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Original Article

Automatic Attention towards Face or Body as a Function of Mating Motivation

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Abstract: Because women's faces and bodies carry different cues of reproductive value, men may attend to different perceptual cues as functions of their long-term *versus* short-term mating motivations. We tested this hypothesis in three experiments on 135 male and 132 female participants. When influenced by short-term rather than long-term mating motivations, men's attention was captured by (Study 1), was shifted to (Study 2), and was distracted by (Study 3) the waist/hip area rather than the face on photographs of attractive women. Similar effects were not found among the female participants in response to photographs of attractive men. These results support the evolutionary view that, similar to the attentional selectivity found in other domains of life, male perceptual attention has evolved to selectively capture and hold reproductive information about the opposite sex as a function of short-term *versus* long-term mating goals.

Keywords: automatic attention, long-term mating, short-term mating, face, body

Introduction

The human cognitive system has evolved to efficiently solve fitness-relevant problems. From relatively automatic processes, such as attention and memory, to more effortful processes, such as logical reasoning and decision-making, psychological adaptations are present at all levels of human cognition (Maner, Gailliot and DeWall, 2007). In processing mating information, for example, one must first identify and differentiate between features of the opposite sex carrying different implications for reproduction. After reproductive-diagnostic cues have been perceived, one must decide on functionally beneficial behavioral responses that effectively facilitate reproductive success. A recent study reported that men preferred to look at a woman's face when primed by long-term mating goals, whereas they preferred to look at a woman's body when primed by

short-term mating goals (Confer, Perilloux and Buss, 2010). These findings point to a mating-specific adaptive functioning of the higher-order cognitive process. Does the lower-order cognitive system have a similar perceptual preference between the face and body which is driven by long-term *versus* short-term reproductive goals? The purpose of the present study is to answer this question by assessing automatic attention to the face or the body of the opposite sex under long-term or short-term mating motivation.

Attention is the first step in encoding information. Its evolutionary function is to search for and capture information relevant to survival and reproductive goals. Given limited or finite attentional capacity (resulting from life history trade-offs and the evolutionary principle of economy) and the diverse and complex social information potentially available, attentional selectivity has evolved to capture and hold information that is most relevant to fitness-enhancing goals. For example, human attention, as well as that of other animal species, is preferentially drawn to animate over inanimate objects in order to avoid predation (New, Cosmides and Tooby, 2007), and it is more sensitive to emotional rather than non-emotional facial expressions of conspecifics as a means for conducting social interactions more effectively (Fox, Russo, Bowles and Dutton, 2001). Thus, limited attentional capacity should be used in the most necessary fashion, thereby providing optimal information for subsequent cognitive processing.

Attentional selectivity is equally important in processing mating information. In a mating context, a heterosexual individual must be able to differentiate members of the opposite sex of high *versus* low mate value (Maner, Gailliot and DeWall, 2007). Automatic attention to features representing different aspects of mate quality is essential for efficient identification and differentiation of suitable potential mates. Human attention is able to target (Duncan, Park, Faulkner, Schaller, Neuberg and Kenrick, 2007) and fixate toward (Maner, Gailliot and DeWall, 2007; Maner, Gailliot, Rouby and Miller, 2007) features of high-quality mating partners. For example, Duncan et al. (2007) asked participants to detect changes in an array of four opposite-sex faces that differed in their level of attractiveness and appeared and disappeared alternately. Male participants with unrestricted sociosexual orientation were faster at detecting changes in attractive female faces than they were at detecting changes in unattractive female faces, suggesting attentional selectivity and acuity over the facial features that signal high mate quality. Similar to such attentional engagement is the effect of sexual attractiveness on attentional disengagement, whereby male participants took a longer time to disengage their attention from attractive female faces than they did from unattractive ones (Maner et al., 2007). Automatic attention to mate quality also differed between participants who either were primed by long-term romantic relationships (Maner, Rouby and Gonzaga, 2008) or were committed to long-term relationships (Maner, Gailliot and Miller, 2009) and those who were not primed to be or were not already in a committed relationship. Similar effects were not found among women.

Whereas the above supports attentional selectivity towards aspects of mate quality distributed across different potential mates, selective attention is also exercised over different facial and bodily features of the same individual. This may be particularly true for human males who face the challenge of assessing two mating-related uncertainties within the same individual: (1) uncertainty over female fertility (i.e., actual reproduction),

including fecundity (i.e., reproductive potential) which is age-graded (from menarche to menopause), and fertilizability, which is time-sensitive (the fertile phase is brief and concealed during the ovulation cycle), and (2) uncertainty over his own paternity because males face the challenge of female infidelity which is facilitated by some of the same female fertility characteristics (e.g., concealed ovulation). The female face and body provide both overlapping and distinct assessment information for the male evaluator. The face is the best indicator of age, which represents perhaps the most important aspect of a female's mate value (Thornhill and Gangestad, 1999). The color, luster, and volume of hair indicate youth and health (Gangestad and Scheyd, 2005), whereas the overall facial impression of femininity implies fertility (Enlow, 1990) and maternal nurturing and warmth (Perrett et al., 1998). Corneocytes and collagen, which give the skin the appearance of softness and vascularization, are enhanced by estrogens and these degenerate after menopause (Farage, Neill and MacLean, 2009). The face also contains information about fluctuating asymmetry and smoothness of skin which, as indicators of overall immunity (Sugiyama, 2004), represent long-term mating and child rearing considerations. Finally, facial features and expressions contain perceptual cues to the assessment of paternity uncertainty. A face may look honest or dishonest, and sexually reserved or flirtatious (Grammer, Honda, Juette and Schmitt, 1999; Schmidt and Cohn, 2001), whereas such assessments cannot be made from visual inspections of the body.

