RUNNING HEAD: Ovulation redirects attention

I only have eyes for you: Ovulation redirects attention (but not memory) to attractive men

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Word count: 1796 (Text: 1768, Captions: 28)

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Keywords: attention; memory; ovulation; fertility; menstrual cycle; evolutionary psychology

Abstract

A number of studies have found a disjunction between women's attention to, and memory for, handsome men. Although women pay initial attention to handsome men, they do not remember those men later. The present study examines how ovulation might differentially affect these attentional and memory processes. We found that women near ovulation increased their visual attention to attractive men. However, this increased visual attention did not translate into better memory. The pattern of findings suggests that any ovulation-driven boost in attention is not a function of increased cognitive processing of handsome men, but may instead reflect nonverbal attempts to communicate romantic interest.

On entering a crowded room, to whom do we pay attention? Who do we later remember? A number of studies have begun to suggest that simple social cognitive processes are often biased in functionally sensible ways (e.g. Ackerman, Becker, Mortensen, Sasaki, Neuberg, Kenrick, 2009; Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007; Maner et al., 2005,). Some of this research suggests sex differences in such processing. For instance, whereas men pay attention to, selectively encode, and selectively remember physically attractive women, women attend to, but do not later remember, handsome men (Becker, Kenrick, Guerin, & Maner, 2005; Maner et al., 2003).

These findings make sense in terms of typical male and female mating strategies: Whereas men are interested in, and nonselective about, possible relationships with female strangers, women have generally higher standards for casual relationships and are less inclined to have such relationships with male strangers (e.g., Clark & Hatfield, 1989; Kenrick et al., 1990). For women, the relative costs of casual relationships are higher than they are for men. In particular, a short-term relationship could result in pregnancy, which brings necessarily high costs for women, but not necessarily for men. Consistently, women tend to engage in careful analysis of men as potential mates, and typically pay high attention to a man's ability to contribute resources to potential long-term relationships (e.g. Li, Bailey, Kenrick, & Linsenmeier, 2002). Hence, it might not generally be a good use of cognitive resources for a woman to devote extensive processing to male strangers, even if they were physically attractive (Kenrick, Delton, Robertson, Becker, & Neuberg, 2007).

There may, however, be an exception to the above generalizations. An emerging literature suggests that hormonal fluctuations near ovulation alter women's mating preferences and behaviors in important ways. Compared to other points in their menstrual cycle, women near ovulation dress more attractively and provocatively (Haselton, Mortezaie, Pillsworth, Bleske-Rechek, & Frederick, 2007). Ovulating women are more attracted to men showing high levels of masculinity (e.g., Penton-Voak, Little, Jones, Burt, Tiddeman, & Perrett, 2003) and signs of creativity (Haselton & Miller, 2006). They also prefer the scent of symmetrical men (Gangestad & Thornhill, 1998). Most critically, women in the most fertile part of their cycle are more interested in extra-pair sexual relations, particularly with men more attractive than their long-term partners (Pillsworth & Haselton, 2006).

Why would women be especially interested in attractive men during ovulation? Symmetry, high masculinity, and creative displays, much like colorful and symmetrical displays in peacocks, may reflect the possession of genetic traits well-suited to survival (Haselton & Miller, 2006). When choosing a mate, females may face trade-offs between males who will stay around and provide resources versus those who are highly attractive to other females and may have more opportunities to stray. A casual liaison could result in transmission of the attractive male's beneficial genes to offspring, but raise the danger of losing a (less attractive but more committed) partner willing to provide resources. Temporally limited and concealed extra-pair liaisons with highly attractive males during the period of maximal fertility are presumably a way of balancing those trade-offs. None of this is presumed to be consciously mediated, and cyclic effects are not found for women on hormonal birth control (which changes normal hormonal patterns).

Despite evidence of ovulatory shifts in overt behavior and expressed preferences, few researchers have explored how ovulation affects early-stage cognitive processing. During ovulation, it might be expected that women pay increased attention to handsome men. Given that highly fertile women are more attracted to, and more interested in mating with, highly attractive men, we predicted that women near ovulation would spend more time attending to attractive men than those in less fertile periods.

Will that translate into better memory for those men? On one hand, it might make sense that ovulating women might not show the typical tendency to eject handsome men from downstream processing. Given their relatively greater interest in attractive men, they may be especially driven to cognitively process such men, which often leads to enhanced memory. On the other hand, increased visual attention to attractive men could serve another function—to communicate interest and thereby encourage those men to approach (Moore, 1985). If increased looking serves as a communication strategy, we would not expect it to contribute to increased memory. In the present study, we measured effects of fertility on visual attention to faces varying on attractiveness and gender using an eye tracking device and also tested women's memory for those faces.

Method

One hundred twelve females enrolled in Introductory Psychology participated in exchange for partial fulfillment of course requirements. Prescreening questionnaires excluded individuals using hormonal birth control and those indicating highly irregular cycle length. Equipment malfunctions and calibration difficulties rendered eye tracking data from 22 participants unusable, leaving a final sample of 90 participants. These

participants were classified as high fertility (N = 24) or low fertility (N = 66) based on information they provided about their menstrual cycle (see below).

