Selective Attention to Signs of Success: Social Dominance and Early Stage Interpersonal Perception

Jon K. Maner, C. Nathan DeWall and Matthew T. Gailliot

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Selective Attention to Signs of Success: Social Dominance and Early Stage Interpersonal Perception

Jon K. Maner
Florida State University

C. Nathan DeWall
University of Kentucky

Matthew T. Gailliot
University of Amsterdam

Results from two experiments suggest that observers selectively attend to male, but not female, targets displaying signs of social dominance. Participants overestimated the frequency of dominant men in rapidly presented stimulus arrays (Study 1) and visually fixated on dominant men in an eyetracking experiment (Study 2). When viewing female targets, participants attended to signs of physical attractiveness rather than social dominance. Findings fit with evolutionary models of mating, which imply that dominance and physical attractiveness sometimes tend to be prioritized preferentially in judgments of men versus women, respectively. Findings suggest that sex differences in human mating are observed not only at the level of overt mating preferences and choices but also at early stages of interpersonal perception. This research demonstrates the utility of examining early-in-the-stream social cognition through the functionalist lens of adaptationist thinking.

Keywords: *evolutionary psychology; motivation; person perception; social status; romantic attraction*

Why is it that some people more than others seem to catch the eye? Do instances in which attention is captured by particular individuals reflect simply random protuberances in one's scanning of the social landscape? Or, instead, might the fact that people selectively attend to certain individuals in the social world reflect important adaptive constraints on the human mind?

Evolutionary theories imply that the human mind is designed to solve important social challenges present in everyday life (e.g., Buss, 1989; Cosmides & Tooby, 1994; Gangestad & Simpson, 2000; Kenrick et al., 2002; Kurzban & Leary, 2001; Lieberman, Tooby, & Cosmides, 2007; Wilson & Daly, 1992). Although evolutionary theories often presume that adaptive psychological mechanisms exist at all levels of cognition—from relatively automatic, lower-order processes of attention and memory to higher order forms of logical reasoning and moral judgment—the majority of empirical studies designed to examine such mechanisms have focused on higher order processes such as judgment and decision making (e.g., Fessler, Pillsworth, & Flamson, 2004; Schaller, Park, & Faulkner, 2003) and overt preferences and evaluations (e.g., Kenrick & Keefe, 1992; Li, Bailey, Kenrick, & Linsenmeier, 2002). Far less empirical attention has focused on adaptive cognitive mechanisms that operate at early, automatic stages of social perception. Such mechanisms are of great importance because early-stage cognition provides the building blocks that shape adaptive higher order cognition and action (see Kurzban, Tooby, & Cosmides, 2001; Maner, Gailliot, & DeWall, 2007).

Authors' Note: Please direct correspondence to Jon K. Maner, Department of Psychology, Florida State University, 1107 West Call Street, Tallahassee, FL 32306-4301; e-mail: maner@psy.fsu.edu.

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The current research examines early-stage perceptual attunements within the domain of mating. Many evolutionary theories suggest that men and women are designed to solve somewhat different mating-related challenges (e.g., Trivers, 1972). An impressive body of empirical research suggests, for example, important differences in the characteristics that men and women tend to prioritize in evaluating potential mates (e.g., Buss & Schmitt, 1993). Surprisingly few studies, however, have investigated the extent to which such sex differences are observed at early stages of social perception. Although recent work has begun to clarify the early-stage processing of mating-related information, most of this work has focused exclusively on the processing of physical attractiveness (e.g., Becker, Kenrick, Guerin, & Maner, 2005; Maner et al., 2003). Few studies have examined the manner in which other mating-related attributes are processed preferentially at early stages of social perception.

The current studies begin to fill this gap in the literature by investigating the possibility that observers selectively attend to individuals displaying signs of social dominance, an attribute that is central to human mating (e.g., Sadalla, Kenrick, & Vershure, 1987). Moreover, we evaluate the extent to which selective attention to signs of social dominance may be sex specific, reflecting the relative emphasis typically placed on male versus female dominance in mating-related contexts.

EARLY-STAGE SOCIAL COGNITION: A WINDOW ONTO THE ADAPTED HUMAN MIND

Functionalist theories imply that human cognition is designed to help individuals successfully navigate the challenges of social life. Indeed, evidence based on these theories suggests that people process information so as to increase their own reproductive fitness (e.g., Haselton & Buss, 2000), to enhance possibilities for building coalitions (e.g., Maner, DeWall, Baumeister, & Schaller, 2007), and to avoid particular types of peril (e.g., Cottrell & Neuberg, 2005; Öhman & Mineka, 2001). One common assumption of functionalist cognitive theories is that for cognition to be both functional and efficient, it must be selective—people selectively attend to, encode, and remember information relevant to solving specific adaptive problems. Some features of the social landscape, particularly those relevant to solving particular adaptive challenges, are likely to receive preferential processing, whereas other features are more likely to be ignored.

ADAPTIVE CHALLENGES IN HUMAN MATING

Success in mating is a key component of the evolutionary process for all sexually reproducing species. Mating involves a diverse array of social challenges, including identifying and attaining a suitable mate as well as guarding against reproductive threats posed by potential competitors. Solving these challenges may be facilitated by psychological mechanisms that selectively process particular members of the opposite sex (potential mates) as well as members of one's own sex (intrasexual competitors) who possess attributes relevant to one's own reproductive success (Maner, Gailliot, Rouby, & Miller, 2007).

Several evolutionary models imply that different characteristics are prioritized in mating-related evaluations of men versus women (Buss & Schmitt, 1993; Kenrick & Keefe, 1992; Trivers, 1972). One important difference is that social dominance typically is valued to a relatively greater extent in men than it is in women (e.g., Li et al., 2002). Evolutionary theories imply that throughout evolutionary history, a woman's offspring would have benefited from her mating with a man who had potential for acquiring resources. As a result, women tend to place a premium on characteristics associated with a man's ability to acquire resources such as social status and dominance (e.g., Sadalla et al., 1987; Singh, 1995).

