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From Evolved Motives to Everyday Mentation

Evolution, Goals, and Cognition

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INTRODUCTION

Walking across a crowding shopping mall, you may see a group of people who vary in their race, gender, attractiveness, clothing style, and demeanor. A similarly complex array of social stimuli confronts us at conferences, airports, farmer's markets, and college campuses. Rarely do we attend equally to all individuals in such complex social environments or to all characteristics of any given individual. Rather, we selectively direct our attention toward a smaller subset of individuals and characteristics. This selective direction of attention often occurs automatically, without conscious intent, and can have important consequences for subsequent thoughts and actions.

Who do we attend to, think about, and later remember? And how are the answers to this question linked to our goals at the moment? We recently embarked on a program of research to explore the processes that influence the selective and automatic direction of perceptual and cognitive resources. In this chapter, we present a conceptual framework that begins to articulate the role that fundamental social goals play in governing these processes. We focus, in particular, on the ways in which self-protection and mating goals selectively facilitate attention toward people who have characteristics relevant to those goals. Integrating theory and research on selective attention processes, the influence of goals on social cognition and behavior, and ecological theories of motivation and social cognition, our

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framework yields some novel hypotheses about how self-protection and mating goals influence attention to, perceptions of, and cognitions about individuals who differ in gender, physical attractiveness, and ethnicity.

THEORETICAL FOUNDATIONS

Selective Attention and Information Processing

Attention – and subsequent information processing – is *selective*. Because information processing capacities are inherently limited, individuals cannot simultaneously allocate attentional resources to all information in the environment (e.g., Kahneman, 1973; Norman & Bobrow, 1975; Pashler, 1994). Psychologists have long studied the processes involved in selective attention and information processing (Fiske & Taylor, 1991; Todd & Gigerenzer, 2000) and have inquired as to whether and why attention may be drawn more to certain types of stimuli rather than others (Funder, 1987; McArthur & Baron, 1983).

Attentional processes seem especially sensitive to *social* stimuli. For instance, people occupying the periphery of a visual field draw attention away from more visually prominent nonsocial stimuli in the center of that field (Rensink, 2000; Rensink, O'Regan, & Clark, 1997). Even simple geometric shapes have a more powerful impact on attention when those shapes are interpreted as social stimuli (e.g., as eyes rather than mere circles; Friesen & Kingstone, 1998). It appears, then, that information processing is *selectively selective*: Some categories of information are more intrinsically interesting and relevant than others. But what particular kinds of information are people likely to notice, remember, and act upon? What circumstances influence this selection and its consequences? A strategy for developing answers to these questions is suggested by a consideration of how goals affect social cognition.

Goals and Social Cognition

How people perceive the events in their lives, and how they organize and remember those events, are profoundly influenced by their goals (e.g., Bargh, 1990; Fiske & Neuberg, 1990; Kruglanski, 1989; Kunda, 1990). For example, people who have chronically higher needs for simple structure are especially likely to make quick judgments, to base those judgments on relatively little information, to make judgments compatible with existing beliefs, and to cling to those judgments more tenaciously in the face of contradictory evidence (e.g., Kruglanski & Webster, 1996; Moskowitz, 1993; Neuberg & Newsom, 1993; Schaller, Boyd, Yohannes, & O'Brien, 1995). Acutely activated goals have similar consequences: Circumstances that temporarily introduce a high need for structure (e.g., time pressure) lead

to effects mirroring those of chronic needs for structure (e.g., Kruglanski & Freund, 1983), whereas circumstances that introduce accuracy goals (e.g., personal accountability, severe personal consequences for inaccuracy, outcome dependency) lead people to attend to and consider more carefully a wider variety of relevant information (e.g., Neuberg & Fiske, 1987; Tetlock & Kim, 1987).

Although much of the extant research has examined the effects of goals on inference processes and other aspects of higher-order cognition, it also appears that goals and need-states can influence lower-level perceptual and cognitive processes (e.g., Di Lollo, Kawahara, Zuvic, & Visser, 2001; Liberman & Förster, this volume; von Hippel, Hawkins, & Narayan, 1994). Bruner and Goodman's (1947) research, in which poor children were especially likely to overestimate the sizes of coins, is a classic illustration of this. Similar conclusions can be drawn from recent research by Spencer, Fein, Strahan, and Zanna (this volume) demonstrating that people who are thirsty are particularly sensitive to the presence of words related to the quenching of that thirst, such as *beverage* and *quench* (cf. Aarts, Dijksterhuis, & De Vries, 2001).