To minimize the possibility that participants would consciously try to control eye movements, they were told the study investigated visual and auditory perception using a portable electroencephalograph; the apparent electroencephalograph was actually a headband containing magnetic sensors that allowed the Applied Science Laboratories Series 5000 eye tracker to reduce eye-capture loss. After calibrating the eye tracking software, participants viewed a slideshow consisting of four slides. Each slide contained eight faces (two exemplars each of the factorial combination of male/female and attractive/average) in a roughly circular array. These faces were neutrally-expressive, White young adults, pre-rated for physical attractiveness. Each slide appeared for 10 seconds with a 2 second break between slides.

Participants next completed the memory test. The memory test consisted of the 32 faces from the slide show and 32 distracter faces also varying on gender and attractiveness. Participants indicated whether they had seen each face on a six-point scale ranging from “Definitely did not see” to “Definitely did see.”

At the end of the study, participants provided information about their menstrual cycle length and regularity and were asked to email researchers the date of their next menses onset. To determine fertility phase, we employed the reverse-cycle day method (cf. Haselton & Miller, 2006). The five days leading up to, and including, ovulation (reverse count days 15-20) are considered high fertility days, while the remaining days are considered low fertility.

Results

To test the effects of fertility on attention to faces, we conducted a mixed ANOVA on the total attention to each face-type with fertility as a between-subjects factor and target gender and attractiveness as within-subjects factors. Overall, there was a main effect of target attractiveness, $F(1, 88) = 44.21$, $p < .001$, $\eta_p^2 = .33$, such that individuals paid more attention to attractive targets (M = 7.90, SD = 2.05) than average targets (M = 6.28, SD = 1.92).

This attractiveness main effect was qualified, however, by a three-way interaction with target gender, target attractiveness, and fertility, $F(1, 88) = 4.98$, $p = .028$, $\eta_p^2 = .054$; see Figure 1. The two-way interaction between fertility and target gender was significant within attractive targets, $F(1, 88) = 6.15$, $p = .015$, $\eta_p^2 = .065$, but not within average targets ($F < .3$). As expected, high fertility women paid more attention to attractive male targets than did low fertility women, $F(1, 88) = 10.28$, $p = .002$, $\eta_p^2 = .105$; fertility had no effect on attention to other face types (all Fs < .40, ps > .56). Additionally, high fertility women paid more attention to attractive males than attractive females, $F(1, 88) = 4.22$, $p = .043$, $\eta_p^2 = .046$.

To test the effects of fertility on memory, we first dichotomized participant responses into either “Did not see” or “Did see.” Using these scores, we calculated d-prime (a measure of recognition sensitivity that controls for false alarms) for each face type (e.g for all attractive male faces). We then conducted a mixed ANOVA on the d-prime scores with fertility as a between-subjects factor and target gender and attractiveness as within-subjects factors. Overall, attractive faces were remembered better than average, $F(1, 88) = 26.951$, $p < .001$, $\eta_p^2 = .234$; see Figure 2.

The significant three-way interaction between target gender, target attractiveness, and fertility status found in the attention data was not replicated in the memory data, $F(1, 88) = .80$, $p = .373$. However, the two-way interaction between target gender and target attractiveness was significant, $F(1, 88) = 12.369$, $p = .001$, $\eta_p^2 = .123$. Attractive women were remembered significantly better than average women, $F(1, 88) = 44.65$, $p < .001$, but attractive men were remembered only marginally better than average men, $F(1, 88) = 2.80$, $p = .095$. Fertility status did not significantly effect memory within any target type ($ps > .17$).

Discussion

Using an eye tracking device, we found ovulating women paid relatively more attention to the attractive male targets in arrays of varying faces. Fertility status had no effect on attention to other face types, and it did not produce an analogous effect on memory.

What function is served by fertility-enhanced attention to attractive men? Recall that ovulating women, in particular, perceive such men to be relatively more desirable (e.g., Haselton & Miller, 2006; Penton-Voak et al., 2003). This fertility-enhanced visual attention may thus reflect a more thorough cognitive assessment of these men. However, fertility status did not enhance subsequent recognition memory for these handsome men. A second possibility, given that eye contact serves to nonverbally signal romantic interest (Moore, 1985), is that increased visual attention by highly fertile women reflects not extended cognitive processing but rather strategic (albeit nonconscious) inclinations to communicate romantic interest to desirable men. The fact that ovulating women do show especially enhanced looking at, but not especially enhanced memory for, handsome men,

is consistent with that possibility. Future research might profitably explore these alternatives in more detail. What is clear is that ovulation does result in increased visual attention specifically directed to handsome men.