Women, in contrast, tend to be evaluated to a relatively greater extent on the basis of their physical attractiveness than on their level of social dominance (e.g., Li et al., 2002). Traits related to perceptions of female attractiveness can serve as cues to a woman's level of health and fertility (Singh, 1993). From an evolutionary perspective, men have a preference for healthy, fertile mates because this preference would have increased the likelihood of fathering viable offspring and successfully passing one's genes on to subsequent generations (Buss & Schmitt, 1993). Consequently, evaluations of female desirability tend to be tied closely to judgments of physical attractiveness. Hence, mating-related evaluations tend to prioritize social dominance in men, whereas they tend to prioritize physical attractiveness in women.

This literature serves as a basis for hypothesizing the types of early-stage perceptual attunements that might be directed toward members of the opposite sex. Evolutionary and social learning perspectives alike imply that whatever traits are particularly valued in men and women are likely to receive preferential cognitive processing by members of the opposite sex. Thus, one might expect that whereas women might be especially attuned to signs of social dominance in men, men instead might be attuned to signs of physical attractiveness in women.

The mating preferences literature also suggests the types of perceptual attunements that might be directed toward members of one's own sex. Members of one's own sex can serve as potential intrasexual competitors. Consequently, members of one's own sex who possess desired mating-related attributes can be perceived as

threatening intrasexual rivals (Buunk & Dijkstra, 2004; Gutierres, Kenrick, & Partch, 1999). This leads to the hypothesis that male perceivers may be particularly attuned to signs of dominance in other men, whereas women may be particularly attuned to signs of physical attractiveness in other women. Such attunements could aid in the identification of potential rivals and, in turn, facilitate efforts at guarding against the potential reproductive threats they pose.

EARLY-STAGE PERCEPTUAL ATTUNEMENTS

Only a limited number of studies have examined the possibility that sex differences in mating preferences are apparent at early stages of social perception. The few studies that have been conducted have shown that people sometimes are more attuned to signs of physical attractiveness in women than in men. Both male and female observers, for example, appear to have greater difficulty pulling their attention away from physically attractive women as compared with physically attractive men (Maner, Gailliot, & DeWall, 2007). Male and female observers also preferentially attend to, encode, and remember attractive women, whereas observers generally are less inclined to preferentially attend to, encode, and remember highly attractive men (Becker et al., 2005; Maner et al., 2003).

As noted earlier, however, the mating literature suggests that observers may be attuned to different characteristics in men and women. In particular, we hypothesize that people may be especially attuned to signs of dominance, rather than physical attractiveness, in male targets. The primary purpose of the current research, therefore, was to assess the extent to which perceivers selectively attend to male versus female target individuals displaying cues to social dominance. Our primary hypothesis was that whereas observers would preferentially attend to male targets displaying cues to social dominance, the same would not hold true for female targets. Moreover, we expected that selective attention to socially dominant men would be observed in both female perceivers (for whom dominant men can represent desired mating partners) and male perceivers (for whom dominant men can represent strong competitors).

We note also a plausible alternative to this primary hypothesis. People sometimes appear to process other people selectively at some stages of cognition but not other stages. For example, evidence suggests that although women pay plenty of initial attention to attractive men, women also display poor memory for attractive men later (Becker et al., in press; Maner et al., 2003). This is consistent with evidence that although women prefer attractive men to unattractive men in the context of short-term mating (Li & Kenrick, 2006), women are more inclined to prefer long-term relationships with men who are socially dominant. It is possible, therefore, that women's attention might be drawn initially to attractive men, rather than dominant men, and that preferential processing of dominant men may show up only later in the stream of processing (e.g., in memory and overt judgments).

INDIVIDUAL DIFFERENCES

Although one hallmark of evolutionary psychology is a focus on psychological mechanisms that are universal, evolutionary theories also imply that individual differences play an important role in the translation of fundamental social motives into observable cognitive outcomes (e.g., Gangestad & Simpson, 2000; Maner, Gailliot, Rouby, et al., 2007). If the hypothesized attentional biases are associated with mating-related motivations, then individual differences in the strength of these motivations should be linked to variations in the nature and degree of bias.

The manner in which people process information about potential mates can be shaped by one's preference for long-term versus short-term partnerships (e.g., Maner et al., 2005; Simpson & Gangestad, 1991), one's level of commitment to a current relationship (Johnson & Rusbult, 1989; Simpson, Gangestad, & Lerma, 1990), and one's interest in alternatives to one's current partner (Miller, 1997; Rusbult, Martz, & Agnew, 1998). We therefore examined the extent to which these individual differences shape the manner in which people attend to socially dominant and physically attractive social targets (see Study 2).

OVERVIEW OF THE CURRENT STUDIES

The primary goal of this research was to investigate whether perceivers selectively attend to target individuals displaying signs of social dominance. In Study 1, we examined the extent to which limiting the attentional capacity of observers led them to report greater frequencies of socially dominant individuals contained within complex visual arrays. In Study 2, we conducted an eyetracking study to examine visual attunement to dominant, as well as physically attractive, social targets. We hypothesized that consistent with the relatively greater emphasis placed on dominance in judgments of men (as compared with women), observers of both sexes would selectively attend to dominant men but not dominant women. Conversely, because physical attractiveness tends to weigh more heavily in judgments of women (as compared with men), we expected that observers of both sexes would be attuned primarily to signs of physical attractiveness in female targets (see Study 2). In Study 2, we examined the extent to which

these patterns of selective attention are associated with mating-related individual differences (sociosexuality, relationship variables).

STUDY 1

Study 1 used a frequency estimation method from previous research (e.g., Maner et al., 2003) to test the hypothesis that participants would selectively process target individuals displaying cues to social dominance. Sets of target photos varying in their level of apparent dominance were presented to participants. Participants in the control condition were presented with the photos in serial fashion and were given the opportunity to attend to and process all of the stimuli. Participants in the experimental condition, however, viewed all of the targets at once under conditions of limited attentional capacity. This latter condition was designed so that participants would be able to process only the targets to which their attention was drawn most strongly. After viewing the arrays, participants estimated the number of socially dominant individuals they had noticed. Frequency estimates under conditions of limited attention should reflect the targets to which attention is drawn most strongly. Therefore, we expected that compared to control participants, participants under conditions of limited attentional capacity would estimate greater proportions of dominant men. In contrast, we did not expect those participants to estimate greater proportions of dominant women.

Method

Participants. One-hundred forty-seven undergraduate psychology students (110 women, 37 men) participated in exchange for course credit.