In some cases, goals influence perception and cognition in a fairly explicit, conscious way, as when people with a high need for accuracy deliberately expend extra effort in an attempt to reach more fully informed judgments. But goal-directed perception and cognition may also proceed less deliberately. Like other knowledge structures, goals and need-states can be activated automatically and may influence perception and thought without explicit conscious awareness (e.g., Bargh, 1990; Bargh & Chartrand, 1999).

Given the abundant evidence that goals influence how people perceive and cognitively organize their world, it seems reasonable that goals would also influence which specific stimuli people attend to. Perhaps because of its focus on explicating general psychological *processes*, however, cognitive psychology – even social-cognitive psychology – has largely ignored issues of domain-specific *content*. Fortunately, questions of how particular goals might relate to particular contents in the social environment have been considered by ecologically oriented theorists, and so we turn to this literature now.

Ecological/Evolutionary Approaches to Motivation and Cognition

Ecologically informed theory and research on motivation imply that the goals having the most immediate impact on the perception of social environments should be those that, over the course of human evolutionary history, have been most closely linked to adaptive outcomes (e.g., Bugental, 2000; McArthur & Baron, 1983; Plutchik, 1980; Scott, 1980; Stevens & Fiske, 1995). Given the central roles of survival and sexual reproduction

in evolutionary processes, it follows that attention in social situations would be directed chronically by motivational states linked to survival and reproduction.

For example, Plutchik (1980) suggested that cues indicating the presence of a possible enemy activate a self-protective motive and its associated emotional responses (e.g., fear or anger, depending on the presence of related cues). This motivational-emotional system subsequently directs attention and alters the availability of behavioral response options (e.g., avoidance, attack) in such a way as to increase the likelihood of action that would have been associated with greater survival success in ancestral environments (Öhman & Mineka, 2001). Similarly, perceptual cues indicating the potential for reproductive success or failure may activate acutely a mating goal and its associated affective responses (Scott, 1980). This will, in turn, direct attention and alter the availability of behavioral responses in such a way as to increase the likelihood of responses that would have been associated with greater reproductive success in ancestral environments.

Empirical evidence is consistent with this general framework and reveals various ways in which specific contextual cues relevant to problems of survival appear to trigger content-specific adaptive cognitive mechanisms (Todd & Gigerenzer, 2000). For example, certain types of logical reasoning are facilitated under conditions in which the reasoning problem has content specific to the detection of cheaters on social contracts – who pose a particular type of social danger – and this effect occurs most strongly when individuals are in a context that connotes greater vulnerability to this danger (Cosmides & Tooby, 1992; Cummins, 1998). As another example, when people are literally in the dark – an ecological circumstance that heuristically connotes a greater vulnerability to harm – they are especially likely to perceive ethnic outgroup members to be hostile and threatening (e.g., Schaller, Park, & Faulkner, 2003; Schaller, Park, & Mueller, 2003).

Similarly, contextual cues pertaining to reproduction appear to trigger specific cognitive mechanisms associated heuristically with reproductive success (Buss, 1999; Kenrick, Li, & Butner, 2003; Kenrick, Sadalla, & Keefe, 1998). For instance, men and women exhibit different evaluative contrast effects on self-assessments of romantic desirability: Men judge themselves to be less desirable mates after being exposed to other men high in social dominance but not after being exposed to other physically attractive men. Women in contrast, judge themselves to be less desirable mates after being exposed to highly attractive women but not after being exposed to women high in social dominance. This pattern is consistent with sex differences in criteria for mate selection that would have been adaptive in ancestral environments (Gutierrez, Kenrick, & Partch, 1999; Kenrick, Neuberg, Zierk, & Krones, 1994).