The major contributors to female bodily attractiveness include waist-to-hip ratio (Singh, Dixson, Jessop, Morgan and Dixson, 2010) and body mass index (Cornelissen, Hancock, Kiviniemi, George and Tovée, 2009), both of which indicate her current fertility status (Confer et al., 2010). Optimal reproductive potential is reached at around 17 years of age and fertility rate peaks at around 24 years of age (Buss, 1994; Symons, 1979). These hormone-based developmental characteristics are arguably best summarized by the waist-to-hip ratio. Thus, calibration of overall reproductive value or fecundity as mostly indicated by the face is future-oriented, whereas fertilizability, most noticeably advertised by the waist-to-hip ratio, carries time immediacy. For example, current infertility of a pregnant woman is best shown by her unattractive waist-to-hip ratio, whereas her facial features representing overall reproductive value (including future fertility) would not show similarly drastic changes. On the other hand, pregnancy as indicated by a large waist-to-hip ratio represents a current state of infertility, whereas honest, prudent, and sexually reserved facial cues and expressions are useful for assessing future fidelity that is related to paternity. As an adaptation to these potentially inconsistent cues, especially in representing future *versus* current reproduction, male visual attention may have evolved to selectively attend to different cues for long-term *versus* short-term mating goals.

In the present study, we tested the hypothesis that men's visual attention would automatically shift to the face or body of the opposite sex as a function of long-term *versus* short-term mating motivation. We focused this hypothesis on men because, as an adaptation to concealed and pre-menopausal ovulation, men have evolved special visual sensitivity toward secondary sexual features distributed in the female face and body (Thornhill and Grammer, 1999). We included women as a comparison group, in whom the same perceptual effects were not expected, because women do not have the same fertility and maternity challenges. We also controlled for sociosexuality which taps individual

differences in one's interest and willingness to engage in casual sexual relationships (Penke and Asendorpf, 2008) and has been found to influence aspects of mating behavior (e.g., Maner et al., 2007) including visual attention (Duncan et al., 2007). We tested our hypothesis in three experiments by using attention disengagement, engagement, and distraction paradigms after participants were primed with long-term *versus* short-term relationship goals. In Study 1, we used a dot probe task to examine the speed with which the participants disengaged their attention from the face or the body of the opposite sex. In Study 2, we examined how long the participants engaged their attention towards the face or the body of the opposite sex while they were performing a change detection task. In Study 3, we examined the probability of, and the speed with which participants were distracted by the face or body while they were simultaneously performing another visual task. We expected that, among men but not women, attention would be more drawn to and fixed on the face of the opposite sex when primed by the long-term mating goal, and relatively more drawn to the body under the short-term mating goal.

Study 1

Methods

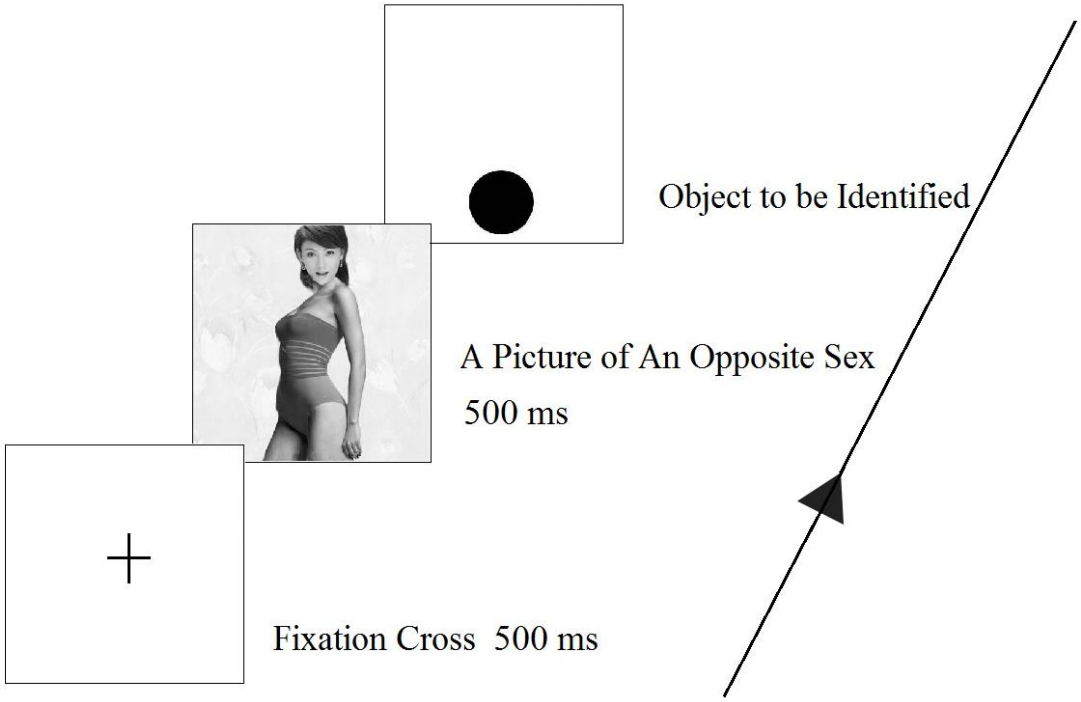
Participants

One hundred and eleven heterosexual undergraduate students (mean age = 20.61, *SD* = .87, 47 males) were recruited from a 3-year community college in a large city in southern China. By random assignment, 56 participants were primed for a long-term relationship and the others were primed for a short-term relationship. The dependent variable was derived from a task in which the participants had to view photographs of attractive members of the opposite sex.

Priming Material

For three minutes, the participants read one of two scenarios of similar length about a long-term or a short-term mating relationship in which the participants were asked to imagine themselves as the protagonist of the mating scenario. This method has been successfully used to activate long-term or short-term mating goals (e.g., Griskevicius, Cialdini and Kenrick, 2006). In the long-term scenario, a male participant was asked to imagine that he spent a wonderful evening with his attractive girlfriend, cooking and having dinner at his place, talking about how he would like to spend the rest of his life with her and to provide her and their children with a nice home and a comfortable living, and, at the end of the evening, he walked her home, kissed her goodnight and went back home by himself. In the short-term relationship scenario, a male participant was asked to imagine that, during an overseas trip, he met and flirted with an attractive woman in a bar, and the woman liked him. They then went to his hotel room and had a passionate night, and on the next day he said goodbye to her and continued with his trip. The two priming stories for the female participants were similar to those for males with the exception that the protagonist was a woman who either planned her future life with her boyfriend (long-term condition) or had a passionate night with a handsome man (short-term condition).