Design. Participants were presented with one array of 12 male targets and one array of 12 female targets. Half of the participants viewed the arrays under conditions of limited attentional capacity: Participants viewed all of the targets simultaneously for only 4 s. Control participants instead were provided ample opportunity to process each of the targets in the arrays, viewing each target, one at a time, for 4 s each. These timings were selected to facilitate comparison with previous studies using the same design (Maner et al., 2003). The overall design of the study was a 2 (sex of target, within-subject) × 2 (presentation method: limited attention vs. control, between-subjects) × 2 (sex of participant) mixed design.

Materials. Twelve male and 12 female target photographs served as stimuli. Stimuli were constructed so as to include targets displaying either relatively high or relatively low levels of social dominance. As in previous research (e.g., Townsend & Levy, 1990), we manipulated targets' level of dominance by varying their dress. Using a digital photo editing program, college-age faces were combined with upper bodies that varied in their attire. Dominant male and female targets were dressed in professional attire (e.g., gender-appropriate business suits), whereas nondominant targets were dressed in casual attire (e.g., sweat suits). Six targets in each array displayed dominant attire and six targets displayed nondominant attire. Photos were prerated by an independent group of undergraduates to ensure that the strength of the dominance manipulation was equivalent for male and female targets. The mean level of perceived social dominance for the dominant male, dominant female, nondominant male, and nondominant female targets were 7.77, 7.59, 3.96, and 3.77, respectively (measured with 9-point scales using the following descriptors: high social status, socially dominant, and respected by others). All stimuli were normed for size, brightness, background, and contrast. Male and female targets were equated on physical attractiveness (each male target was paired with a female target of similar attractiveness).

Separate arrays were constructed for male and female faces and were presented on a large video screen. In the parallel presentation (attention-limiting) condition, targets were arranged in a rectangular spatial array (three rows of four photos). The location of each target within its array was determined randomly. In the serial presentation (control) condition, targets were positioned in the center of the video screen and were viewed one at a time for 4 s in random order. Male and female targets with equivalent dominance ratings were matched such that they were located at the same spatial location within their respective parallel arrays and in the same temporal location within their respective serial arrays.

Procedure. Participants arrived for a study ostensibly about how people form first impressions of groups. The experimenter told participants that they would be viewing groups of people and that it was important for them to try to view all of the photos so that they would be able to form an impression of the group as a whole. Participants then viewed either the male or female array projected onto the video screen (order of presentation was counterbalanced). After viewing each array, participants estimated the percentage of socially dominant targets that they had noticed within the array. Participants estimated the percentage of targets that were high social status, socially dominant, and respected by others (embedded among irrelevant distracter items, e.g., eyes open). Scores on these three items were averaged to create composite measures indicating the estimated frequency of socially dominant

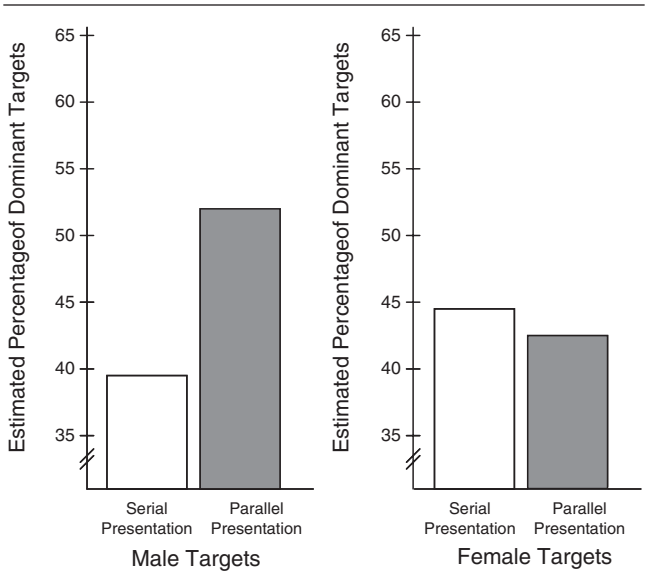

Figure 1 Limiting participants' attentional capacity by rapidly presenting multiple social targets in parallel (compared to when they were presented serially) led to greater frequency estimates of dominant men but not dominant women.

male and female targets (α = .62 and .63 for male and female targets, respectively).

Results

Mixed-design analysis of variance (ANOVA) was used to analyze frequency estimates of socially dominant male and female targets. We observed a significant main effect of presentation method, $F(1, 145) = 4.23$, $p = .04$, and a significant Presentation Method × Target Sex interaction, $F(1, 145) = 19.43$, $p < .001$ (see Figure 1). Simple effect tests confirmed a pattern that was consistent with our predictions: Compared to participants in the serial presentation (control) condition, participants whose attention was limited by the parallel presentation method estimated greater percentages of dominant male targets, $F(1, 145) = 18.73$, $p < .001$, $\eta^2 = .11$. Frequency estimates of socially dominant female targets, in contrast, did not differ as a function of presentation method, $F < 1$.

Participants estimated a higher percentage of socially dominant male targets than female targets only in the (attention-limiting) parallel presentation condition, $F(1, 147) = 17.60$, $p < .001$. Estimates of socially dominant male and female targets differed from one another in the serial presentation condition as well, but in the opposite direction, with greater estimates of dominant female targets, $F(1, 147) = 4.44$, $p < .04$. None of these effects interacted with participant sex.

Discussion

Limiting participants' attentional capacity led them to estimate higher proportions of socially dominant male targets but not socially dominant female targets. When target arrays were presented for a limited amount of time, participants presumably based their estimates on the targets to which their attention was drawn most strongly and quickly—male targets exhibiting cues to dominance. Limiting participants' attention did not lead to greater estimates of dominant women and, if anything, led to a slight reduction in estimates of dominant women. These results, therefore, are consistent with the hypothesis that attention would be initially captured by socially dominant men but not by socially dominant women.

It is worth noting that participant sex did not moderate the processing of socially dominant male targets. This is consistent with theory and evidence suggesting that dominant male targets may be salient for both female observers (for whom dominant men can serve as desirable mating partners) and male observers (for whom dominant men can serve as strong intrasexual competitors).

Despite the strength of these findings, an important limitation to the method should be noted. Whereas this study provides direct evidence for frequency estimation biases under conditions of limited attention, it provides only indirect evidence for attentional biases themselves. Previous evidence suggests that frequency estimates can be affected by intervening cognitive factors, such as the salience of particular information in memory (Maner et al., 2003). Thus, the findings from Study 1 could reflect heightened salience of dominant male targets in memory, in addition to potential attentional biases. To test hypotheses regarding selective attentional biases in another way, therefore, we used a different measure of attention in Study 2.