These lines of research (which we expand upon later) are consistent with an ecological approach to social cognition: Specific perceptual cues

activate specific evolutionarily designed goals – goals linked to problems of survival or reproduction – which, in turn, direct cognitive processes to proceed in a manner that was adaptive throughout ancestral times. An important implication of this *adaptive motivational system* approach is the assumption, often implicit, that only one of these fundamental systems will predominate at any given moment in time. This assumption is consistent with research and theory on neural networks, and with research indicating that goal states may inhibit the activation of other goals (Tipper, 1992). For instance, Martindale (1980, 1991) reviewed evidence suggesting that inhibitory processes contribute to selective processing at every level of perception. Hierarchical processes of lateral inhibition and vertical activation lead to something like a winner-take-all psychological state. This is essential to functioning, as it allows the central nervous system to set priorities rather than being pulled every which way by millions of neural inputs. Martindale argued that these processes occur up to the highest level of cognition, so that only one executive system (or *subself*, in Martindale's terminology) predominates psychologically at any given time, facilitating attention to and processing of certain types of information and inhibiting attention to and processing of other types of information. Thus, for example, if a mating goal is activated, information relevant to mating will increase in salience, whereas information irrelevant to mating will recede into the perceptual background. Or, if a self-protective goal is activated, perceptual information relevant to threat and self-defense will increase in salience, whereas functionally irrelevant information will recede into the background.

Ecological approaches to social cognition are rich in explanatory power, and in conceptual and practical implications. However, as with any new line of inquiry in the psychological sciences, much of the theoretical speculation has yet to be substantiated by empirical data. Of the extant empirical investigations testing these theoretical speculations, most have addressed hypotheses pertaining to behavior or to conscious and deliberate higher-order social cognitive processes – logical reasoning, overt judgment, and behavioral decision making. There has been very little empirical research examining the impact of survival- and reproduction-relevant need-states on lower-order (and largely nonconscious) perceptual processing of complex social environments. One of our aims is to focus on these lower-level perceptual and attentional processes.

Transitional Summary

Considered separately, the three lines of inquiry just summarized suggest specific questions that remain unanswered and empirical gaps that remain to be filled. Considered jointly, they suggest an integrative line of theory and research that may help address those questions and fill those gaps.

Toward this end, we outline a general conceptual framework that yields a number of novel and previously untested hypotheses about the effects of ecologically important interpersonal goals and need-states on attention, encoding, retrieval, and judgment when people are presented with complex social environments. Our conceptual model focuses on the ecologically important goals of *self-protection* and *mating*. Before summarizing the model and hypotheses, therefore, we briefly discuss previous research linking these two goals to social cognition.

IMPACT OF SELF-PROTECTION AND MATING GOALS ON SOCIAL COGNITION

Because both self-protective and mating behaviors are presumed to have played fundamental roles in human evolution, it follows that most people are, to some extent, chronically sensitive to environmental cues bearing on the satisfaction of these goals.

For instance, based on an extensive literature review, Öhman and Mineka (2001) concluded that cues associated with potential physical threat invoke rapid and automatic activation of dedicated neural circuits in the amygdala. This circuitry has dense efferent connections with the cortex, thereby suggesting, in combination with a number of experimental findings they review, that activating the self-protection/fear system has powerful directive implications for cognitive processes. Indeed, people are especially quick to notice, and are adept at encoding, information that implies danger or threat, whether that information is conveyed by truly social cues such as facial expressions (Hansen & Hansen, 1988; Öhman, Lundqvist, & Esteves, 2001) or semantic cues such as words (Pratto & John, 1991). Regarding mating goals, men and women – who are presumed to have required different behavioral strategies as a means of satisfying reproductive goals – differentially appraise potential mates in ways consistent with their different strategies of goal attainment (Buss, 1999; Buss & Kenrick, 1998; Gangestad & Simpson, 2000; Kenrick, 1994). In the absence of any measure or manipulation of goals or need-states, however, results such as these provide only indirect evidence of the impact of goals.

Somewhat more useful are studies that reveal correlations between individual differences in variables that indirectly implicate need-states and consequent cognitions about others. For instance, people who chronically feel highly vulnerable to danger (and so may have chronically activated self-protection goals) are more prejudiced against ethnic outgroups and are especially likely to exaggerate threats posed by outgroup members (Altemeyer, 1988). Similarly, individuals who are chronically inclined to seek short-term mating opportunities, or who are not currently involved in a committed relationship, are more attentive to mating-relevant features of the opposite sex, such as physical attractiveness and social

dominance (Simpson & Gangestad, 1992; Simpson, Gangestad, & Lerma, 1990). At best, however, the correlational nature of these results offers indirect, imperfect, and incomplete evidence of the impact of goals on social cognition.

