of other goals. Consequently, when a fearful self-protective state is aroused, it may be most functional to perceive anger specifically in the faces of individuals who, on the basis of other available information, are prejudged to be especially likely to pose some sort of threat.

Throughout much of human history, members of hostile out-groups have posed threats to oneself and members of one's group (e.g., Baer & McEachron, 1982; Daly & Wilson, 1988; Schaller, Park, & Faulkner, 2003). It has been argued that the human mind evolved to be especially efficient at learning perceptual features that distinguish between coalitional in-groups and out-groups, and once learned, those features exert a substantial impact on expectations and beliefs about individuals bearing those features (Kurzban, Tooby, & Cosmides, 2001; Schaller, Park, & Mueller, 2003). In many contemporary cultural contexts, markers of ethnicity are among the most salient features of coalitional group status. There is abundant evidence that in the absence of additional information to the contrary, membership in certain ethnic out-groups may

heuristically signal potential threat (e.g., Hugenberg & Bodenhausen, 2004; Payne, 2001). Further, there is evidence that when self-protective states are aroused, prejudicial perceptions of certain ethnic out-groups are exaggerated (e.g., DeSteno, Dasgupta, Bartlett, & Caidrie, 2004; Schaller, Park, & Faulkner, 2003). These lines of research suggest the general hypothesis that when a self-protective motive is aroused, people will be particularly likely to detect anger in the faces of ethnic out-group members.

Although humans may be generally predisposed to form prejudicial preconceptions linking coalitional out-groups to threat, there is likely to be considerable individual variation in the activation of this tendency. First, out-group vigilance does not necessarily apply in an equivalent manner to all members of a given out-group. For example, although Blacks are heuristically associated with physical threat in the minds of many Whites (Madon et al., 2001), prejudices of Whites toward Blacks and the stereotypes of criminality and aggressiveness are directed disproportionately toward Black men (e.g., Quillian & Pager, 2001; see also Sidanius & Veniegas, 2000). We expected, therefore, that in out-groups for which males, in particular, are targeted by negative threat-related stereotypes, the projection of anger should occur more strongly for males of those out-groups.

Second, there may be individual differences in the extent to which people associate threat with a given out-group. Indeed, people in modern societies frequently encounter members of numerous ethnic out-groups, and many of them are not perceived as posing immediate threats. The tendency for fearful self-protective individuals to functionally project anger in the faces of ethnic out-group members, therefore, may be moderated by the extent to which those observers associate threat with those out-groups. The projection of anger should occur most clearly among observers who strongly associate the out-group with threat. This would be consistent with evidence that self-protection goals lead people to report greater threat-related stereotypes of heuristically threatening out-groups but not of out-groups that are perceived as less threatening (Schaller, Park, & Mueller, 2003).

### Mate-Search Motivation and the Projection of Sexual Arousal

Differential success in mating is a key component of the evolutionary process for all sexually reproducing organisms. It stands to reason, therefore, that cognitive resources would be strongly attuned to potential mating opportunities, particularly when a mate-search motive and its associated affective state are aroused. Consistent with this functional perspective, chronically active mate-search goals lead observers to attend selectively to desirable members of the opposite sex (Maner et al., 2003).

What might be the emotion-perception consequences of arousing a mate-search motive? Some clues are provided by evidence supporting theories of differential parental investment (Trivers, 1972) and error management theory. Theories of differential parental investment imply that because men have a lower level of initial obligatory parental investment than women, men tend to be somewhat less selective in choosing their mates and to seek relatively greater numbers of short-term sexual partners. These theories are consistent with empirical evidence suggesting that compared with women, men are more inclined to seek out relatively greater numbers of short-term sexual partnerships (e.g., Buss

& Schmitt, 1993; Clark & Hatfield, 1989; Kenrick, Sadalla, Groth, & Trost, 1990; Regan, 1998). Drawing on the evolutionary logic of differential parental investment, Haselton and Buss (2000) theorized that throughout evolutionary history, it may have been adaptive for men to overestimate levels of sexual interest in potential mating partners (for that could inspire them to initiate potential sexual interactions; M. M. Moore, 1985), whereas it would not have been adaptive for women to make the same error. Their findings confirmed these expectations: When observing the behavior of opposite-sex targets, men overestimated the targets' level of sexual interest; a parallel bias was not exhibited by female observers (Haselton & Buss, 2000).

In line with these findings, we expect that a mate-search goal may lead men, in particular, to perceive a desirable other as sexually aroused. Different evolutionary models of mate selection, however, generate somewhat different predictions with respect to what types of female targets might elicit a sexual overperception bias among male perceivers. The logic of differential parental investment (Trivers, 1972) implies that men might tend to relax their standards quite a bit in the context of short-term sexual partnerships. Indeed, evidence suggests that men do tend to lower their standards when seeking short-term mates (Kenrick et al., 1990; Kenrick, Groth, Trost, & Sadalla, 1993; Regan, 1998). As a consequence, one might expect mate-search goals to elicit among men the perception that women are sexually aroused regardless of the extent to which those women appear to possess attractive qualities.

However, findings that men are willing to be less discriminating in choosing sexual partners do not imply that they lack strong preferences. A good deal of evidence also suggests that men are strongly inclined to favor women who possess signs of youth and fertility (e.g., Buss & Schmitt, 1993; Kenrick et al., 1994; Kenrick & Keefe, 1992). Female physical attractiveness acts as a strong cue to these qualities. Indeed, men tend to prioritize physical attractiveness for both short- and long-term relationships and would, all things being equal, prefer an attractive partner even for a short-term relationship (Li, Bailey, Kenrick, & Linsenmeier, 2002). Moreover, although mating involves higher costs for women than for men, it is not cost free for men. For example, pursuing any given partner involves some energy expenditure, and it reduces resources and time for pursuing other partners and other goals. Men might therefore be expected to selectively perceive sexual arousal in highly attractive females. This is consistent with evidence suggesting that given a range of potential mates, men tend to focus on highly attractive women (Maner et al., 2003).

### Overview of the Current Research

In the present studies, we examined the extent to which self-protection and mate-search goals might lead observers to project functionally related emotions onto goal-relevant social targets. Study 1 focused on both self-protection motives and mate-search motives. An experimental manipulation was used to temporarily arouse each kind of motive, and participants were asked to judge the emotions evident in the faces of target persons who varied along dimensions of ethnicity (Black or White), sex, and physical attractiveness. Study 2 focused exclusively on the consequences of

a self-protective motive. This study was designed to assess the extent to which the self-protection findings of Study 1 might generalize to perceptions of a different ethnic out-group (Arabs), and also to explicitly examine the moderating effect of individual differences in stereotypic expectations about the out-group.

In addition to examining the hypothesized effects of the experimental manipulation, both studies used additional methods to assess conceptually relevant individual differences, allowing us to explore the extent to which chronic goal states might mimic or interact with the effects of temporarily aroused motivations. From a functionalist perspective, chronically and acutely activated motives should operate in a parallel fashion, both eliciting cognitive biases that could serve to facilitate goal-consistent responses.

### Study 1

In this experiment, we activated self-protection, mate-search, or neutral motivational states by having participants view film clips designed to elicit motivation-specific emotions. Participants then viewed male, female, White, and Black faces of varying attractiveness and judged the emotions they believed were expressed in each target's face. All targets actually held neutral facial expressions. Additionally, to assess projection biases associated with chronically active goals, we obtained measures linked to chronic self-protective and mate-search motivation.

With respect to self-protection, we predicted that activating a self-protection motive would lead White participants to perceive greater amounts of anger in Black male faces but not in other target faces (e.g., White males, Black females). This prediction was consistent with past research (Quillian & Pager, 2001; Sidanius & Veniegas, 2000) as well as pretest data collected from a separate sample within our own participant population suggesting that White participants tend to heuristically associate Black males (more than Whites or Black females) with physical aggressiveness. We also predicted that participants with chronic self-protective motivation would exhibit the same bias, even in the absence of an acutely induced goal state.