STUDY 2

In Study 2, we again tested the hypothesis that observers would selectively attend to men, but not to women, displaying cues to social dominance. Study 2 included several methodological enhancements designed to improve on and extend the earlier findings. First, rather than a frequency estimation method, we used a more rigorous eyetracking method. Tracking actual eye movements provides a particularly useful measure of attentional bias.

Second, in addition to examining attention to signs of social dominance, we examined attention to physical attractiveness. We independently manipulated targets' level of dominance and physical attractiveness to assess their unique effects on attentional bias. As described earlier, physical attractiveness tends to be valued to a

relatively greater extent in women (compared to men) and evidence indicates that both male and female perceivers are especially attentive to physically attractive women (e.g., Maner et al., 2003). Therefore, whereas we expected observers to attend to dominant male targets, we expected that observers would focus especially on physically attractive female targets.

Might one also expect physically attractive male targets to draw attention? Theory and research suggest competing answers to this question. On one hand, evolutionary theories of mating suggest that dominance and social status generally are valued in men to a relatively greater extent than is attractiveness. Therefore, there is some reason to expect that attention will be directed toward signs of male dominance rather than attractiveness.

However, there is also evidence that women, especially those inclined to pursue a short-term mating strategy (i.e., sexually unrestricted women), are interested in mating with physically attractive men (e.g., Li & Kenrick, 2006) and sexually unrestricted women do attend preferentially to signs of male attractiveness (Maner et al., 2003; Maner, Gailliot, Rouby, & Miller, 2007). Thus, although there are reasons to expect that attractive men generally may not capture attention, there are also reasons to expect that some observers—particularly unrestricted women—may be attentive to signs of male attractiveness.

A third methodological enhancement of Study 3 was that it examined individual differences that might be used to predict the extent of attentional bias to particular social targets. We focused on three mating-related individual differences: sociosexual orientation, romantic relationship status, and interest in alternative partners. Whereas people with an unrestricted sociosexual orientation are generally inclined to engage in sexual relationships without need for emotional commitment, people with a restricted sociosexual orientation tend to require emotional closeness and commitment before engaging in a sexual partnership (Simpson & Gangestad, 1991). Unrestricted versus restricted sociosexual orientations reflect a key difference between mating strategies designed to facilitate multiple, short-term, sexual relationships versus more committed, long-term relationships, respectively. Both men and women place a premium on the attractiveness of short-term mating partners (Li & Kenrick, 2006). We therefore hypothesized that unrestricted participants would be more attentive than restricted participants to physically attractive members of the opposite sex.

Similarly, we expected that single participants, compared to participants who are already committed to a romantic relationship, would be relatively more attentive to desirable members of the opposite sex. Committed participants presumably have their mating goals satisfied to a relatively greater extent and thus may have less reason to attend to potential alternatives to their current partner. We therefore expected that single women, as compared with committed women, would attend more to socially dominant, and perhaps also highly attractive, male targets. We expected that single men, as compared with committed men, would attend more to highly attractive female targets.

Finally, we expected that among individuals in a current relationship, interest in alternative partners would be associated with greater attention to those alternatives (see Miller, 1997). That is, individuals who are in a relationship but who nonetheless have interest in pursuing alternative partners may preferentially attend to highly desirable members of the opposite sex. Evolutionary theories imply that both men and women pursuing extra-pair encounters value the physical attractiveness of extra-pair partners (Scheib, 2001). We therefore expected that interest in alternative partners would be associated with greater attention to attractive members of the opposite sex. In addition, evolutionary theories suggest benefits to women engaging in extra-pair romantic encounters with highly dominant men (e.g., Smith, 1984; Smuts, 1985; Symons, 1979). We therefore expected that female participants interested in pursuing alternative partners also might be attentive to dominant men. We did not expect that men—even those interested in alternatives to their current partner—would be especially attentive to signs of social dominance in female targets.

Method

Participants. Forty-nine undergraduate psychology students participated in exchange for course credit. Data from 2 participants were excluded from analysis because, due to equipment malfunction, the majority of their data were unusable. This resulted in a sample of 47 participants (29 women, 18 men). Approximately half of the sample ($n = 24$; 18 women, 6 men) was in a current romantic relationship.

Design and stimulus materials. Each participant viewed one array of eight male faces and one array of eight female faces. Each array was constructed so as to contain two targets displaying each combination of highly dominant versus nondominant and highly attractive versus average-looking. Thus, the overall design of the study was a 2 (target sex) × 2 (target attractiveness) × 2 (target dominance) × 2 (participant sex) mixed design. Order of presentation of the male and female arrays was counterbalanced.

All targets were prerated for their levels of physical attractiveness and dominance. Male and female faces

were matched such that they had equivalent dominance and physical attractiveness ratings. Mean ratings of physical attractiveness were 7.63 (*SD* = 1.23) for the attractive targets and 5.17 (*SD* = 1.36) for the average-looking targets (measured with a 9-point scale). As in Study 1, target dominance was manipulated by varying targets' dress. Mean ratings of social dominance were 7.69 (*SD* = 1.25) for the dominant targets and 3.94 (*SD* = 1.38) for the nondominant targets (measured with 9-point scales). Target photos were situated in a roughly circular array for presentation on a 21″ computer monitor. Targets were randomly situated in the array with the constraint that no two targets of the same type were placed next to one another. Male and female faces with equivalent dominance and physical attractiveness ratings were situated in the same position within their respective arrays.

Eyetracker. An Applied Science Laboratories series 5000 eyetracker was used. This eyetracker samples eye saccades at 60 Hz (60 samples per s) and is accurate to within 1 to 2 degrees visual angle (approximately ½″ of monitor space). The eyetracker sits atop a small lightweight headband placed on the participant's head. The eyetracker is equipped with a magnetic head tracker, which allows for natural head movement throughout stimulus presentation.

Procedure. After arriving at the laboratory, participants were told that the study investigated color perception—how the eye processes color—and that the eyetracker was a color-optics recording device that would record information from the retina while viewing color stimuli. The participant was fit with the eyetracker and the experimenter closed a room divider so that the participant was alone in his or her half of the room (although the participant could still hear the experimenter's voice for instructions). Participants were told simply to "look naturally at the screen" throughout the experiment.