A more compelling inquiry into the impact of self-protection and mating goals demands the manipulation of goal activation. Some recent studies on intergroup cognition have taken such an approach, with results revealing that a variety of contextual manipulations connoting danger (and thus presumably activating self-protection goals) lead to exaggerated stereotypes and prejudices (e.g., Judd & Park, 1988; Mullen, Brown, & Smith, 1992; Rothgerber, 1997; Schaller et al., 2003). More directly relevant to the present inquiry, there is also evidence that a danger-connoting context (intergroup competition) can lead to enhanced recall of the personal characteristics of outgroup members (Judd & Park, 1988); this latter phenomenon also implies some impact of the goal state on attention processes.

Nonetheless, little evidence directly addresses the implications of the ecological approach to goal-directed social cognition. In particular, almost no evidence bears on the impact of temporarily activated self-protection goals on selective attention and other low-level processes of person perception, and there is little or no analogous evidence bearing on the impact of mating goals. Because lower-level processes such as attention and initial encoding constrain subsequent processing, these processes are likely to be especially influential. Furthermore, such processes are often outside voluntary control and hence are less subject to impression management. If you ask people whether they would find a particular target a potentially desirable mate, it is possible they will tell you what they think you want to hear. However, if their eyes are spontaneously and immediately drawn to some individuals rather than others, or if they are unable to report reliably whether particular individuals were even present in a social array, this provides a potentially nonreactive measure of basic social cognitive processes.

CONCEPTUAL MODEL AND HYPOTHESES

Integrating the lines of reasoning reviewed here leads to a straightforward model articulating the impact of self-protection and mating goals on attention and perception in complex social environments.

First, particular classes of stimuli in the social environment are likely to activate relevant goal systems. Some of these cues will be fairly explicit and obvious (eye contact from a smiling, attractive member of the opposite sex), whereas others will be more implicit and nonobvious (incidental perception of semantic information connoting sexual desire).

Once a goal is activated, it directs attention selectively to people who have characteristics heuristically relevant to successful goal attainment.

Features relevant to self-protection goal attainment are those related to the probability that another person is potentially dangerous and should be avoided; these include gender (i.e., maleness), ethnic outgroup status, and angry facial expressions. Features relevant to mating goal attainment are those related to the probability that another would make a good mate; these include gender, physical attractiveness, and social dominance.

In addition to facilitating attention to individuals who possess goal-relevant features, the activated goal inhibits attention to and processing of other, goal-irrelevant categories of information. If self-protection goals are active, for instance, attention to and processing of physically attractive opposite-sex others are likely to be suppressed. If mating goals are active, attention to and processing of outgroup others are likely to be suppressed (but not as strongly, as discussed later).

Active self-protection and mating goals should also influence early-stage perception/interpretation processes in ways heuristically biased toward the successful implementation of the goal. For instance, individuals concerned for their safety should not only be particularly attuned to potential physical threats in their environment, but their threshold for perceiving individuals and events as threatening should be relatively low: Indeed, because the costs of failing to identify an authentic threat are high (Kurzban & Leary, 2001), such individuals may initially perceive threats where they objectively do not exist. Similarly, individuals interested in sex and romance may have a relatively low threshold for perceiving mating opportunities, and thus may “see” mating opportunities that objectively do not exist (Haselton & Buss, 2000).

Finally, the hypothesized effects of goal activation on attention and perception are expected to influence “downstream” processes. Thus, because of their proposed effects on attention and perception, self-protection and mating goals are each expected to influence memory differentially for different individuals in complex social environments, judgments about those individuals (such as changes in perceived frequency of individuals in salient categories), and evaluations of the social environments containing those differentially salient individuals.

The predictions generated by this functional framework are subtly, but importantly, different from those predicted by a traditional associative model. Although we must assume the operation of associative links between different features of cognition (e.g., between known cues, goals, and subsequent expectations), the current model does not merely assert that the activation of emotion or semantic information leads to the activation of associatively linked cognitions. Rather, the model generates more finely articulated predictions about the effects of specific types of emotion or semantic information on the activation – and inhibition – of specific aspects of attention and cognition. These predictions go beyond mere affective or semantic similarities.