Figure 1. Illustration of the attention task in Study 1. The example shows stimuli used for male participants, whereas female participants used a different set of stimuli using male targets.



Attention Disengagement Task

The "Dot Probe Task" has been used previously to measure participants' focus of attention and to assess biases of attentional disengagement away from specific stimuli (e.g., Maner, Gailliot and DeWall, 2007). If a participant was attracted to the face (or the body) shown in the opposite-sex photograph, then his or her attention would be fixed to that part. This fixation should therefore attenuate his or her attention away from the new stimulus, if that stimulus is presented in a position different from the original stimulus, resulting in a slower response in this condition.

In each trial, in the center of the computer screen, a fixation cross "+" appeared for 500 ms, and then an opposite-sex photograph appeared for 500 ms (Figure 1). The photograph showed the person from head to knees and was positioned so that the chest area appeared in the center of the screen with the face and the waist each at a similar distance from the center. Immediately after the photograph appeared, an object (a circle or a square) appeared either in the upper (the face position in the previous photograph) or the lower part of the screen (the waist position in the previous photograph). The participant's task was to identify as quickly as possible whether the object was a circle or a square; to do this they had to press the letter "O" or "P" on the keyboard. After each response, the participant was given a 1,000 ms break before the next trial. There were four practice and 40 test trials. In

half of the trials, the object appeared on the upper part of the screen and, in the other half, the object appeared on the lower part of the screen. Half of the objects were circles and half were squares. The order of location and shape of the object was randomized. The photographs (44 women or 44 men for participants of the opposite sex) were selected from internet picture banks and were processed by Photoshop in order to achieve the same size and a similar brightness and contrast. Rated by an independent group of 20 undergraduate male and 18 female students on a 10-point scale, the attractiveness ratings were M = 7.62 (SD = .46) for the female photographs and M = 7.48 (SD = .66) for the male photographs.

Sociosexual Orientation

We used scores on the Revised Sociosexual Orientation Inventory (Penke and Asendorpf, 2008) as a covariate to control for individual differences in participants' attitudes toward casual sex. Sample items include "with how many different partners have you had sex within the past 12 months" and "I can imagine myself being comfortable and enjoying 'casual' sex with different partners." Rated on a uniform 9-point scale, higher SOI scores indicate more unrestricted sociosexual orientation or higher willingness to engage in an uncommitted sexual relationship. The internal consistency reliability estimate in this study was α = .71.

Procedure and Design

All tasks were completed individually. Upon arriving at the experiment room, each participant signed a consent form and received a brief introduction about the experimental processes. The participant was then given the mating scenario which they were asked to read and to remember the details for a memory test later on. Afterwards, the participant completed the attention task by viewing 44 opposite-sex photographs. The participants completed the Sociosexual Orientation Inventory last. The design was a 2 (*participant gender*) × 2 (*mating prime*: long-term *versus* short-term, manipulated between participants) × 2 (*focus of attention*: face *versus* body, manipulated within participants) mixed model ANCOVA, with SOI score as a covariate.

Results

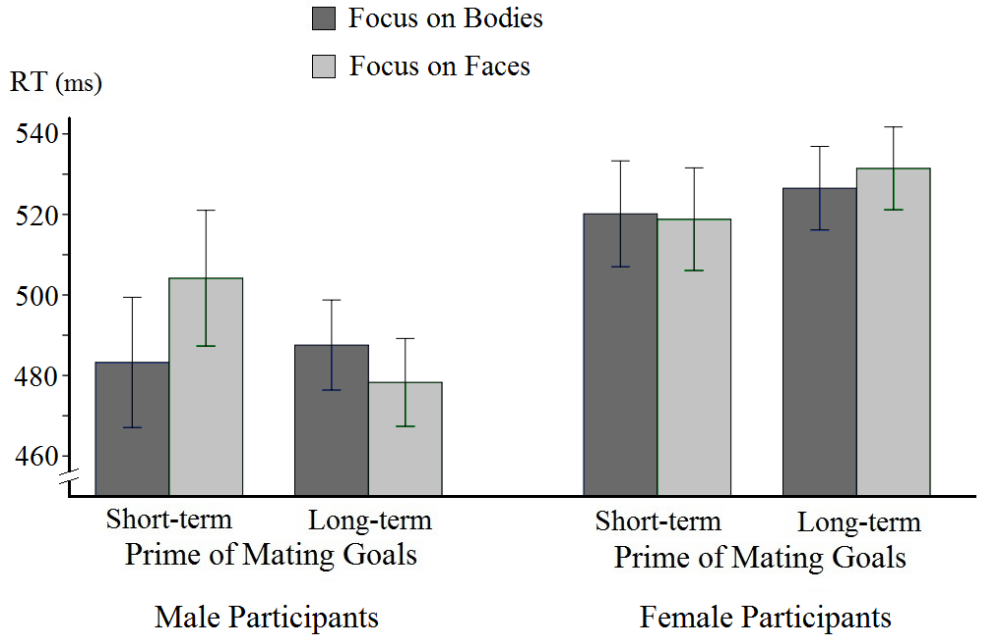
Trials with incorrect responses (3.10%) and those with unreasonably fast responses (usually due to starting the task before the starting prompt; RT < 300 ms; .85%) were excluded from the analysis. Following previous priming experiments (e.g., Lemm, Dabady and Banaji, 2005), extremely long responses (more than 3 SD above the mean of each participant) were trimmed to the RT value of 3 SD above the mean (.74%). If a participant's attention was previously attracted to the face, his or her response to the object appearing in the face position should be faster than that appearing on the waist/hip position. Similarly, if the participant's attention was previously drawn to the waist/hip position, his or her response to the object appearing on the face should be slower than that appearing on the waist/hip position.