The experimenter calibrated the eyetracker to the participant's eye by having participants look at several points on the computer screen. The participant then viewed a set of filler stimuli consisting of colored patches and household objects, allowing the experimenter to check the accuracy of the eye calibration (and bolstering the cover story). Next, the participant viewed the first stimulus array (men or women, order was counterbalanced) for 40 s. After viewing the first stimulus array, the participant viewed the second array, again for 40 s. Throughout stimulus presentation, participants' eye movements were surreptitiously recorded.

After viewing the stimuli, participants were told that the researchers were interested in how a variety of personal and demographic characteristics might be related to visual processing and they completed a questionnaire that included measures of sociosexual orientation, relationship status, and interest in alternative partners. After completing this questionnaire, participants were probed for suspicion and debriefed.

Measures

Visual fixations. The amount of time spent visually fixating on each target was recorded. A target fixation was recorded whenever the participant attended to a given target photograph for at least 10 ms (shorter fixations were excluded because they usually reflect simple saccade-related eye movements). Summary measures were created by calculating the proportion of total fixation time spent attending to a particular type of face (e.g., the proportion of total fixation time spent attending to dominant male faces). Separate measures were calculated for (a) the first 4 s of stimulus presentation (to assess initial attentional bias and to allow for comparison with Study 1) and (b) the full 40-s presentation (to evaluate the persistence of any potential biases).[1]

Sociosexuality. The Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991) measures the extent to which a person has unrestricted sexual attitudes and behavior, that is, the extent to which a person requires emotional intimacy and commitment before having sex (e.g., "Sex without love is okay," "With how many different partners do you foresee yourself having sex during the next 5 years?"). SOI scores were assigned using the within-sex standardized scoring method described by Simpson and Gangestad (1991; $\alpha = .87$). Higher scores on the SOI indicate a more unrestricted sociosexual orientation.

Romantic relationship status. Participants characterized themselves as being (a) married, (b) single but in a committed relationship, (c) single and dating, (d) single and not currently dating, or (e) other (free response—no participants chose this option). Participants describing themselves as married or in a committed relationship were categorized as committed, with all other participants categorized as uncommitted.

Interest in alternative partners. Participants describing themselves as married or in a committed dating relationship completed the Relationship Alternatives scale (Rusbult et al., 1998), providing a 10-item measure of interest in alternatives to one's current relationship (e.g., "My needs for intimacy, companionship, etc., could easily be fulfilled in an alternative relationship," "My sexual needs (holding hands, kissing, etc.) could be fulfilled in alternative relationships"; $\alpha = .87$).

Results

An omnibus ANOVA assessed effects of the experimental manipulations (with target sex and attention toward dominant vs. physically attractive targets as within-participant variables and participant sex as a between-participants variable). This analysis revealed that during initial stimulus presentation (first 4 s), the degree to which participants' eyes were drawn to dominant versus attractive targets depended on the sex of the target, $F(1, 45) = 9.83$, $p = .003$. This same two-way interaction also was observed for the full 40-s presentation period, $F(1, 45) = 15.07$, $p < .001$, providing initial evidence for the persistence of attentional bias. No significant effects of participant sex were observed. This preliminary analysis was followed with tests designed to evaluate the extent to which attention was drawn to signs of dominance versus physical attractiveness in male and female targets.

Effects of target dominance. We first evaluated whether participants' eyes initially were drawn to signs of dominance during the first few seconds of stimulus presentation. Consistent with the results of Study 1, participants' eyes were drawn selectively to dominant men: Participants fixated on these targets more than half the time ($M = 58\%$, $SD = 25\%$), $F(1, 46) = 4.71$, $p = .04$, $\eta^2 = .09$, which is more than one would expect by chance given the equal numbers of dominant and nondominant targets (see Figure 2). In contrast, observers spent significantly less than half the time during the first 4 s fixating on dominant female targets ($M = 41\%$, $SD = 22\%$), $F(1, 46) = 7.97$, $p = .01$, $\eta^2 = .15$. Participants spent a greater proportion of the first 4 s fixating on dominant men than on dominant women, $F(1, 46) = 9.80$, $p = .003$, $\eta^2 = .18$.

To evaluate the persistence of these biases, we performed equivalent analyses for the full 40-s presentation period. We again found that participants spent more than half the time fixating on dominant men ($M = 54\%$, $SD = 11\%$), $F(1, 46) = 5.39$, $p = .03$, $\eta^2 = .11$. For female targets, a trend in the opposite direction was observed, such that observers fixated on dominant women somewhat less than half the time ($M = 48\%$, $SD = 11\%$), $F(1, 46) = 2.08$, $p = .16$, $\eta^2 = .04$. Participants spent a greater proportion of the 40-s presentation period fixating on dominant men than on dominant women, $F(1, 46) = 6.13$, $p = .02$, $\eta^2 = .12$.

To summarize, high levels of social dominance in male targets captured initial visual attention and this bias persisted throughout an extended stimulus presentation. In contrast, high levels of dominance in female targets failed to capture the eye of observers and, if anything, seemed to repel attention. None of these results were qualified by the sex of the participant.

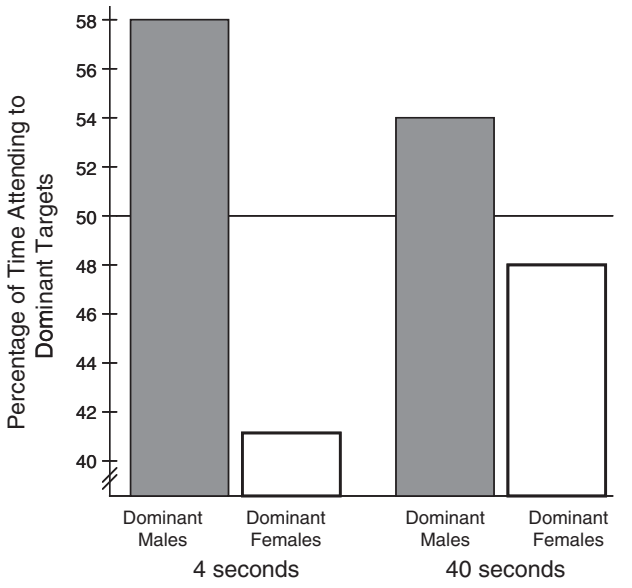

Figure 2 Observers exhibited a bias toward attending preferentially to dominant male targets but not dominant female targets.
NOTE: The tendency to attend to dominant male targets was especially apparent within the first 4 s of stimulus presentation.