For example, a strictly associative model leads one to expect the greatest amount of noticing and remembering of stimuli that are most closely linked, semantically or affectively, to an active goal or emotional state. Thus, when self-protection/fear or mating/romantic interest is primed, participants should be most likely to detect identical emotions in others (e.g., to detect fear when fear is primed) as well as emotions that are similarly valenced (e.g., anger, disgust, sadness, guilt). Our functional model compels a different set of predictions: When fear is primed, participants may indeed be more likely to detect fear cues in others, but they should be even more likely to detect threatening cues (e.g., anger) in others.

Another interesting implication follows from the ecological approach: A functional analysis implies intrinsic prioritization of goals. We have chosen as our exemplars two goals with clear functional significance. Yet, functional logic suggests a priority of self-protection goals over mating goals in circumstances involving the simultaneous presence of threats of physical harm and mating opportunities. Although a simplistic application of an evolutionary model might lead one to expect that mating goals will trump all others, given the central importance of reproduction to natural selection, this is unlikely to be the case in any given situation. Why? The individual who fails to respond to physical threats may suffer immediate harm and even loss of life, whereas the individual who misses an opportunity to mate will live to see other mating opportunities. Thus, there are very different functional implications of (a) attending to mating cues while failing to attend to threat cues versus (b) attending to threat cues while failing to attend to mating cues. This implication yields the hypothesis that attention to danger-relevant stimuli will be less easily inhibited than attention to mating-relevant stimuli.

EARLY EMPIRICAL INVESTIGATIONS

Although our research program is still quite young, we can briefly describe here two sets of studies that lend empirical support for several of the ideas just presented. The first explores how the physical attractiveness of same- and other-sex targets may capture attention within complex social contexts; the second explores how self-protection and mating goals influence the perception of emotion in the faces of others.¹

¹ Our predictions are derived from adaptationist models of functional links between motivational states and attentional processes. It is important to note, however, that they represent heuristic implications several steps down the epistemological ladder from tests of underlying assumptions of the theory of natural selection (see Öhman & Mineka, 2001, for a discussion of these issues); our studies should not be viewed as tests of fundamental evolutionary theory. We should also note that, although some stimuli associated with motivational states such as fear may be represented innately (e.g., angry facial expressions;

Physical Attractiveness and the Eye of the Beholder

Because mating is a fundamental social goal, humans ought to be, in general, chronically attuned to features of others that heuristically bear on their desirability as mating partners. Much evidence indicates that physical attractiveness often plays a major role in romantic relationships (e.g., Feingold, 1990, 1992; Shackelford, 2001; Simpson et al., 1990), and so we might expect people to direct their attention selectively to individuals who are physically attractive; this tendency should be exaggerated among those perceivers currently interested in romance. We explored this general idea in a series of five experiments, focusing specifically on several alternative hypotheses derived from evolutionary considerations (Maner et al., 2003).

- The *opposite-sex beauty captures the eye* hypothesis states that both men and women will selectively focus on highly attractive members of the other sex. This hypothesis is consistent with theory and evidence that men tend to value highly the physical attractiveness of potential romantic partners (e.g., Buss & Schmitt, 1993; Kenrick, Sadalla, Groth, & Trost, 1990) and that women value the physical attractiveness of short-term (Buss & Schmitt, 1993; Gangestad & Simpson, 2000) and extra-pair partners (Scheib, 2001).
- Alternatively, the *one-sided gender bias hypothesis* states that men, more than women, selectively attend to attractive members of the other sex. This hypothesis is consistent with research suggesting that men value physical attractiveness in potential mates relatively more than females do (Buss, 1989; Feingold, 1990, 1992; Kenrick et al., 1990). For example, women shown photos of physically attractive men did not alter their commitment to their partners, as men did when exposed to physically attractive women (Kenrick et al., 1994). Also, whereas men invite mating opportunities with strangers, women tend to be somewhat less drawn to physically attractive strangers (e.g., Clark & Hatfield, 1989).
- Finally, the *female beauty captures the eye* hypothesis states that both men and women focus selectively on attractive female faces. Attractive women might be salient for female observers because such females represent potential intrasexual competitors (c.f. Gutierrez et al., 1999). Consistent with this, Hassebrauck (1998) found that, when provided the opportunity, both male and female observers look at female stimulus features typically associated with judgments of female physical attractiveness (i.e., eyes, lips, waist, and hips) sooner and more often than for these same features on male targets. Also, both men and women show enhanced recognition for attractive female faces (Shepard & Ellis, 1973).