The ANCOVA showed a main effect of *participant gender*, reflecting generally

slower responses from females compared to males (F (1, 106) = 6.17, p = .015, η^2 = .06). There was also a two-way interaction between *mating prime* and *focus of attention* (F (1, 106) = 4.46, p = .037, η^2 = .04), and a three-way interaction between *mating prime, focus of attention* and *participant gender* (F (1, 106) = 10.18, p = .002, η^2 = .09, Figure 2).

Separate analyses of the male participants showed an interaction effect between the *mating prime* and the *focus of attention* (F (1, 44) = 14.64, p < .001, η^2 = .25), but no main effect of *mating prime* (F (1, 44) = .16, p = .69, η^2 = .004) or *focus of attention* (F (1, 44) = .21, p = .65, η^2 = .005). The male participants primed with short-term mating goals responded to the object located in the waist/hip position (M = 483.25 ms, SD = 77.64) faster than in the face position (M = 504.17 ms, SD = 80.85; F (1, 21) = 7.06, p = .015, η^2 = .25), thereby suggesting that their attention was previously fixed at the waist/hip position. By contrast, when primed with long-term mating goals, there were no significant differences in men's response time between the waist/hip position (M = 487.56 ms, SD = 54.84) and the face position (M = 478.28 ms, SD = 53.45; F (1, 22) = 1.03, p = .32, η^2 = .04). For the female participants, there was no main effect either for *mating prime* (F (1, 61) =.49, p = .48, η^2 = .008) or for *focus of attention* (F (1, 61) = .02, p = .88, η^2 = .00). There was also no interaction between *mating prime* and *focus of attention* (F (1, 61) = .63, p = .43, η^2 = .01). In the next study, we used the "change blindness paradigm" to further assess the location of the participants' natural visual attention (Rensink, O'Regan and Clark, 1997).

Figure 2. Attentional disengagement from bodies and faces of the opposite sex as functions of *mating prime* and *participant gender* in study 2 (Error bars indicate ± S.E.).



Study 2

Method

Participants and Design

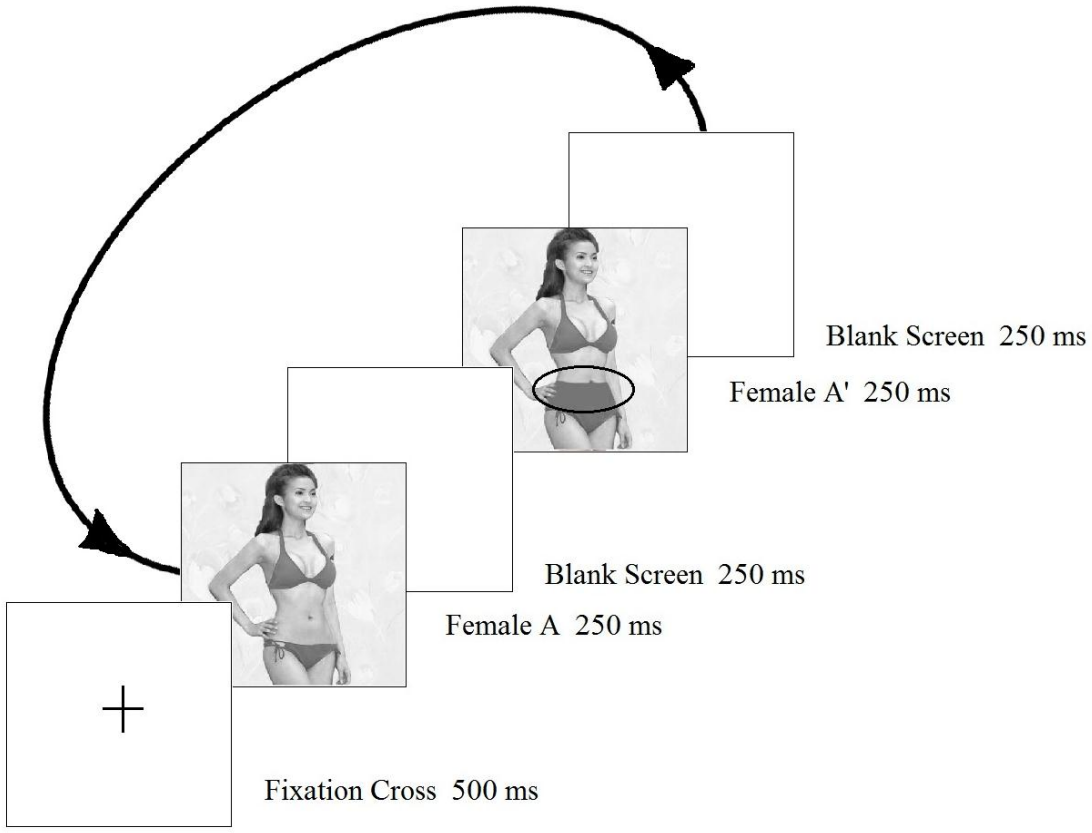
One hundred and sixteen heterosexual students (mean age = 20.62, *SD* = 1.02, 44 males) were recruited from a community college in a metropolis of southern China. They were randomly assigned to either a long-term (n = 58) or short-term relationship priming conditions. We used a 2 (*participant gender*) × 2 (*priming of mating motivation*: long-*versus* short-term) × 2 (*focus of attention*: face *versus* body) mixed model design. The dependent variable was the participants' reaction time in performing a change blindness task.