More broadly, these findings lend further support to the growing appreciation that perceptual and cognitive biases of various kinds often serve functionally sensible aims (e.g., Kenrick, Neuberg, Griskevicius, Becker, & Schaller, in press). Finally, it is useful to note that ovulation status lies outside the theoretical architecture of traditional social psychological theories of relationships. As such, these data combine with findings demonstrating important effects of various hormones (e.g., Miller & Maner, in press; Durante & Li, 2009; Roney & Simmons, 2008) to illustrate the value of generating integrative, biosocial models of social cognition. Furthermore, these findings contribute to an emerging literature exploring the importance of neuroendocrine processes for social cognition and behavior.

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Figures

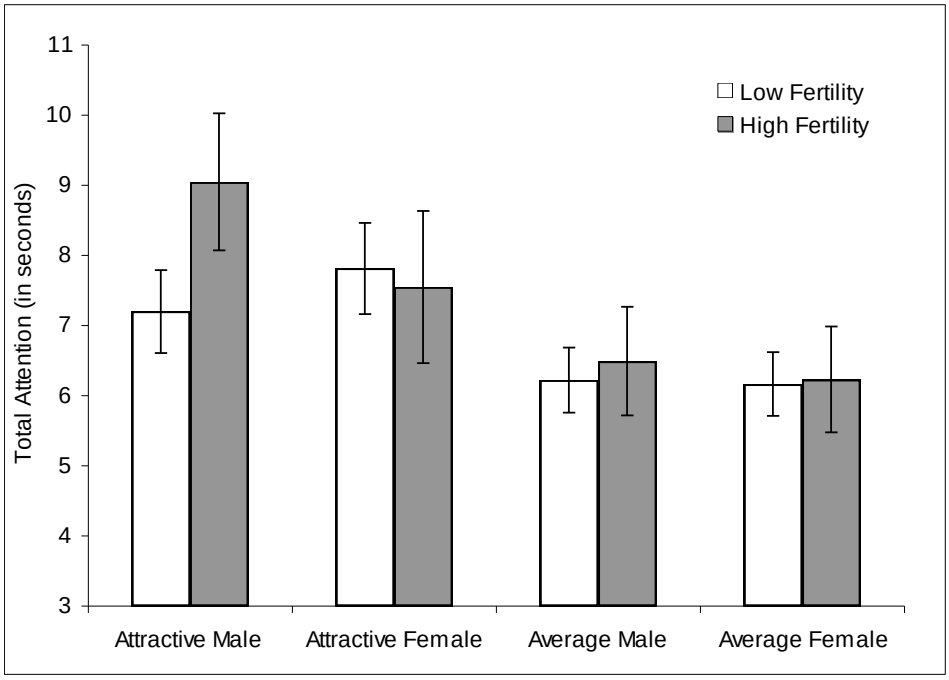

Figure 1. Mean time spent looking at each face type. Error bars represent 95% CI.

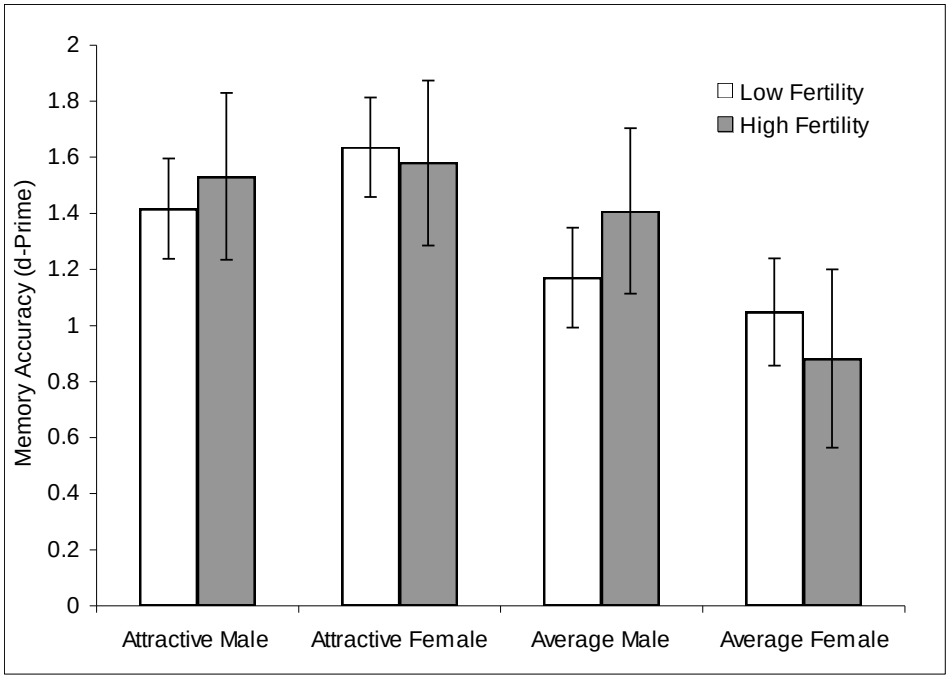

Figure 2. Memory accuracy for each face type. Error bars represent 95% CI.