Hypotheses bearing on the consequences of a mate-search motive were as follows: If participants respond in line with a simple consideration of sex differences in obligatory parental investment, then the activation of a mate-search goal is likely to lead male participants (but not female participants) to perceive heightened levels of sexual arousal (but not other emotions) in opposite-sex faces (but not in same-sex faces), regardless of targets' physical attractiveness. However, in line with other research suggesting that men are particularly schematic for physical attractiveness in women (Maner et al., 2003; Li et al., 2002), one might also expect this effect to be more specific to opposite-sex faces that are physically attractive. We also predicted that sexually unrestricted participants, compared with more restricted participants, would perceive greater degrees of sexual arousal in opposite-sex targets, even in the absence of a situationally induced goal state. Compared with those with a restricted sociosexual orientation, people with an unrestricted sociosexual orientation are generally more inclined to engage in numerous short-term sexual relationships without a need for emotional commitment. Unrestricted individuals, therefore, should have somewhat more to gain from overestimating the level of sexual interest in members of the opposite sex (cf. Haselton & Buss, 2000). Finally, a consideration of findings that people tend

to focus primarily on members of their own race as potential mates (Li & Kenrick, 1998) would lead to the expectation that these biases might be most powerful for perceptions of opposite-sex members of one's own race.

### Method

**Participants.** One hundred five White undergraduate psychology students participated in the study.<sup>1</sup> Data from 7 participants were excluded from analyses because they were personally acquainted with one or more of the targets ( $n = 2$ ), left greater than 50% of data missing ( $n = 2$ ), or reported knowledge of the specific hypotheses of the study during debriefing ( $n = 3$ ). Ninety-eight participants remained for analysis (40 men, 58 women).

**Design.** Each participant was randomly assigned to view a film clip designed to elicit a mate-search motive, a self-protective motive, or no particular motive (control). Each participant then viewed a series of target faces that included male and female Whites and Blacks; these faces had been pre-rated as either physically attractive or average in attractiveness. Thus, the overall experimental design of the study was a 3 (motivational state: mate search, self-protection, control)  $\times$  2 (participant sex; between subjects)  $\times$  2 (target sex; within subjects)  $\times$  2 (target race: White, Black; within subjects)  $\times$  2 (target attractiveness: attractive, average; within subjects) design.

**Materials.** Film clips were used to elicit self-protective or mate-search motivation. The self-protection clip included scenes from *Silence of the Lambs* (Bozman, Saxon, Utt, & Demme, 1991), in which a White male serial killer stalks a White female FBI agent through a dark basement. This clip has been previously demonstrated to elicit high levels of fear (Gross & Levenson, 1995). The mate-search film clip included scenes from *Things to Do in Denver When You're Dead* (Cantin, Weinstein, Weinstein, & Fleder, 1995), in which an attractive White man and woman meet and have a romantic first date. The control clip, from the film *Koyaanisqatsi* (Reggio & Coppola, 1983), included time-lapsed videography of urban living (e.g., people going up and down on an escalator, people working on an assembly line), accompanied by orchestral music. The film clips ranged from approximately 6.0 to 7.5 min.

The 16 target photos included facial snapshots of male and female White and Black undergraduate students. Two of each target type (e.g., attractive White female, average Black male) were included. Photos were pre-rated by 8 White male and 11 White female undergraduates for their level of physical attractiveness and level of perceived facial affect. Targets were selected so that the level of physical attractiveness was equivalent across target sex and target race categories. Furthermore, we included only targets for whom low levels of expressed affect were reported (below 3 on a 9-point Likert scale).

**Procedure.** Each participant was greeted individually by a female experimenter and seated in the lab. The room was dimly lit with a single shaded 60-W bulb, creating an atmosphere that depending on context could be consistent with either a sexual/romantic or fear-inducing state. The participant was told that the study investigated how people are able to perceive subtle emotional microexpressions in other people's faces, even when those people are trying to hide their emotional expression. The participant then watched one of the three film clips and was instructed to imagine what the characters in the clip were feeling. The experimenter left the room while the participant viewed the clip.

Once the clip was over, the experimenter reentered the room and told the participant that he or she would view a series of photos. The experimenter then made the following statement:

Each person you will see was instructed to relive in their mind some very emotionally arousing event in their life, a time in their life that caused a strong emotional reaction. Once they were really feeling the emotions of that event again, we asked that they cover up their

emotions by putting on a neutral facial expression. Then we took their picture. Remember though, that research has shown that emotions, in general, can still be detected because people can subconsciously notice subtle microexpressions on people's faces. People are especially accurate when they make their judgments based on their immediate gut reaction about what the emotion is, so you should try to go with your gut reactions to the people in the photos.

The experimenter then left the room and the participant began viewing the faces. The 16 target faces were viewed on a computer monitor in randomized order. Each face was presented for 1 s. For each face, participants recorded their perceptions of the targets' emotions, using a mouse to indicate their responses to the computerized questionnaire.

Once the participant finished responding to each of the target faces, the experimenter reentered the room and asked the participant to complete both the Belief in a Dangerous World scale (BDW; Altemeyer, 1988) and the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991). The experimenter again left the room while the participant completed these scales. Once participants completed these questionnaires, they were carefully probed for suspicion, debriefed, given their credit, and dismissed.

**Measures.** After viewing each target face, participants rated the extent to which they believed the target was (a) sexually aroused, (b) angry, (c) frightened, and (d) happy. Measuring perceptions of sexual arousal and anger allowed us to directly test hypotheses implied by the functional projection model. In addition, we measured perceptions of fright so that we could assess the possibility of more straightforward projection effects—in particular, the possibility that participants experiencing fear might perceive the same state in others. We measured perceptions of happiness so that we could differentiate perceptions of sexual arousal from perceptions of another, more general positive state. All responses were recorded using 9-point Likert scales with endpoints 1 (*not at all*) and 9 (*very much*). These measures served as the primary dependent variables.

The BDW is a 12-item scale measuring the extent to which one believes the world is a dangerous place in which one must frequently protect oneself from physical harm. Example items include "There are many dangerous people in our society who will attack someone out of pure meanness, for no reason at all" and "Every day as our society becomes more lawless and bestial, a person's chance of being robbed, assaulted, and even murdered go up and up." A BDW score was assigned to each participant by averaging responses to all items on the scale (after reverse scoring appropriate items;  $\alpha = .76$ ).

The SOI measures the extent to which one exhibits unrestricted sexual attitudes and behavior, in particular one's willingness to engage in casual sexual partnerships. Unrestricted versus restricted sociosexual orientations reflect key differences between mating strategies aimed at facilitating multiple short-term sexual relationships versus more committed long-term relationships, respectively. Example items include "Sex without love is okay" and "With how many different partners do you foresee yourself having sex during the next 5 years?" SOI scores were assigned to participants using the within-sex z-scoring method established by Simpson and Gangestad (1991). Greater scores on the SOI indicate a greater degree of sexual unrestrictedness.

Additionally, to assess the effects of watching the film clips, self-reported measures of affect were collected from approximately half of the participants ( $n = 43$ ). Immediately after they viewed the film clip, these participants indicated the extent to which they were experiencing fear, sexual arousal, romantic arousal, interest, tension, and happiness. Re-

<sup>1</sup> So as not to exclude minority students or sensitize our White participants to the relevance of race to the study's hypotheses, we allowed individuals of all groups to sign up and participate. Because our hypotheses pertained only to White participants, however, we included only Whites in the analyses. The small non-White sample size did not provide adequate power to conduct separate analyses for those participants.

sponses to these items were measured using 7-point Likert scales, with endpoints 1 (*not at all*) and 7 (*very much*).<sup>2,3</sup>

## Results

**Manipulation checks.** Self-reported measures of affect confirmed that the film clips were effective in eliciting the desired target states in participants. Means and standard deviations for these affect items are provided in Table 1. Compared with those in the control condition, participants viewing the self-protection clip reported significantly more fear, more tension, more interest, and less happiness (all  $ps < .01$ ). Compared with controls, participants viewing the mate-search film clip reported significantly more sexual arousal, more romantic arousal, more interest, and more happiness (all  $ps < .05$ ); they also reported experiencing somewhat less anger ( $p = .06$ ). Notably, the mate-search film elicited virtually identical levels of romantic arousal,  $F(1, 39) = 0.01$ , and sexual arousal,  $F(1, 39) = 0.00$ , in male and female participants.