Preference of Attention

The "change blindness paradigm", which has been successfully used to access preferential attention to specific objects (New, Cosmides and Tooby, 2007), was used to measure the participants' visual preference for the face or the body. Two pictures that were identical except for one feature change either in the face or in the waist/hip area of the opposite-sex photograph were presented to the participants as a stream of rapidly alternating pictures on the computer screen (Figure 3). As shown in Figure 3, the change occurred on the clothes and accessories in the waist/hip area or, for the face position, in the hairstyle and clothing accessories near the face. The faster that a participant spotted the difference between the two flashing alternations, the more preferentially he or she attended to the changing locale. In each trial, a fixation cross "+" of 500 milliseconds was followed

by a flash of two almost identical pictures rapidly alternating on the computer screen. The participants were asked to locate the change by pressing the "1" key and then to type a few words to describe the change. Participants then had to click a button at the bottom of the screen to start the next trial. There were four practice trials and 40 test trials. In half of the trials the change was in the face, and in the other half the change occurred in the waist/hip area. The same set of photographs used in Study 1 was used to generate the flashes. The time that elapsed after the first picture appeared and before the computer key was pressed was counted as Reaction Time.

Figure 3. Illustration of the change blindness paradigm in Study 2. Below is an example of the stimuli used for male participants (female participants used a different set of stimuli depicting male targets)

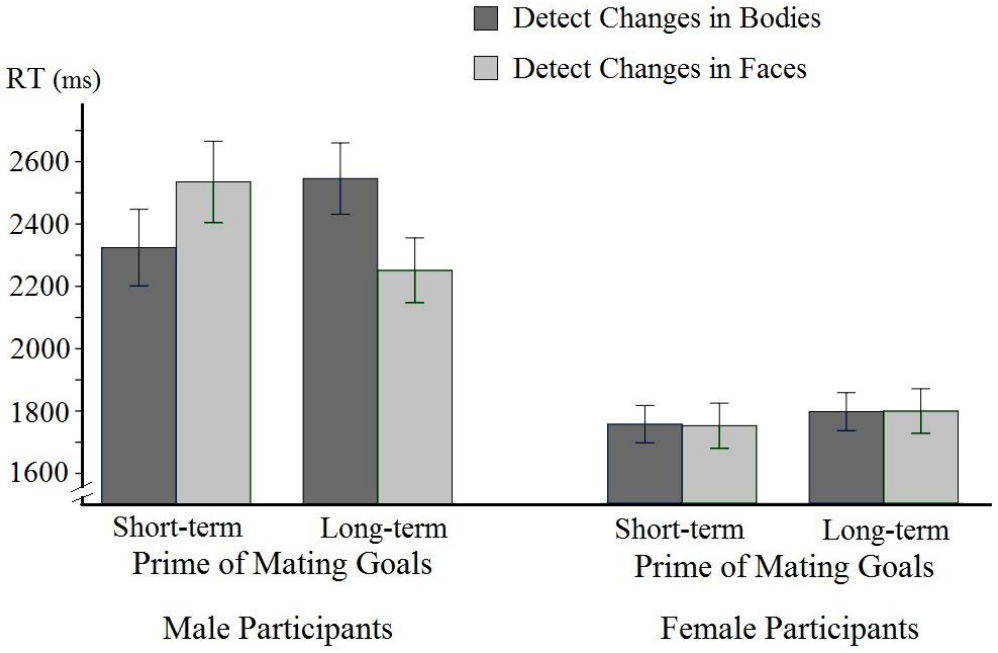


Results

As in Study 1, extremely long responses (above 3 SD from the mean of each participant) were trimmed to the RT value of 3 SD above the mean (.85%). No responses shorter than 300ms occurred. A 2 (*participant gender*) × 2 (*mating prime*: long-term *versus* short-term) × 2 (*focus of attention*: face *versus* body) mixed model ANCOVA with SOI score as a covariate showed a main effect of *participant gender* (F (1, 111) = 40.85, p < .001, η^2 = .27) and a three-way interaction effect, F (1, 111) = 17.16, p < .001, η^2 = .13

(Figure 4). A separate analysis of male participants showed an interaction between *mating prime* and *focus of attention* (F (1, 41) = 26.29, $p < .001$, $\eta^2 = .39$), but no main effect of *mating prime* (F (1, 41) = .07, $p = .79$, $\eta^2 = .002$) or *focus of attention* (F (1, 41) = .81, $p = .38$, $\eta^2 = .02$). Males primed with short-term mating goals detected changes in the waist/hip area (M = 2324.16 ms, SD = 576.12) faster than they detected changes in the face (M = 2535.26 ms, SD = 611.40; F (1, 20) = 5.27, $p = .033$, $\eta^2 = .21$). When primed with long-term mating goals, male participants were slower at detecting changes in the waist/hip area (M = 2545.66 ms, SD = 536.59) than they were at detecting changes in the face area of the flashing pictures (M = 2251.67 ms, SD = 486.68; F (1, 20) = 6.75, $p = .017$, $\eta^2 = .25$). For the female participants, there were no significant interactions or main effects.

Figure 4. Detecting changes in bodies and faces of the opposite sex as functions of *mating prime* and *participant gender* in study 2 (error bars indicate ± S.E.)



Study 1 used attention disengagement and Study 2 used attention engagement to assess automatic attention to the face or the body. In both studies, a faster response time confirmed our mating-related hypothesis. In the next study, we used an opposite paradigm to see how much of the men's attention to an ongoing task was differently distracted by the face or the body of attractive members of the opposite sex. Because Study 1 and Study 2 showed no attentional differences between male faces and male bodies among the female participants, the next study used male participants only.