Effects of physical attractiveness. We conducted similar analyses to assess effects of physical attractiveness (see Figure 3). During initial stimulus presentation (first 4 s), significantly more than half of participants' fixation time was spent on attractive women ($M = 59\%$, $SD = 18\%$), $F(1, 46) = 11.29$, $p = .002$, $\eta^2 = .20$. No such bias was observed for attractive male targets ($M = 50\%$, $SD = 23\%$), $F < 1$. The difference in initial fixation on attractive women versus men approached significance, $F(1, 46) = 3.57$, $p < .07$, $\eta^2 = .07$. Thus, whereas participants' eyes were initially drawn to signs of physical attractiveness in women, there was little evidence to suggest that male attractiveness captured initial attention.

Similar analyses evaluated whether visual fixation on attractive women persisted throughout the full presentation period. Indeed, it did. Participants spent significantly more than half the time fixating on attractive women ($M = 58\%$, $SD = 11\%$), $F(1, 45) = 30.65$, $p < .001$, $\eta^2 = .41$. The magnitude of this attentional bias depended on the sex of the participant, $F(1, 45) = 5.08$, $p = .03$. A sizable bias was observed in male participants, such that their eyes were strongly drawn toward attractive women ($M = 62\%$, $SD = 11\%$), $F(1, 17) = 21.28$, $p < .001$, $\eta^2 = .56$. A similar but relatively weaker bias was observed among female participants ($M = 55\%$, $SD = 10\%$), $F(1, 28) = 7.77$, $p < .01$, $\eta^2 = .22$. Again, there was no evidence to suggest that participants were biased toward attending to attractive male targets ($M = 52\%$, $SD = 14\%$), $F(1, 46) = 1.06$,

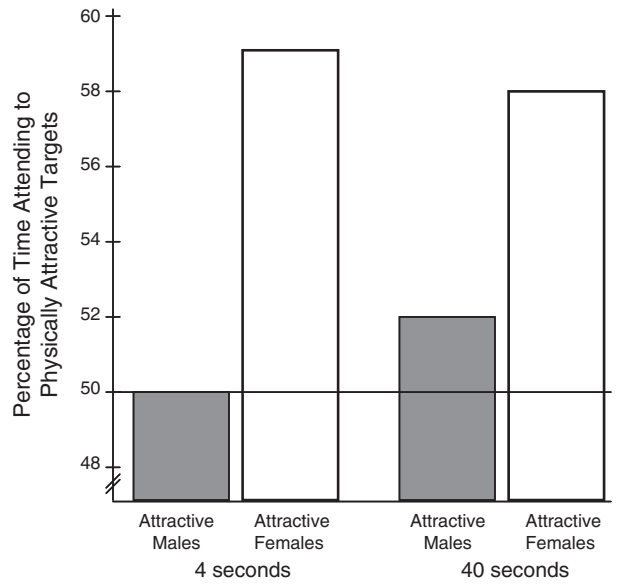

Figure 3 Observers exhibited a bias toward attending preferentially to physically attractive female targets, whereas no such bias was observed for physically attractive male targets.

$p = .31$, $\eta^2 = .02$. Indeed, participants spent a greater proportion of time fixating on attractive female targets than they did on attractive male targets, $F(1, 46) = 5.10$, $p = .03$, $\eta^2 = .10$.

Sociosexuality and relationship status. We conducted regression analyses to assess the hypotheses that unrestricted participants and single participants would be relatively more inclined than restricted participants and committed participants to attend to attractive members of the opposite sex. Attention to attractive members of the opposite sex was predicted from relationship status, SOI, participant sex, and their centered interactions. Results indicated that relatively unrestricted individuals were indeed more likely than restricted individuals to fixate on physically attractive opposite sex targets ($\beta = .39$, $t = 2.06$, $p < .05$, partial $r = .31$). This relationship did not depend on the sex of the participant ($p > .25$). (This relationship was observed only throughout the full presentation, not during initial presentation, $p = .77$.) In contrast to the results for sociosexuality, single participants were no more likely than committed participants to fixate on attractive members of the opposite sex ($\beta = -.07$, $t = -.46$, $p = .65$). Neither sociosexuality nor relationship status predicted fixation on dominant opposite sex targets (ps > .15), dominant same sex targets (ps > .50), or attractive same sex targets (ps > .50).

Interest in alternatives. To test the hypothesis that interest in relationship alternatives would be associated with attention to attractive opposite sex targets, regression analyses were conducted within committed participants. Attention to attractive members of the opposite sex was predicted from participant sex, interest in alternatives, and their centered interaction. Because the previous analyses highlighted SOI as a predictor of attention to attractive opposite sex targets, we controlled for SOI in the current analysis.

Participants interested in alternatives to their current partner were more likely to fixate on attractive opposite sex targets ($\beta = .45$, $t = 2.33$, $p = .03$, partial $r = .46$). This relationship did not depend on the sex of the participant ($p > .75$). Interest in alternatives was not as strongly related to fixation on attractive opposite sex targets during initial stimulus presentation ($\beta = .13$, $p = .55$, partial $r = .13$), although the trend was in the same direction.

In addition, planned tests assessed the possibility that women interested in alternative partners might preferentially attend to dominant male targets. Although no significant relationship was observed throughout the full 40-s presentation ($r = -.24$, $p = .35$), women interested in alternative partners did fixate more on dominant men during initial stimulus presentation ($r = .62$, $t = 2.42$, $p = .03$). No such relationship was observed among male participants attending to dominant female targets at any presentation length (ps > .55). Finally, further analyses speak to the specificity of these findings: Although participants' interest in alternative partners predicted their attention to members of the opposite sex, it was not related to attention to members of their own sex (all ps > .20).

Discussion

The findings of Study 2 extend those of Study 1 and provide additional evidence that observers selectively attend to male targets, but not female targets, displaying cues to social dominance. Study 2 also provides evidence to suggest that observers preferentially attend to female targets, but not male targets, exhibiting signs of physical attractiveness. These findings are consistent with previous evidence that whereas social dominance tends to weigh somewhat more strongly into mating-related judgments of men than women, physical attractiveness tends to be relatively more influential in judgments of women than men. Hence, these attentional biases are consistent with commonly observed sex differences in human mating.