**Effects of activating a self-protection motive.** To test hypothesized effects, analyses focused primarily on perceptions of anger and examined effects of the experimental manipulation on the anger perceived in Black and White men and women. Table 2 summarizes mean levels of perceived anger within condition, broken down according to target race and target sex.<sup>4</sup> These results reveal an effect of the self-protection motive on perceptions of anger in the faces of Black men but little or no effect on perceptions of anger in any of the other target faces.

Indeed, a 2 (self-protection condition vs. control)  $\times$  2 (participant sex) analysis of variance (ANOVA) demonstrated a significant main effect of motivational state on perceptions of anger in Black men,  $F(1, 94) = 7.85, p < .01$ . A planned contrast indicated that participants in the self-protection condition, compared with those in the control condition, perceived more anger in Black male

faces,  $F(1, 96) = 7.26, p < .01 (R^2 = .070)$ . Furthermore, participants in the self-protection condition perceived more anger in Black male faces than in the other target faces,  $F(1, 31) = 6.31, p = .02$ . In contrast to these findings, viewing the mate-search film clip did not lead participants to see more anger in Black male faces,  $F(1, 96) = 1.64, p = .20$ .

This effect was specific to Black male targets. Participants did not perceive significantly greater anger in White male targets,  $F(1, 96) = 0.21, p = .65$ , Black female targets,  $F(1, 95) = 0.20, p = .65$ , or White female targets,  $F(1, 95) = 1.53, p = .22$ . These results suggest that the functional projection of anger is indeed specific to targets who are prejudged to be threatening.

The projection of anger onto Black male faces was not due to a tendency to perceive more emotion in general in Black men: Participants in the self-protection condition, compared with the control condition, did not perceive significantly greater amounts of sexual arousal,  $F(1, 96) = 0.26, p = .61$ ; fear,  $F(1, 96) = 0.66, p = .42$ ; or happiness,  $F(1, 95) = 1.58, p = .21$ , in Black men.

Finally, there was no evidence that participants may have projected their own emotional state (fear) onto targets. Participants in the self-protection condition, compared with control participants, did not perceive significantly more fear in target faces. This noneffect emerged regardless of whether we examined average fear ratings across targets,  $F(1, 91) = 0.34, p = .56$ , or whether we examined fear ratings for individual targets (all  $ps > .15$ ).

<sup>2</sup> Previous research (Maner & Kenrick, 2001) has suggested difficulties with measures explicitly tapping into participants' motives. We have the sense that participants are better at reporting their emotions (e.g., feeling fear) than they are at reporting what motivational states (e.g., wanting to protect oneself from harm) ultimately underlie those emotions. We suspect this is because motives such as seeking sexual partners and wanting to protect oneself from harm are phenomenologically experienced as emotions; participants may, therefore, possess the ability to self-report their emotions to a greater extent than they can the motives underlying them.

<sup>3</sup> None of the effects reported in the *Results* section were significantly influenced by whether or not the participant responded to the manipulation checks. Thus, participants who did and did not complete these items were combined for all analyses.

<sup>4</sup> We noted that participants did not see equivalent baseline levels of anger across target categories in the control condition,  $F(3, 27) = 3.63, p < .03$ . Our pretesting, which was based on selecting targets with low ratings of overall expressiveness, apparently was not completely successful in equating targets on specific emotional expressions. In particular, participants saw a particularly low level of anger ( $M = 1.97$ ) and a high level of happiness ( $M = 6.03$ ) in one Black male target, which depressed the mean level of perceived anger in Black males across conditions. To ensure that baseline ratings of this face were reliable, we presented all faces to an independent group of raters ( $n = 20$ ) for 30 s each; they judged the amount of anger, fear, happiness, and sexual arousal in each face. These ratings mapped closely onto the ratings in the control condition ( $r = .73$ ). Indeed, that same Black male target was perceived as less angry ( $M = 2.30$ ) and happier ( $M = 5.10$ ) than other targets. Therefore, we have not included anger ratings for that one Black male target in the present analysis. However, excluding this Black male target does not alter the results associated with perceptions of anger in Black males: When this Black male target is included in the analysis, participants still perceived more Black male anger in the self-protection condition ( $M = 3.74, SD = 1.46$ ) than in the control condition ( $M = 2.93, SD = 1.38$ ),  $F(1, 96) = 5.25, p < .03$ .

Table 1  
Mean Self-Reported Levels of Affect by Motivation Condition

Affect item	Control ( $n = 15$ )	Self-protection ( $n = 14$ )	Romance ( $n = 14$ )
Fear			
<i>M</i>	1.53	5.29***	1.64
<i>SD</i>	0.99	1.68	0.93
Anger			
<i>M</i>	2.33	2.79	1.43
<i>SD</i>	1.59	1.05	0.65
Interest			
<i>M</i>	4.13	6.29***	5.64*
<i>SD</i>	1.85	0.91	1.28
Tension			
<i>M</i>	3.60	6.00**	3.71
<i>SD</i>	2.13	1.71	1.68
Happiness			
<i>M</i>	3.33	1.14**	5.79**
<i>SD</i>	1.63	0.36	0.97
Romantic arousal			
<i>M</i>	1.07	1.36	6.64***
<i>SD</i>	0.26	1.08	0.50
Sexual arousal			
<i>M</i>	1.07	1.21	4.36***
<i>SD</i>	0.26	0.80	1.98

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 2  
Mean Levels of Perceived Anger in Each Motivation Condition by Target Race and Sex

Target category	Control ( <i>n</i> = 30)	Self-protection ( <i>n</i> = 34)	Mate search ( <i>n</i> = 34)
Black males			
<i>M</i>	3.26	4.44	3.87
<i>SD</i>	1.75	1.77	1.77
Black females			
<i>M</i>	3.63	3.77	3.78
<i>SD</i>	1.23	1.29	0.88
White males			
<i>M</i>	3.63	3.49	3.66
<i>SD</i>	1.34	1.38	1.31
White females			
<i>M</i>	3.10	3.57	4.09
<i>SD</i>	1.09	1.67	1.30

*Effects of activating a mate-search motive.* To test hypothesized effects of activating a mate-search motive, primary analyses focused on perceptions of sexual arousal in target faces. Means for perceived sexual arousal for each condition and participant sex by target race, sex, and attractiveness are presented in Table 3.

A first set of analyses illuminated the effects of an aroused mate-search motive on male participants' perceptions of women. A 2 (mate-search condition vs. control)  $\times$  2 (participant sex)  $\times$  2 (level of female attractiveness) ANOVA demonstrated a significant main effect of participant sex on perceptions of sexual arousal

in White female faces,  $F(1, 93) = 18.77, p < .001$ . This main effect was qualified by a three-way interaction between motivation condition, participant sex, and level of female attractiveness,  $F(1, 93) = 4.45, p < .05$ . Male participants in the mate-search condition perceived more sexual arousal in attractive White female faces than did males in the control condition,  $F(1, 96) = 4.45, p < .05$  ( $R^2 = .044$ ). Moreover, men in the mate-search condition perceived more sexual arousal in attractive White female targets than in other targets,  $F(1, 18) = 12.67, p = .002$ . Activating a self-protection motive, in contrast, did not increase men's perceptions of sexual arousal in attractive White female faces ( $F < 1$ ).