Study 3

Method

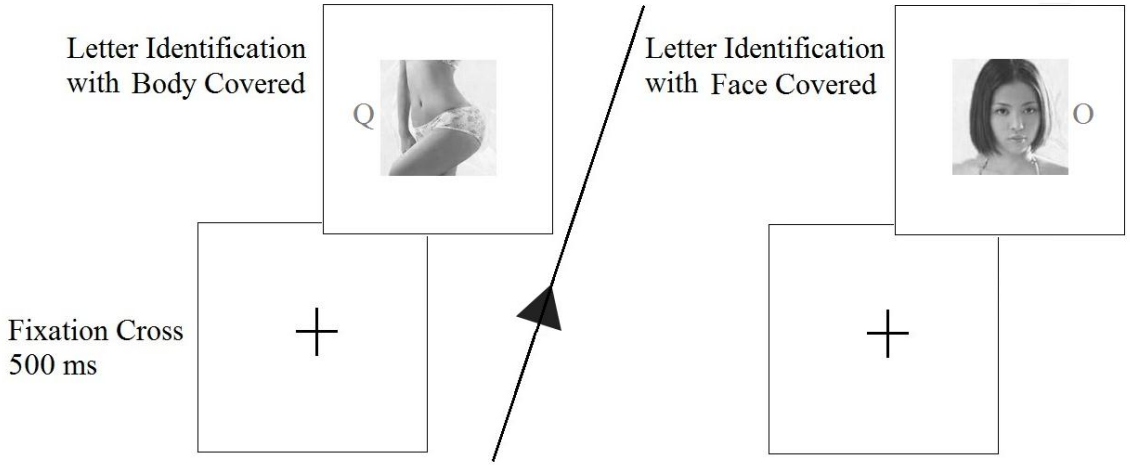
Participants

Forty-four heterosexual male undergraduate students (mean age = 20.72, *SD* = 1.24) were recruited from a 3-year community college in southern China. By random assignment, half of the participants were primed for a long-term relationship and half were primed for a short-term relationship. The dependent variable was derived from a simple attention task in which participants had to view photographs of attractive members of the opposite sex.

Attention Distraction

A photograph of an attractive female face or waist/hip area was presented in the centre of the screen. A letter "O" or "Q" appeared either on the left or the right side of the face or the waist/hip picture (Figure 5). Each participant's task was to indentify whether the letter was "O" or "Q". Response latency in completing this simple task indicates potential visual distraction from either the face or the waist/hip area.

Figure 5. Illustration of the Letter Identification Task in Study 3



Design and Procedure

Study 3 used a 2 (priming of *mating motivation*: long-term *versus* short-term manipulated between participants) × 2 (*distraction of attention*: face *versus* waist/hip manipulated within participants) mixed design. The procedure was the same as in Study 1 and Study 2 except for the attention distraction task described above. There were four practice trials and 40 test trials. In half of the trials, the letter "O" or "Q" appeared next to the face picture, and in the other half of trials it appeared next to the waist/hip picture. The position (left or right) and the type of letter ("O" or "Q") were counterbalanced across the trials.

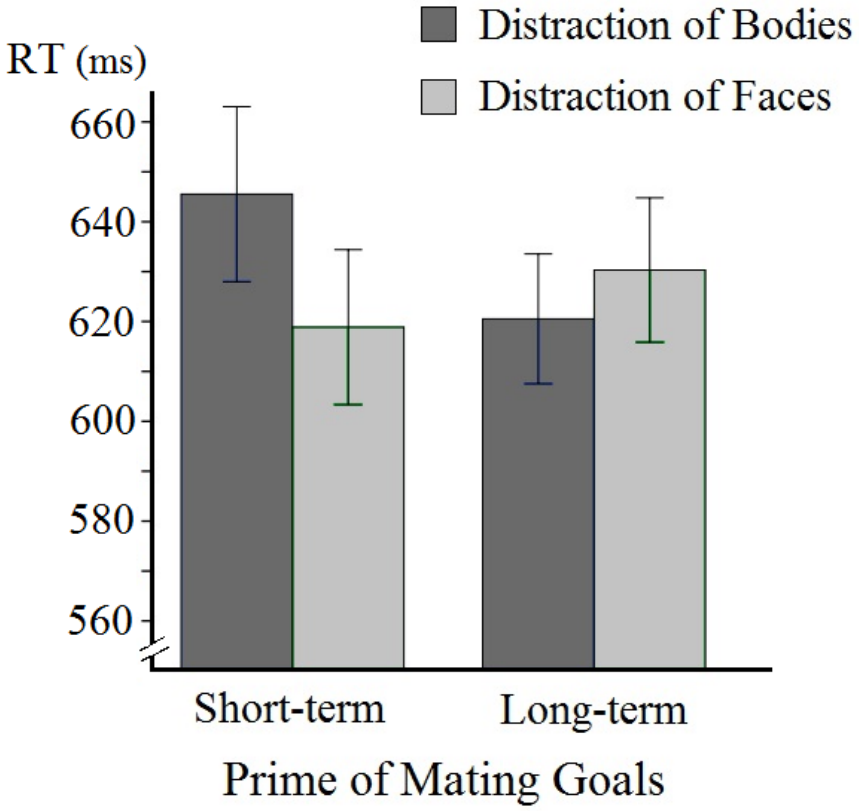
Results

As before, trials with incorrect responses (3.35%) and unreasonably fast responses

(RT < 300 ms; 0%) were excluded from the analysis. Extremely long responses (above 3 SD from the mean of each participant) were trimmed to the RT value of 3 SD above the mean (.91%). A longer RT in letter identification suggests that the participant's attention was distracted by the face or waist/hip picture appearing on the side of the letter.

A 2 (*mating prime*: long-term *versus* short-term) × 2 (*distraction of attention*: face *versus* body) mixed model ANCOVA with SOI score added as a covariate showed the interaction effect between *mating prime* and *distraction of attention* (F (1, 41) = 37.91, p < .001, η^2 = .48) but there was no main effect of *mating prime* (F (1, 41) = .10, p = .75, η^2 = .003) or *distraction of attention* (F (1, 41) = 1.54, p = .22, η^2 = .03; Figure 6). In the short-term mating condition, letter recognition was slower when the letter was presented with the waist/hip area (M = 645.52 ms, SD = 82.28) than with the face (M = 618.88 ms, SD = 72.89; F (1, 20) = 5.54, p = .029, η^2 = .22), whereas, in the long-term mating condition, letter recognition when the letter was presented with the face (M = 630.33 ms, SD = 67.89) was similar to that when the letter was presented with the waist/hip area (M = 620.53 ms, SD = 61.00; F (1, 20) = 3.05, p = .096, η^2 = .13).