The presence of relationships between mating-related individual differences and selective attention to particular social targets provides even greater insight into the motivations potentially underlying these attentional biases. As predicted, sexually unrestricted participants—who are especially inclined to seek physically attractive short-term mates—were particularly inclined to fixate

on attractive members of the opposite sex. However, sexually unrestricted participants were not especially attentive to targets displaying cues to social dominance. This fits with evidence that both men and women tend to place greater importance on the physical attractiveness of short-term sexual partners than on their level of social dominance (e.g., Li & Kenrick, 2006).

Contrary to our expectation, single participants were no more inclined than committed participants to attend to desirable members of the opposite sex. This could reflect the relatively small numbers of committed and single participants in the experiment; the relatively small sample is a limitation of the study. Among committed participants, however, level of interest in alternative partners was related to selective attention to members of the opposite sex. Consistent with previous findings (Miller, 1997), participants who expressed interest in alternative partners tended to fixate on physically attractive members of the opposite sex. Women (but not men) who expressed interest in alternative partners also focused on dominant men. These findings are consistent with previous research on extra-pair romantic partnerships, which suggests that whereas men are drawn to attractive women, women may be drawn to both physically attractive and dominant men (e.g., Scheib, 2001; Symons, 1979). The relationships among individual differences and attentional bias were target specific, thereby providing further discriminative evidence to suggest that the observed biases were reflective of mating-related motivations.

GENERAL DISCUSSION

Attention is the doorway to cognition. Attention sets critical constraints on what social information is initially encoded and therefore available for further processing. Only once people attend to others can they evaluate them, form judgments about them, and make decisions about whether they would prefer to flee from them, fight them, or ask them out on a date.

Findings from the current studies suggest that observers vigilantly attend to others who are relevant to their own reproductive success. We found consistent evidence that people selectively process men displaying cues to social dominance. This fits with previous evidence that social dominance often weighs heavily into mating-related judgments about men (Sadalla et al., 1987). Highly dominant men serve as desirable mating partners for women and as strong intrasexual competitors for other men (e.g., Buss & Schmitt, 1993). In contrast, observers did not similarly process women displaying cues to social dominance. This fits with evidence suggesting that dominance tends to weigh more heavily in mating-related evaluations of men than of women (Buss, 1989).

Findings from Study 2 suggest a contrasting pattern of attention to men versus women on the basis of their physical attractiveness. Whereas highly attractive women captured the eye of observers, highly attractive men did not. This is consistent with previous evidence that physical attractiveness is valued in women to a relatively greater extent that it is in men (e.g., Li et al., 2002). Thus, the patterns of attentional bias observed in the current studies seem to reflect the criteria with which men and women typically are evaluated as potential mates and as intrasexual rivals. These findings are consistent with a rich body of evolutionary theory suggesting that these criteria reflect the somewhat different mating-related challenges that men and women have faced throughout human evolutionary history.

Moving beyond previous studies, the current research simultaneously varied the dominance and attractiveness of target individuals, providing a novel opportunity to evaluate patterns of attentional bias under conditions in which these attributes might compete with one another for attention. This competition reflects a common trade-off intrinsic to mating (see Li et al., 2002). For example, some previous evidence suggests that in the absence of cues to dominance, female observers tend to focus more on highly attractive men than on average-looking men (Maner et al., 2003). However, in the current research, no such tendency was observed, suggesting that although women may prefer attractive men to average-looking men, signs of dominance may trump cues to physical attractiveness.

Another unique aspect of the current investigation is that unlike many other studies of human mating, participants in these studies were unaware that the tasks they were performing had anything to do with research on mating. Findings therefore suggest that the observed sex-differentiated attunements do not emerge only under conditions in which mating-related concerns or stereotypes are intentionally made salient (e.g., when participants are asked to indicate their explicit mating preferences).

The current research also provides a novel methodological approach for testing a broad range of hypotheses pertaining to the attributes that may be prioritized in others (see, e.g., Cottrell, Neuberg, & Li, 2007). The current studies contribute to the broader literature on person perception by describing methods useful for evaluating the types of features in others that people preferentially process at basic perceptual levels.

The Interplay of Evolved Cognitive Mechanisms and Culturally Bounded Knowledge

The current research integrates theories of evolved cognitive mechanisms with theories that specify content derived from culturally bounded knowledge structures.

Consistent with many theoretical models of functional cognition, we have framed our inquiry into selective attentional processes within the broader metatheoretical context of evolutionary psychology. Contrary to an all-too-common misperception, an evolutionary perspective does not serve as an alternative to accounts that emphasize social learning or culture. Indeed, the capacities for learning and culture are themselves grounded in a set of evolutionary adaptations (Bjorklund, 2003; Cosmides & Tooby, 1992; Moore, 2004) and many specific psychological processes that are rooted in evolved mechanisms are still responsive to cultural context and social learning histories (Gangestad, Haselton, & Buss, 2006). The human mind is not hardwired to respond innately to all manner of social stimuli; rather, it evolved to be especially adept at learning those stimuli that are relevant to evolutionarily fundamental motives and to selectively process those stimuli when they are perceived. Indeed, although it is doubtful that even the most socially dominant australopithecine ever wore a $1,200 Armani suit, members of the culture in which the current studies were conducted commonly use dress as a way of communicating their level of social dominance.

This approach to evolutionary psychology is consistent with our results pertaining to the selective processing of dominance cues. Human social structures, similar to those of other primates, tend to be hierarchically organized (Eibl-Eibesfeldt, 1989). In turn, people appear to possess mechanisms for categorizing others in terms of their social dominance and for rapidly learning whatever cues reliably signal a person's level of dominance. The specific cues used for this purpose are variable, implying that dominance signals depend on local learning environments. Indeed, stimuli signaling a person's level of social dominance have varied considerably across cultures and historical epochs. Hence, mating-related concerns seem to precipitate domain-specific psychological mechanisms that operate in necessary conjunction with social learning processes. Indeed, similar to the attributes that signal a person's dominance, even the value placed on particular cues denoting physical attractiveness may vary somewhat across different cultural contexts (Gangestad et al., 2006).