The tendency for men in a romantic state to perceive increased sexual arousal was specific to attractive White female faces: Men in the mate-search condition did not perceive significantly more sexual arousal in average White female faces, attractive Black female faces, or average Black female faces (all  $ps > .25$ ). Nor did male participants perceive more sexual arousal in male faces:  $F(1, 95) = 0.04, p = .84$ , for White male targets and  $F(1, 96) = 0.12, p = .73$ , for Black male targets. In sum, the functional projection effects among male participants were specific to the perception of sexual arousal in faces of attractive White female targets.

These effects were not merely target specific; they were emotion specific as well. There was no general tendency among men to perceive more emotion in the faces of attractive White female targets. Male participants in the mate-search condition, compared with those in the control condition, did not perceive in those same attractive White female targets significantly more happiness,  $F(1, 96) = 0.84, p = .36$ ; anger,  $F(1, 96) = 2.47, p = .12$ ; or fear,  $F(1,$

Table 3  
Mean Levels of Perceived Sexual Arousal in Each Motivation Condition by Target Race, Sex, and Attractiveness

Target	Male participants			Female participants		
	Control	Mate search	Self-protection	Control	Mate search	Self-protection
Attr White female						
<i>M</i>	3.54	4.96	3.35	2.82	2.15	2.26
<i>SD</i>	2.02	1.80	2.21	1.87	1.28	1.18
Avg White female						
<i>M</i>	2.19	2.64	2.38	1.74	2.05	1.81
<i>SD</i>	1.20	1.36	1.23	1.00	1.33	1.02
Attr White male						
<i>M</i>	2.96	2.82	3.45	3.53	3.70	3.12
<i>SD</i>	1.93	1.35	1.61	2.37	2.27	1.84
Avg White male						
<i>M</i>	2.50	2.89	2.25	2.56	3.45	2.31
<i>SD</i>	1.19	1.38	1.45	1.61	1.65	1.41
Attr Black female						
<i>M</i>	3.35	4.04	3.42	2.50	2.85	2.50
<i>SD</i>	1.86	1.43	2.25	1.41	1.70	1.72
Avg Black female						
<i>M</i>	1.81	2.18	1.85	1.76	1.74	1.81
<i>SD</i>	0.80	0.95	1.16	1.35	1.21	1.39
Attr Black male						
<i>M</i>	3.15	2.96	3.62	3.32	3.40	3.31
<i>SD</i>	1.61	1.89	2.22	2.16	2.00	1.52
Avg Black male						
<i>M</i>	2.58	3.21	3.00	3.44	3.75	3.45
<i>SD</i>	1.47	0.93	1.67	2.12	2.05	1.83

Note. Attr = attractive; Avg = average.

95) = 0.34,  $p = .56$ . Thus, the evidence suggests that the primary emotion projected onto the faces of attractive White female targets was the emotion (sexual arousal) that is most clearly functionally relevant to male participants' own emotional-motivational state.

Additional analyses focused primarily on the effects of the mate-search motive on female participants' perceptions of male faces. These analyses revealed little in the way of meaningful results, indicating that the effects of a mate-search motive were not symmetric across gender. A 2 (mate-search condition vs. control)  $\times$  2 (participant sex)  $\times$  2 (level of male attractiveness) ANOVA on perceptions of sexual arousal in White male faces revealed no effects of condition,  $F(1, 93) = 1.43$ ,  $p = .23$ , or participant sex ( $F < 1$ ).

*Ancillary analyses: Chronic individual differences and functional projection.* In addition to the effects of the experimental manipulation, our methods allowed us to explore the effects of individual difference variables that may tap into chronically activated self-protective motivation (BDW) and mate-search motivation (SOI).

To assess links between chronically active self-protective motivation and perceptions of anger in out-group members, we examined the relationship between perceived anger in Black male targets and BDW scores within each experimental condition. Regression analyses were performed by predicting perceived anger in Black male targets from BDW scores, participant sex, and their interaction (after centering both variables; Aiken & West, 1991). Results indicate that BDW scores were significantly related to perceived Black male anger in the control condition ( $b = 0.71$ ,  $p < .05$ ; zero-order  $r = .38$ ,  $p < .05$ ). In contrast, BDW scores were not significantly related to perceptions of Black male anger in the self-protection condition ( $b = -0.25$ ,  $p = .49$ ). Although BDW scores were marginally related to perceptions of Black male anger in the mate-search condition ( $b = -0.52$ ,  $p = .06$ ), higher BDW scores were associated with lower perceptions of anger, making interpretation of this result difficult. Deeper analyses indicated that this counterintuitive result may have been partially spurious because of a negative correlation between BDW and SOI scores ( $r = -.23$ ,  $p = .02$ ; SOI may have moderated the manner in which participants reacted to the mate-search motive). Indeed, when SOI and the BDW  $\times$  SOI interaction were added to the regression model predicting Black male anger in the mate-search condition, the effect of BDW was reduced to nonsignificance ( $p = .34$ ). In sum, a chronic self-protection motive (indicated by higher levels of BDW) predicted perceptions of anger in out-group males, but this relationship was evident only under conditions in which no salient temporary motive was aroused.

Using a parallel analytic strategy, we examined links between SOI and perceptions of sexual arousal in opposite-sex targets within each experimental condition. Regression analyses were performed by predicting perceived sexual arousal in attractive, opposite-sex White targets from SOI scores, participant sex, and their centered interaction. Results indicate that SOI scores were related to perceived sexual arousal in the control condition,  $b = 0.07$ ,  $p < .05$  (zero-order  $r = .41$ ,  $p < .05$ ); this effect did not interact with participant sex ( $b = -0.09$ ,  $p = .17$ ). SOI scores were not significantly related to perceptions of sexual arousal in the self-protection or mate-search conditions (both  $ps > .30$ ). Thus, regardless of participant sex, perceivers with a more unrestricted sociosexual orientation were more likely to perceive sex-

ual arousal in attractive opposite-sex White targets, but this effect was evident only under conditions in which no highly salient temporary motive was aroused.

### Discussion

These results provide evidence for the functional projection of emotions. The arousal of specific emotional-motivational states led to an increased tendency to perceive specific goal-relevant emotions in the faces of specific goal-relevant social targets.

The arousal of a self-protection motive (and its affiliated fearful emotional state) led White participants to perceive greater anger specifically in the faces of Black men. It is noteworthy that this effect was limited to Black men; there was no such effect on perceptions of Black women. This result implies that when prejudging others as potential threats, perceivers do not simply attend to coalitional out-group status; rather, they may be attentive to a broader set of cues (such as target sex) that stereotypically discriminate between threatening and nonthreatening out-group members. This effect was not only target specific but emotion specific as well: Perceivers saw in Black male targets only more anger.

The arousal of a mate-search motive (and its affiliated affective state of sexual arousal) led men to perceive greater sexual arousal specifically in the faces of attractive White women. There was no complementary effect observed among female participants, an asymmetry that is consistent with previous findings indicating that only men tend to overestimate the sexual interest of opposite-sex others (e.g., Haselton & Buss, 2000). It is noteworthy that this effect was specific to attractive (but not average-looking) female faces. These results add to a large body of evidence indicating that even though men may exhibit relatively low standards in the context of short-term mating (e.g., Buss & Schmitt, 1993), they nevertheless do selectively focus on highly attractive potential mates (Li et al., 2002; Maner et al., 2003). The functional projection of sexual arousal was target specific in one other regard as well: The effect was observed primarily for attractive White female targets but did not emerge clearly for attractive Black female targets (the pattern of means was similar, but the latter effect was much weaker). It is possible that this apparent effect of target ethnicity was simply a product of the specific stimuli used in the study, but it is also possible that it reflects some underlying in-group favoritism in the realm of mate selection. Other evidence has indicated that White men may have a somewhat higher threshold for finding non-White women to be desirable as mates (Li & Kenrick, 1998). Further research is clearly necessary to examine the extent to which this potential form of prejudice operates in basic processes of social cognition and person perception.