Figure 6. Attentional distraction of bodies and faces as a function of mating prime in study 3 (error bars indicate ± S.E.)



Discussion

By using different attention research paradigms, we demonstrated that there is an

automatic shift of attention between the body and the face of the opposite sex among men, but not among women, as a function of their long-term *versus* short-term mating motivations. Study 1 showed that under the short-term mating motivation, men's attention was captured by the waist/hip area rather than by the face on photographs of attractive women, whereas women's attention was captured equally by the waist/hip area and the face on photographs of attractive men. Consistent with Study 1, Study 2 showed that men's attention shifted between the female face and body as a function of long-term and short-term mating motivations, and this same attention-shifting effect was absent in women. Using a distraction task, Study 3 showed that when primed with short-term rather than long-term mating goals, men's attention was more likely to be distracted by the waist/hip area than by the face of attractive women.

These results support the evolutionary view that, similar to other domain-specific cognitive adaptations, visual processing in the mating domain may also be fashioned by an adaptive process driven by sexual selection and specific mating goals. Human attention has been adaptively tuned to be sensitive to cues that help to solve fitness-relevant issues, including mating (Schaller, Park and Kenrick, 2007). Because men and women have faced different reproductive challenges, they can be expected to pay attention to different perceptual cues within the mating domain. Men have faced two recurrent reproductive challenges, namely, fertility uncertainty and paternity uncertainty. As an adaptation, men direct attention to perceptual cues of female fecundity and fertilizability, especially when short-term mating goals are activated. Whereas information about female fertility is contained both in the face and the body, the most direct and noticeable indicator of current fertilizability is the waist-to-hip ratio (Confer et al., 2010; Currie and Little, 2009). As shown in the present study, men driven by short-term mating motivation paid greater attention to the waist/hip area rather than the face. Automatic attention to and subsequent calibration of fertilizability based on the waist-to-hip ratio may have helped men to solve the short-term mating challenge of fertility uncertainty.

In pursuing long-term relationships, on the other hand, it is adaptive for a man to attend to perceptual cues that help him to assess and perhaps reduce his paternity uncertainty. Most attributes leading to the reduction of paternity uncertainty are contained in facial rather than bodily appearance. These may include looking honest *versus* dishonest, submissive *versus* aggressive, and sexually reserved *versus* frivolous. In addition to indicating paternity, the face also carries cues of future reproductive value, including information about symmetry, fecundity, and femininity (Rhodes, 2006; Thornhill and Gangestad, 1999). In the present study, men paid attention to the face rather than the body of attractive women when primed by long-term relationship goals. Such perceptual attention may have helped to solve long-term mating challenges, including that of reducing paternity uncertainty.

In the evolutionary past, a woman's reproductive challenge has been the procurement of resources to help her during pregnancy and when raising her young. Indicators of paternal and provisioning ability are contained in the face (e.g., conspicuous brow ridges indicating status (Mazur and Booth, 1998) and large pupils indicating sensitivity (Tombs and Silverman, 2004)) and in facial expressions (Roney, Hanson, Durante and Maestripieri, 2006). However, some of these traits are also contained in body

features (e.g., masculinity and muscularity; Frederick and Haselton, 2007; Singh, 1995). Ancestral women also needed to procure good genes to ensure offspring genetic quality, including immunity against pathogens. Indicators of good genes are also contained in both the face (e.g., symmetry) and the body (e.g., muscularity). Such pre-copulation considerations are also driven by the fertilizable status of women. Women are more interested in short-term mating relations when they are ovulating than when they are not (e.g., Gangestad, Thornhill and Garver, 2002; Guéguen, 2009). It is likely that women may look at the male face and body differently during the different phases of their menstrual cycle (Penton-Voak et al., 1999). Whereas the present study focuses on men, future studies could examine automatic perceptual processes among women as functions of their menstrual cycle phase.

Future studies may also investigate other conditions which may result in perceptual changes in the visual processing of the opposite sex. For example, whether or not a man is currently engaged in a long-term relationship (Maner et al., 2009), and whether or not he is secure about the relationship, may affect his sense of paternity certainty and hence his perceptual processing of the female face and body. Social status or self-perceived social status, which could be measured as one's current social status or could be experimentally manipulated, may also affect men's self-efficacy regarding paternity assessment and female fertility accessibility. These mental states may in turn result in automatic attention to different perceptual cues from the opposite sex. Future studies may also employ eye-tracking technology to obtain more detailed and precise measurements of perceptual characteristics in processing the secondary sexual features of the opposite sex. Despite these and other improvements that could be made in future studies, this is one of the earliest studies to examine how men and women view the face and the body of the opposite sex. Building on Confer et al. (2010), the present study examined men's automatic attention to photographic images of the female face or body which were also presented simultaneously. The results confirm the evolutionary view that mating-related perceptual processing is domain-specific and has been shaped by sexual selection and specific mating goals.

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References

Buss, D. M. (1994). *The evolution of desire: Strategies of human mating*. New York: Basic Books.

Confer, J. C., Perilloux, C. and Buss, D. M. (2010). More than just a pretty face: Men's priority shifts toward bodily attractiveness in short-term versus long-term mating contexts. *Evolution and Human Behavior, 31,* 348-353.

Cornelissen, P. L., Hancock, P. J. B., Kiviniemi, V., George, H. R. and Tovée, M. J. (2009). Patterns of eye movements when male and female observers judge female attractiveness, body fat and waist-to-hip ratio. *Evolution and Human Behavior, 30*, 417-428.

Currie, T. E. and Little, A. C. (2009). The relative importance of the face and body in judgments of human physical attractiveness. *Evolution and Human Behavior, 30*, 409-416.

Duncan, L. A., Park, J. H., Faulkner, J., Schaller, M., Neuberg, S. L. and Kenrick, D. T. (2007). Adaptive allocation of attention: Effects of sex and sociosexuality on visual attention to attractive opposite-sex faces. *Evolution and Human Behavior, 28*, 359-364.

Enlow, D. H. (1990). *Facial growth*. Philadelphia, PA: Harcourt Brace Javanovich.