Darwin, 1857), most social stimuli that trigger fundamental motivational states are likely to be learned (albeit very efficiently) through experience (Öhman & Mineka, 2001).

In the first three studies, we presented participants with arrays of male and female faces of varying attractiveness under conditions of either unlimited or limited ability to attend to the arrays. Participants subsequently estimated the frequency of attractive faces they saw in the arrays. We reasoned that if physically attractive targets capture attention at an early stage of visual processing, observers would initially fixate on the most attractive people in an array of faces. Then, if the array of faces disappears after only a very short period of time, observers will not have had the opportunity to fully process the remainder of the faces (i.e., less attractive faces). Therefore, if observers are subsequently asked to estimate the proportion of physically attractive targets in the array, participants in the limited attention conditions should estimate higher numbers of attractive targets than should those in the full-attention conditions.

Results from these studies were consistent: Both male and female participants estimated relatively high proportions of attractive women under conditions of limited attentional opportunity. In contrast, when participants were provided the opportunity to attend to all the faces, they estimated equivalent proportions of attractive men and women. These studies thus suggest that, at an early stage of visual processing, female attractiveness captures the attention of both male and female observers. These results support neither the *one-sided gender bias* nor the *opposite-sexed beauty captures the eye* hypothesis: Women also estimated relatively high proportions of attractive women and did not show a bias toward attractive men in their estimation of men.

These studies employed only an indirect indicator of attention – frequency estimates under circumstances of constrained attentional ability. To measure attention more directly, we employed eye-tracker technology in a fourth study: We measured participants' eye fixations as they scanned the arrays of faces. In this study, we also measured chronic interest in sexual relationships so that we might assess the extent to which this motive might increase the focus on mating-relevant targets.

Replicating the previous results, both male and female observers in Study 4 were biased toward paying greater attention to physically attractive, as compared to average-looking, female targets. The data thus further support the *female beauty captures the eye* hypothesis.

However, unlike the results from the previous studies, women additionally exhibited a bias toward attending to attractive, as compared to average-looking, men, thereby lending support to the *opposite-sexed beauty captures the eye* hypothesis. Moreover, sexually unrestricted participants – who possess relatively greater mate-search goals – were particularly biased toward attending to attractive opposite-sexed targets. This was the case for both men attending to women and women attending to men, strongly suggesting that the motivation to seek mates plays a role in guiding attention toward attractive opposite-sex people.

Finally, there was a strong positive relationship between women's attention to attractive men and their attention to attractive women; no such relationship was found for male observers. Those women most visually interested in the attractive men – and who, if you recall, were dispositionally most interested in seeking new romantic partners – were the ones who spent the most time looking at the attractive women. These findings are consistent with the idea that heterosexual women with active mate-search goals may have an interest in assessing their competition.

Why did the more direct measure of attention – eye fixations – reveal directed female attention toward attractive men, whereas the other studies consistently revealed that women did not overestimate the proportion of attractive men in the arrays to which they had been exposed? Data from a fifth experiment suggests that women's memory for attractive men is relatively poor. One plausible explanation for the lack of frequency estimation bias, then, is that even though women's attention is initially drawn to attractive men, their cognitive processing of those attractive men subsequently begins to diminish: Because women are not as interested in male strangers as potential mates, and because physical attractiveness is not as important a determinant of female mating choices (Buss, 1989; Feingold, 1990, 1992; Kenrick et al., 1990), attractive men may not be cognitively benefited by their attractiveness (i.e., may not be increasingly likely to be encoded and remembered), and thus may not be especially likely to come to mind when one attempts to estimate their frequency in the social environment.

In sum, these data provide some early support for our framework by demonstrating that social motives can, in a predictable manner, direct attention toward mating-relevant stimuli.

Perceiving Emotions

As suggested earlier, people concerned about self-protection and mating should be biased toward perceiving others to be potential threats or mates, respectively. We explored this hypothesis in an experiment investigating how both chronic and manipulated goals would influence people's perceptions of others' facial expressions (Maner et al., 2003).