Although the primary purpose of the study was to test hypotheses about the consequences of temporarily aroused emotional-motivational states, several additional results explored the effects of chronic individual differences (belief in a dangerous world, sociosexual orientation) on the projection of emotion. BDW, an indicator of chronic self-protective concern, was associated with the projection of anger in Black men. This suggests that chronic self-protective motives may operate in parallel with situationally activated self-protective motivation and fear. Furthermore, the link between BDW and perceptions of anger was observed only in the absence of acutely activated motivational states, consistent with other findings revealing that effects of personality variables are



less apparent within “strong” social situations (Snyder & Ickes, 1985; see also Bargh, Lombardi, & Higgins, 1988).

With respect to individual differences in sociosexuality, there were three noteworthy findings. First, in the control condition, sexually unrestricted individuals perceived greater sexual arousal in attractive opposite-sex others, a finding consistent with previous theory and research on sociosexual orientation (Simpson & Gangestad, 1991). Second, this relationship existed only in the control condition and was not observed in either condition in which highly salient temporary motives were aroused. Third, the links between SOI and perceptions of sexual arousal emerged symmetrically for both male and female perceivers. Why was a sex difference observed for temporarily aroused mate-search motives but not for an individual difference variable that taps into a conceptually similar goal state? One answer lies in the natural confound between gender and sociosexuality (e.g., Simpson & Gangestad, 1991, 1992). On average, men tend to be more unrestricted than women, and so under conditions in which mate-search motives are salient, men are more likely than women to project greater sexual arousal onto desirable mating partners. Of course, this sex difference ignores variability within sex (cf. Gangestad & Simpson, 2000). Some women have unrestricted sociosexual orientations, and some men have restricted sociosexual orientations. Regardless of their sex, sexually unrestricted individuals are inclined to seek relatively large numbers of new sexual partners and therefore would be expected to project sexual arousal onto attractive members of the opposite sex.

### Replicating the Self-Protection Effect

Before describing Study 2, which was designed to conceptually extend the self-protection findings from Study 1, we should note that we performed an additional study that replicated the experimental self-protection effects reported above. In the context of exploring some related issues, we conducted a separate data collection in which 51 participants (24 men, 27 women) judged an independent set of Black and White faces after viewing either the self-protection or control film clip (Kenrick et al., 2004). As in Study 1, participants reported the amount of anger, fear, happiness, and sexual arousal they saw expressed in each face. The findings of this experiment were consistent with those of Study 1. Compared with control participants, participants in whom a self-protection motive had been elicited reported seeing more anger in Black male faces,  $F(1, 49) = 3.49, p < .04$  (one-tailed;  $R^2 = .066$ ). Activating a self-protection motive, in contrast, did not lead participants to see more anger in White targets or Black female targets (all  $ps > .20$ ). Nor did it lead participants to report more emotion in general in Black male faces: For perceptions of happiness, fear, and sexual arousal in Black men, all  $ps > .29$ . Finally, activating a self-protection motive did not lead participants to see more fear in target faces ( $F < 1$ ). These findings, therefore, replicate the experimental self-protection findings from Study 1. They provide further evidence that the functional projection of anger is reliable, robust, and specific to targets that are heuristically associated with physical threat.

### Study 2

In Study 2, we sought to methodologically improve on and conceptually extend the functional projection findings of Study 1.

Our primary goals were threefold. First, we sought to determine whether the self-protection effects found for perceptions of Black men would generalize to members of another heuristically threatening out-group (Arabs). Second, we wished to increase experimental control by using the same faces to portray both in-group and out-group members. Third, we examined the extent to which implicit attitudes toward the target group might moderate the projection of anger under fear-eliciting circumstances. If perceivers simply use out-group status as a crude heuristic cue signaling threat, then the arousal of a self-protective motive may lead them—regardless of their own personal beliefs—to project anger in the faces of Arabs. However, if perceivers draw on their own stereotypic prejudgments, then even self-protective perceivers may project anger onto Arab faces only to the extent that they personally have learned to associate Arabs with threat. If that is the case, one would therefore expect effects to be most pronounced among participants with strong Arab–threat associations.

The results of Study 1 reveal that the functional projection of anger was limited to the perception of Black men. Might one expect the effects of Study 2 to be similarly limited to Arab male targets? Following the reasoning outlined at the outset of Study 1, the answer depends on the extent to which threat-relevant prejudicial expectations are specific to Arab men or general across Arab men and women. Some data suggest the former, indicating that men are generally regarded as more threatening than women (Daly & Wilson, 1988) and that anger is more quickly identified in male faces than in female faces (Becker, Kenrick, Neuberg, & Smith, 2004). These findings suggest that the functional projection of anger would be most pronounced for Arab male targets.

Several other sources of information, however, indicate that threat-linked expectations of American participants might not be specific to Arab men. One source of information is provided by the cultural context: Data were collected at an American university during a time when U.S. relations in the Middle East were strained—the United States had just begun its military campaign against Iraq—and in media outlets, Arab peoples of both sexes were portrayed as dangerous and fanatically anti-American (e.g., in April 2002, *Newsweek* magazine ran a cover story on an 18-year-old Palestinian female terrorist, with the banner headline “Suicide Mission: A Human Bomb and Her Victim”; Hammer, 2002). This line of reasoning is buttressed by a second source of information: Additional data collected from an independent sample of undergraduates. These data suggest that stereotypic expectations of Arabs—at least along the pertinent dimension of threat—are similar for male and female targets (these data are reported in greater detail in the *Results* section). Consequently, in Study 2, there is a conceptual basis for anticipating that the functional projection of anger might occur for both Arab men and women.

### Method

**Participants.** One hundred two undergraduate psychology students (38 women, 64 men) participated in the study. They were awarded course credit for their participation.

**Design.** Each participant was randomly assigned to view a film clip designed to elicit either self-protective motivation or no particular motivation (control). Each participant then viewed a series of male and female target faces that were portrayed as being either White American university students or Arab nationals. The overall experimental design of the study

was a 2 (motivational state: self-protection, control; between subjects)  $\times$  2 (participant sex; between subjects)  $\times$  2 (target sex; within subjects)  $\times$  2 (target group: American, Arab; within subjects) design. Participants' level of implicit Arab–threat associations served as a continuous between-subjects independent variable.

**Materials.** As in Study 1, scenes from *Silence of the Lambs* were used to elicit self-protective motivation, and scenes from *Koyaanisqatsi* were used in the control condition. To achieve greater uniformity of facial expression across target race, we used the same faces to portray both Americans and Arabs. Photos of six male and six female ethnically ambiguous undergraduate students were used. Target race was manipulated by (a) slightly lightening or darkening their skin and (b) including either a baseball cap or Middle Eastern headgear on their heads (gender-appropriate headgear was used). These photographic manipulations were performed using Adobe Photoshop. Each participant saw a total of 12 target faces: 3 of each gender–race combination (e.g., American woman, Arab man). No participant saw the same face depicted as both American and Arab. We randomized across participants which faces were presented as Arab and which were presented as American, and each face was presented an equal number of times as Arab versus American. Pretesting indicated that all targets maintained relatively neutral facial expressions (below 4.0 on a 9-point scale of emotional expressiveness).

**Procedure.** The procedure was similar to the one used in Study 1. Participants were told that the study investigated people's ability to perceive subtle emotional microexpressions in other people's faces. Participants were told that the study was being conducted in collaboration with Middle Eastern researchers and that some of the photos they would be viewing were of Arab nationals whereas others would be of students at their own university. Participants were told that although some of the faces they would see expressed little emotion, other faces might be hiding certain emotions (but that those emotions could be identified via subtle microexpressions). Participants then watched either the fear-inducing or the control film clip and were asked to empathize with the characters in the clip. After viewing the clip, participants viewed and evaluated the expressions of the 12 target faces, which were presented on the computer in blocked and counterbalanced order. Each face was viewed for 1 s.