Farage, M. A., Neill, S. and MacLean, A. B. (2009). Physiological changes associated with the menstrual cycle: A review. *Obstetrical and Gynecological Survey, 64*, 58-72.

Fox, E., Russo, R., Bowles, R. and Dutton, K. (2001). Do threatening stimuli draw or hold visual attention in subclinical anxiety? *Journal of Experimental Psychology: General, 130*, 681-700.

Frederick, D. A. and Haselton, M. G. (2007). Why is muscularity sexy? Tests of the fitness indicator hypothesis. *Personality and Social Psychology Bulletin, 33*, 1167-1183.

Gangestad, S. W. and Scheyd, G. J. (2005). The evolution of human physical attractiveness. *Annual Review of Anthropology, 34*, 523-548.

Gangestad, S. W., Thornhill, R. and Garver, C. E. (2002). Changes in women's sexual interests and their partners' mate retention tactics across the menstrual cycle: Evidence for shifting conflicts of interest. *Proceedings of the Royal Society B, 269*, 975-982.

Grammer, K., Honda, M., Juette, A. and Schmitt, A. (1999). Fuzziness of nonverbal courtship communication unblurred by motion energy detection. *Journal of Personality and Social Psychology, 77*, 487-508.

Griskevicius, V., Cialdini, R. B. and Kenrick, D. T. (2006). Peacocks, Picasso, and parental investment: The effects of romantic motives on creativity. *Jouranl of Personality and Social Psychology, 91*, 63-76.

Guéguen, N. (2009). Menstrual cycle phases and female receptivity to courtship solicitation: An evaluation in a nightclub. *Evolution and Human Behavior, 30*, 351-355.

Lemm, K. M., Dabady, M. and Banaji, M. R. (2005). Gender picture priming: It works with denotative and connotative primes. *Social Cognition, 23*, 218-241.

Maner, J. K., Gailliot, M. T. and DeWall, C. N. (2007). Adaptive attentional attunement: evidence for mating-related perceptual bias. *Evolution and Human Behavior, 28*, 28-36.

Maner, J. K., Gailliot, M. T. and Miller, S. L. (2009). The implicit cognition of relationship maintenance: Inattention to attractive alternatives. *Journal of Experimental Social Psychology, 45*, 174-179.

Maner, J. K., Gailliot, M. T., Rouby, A. and Miller, S. L. (2007). Can't take my eyes off you: Attentional adhesion to mates and rivals. *Journal of Personality and Social Psychology, 93*, 389-401.

Maner, J. K., Rouby, D. A. and Gonzaga, G. C. (2008). Automatic inattention to attractive alternatives: The evolved psychology of relationship maintenance. *Evolution and Human Behavior, 28*, 343-349.

Mazur, A. and Booth, A. (1998). Testosterone and dominance in men. *Behavioral and*

Brain Sciences, 21, 353-380.

New, J., Cosmides, L. and Tooby, J. (2007). Category-specific attention for animals reflects ancestral priorities, not expertise. *Proceedings of the National Academy of Sciences, USA*, 104, 16598-16603.

Penke, L. and Asendorpf, J. B. (2008). Beyond global sociosexual orientations: A more differentiated look at sociosexuality and its effects on courtship and romantic relationships. *Journal of Personality and Social Psychology, 95*, 1113-1135.

Penton-Voak, I. S., Perrett, D. I., Castles, D. L., Kobayashi, T., Burt, D. M., Murray, L. K. and Minamisawa, R. (1999). Menstrual cycle alters face preference. *Nature, 399*, 741-742.

Perrett, D. I., Lee, K. J., Penton-Voak, I. S., Rowland, D. R., Yoshikawa, S., Burt, D. M., Henzi, S. P., Castles, D. L. and Akamatsu, S. (1998). Effects of sexual dimorphism on facial attractiveness. *Nature, 394*, 884-887.

Rensink, R. A., O'Regan, J. K. and Clark, J. J. (1997). To see or not to see: The need for attention to perceive changes in scenes. *Psychological Science, 8*, 368-373.

Rhodes, G. (2006). The evolutionary psychology of facial beauty. *Annual Review of Psychology, 57*, 199-226.

Roney, J. R., Hanson, K. N., Durante, K. M. and Maestripieri, D. (2006). Reading men's faces: Women's mate attractiveness judgments track men's testosterone and interest in infants. *Proceedings of the Royal Society B, 273*, 2169-2175.

Schaller, M., Park, J. H. and Kenrick, D. T. (2007). Human evolution and social cognition. In R. I. M. Dunbar and L. Barrett, (Eds.), *Oxford handbook of evolutionary psychology* (pp. 491-504). Oxford, UK: Oxford University Press.

Singh, D. (1995). Female judgment of male attractiveness and desirability for relationships: Role of waist-to-hip ratio and financial status. *Journal of Personality and Social psychology, 69*, 1089-1101.

Singh, D., Dixson, B. J., Jessop, T. S., Morgan, B. and Dixson, A. F. (2010). Cross-cultural consensus for waist-hip ratio and women's attractiveness. *Evolution and Human Behavior, 31*, 176-181.

Schmidt, K. L. and Cohn, J. F. (2001). Human facial expressions as adaptations: Evolutionary questions in facial expression research. *American Journal of Physical Anthropology, 33*, 3-24.

Sugiyama, L. S. (2004). Illness, injury, and disability among shiwiar forager-horticulturalists: Implications of health-risk buffering for the evolution of human life history. *American Journal of Physical Anthropology, 123*, 371-389.

Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.

Thornhill, R. and Gangestad, S. W. (1999). Facial attractiveness. *Trends in Cognitive Sciences, 3*, 452-460.

Thornhill, R. and Grammer, K. (1999). The body and face of woman: One ornament that signals quality. *Evolution and Human Behavior, 20*, 105-120.

Tombs, S. and Silverman, I. (2004). Pupillometry: A sexual selection approach. *Evolution and Human Behavior, 25*, 221-228.