First, we hypothesized that individuals concerned with self-protection should be particularly sensitive to the presence of anger in others' faces, as angry expressions signal an increased possibility of aggression (e.g., Ekman, 1982; Scherer & Wallbott, 1994). Indeed, people selectively attend preconsciously to angry faces (Öhman & Mineka, 2001) and are able to detect them quickly (Hansen & Hansen, 1988; Öhman et al., 2001; Van Honk, Tuiten, de Haan, van den Hout, & Stam, 2001). And because failing to identify a physical threat is generally a more costly error than is perceiving a threat where one does not exist (Haselton & Buss, 2000), individuals

concerned with physical safety should be biased toward seeing anger, at least initially, in even neutrally expressive faces.

This bias is likely to be especially strong when perceiving outgroup faces – particularly outgroup male faces – as outgroup men tend to be heuristically associated with physical threat. This bias might also be especially strong among male perceivers, as throughout our evolutionary history men have been the ones most likely to confront outgroup men (Daly & Wilson, 1988; Sidanius, Pratto, & Bobo, 1994; Wilson & Daly, 1992). Male intergroup contact, and hostility, predominate among primate species closely related to humans (Carpenter, 1974; Cheney, 1986; Goodall, 1986; Wrangham, 1987). Moreover, negative outgroup stereotypes tend to be more strongly associated with male outgroup members than with female outgroup members (Eagly & Kite, 1987).

This line of reasoning led us to predict that (a) activating a self-protective state by eliciting fear will lead white undergraduates, particularly white men, to perceive black male faces (but not white male faces or female faces) as exhibiting anger to a greater extent than when such a state has not been activated; (b) participants for whom self-protective goals are chronically active, compared to those with less active self-protective goals, should demonstrate a similar bias.

We followed a similar line of reasoning when considering the effects that active mating goals might have on the perception of sexual arousal in neutrally expressive faces. Because individuals interested in mating should process mating-relevant social information so as to facilitate behaviors aimed at procuring potential mates, we anticipated that romantic goals might increase the likelihood that one would perceive desirable others as romantically aroused themselves; such a bias would increase the likelihood that one might approach them (Haselton & Buss, 2000). In particular, because physically attractive others tend to be desired as mates, individuals with chronically or acutely active romantic goals should see physically attractive individuals as being romantically aroused. As we reviewed earlier, however, because women are somewhat less interested in unknown physically attractive men, we might expect this perceptual bias to be stronger for male perceivers than female perceivers. Indeed, whereas men tend to overestimate the amount of sexual intent in female behavior, women do not exhibit a similar bias (Abbey, 1982; Haselton & Buss, 2000).

Thus, we predicted that (a) activating a romantic goal would lead men to perceive attractive female targets as more sexually aroused than when such a goal has not been activated; (b) activating a romantic goal may not lead women to perceive attractive male targets as sexually aroused to the same extent that it will for men; (c) participants for whom mate-search goals are chronically active (i.e., sexually unrestricted individuals; Simpson & Gangestad, 1991, 1992), compared to those with less active mate-search goals, should demonstrate a bias toward perceiving attractive

opposite-sexed targets as being sexually aroused. Finally, because pretesting indicated that participants in our population focus on own-race members as potential mates – and do not view members of other races as sexually desirable – we suspected that the motivational bias would be limited to perceiving sexual arousal in opposite-sexed members of one's own race.

We activated self-protective, romantic, or neutral motivational states via film clips: To activate the goal of self-protection, participants viewed scenes from *Silence of the Lambs*, in which a white male serial killer stalks a white female FBI agent officer through a dark basement; to activate the mating goal, participants viewed scenes from *Things to Do in Denver When You're Dead*, in which an attractive white man and woman meet and have a romantic first date; in the neutral control clip, participants viewed scenes from the film *Koyaanisqatsi*, which included time-lapse videography of urban living (e.g., people going up and down on an escalator, people working on an assembly line). Participants then briefly viewed (1 second) male and female white and black faces of varying attractiveness and judged the emotions they believed were expressed in each target's face; all targets actually had neutral facial expressions. After viewing each face, participants rated the extent to which they believed the target was sexually aroused, angry, frightened, and happy. Finally, to assess effects associated with chronically active social goals, we obtained measures linked to chronic self-protective and romantic motivation.