Once participants finished responding to each of the target faces, they performed a modified version of the Implicit Association Test (IAT; Greenwald et al., 2002). The IAT was used to assess the strength of participants' implicit associations between Arabs and threat. For this task, participants categorized target words into one of two ethnicity–attribute pairs—each pair consisted of an ethnicity (Arab or American) and an attribute (pleasant or threatening). In a “compatible” block of trials, one pair consisted of Arab and threatening and the other consisted of American and pleasant. That is, if a target word related to either Arab or threatening, the participant was to categorize it as being associated with the first pair. If, instead, the target word related to either American or pleasant, the participant was to categorize it as being associated with the second pair. In an “incompatible” block of trials, Arab and pleasant were paired, and American and threatening were paired (compatible and incompatible blocks were counterbalanced). Individual target words, which fell into one of these four categories, appeared in succession on the computer screen. Example words include *Baghdad* (Arab), *Washington* (American), *happy* (pleasant), and *murder* (threatening). When each word appeared, participants categorized it as quickly as possible (using a computer keyboard) into one of the two ethnicity–attribute pairs. Categorization response times were recorded. A participant with strong Arab–threat associations would be expected to more quickly categorize words on compatible trials than on incompatible trials, for he or she should more closely associate threatening words with being Arab than with being American. After completing the IAT, participants completed the BDW. Then they were probed for suspicion, debriefed, and dismissed.<sup>5</sup>

**Measures.** After viewing each target face, participants were asked to rate the extent to which they believed the target was (a) sexually aroused,

(b) angry, (c) frightened, and (d) happy. Responses were recorded using 9-point Likert scales with endpoints 1 (*not at all*) and 9 (*very much*). These measures served as the primary dependent variables. A BDW score was assigned to each participant by averaging responses to all items on the scale (after reverse scoring appropriate items;  $\alpha = .78$ ).

An IAT score was assigned to each participant on the basis of his or her performance on the IAT. IAT scores were calculated using only reaction times to correct responses, and any reaction time longer than 3,000 ms was truncated to that value. For each participant, we calculated the mean of the resultant reaction times for the compatible (Arab–threatening vs. American–pleasant) and incompatible (Arab–pleasant vs. American–threatening) blocks. We then subtracted the mean reaction time for the compatible blocks from the mean reaction time for the incompatible blocks, yielding an index of Arab–threat association, with higher values indicating a greater degree of association between Arabs and threat.

## Results

**Assessing baseline levels of anger.** One goal of this study was to eliminate baseline differences in perceived anger across target ethnicity by using the same faces to portray both American and Arab faces. We conducted a repeated-measures ANOVA, which confirmed that target faces were viewed as equally angry in the control condition,  $F(3, 48) = 1.40, p = .25$ .

**Effects of activating a self-protection motive.** To test hypotheses about the functional projection of anger, we performed a multiple regression analysis in which we predicted perceptions of anger in Arab targets from participants' motivation condition, IAT scores, participant sex, and the interactions among these variables (after centering each independent variable; nonsignificant interactions were dropped from the model).

The results of this analysis were consistent with expectations. There was a significant interaction between the motivation manipulation and participants' level of implicit Arab–threat associations ( $\beta = -.30, p < .002$ ). To probe the moderating effect of IAT scores, we assessed the simple effect of the motivation manipulation at high and low points on the IAT scale (Aiken & West, 1991). We tested the simple effect of activating a self-protection motive at 1 standard deviation above and below the mean of participants' IAT scores ( $SD = 102.82$ ; Aiken & West, 1991) and did so separately for perceptions of anger in the faces of Arab men and Arab women. Results indicate that for participants with strong Arab–threat associations, activating a self-protection motive significantly increased perceptions of anger in Arab men ( $\beta = .28, p = .05$ ; partial  $R^2 = .040$ ). The same effect was found for Arab women ( $\beta = .33, p < .03$ ; partial  $R^2 = .053$ ). No such effects were found among participants with weak Arab–threat associations. For these participants, there was no evidence that a self-protection motive increased perceptions of anger in either Arab men ( $\beta = -.18, p = .19$ ) or Arab women ( $\beta = -.16, p = .27$ ).

The tendency for participants with strong Arab–threat associations to see Arab targets as angry was not due simply to a tendency for them to see them as more emotional in general. Activating a self-protection motive did not lead these participants to see Arabs as happier ( $\beta = .13, p = .19$ ), more sexually aroused ( $\beta = .10$ ,

<sup>5</sup> None of the individual difference measures reported in this article (BDW and SOI in Study 1; BDW and IAT in Study 2) varied across experimental condition, suggesting that responses to these measures were unaffected by the experimental primes.

$p = .34$ ), or more fearful ( $\beta = .08, p = .42$ ). Neither was it the case that activating a self-protection motive led these participants to see more anger in American targets ( $\beta = .08, p = .45$ ). Finally, there was little evidence that participants perceived their own fearful emotional state in the faces of others. Self-protection participants, compared with control participants, did not perceive significantly more fear in American targets ( $\beta = .03, p = .74$ ) or Arab targets ( $\beta = .08, p = .42$ ).

*Links between chronic self-protective motivation and perceptions of anger.* As in Study 1, we examined the extent to which BDW scores might be associated with perceptions of anger in the faces of goal-relevant target individuals. To test this prediction, we added participants' BDW scores to the regression model described in the previous section.

Results suggest that participants' level of chronic self-protective motivation was related to perceptions of anger in Arab male targets. Participants' BDW scores significantly predicted perceptions of anger in Arab men ( $\beta = .21, p < .04$ ), such that participants with high levels of chronic self-protective motivation were particularly likely to see anger in Arab male faces. Furthermore, this relationship was somewhat stronger among participants with strong Arab-threat associations ( $\beta = .26, p = .05$ ; partial  $R^2 = .04$ ) than among participants possessing weaker Arab-threat associations ( $\beta = .16, p = .26$ ; partial  $R^2 = .01$ ). It is interesting to note that the predictive effects of BDW did not extend to perceptions of anger in Arab female faces ( $\beta = -.11, p = .29$ ).

In contrast to Study 1, the relationship between chronic self-protective motivation and perceptions of anger did not depend on experimental condition. The relationship between BDW scores and perceptions of anger in Arab men was similar in the self-protection condition ( $\beta = .24, p = .10$ ) and the control condition ( $\beta = .19, p = .15$ ).

*Assessing stereotypic expectations of Arabs.* As mentioned above, to assess threat-related stereotypes of Arab men and women, we collected additional data from an independent sample of 28 undergraduates. These participants were asked to indicate their perception of the average American's stereotype of specific groups (a method that minimizes self-presentational concerns and can successfully assess cultural stereotypes; e.g., Schaller, Conway, & Tanchuk, 2002). They made comparative ratings of American women and Arab women on a series of trait adjectives. Ratings were made on 9-point rating scales ( $-4 = \textit{More characteristic of Americans}$ ,  $0 = \textit{Equally characteristic}$ ,  $4 = \textit{More characteristic of Arabs}$ ). They also made comparative ratings of American men and Arab men on the same rating scales (order of target sex was counterbalanced). Two of the rated traits were "dangerous" and "threatening"; ratings on these two traits were averaged to create a composite index of perceived threat. Results indicated that relative to Americans, both Arab men ( $M = 1.79, SD = 2.24, t(27) = 4.22, p < .001$ ), and women ( $M = 1.41, SD = 2.73, t(27) = 2.74, p = .01$ ), were viewed as stereotypically threatening. The difference between these two means was small and not reliable; a repeated-measures ANOVA revealed no meaningful sex difference,  $F(1, 27) = 0.38, p = .55$ . Thus, these data suggest that stereotypic expectations of threat are similar for Arab male and Arab female targets. These data are therefore consistent with the finding that activating a self-protection motive led participants in Study 2 to perceive more anger in both Arab men and Arab women.