Indeed, it is important to consider the role that social learning may play in shaping the manifestation of early-in-the-stream adaptive cognition (see Eagly & Wood, 1999). Although cultural theories sometimes struggle with the ability to explain why certain features ultimately are valued in men and women, cultural theories, like evolutionary theories, would predict that whatever features are valued are likely to be selectively processed. Thus, the predictions tested in the current research are consistent with both evolutionary and cultural models.

Indeed, a satisfactory theory of mating-related cognitive biases requires one to consider both the adaptive mating strategies evolved in men and women throughout history, as well as the more proximate cultural factors that can shape the observable features of those strategies. It is our hope that future investigations will consider the interplay between distal (e.g., evolutionary) and proximate (e.g., cultural) explanations for social psychological processes.

Individual Differences in Attentional Bias

Several additional findings from the current research highlight the important role that individual differences play in shaping mating-related cognition. We observed several hypothesized relationships between mating-related individual differences and perceptual attunement to reproductively relevant social targets. The presence of these relationships highlights the specific mating-related functions that these biases may be designed to serve. For example, the tendency to focus on attractive opposite-sex targets was particularly pronounced among unrestricted participants, who are generally inclined to seek out large numbers of attractive short-term mates. This suggests that selective attention to physically attractive members of the opposite sex may reflect a type of perceptual vigilance designed to facilitate identification and procurement of potential mating partners.

In addition, among participants already in a romantic relationship, those expressing interest in alternative partners were especially likely to focus on desirable members of the opposite sex. Moreover, the specific targets on which these participants focused reflected differences in the characteristics preferred by men versus women. Women interested in alternative partners were inclined to focus on both highly attractive and highly dominant men. In contrast, men who were interested in alternative partners tended to focus on highly attractive female targets but not on dominant female targets. Thus, the relationships between mating-related individual differences and selective attention seem to reflect several of the complexities known to exist in sex-differentiated human mate preferences.

At a broader conceptual level, this investigation highlights the role that individual differences can play in shaping adaptive early-stage social cognition. Although evolutionary theories have at times tended to downplay the importance of individual differences, the current studies illustrate the fact that individual differences can play an important role in shaping the proximate operation of fundamental, evolved mating motives.

Implications for Relationships

The current findings may have significant implications for relationship decisions. Exposure to highly

dominant men can decrease a woman's commitment to her current partner (Kenrick, Neuberg, Zierk, & Krones, 1994). Selective attention to highly dominant male targets, therefore, could undermine women's satisfaction with and commitment to a current relationship, especially among women already interested in alternative partners, for whom attention to dominant men was particularly pronounced. Furthermore, attention to highly dominant men can lower men's perceptions of their own value as a mate (Gutierres et al., 1999). These perceptions, in turn, may influence men's judgments of which women might serve as realistic dating partners (Grammer, 1992) as well as decisions about which tactics to use in attaining those partners (e.g., Simpson, Gangestad, Christensen, & Leck, 1999).

Relationship outcomes also may be affected by selective attention to highly attractive women. Exposure to attractive women can undermine men's judgments of other women (Kenrick, Gutierres, & Goldberg, 1989) as well as men's satisfaction with their current partners (Kenrick et al., 1994). Indeed, people in committed relationships who attend to attractive alternatives can experience lower levels of relationship satisfaction, commitment, investment, and adjustment (Miller, 1997). Thus, the attentional biases observed in the current studies could undermine relationship success, although previous research also has documented strategies used by committed individuals to maintain relationship esteem in the face of attractive alternatives (e.g., Johnson & Rusbult, 1989).

Limitations and Future Directions

In addition to these implications, there are limitations of the current research that deserve discussion, in part because they afford useful avenues for future research. Although the current studies provide consistent evidence suggesting that observers selectively attend to men displaying cues to social dominance, we did not exhaust the range of possible cues that can serve as dominance signals. Although some cues to social dominance may be fairly consistent across cultures (e.g., posture, physical size; e.g., Argyle, 1994), others are likely to vary significantly across cultural contexts (e.g., dress). Future research would benefit from examining the extent to which individuals preferentially process a range of characteristics that might serve to denote social dominance.

Another limitation involves our use of college samples. It is difficult to know the extent to which the biases observed in the current research would generalize to more demographically diverse populations. For example, mating seems to be an especially immediate and salient feature of the social environment among college participants, which could enhance the likelihood of mating-related cognitive attunements. Furthermore, it is possible that college participants—even those who consider themselves to be part of a long-term committed relationship—may not be engaged in the sort of commitment characteristic of older or married individuals. This could explain why, in this research, relationship status did not appear to moderate attention to desirable members of the opposite sex. Further research is needed to evaluate the extent to which the current results generalize to other populations.

A broader limitation lies in the specific perceptual processes we chose to examine. A functionalist perspective implies that many different early-stage cognitive processes are guided by mating-related motivations. Attention is only one of several cognitive processes likely to be guided by adaptively relevant psychological factors. Future research may benefit from focusing on ways in which reproductively relevant social stimuli are preferentially processed at other stages of social cognition (e.g., encoding, memory).

Conclusion

Although many evolutionary theories presume the existence of adaptive cognitive mechanisms at early stages of social perception, empirical studies have at times fallen short of directly examining these mechanisms. Instead, studies have tended to investigate cognitively downstream processes (e.g., preferences, judgments, and choices) and have left relatively unexplored the more automatic, early-stage cognitive mechanisms presumed to underlie them. The current study reflects a step forward on the path toward more direct examination of early-stage cognitive mechanisms within the domain of mating. Findings from these studies suggest that observers selectively attend to signs of social dominance in male targets. In contrast, findings suggest that observers preferentially attend to female targets who are physically attractive rather than socially dominant. These attentional biases fit with evolutionary theories positing differences in the attributes prioritized by men's and women's mating strategies. Who people vigilantly attend to, therefore, may provide a window into the presence of specific mechanisms designed to increase reproductive success. Indeed, examination of automatic, early-stage cognitive mechanisms represents an area of great promise for future empirical research and provides important insight into the adapted human mind.

NOTE

1. The number of times participants fixated on each face also was recorded. Not surprisingly, number of fixations and amount of fixation time were highly correlated and results of analyses based on these two measures were equivalent. Therefore, to streamline the presentation of the results, we report only data pertaining to fixation time.

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