Results strongly supported our predictions. First, both acute and chronic self-protective motives were associated with increased perceptions of anger in black male faces. After viewing a film clip designed to elicit self-protective motivation (as opposed to the control film), male (but not female) participants perceive a greater amount of anger in black male faces. Only black males were targeted by this bias. Moreover, male participants perceived only more anger, and not other emotions, in those black male faces. Finally, in the control condition in which no motivation was acutely activated, participants (both men and women) possessing chronic self-protective motives also perceived greater amounts of anger specifically in black male faces.

Second, romantic goals also led to the predicted social-perceptual bias. After viewing a film clip designed to elicit romantic motivation (as opposed to the control film), male participants perceived a greater amount of sexual arousal in attractive white female faces. These men did not perceive attractive white women to be experiencing the other emotions, nor did they view any other targets as sexually aroused. No parallel effects were exhibited by female participants. Finally, in the control condition in which no goal was explicitly activated, sexually unrestricted participants (both male and female) perceived greater amounts of sexual arousal in attractive opposite-sexed faces.

The specificity of these effects provides strong support for the functional motives perspective over a simple associative priming perspective. Our functional approach led to focused predictions about which emotions would be perceived in which targets as a function of the activated goal – and these predictions were often in conflict with those generated by traditional semantic or affective priming perspectives. For instance, activating fear did not lead participants to perceive more fear in target faces but rather more anger – an emotion more functionally relevant to one’s own self-protective state. Moreover, whereas a simple associative perspective possesses little ability to generate specific predictions about which targets should elicit greater perceptions of anger, the functional motives perspective led us to predict, and confirm, that participants perceived more anger only in men of an outgroup that is heuristically viewed as physically threatening. These findings thus impressively demonstrate the utility of the functional motives perspective: Activating particular emotion/motivation systems leads to social-cognitive consequences that may facilitate potentially adaptive behavioral responses.

IN CLOSING

We suspect that most psychologists readily accept the premise that perception and cognition are for doing (e.g., Gibson, 1979; James, 1890/1981) – that, at some level, we perceive and think in order to act in ways that better serve our goals. Indeed, one could reasonably argue that some of the most significant advances in social psychological theorizing and research during the 1980s and 1990s were those related to explicating motivational influences on cognition (e.g., Bargh, 1990; Fiske & Neuberg, 1990; Kruglanski, 1989; Kunda, 1990; Petty & Cacioppo, 1986). In retrospect, it’s not surprising that much of that effort focused on the effects of epistemic goals – on the desire for accuracy, on the need for cognition, simplicity and structure, decisiveness, consistency, and the like. After all, these goals are explicitly *about* perception and cognition. As important as much of that work was, especially in the aggregate, one could reasonably suggest that its focus on epistemic goals failed to capture the more fundamental and ubiquitous set of concerns we have each day as social creatures. Don’t we want to protect ourselves and those we care about? Don’t we seek romance, friendships, and status? Motives such as these failed to find a place within the social-cognitive revolution.

Ironically, the 1980s and 1990s also hosted, albeit more controversially, the ascent of the evolutionary perspective as a theoretical player within social psychology. Whereas the social cognitive framework tended to focus its interest in motivation primarily on epistemic goals, constrained as it was from the beginning by the metaphor of the human as a computer-like

information processor, the evolutionary perspective was from the beginning rich in theorizing about human social goals but somewhat impoverished in its weak focus on basic cognitive processing. Far from being incompatible, then, we view these two approaches as highly complementary: The contributions of each will be greatly strengthened by their integration.

Our empirical findings begin to illustrate this: Early-in-the-stream perceptual and cognitive processes are directed in functional ways by the fundamental social goals of self-protection and romance-seeking. Our future work will elaborate on these findings, reveal their implications for “downstream” cognition, judgments, and behaviors, test other features of the framework (e.g., hypotheses about asymmetrical influences of the self-protection and romance-seeking goals), and move to explore additional fundamental social goals.

We believe that the promise of our integrative perspective is great. By integrating theory from ecological and evolutionary psychology with a contemporary understanding of fundamental cognitive processes, and by empirically exploring this integration with modern methods and technologies, we believe that one can arrive at both a broader and deeper understanding of how and what people think about those around them.

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