## Discussion

The experimental results of Study 2 conceptually replicate and extend those from Study 1. The arousal of a fearful self-protective state led American university students to perceive anger (but not other emotions) specifically in the faces of Arabs. Moreover, this effect was found only among perceivers who harbored stereotypes implicitly linking Arabs to threat. Thus, consistent with the functional perspective, the effects of self-protective motivation were most powerful when an observer strongly associated a particular target group with physical threat. These results are also consistent with other recent studies that in methodologically different ways document a relationship between implicit anti-Black prejudice and perceptual associations between anger and Black faces (Hugenberg & Bodenhausen, 2003, 2004).

The fact that the functional projection of anger was moderated by the perceiver's own implicit attitudes about Arabs conceptually complements the findings from Study 1. At a cultural level of analysis, some out-group members are more closely linked to threat than others (Black male vs. female targets; Study 1); at an individual level of analysis, some perceivers are more likely than others to link any given out-group with threat (Study 2). Both levels of analysis inform the extent to which any target individual is likely to be prejudged by perceivers as stereotypically threatening; this judgment, in turn, appears to guide the functional projection of anger. Considered together, the results of both studies suggest that in order to understand and predict the consequences of this particular functional projection phenomenon, one must not only consider simple markers of coalitional out-group status; one must consider also the more complete set of psychological mechanisms through which specific stereotypes about out-groups are acquired and activated.

These results also provide additional evidence linking chronic belief in a dangerous world to the functional projection of anger. Consistent with Study 1, there is evidence that high BDW was related to a greater tendency to perceive anger in the faces of out-group men. Unlike Study 1, this link was apparent even when a salient self-protective motive was experimentally activated. What might explain this apparently stronger relationship? One clue may lie in the fact that participants' BDW scores were substantially higher in Study 2 than in Study 1,  $t(198) = 5.05, p < .001$ , indicating greater levels of chronic self-protective concern. This, in turn, could have led to somewhat more robust links between chronic self-protective concerns and the projection of anger. In any case, these results suggest that the effects of BDW may sometimes mimic the effect of a temporarily aroused self-protection motive. However, BDW did not entirely mimic the effects of the experimental manipulation. Whereas the experimental manipulation led to functional projection of anger in the faces of both Arab men and Arab women, BDW was related only to perceptions of anger in Arab men. In the General Discussion, we consider more fully some of the similarities and differences between chronic and temporarily activated goal states.

## General Discussion

In the classical Freudian sense, projection involves attributing one's own undesirable feelings to others. The present research suggests that emotional-motivational states may elicit a very dif-

ferent process—functional projection—in which one attributes to others specific feelings that are functionally relevant to the goals implicated by one's own emotional state. Working within the functionalist framework of evolutionary psychology, we tested hypotheses identifying specific emotions that might be projected onto specific target persons under specific circumstances.

The temporary arousal of a self-protection motive led participants to perceive a greater amount of anger in the faces of out-group members that are heuristically associated with threat. These effects were specific to the perception of anger—an emotion that in this interpersonal context is functionally relevant to a self-protection motive. These effects were also specific to out-group targets that were stereotypically associated with potential threats. The projection of anger did not occur for subcategories of out-groups that are not linked to threat (Study 1), nor did it occur for participants who failed to harbor strong stereotypic expectations linking the out-group to threat (Study 2). The operation of these moderating variables further implicates the functional nature of this emotional projection phenomenon.

The temporary arousal of a mate-search motive led men to perceive a greater amount of sexual arousal in attractive White female faces. This effect was specific to the perception of sexual arousal—an affective state that is functionally relevant to mate-search motivation. This effect was also specific to attractive female targets; no greater sexual arousal was perceived in the faces of same-sex targets or in less attractive female targets. These results are, therefore, consistent with evolutionary models suggesting that despite men's generally low standards for short-term mating (Buss & Schmitt, 1993), they do still tend to favor more attractive, compared with less attractive, women (Kenrick & Keefe, 1992; Li et al., 2002). The target specificity of this effect further implicates the functional nature of this particular emotional projection phenomenon. The underlying functional nature of the phenomenon is also evident in the fact that the effect was specific to male perceivers, whereas no such effect was found among female perceivers. This is consistent with evolutionarily inspired theory and research suggesting that women are substantially less interested in strangers as potential mates (Clark & Hatfield, 1989; Kenrick et al., 1994; Regan, 1998). It also fits with findings that whereas men tend to overestimate the amount of sexual intent in female behavior, women do not exhibit a parallel bias (Haselton & Buss, 2000). Because women tend to value characteristics other than physical attractiveness in potential mates (e.g., social dominance, high status; see, e.g., Feingold, 1990), it is plausible that including information about these other attributes might lead women to exhibit effects similar to those that we observed for men in the current study.<sup>6</sup>

### *Limitations and Implications*

As we have defined it, functional projection is a fairly broad concept; the studies reported here focus on just a few specific manifestations of functional projection. One obvious limitation lies in our specific focus on just two of the many possible emotional-motivational states that might drive this perceptual phenomenon. Although these particular states—based on evolutionarily fundamental needs for survival and reproduction—are surely important influences on social cognition, so too are other emotions and motives. Future studies might explore the extent to which other

important emotional-motivational states (such as achievement motivation, loneliness, or disgust) might also elicit the functional projection of specific emotions to others.

Another limitation lies in the particular emotion-detection task used in these studies. Participants attributed emotional experiences to individuals who, in reality, were not displaying any emotional expressions. Another potentially interesting question is whether or not activating self-protection and mate-search motives might lead to differential sensitivity in perceiving actual emotional expressions. For example, would activating a self-protection motive lead participants to more accurately or more rapidly detect actual facial cues to anger? Would this sensitivity depend on whether the target is a member of a heuristically threatening out-group? Research might profitably explore the extent to which activating certain social motives leads to both biases and sensitivities in emotion detection.

Some additional limitations pertain specifically to the functional projection of anger in faces of stereotypically threatening out-group members. We observed conceptually consistent effects across two studies that focused on two different out-groups; nevertheless, these two out-groups are hardly exhaustive of the many different kinds of coalitional out-groups.

Moreover, we expect that individuals of different races and ethnicities would respond to different categories in different ways (e.g., Israelis viewing male targets manifesting cues to Palestinian nationality and vice versa, Africans of competing tribal groups, etc.). Distinctions such as American versus anti-American and Palestinian versus Israeli, and which side of the distinction one is on, are necessarily learned. Indeed, as we noted earlier, functionalist-evolutionary approaches presume that the motivation to protect oneself may be innate but do not at all presume that cues to threatening human groups are innate.

Indeed, as our results indicate, these functional projection effects are likely to be moderated by the structure and content of existing stereotypes about out-groups. Although there may be a universal tendency to be wary of coalitional out-groups (Campbell, 1965; Kurzban et al., 2001; Schaller, Park, & Faulkner, 2003), which may inform the development and acquisition of stereotypes, the content of stereotypes is dynamic and sensitive to idiosyncratic elements of the social context in which these stereotypes emerge (Schaller et al., 2002). It will be useful for future research to explore this functional projection phenomenon in relation to a more diverse set of out-groups and intergroup contexts. It would also be illuminating to test functional projection hypotheses within more artificial contexts (e.g., a minimal group paradigm; DeSteno et al., 2004) in which the impact of preexisting stereotypes could be experimentally curtailed.

Despite these and other limitations, these results have some interesting implications, not only for social cognition but for social

<sup>6</sup> It is possible that our mate-search prime may have activated a primarily sexual mind-set in participants. This would explain why greater effects were found for men, who are generally more inclined than women to see attractive others as sexual rather than romantic opportunities. However, it is important to note that the film clip used in the romance condition was not explicitly sexual in any way (indeed, it stopped shy of even a first kiss), and manipulation checks revealed both men and women reporting identical levels of sexual arousal and romantic arousal after watching this film.

interaction as well. For example, any bias toward perceiving anger in out-group members may exaggerate latent anxieties in intergroup interactions or may lead individuals to avoid such interactions entirely (Plant & Devine, 2003). This might be particularly problematic, because the mere presence of some out-group members could arouse a fearful self-protective state. Future research might profitably explore the implications of the current findings for actual social interaction and decision making in an intergroup context.

The results of Study 2—indicating moderating effects of implicit stereotypic associations—also suggest a potentially positive implication for the reduction of subtle prejudices. Interventions designed to reduce out-group–threat associations might consequently reduce the biased tendency to project anger onto out-group members. Evidence does suggest, for example, that implicit prejudices can be attenuated through manipulations designed to reduce the negative stereotypes that underlie them (e.g., Dasgupta & Greenwald, 2001).

The present findings may also have implications for sexually charged interactions between men and women. Previous research has suggested that men generally tend to overestimate female sexual intent (e.g., Haselton & Buss, 2000). Our findings suggest that this tendency may be exaggerated under conditions that elicit mate-search motives. Situations eliciting male sexual desire may therefore set the stage for unwanted sexual advances and other inappropriate interpersonal acts. Increasing our understanding of this functional projection phenomenon may serve as a useful step toward minimizing the incidence of such events. In addition to these direct implications, the present results are also relevant to some broader conceptual issues.

#### *Impact of Chronic and Temporarily Activated Motivational States*

Our studies were designed primarily to investigate the effects of temporarily aroused emotional–motivational states on the functional projection of emotion. Our methods allowed us also to examine the operation of individual-difference variables that may indicate differences in the chronic activation of the same motivational states. Indeed, BDW did predict the projection of anger, and scores on the SOI did predict the functional projection of sexual arousal. However, predictive effects of the individual-difference variables were not entirely consistent with the effects of the temporarily activated motives. Nor, in the case of BDW, were the effects entirely consistent across the two studies. Thus, although chronic and temporarily activated goal states do appear to operate in a similar manner, there appear to be some conceptually important differences as well. One difference surely lies in the extent to which emotion systems are engaged. Emotions are especially responsive to temporary changes in one’s environment, so acutely activated motives are likely to impose a stronger and more consistent impact on cognition and behavior (e.g., Bargh et al., 1988); the effects of chronic goal states may be more highly variable across situations.

These results also bear on questions about the potential interplay between chronic and temporary motivational states. Some previous research has suggested that chronic and temporarily aroused goals exhibit additive effects, with each contributing independently to the manifestation of functional responses (e.g., Bargh, Bond, Lom-

bardi, & Tota, 1986). Other research reveals interactive effects between chronic and temporarily aroused goals (e.g., Maner & Peruche, 2004; Schaller, Park, & Mueller, 2003). There is a vast literature on Person  $\times$  Situation interactions that suggests a variety of different reasons why chronic individual differences may interact with situation-specific concerns (Snyder & Ickes, 1985). In our studies, we found evidence for additive effects (Study 2) as well as interactive effects (Study 1), and there is no real conceptual basis to suggest that one of these patterns represents a more general phenomenon than the other. The precise relationships between chronic and temporarily aroused goal states are likely to vary with the specific nature of those goal states, the specific nature of the cognitive or behavioral output variable, and the specific characteristics of the immediate environmental context.

#### *Functional Projection and Associative Priming*

Biases in emotion perception may emerge from a variety of conceptually distinct psychological mechanisms. For instance, there is evidence that the experience of some mood (happiness, sadness) or motivational state can lead to a tendency to perceive similar mood states and motivational states in others (Kawada et al., 2004; Niedenthal et al., 2000). These findings reflect a straightforward emotional projection that is consistent with psychological mechanisms of associative priming (Srull & Wyer, 1979).

It is fairly clear, however, that a simple associative priming perspective cannot account for the findings reported here. Although an associative priming perspective might imply that the arousal of a mate-search motive would lead people to perceive sexual arousal in others, it cannot account for the fact that this effect is specific to certain targets (attractive members of the opposite sex), nor does it explain the fact that the effect is specific to male (but not female) perceivers. Furthermore, an associative priming perspective cannot easily explain the fact that the arousal of a fearful self-protective state leads to the projection of anger in the faces of specific targets (stereotypically threatening out-group members) but not others. In fact, an associative priming or mood-congruency perspective most straightforwardly implies that the experience of fear would lead to the projection of fear; no such pattern of effects was found in our studies. The present findings thus support a motivation-based functional projection model over a simple associative priming model.

Note that we do not view the functional motives model as an “alternative” to associative network models of cognition. A functionalist approach also implies associative links between different features of motivation and cognition. However, the functional approach does more than assert that activating a goal or emotion leads to the activation of associatively linked semantic and affective categories. Rather, it leads to more finely articulated predictions about how activating specific goals and emotions should lead observers to systematically perceive functionally relevant social targets in ways that could facilitate goal-consistent behavioral responses.

#### *The Interplay of Evolutionary Motives and Learned Knowledge Structures*

Consistent with many theoretical models of emotion, we have framed our inquiry into functional projection within the broader

metatheoretical context of evolutionary psychology. Contrary to an all too common misperception, an evolutionary perspective does not discount the role of social learning. Indeed, the capacity for learning is itself based on a set of evolutionary adaptations (B. R. Moore, 2004), and many specific psychological processes that are rooted in evolved mechanisms are still responsive to cultural context and social learning histories (Kenrick, Becker, Butner, Li, & Maner, 2003). Rather than being hardwired to respond innately to specific stimuli, the human mind evolved to be especially adept at learning those stimuli that are relevant to evolutionarily fundamental motives and to flexibly implement functionally relevant responses when those stimuli are perceived. Research on fear provides an excellent example: There is no simple catalog of stimuli that innately arouse fear; rather, it appears that there is an evolved capacity to rapidly learn specific stimuli that are dangerous and for those stimuli to thereafter arouse fear and other functionally relevant psychological responses (Öhman & Mineka, 2001). The fundamental evolutionary need for survival precipitates domain-specific psychological mechanisms that operate in necessary conjunction with general learning processes.

This approach to evolutionary psychology is consistent with our results pertaining to the functional projection of anger in out-group faces. Humans, like other primates, tend to be xenophobic (Holloway, 1974). Toward that end, they appear to possess basic mechanisms for parsing people into coalitional categories of “us” and “them” and for rapidly learning whatever cues reliably make that distinction. The specific cues used for this purpose are variable, implying that coalitional distinctions depend importantly on local learning environments (Kurzban et al., 2001). Local influences, therefore, should also be considered when making predictions about the functional projection of sexual arousal. There may be an evolved tendency for men to perceive sexual arousal in the demeanor of desirable women, but the specific features that connote desirability may vary across different social contexts. Even the value placed on physical attractiveness may vary somewhat across different cultural contexts (Gangestad & Buss, 1993).

In general, although the basic mechanisms underlying the functional projection of emotion may be universal across peoples, the superficial manifestations of these evolved mechanisms may vary depending on the relevant social context. Few empirical studies have systematically examined the manner in which idiosyncratic learning processes shape the expression of fundamental motives, and our studies are no exception. Nevertheless, we have attempted to attend to these complexities in formulating and testing hypotheses about functional projection.

### Conclusion

The present findings suggest that fundamental motives pertaining to survival and reproduction predictably influence social perception. These motives lead people to project specific functionally relevant emotions onto goal-relevant social targets—a bias in emotion perception that could facilitate the performance of goal-consistent behavior. These functional projection phenomena are likely to have important consequences for people’s interactions with others.

This research highlights the utility of integrating traditional social–cognitive approaches to social perception with functionalist evolutionary perspectives. An evolutionary perspective provides a

useful set of tools for the generation of hypotheses and the discovery of novel social–cognitive phenomena—particularly phenomena bearing on group processes and interpersonal behavior. This metatheoretical marriage holds great promise for the further development of social psychological theories that integrate process, content, and function.

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