THE ROYAL SOCIETY biology letters

Female intrasexual competition decreases female facial attractiveness

Maryanne L. Fisher

Department of Psychology, York University, Toronto, Ontario M3J 1P3, Canada (*mlfisher@yorku.ca*)

Recd 20.08.03; *Accptd* 12.01.04; *Published online* 18.02.04

Evolutionary theory predicts that female intrasexual competition will occur when males of high genetic quality are considered to be a resource. It is probable that women compete in terms of attractiveness since this is one of the primary criteria used by men when selecting mates. Furthermore, because hormones influence the mate-selection process, they may also mediate competition. One competitive strategy that women use is derogation—any act intended to decrease a rival's perceived value. To investigate intrasexual competition through derogation, the influence of oestrogen on women's ratings of female facial attractiveness was examined. During periods of high oestrogen, competition, and hence derogation, increased, as evidenced by lower ratings of female facial attractiveness. By contrast, oestrogen levels did not significantly affect ratings of male faces. These findings support the theory of female intrasexual competition with respect to attractiveness.

Keywords: facial attractiveness; intrasexual competition; female mate choice; fertility

1. INTRODUCTION

Intrasexual competition is the use of strategies to compete with members of the same sex for mating access to members of the opposite sex. It has evolved as an important behavioural adaptation for attracting mates and for gathering the resources necessary for reproduction (Darwin 1871). Females compete for males when males vary in their ability to provide a limiting resource and when the benefits of competition exceed the costs (Palombit *et al.* 2001). Since men vary in their abilities to protect offspring (Wilson *et al.* 1980) and to provide resources (Buss 1989), women need to compete for men who display developed abilities. These men can choose from an array of available women who seek provisioning, causing female intrasexual competition that is driven by an unequal ratio of a few 'good' men to many available women.

Research on mate selection has shown that men prefer attractive women (e.g. Buss 1989). Since mate preference is thought to drive intrasexual competition in the opposite sex (Darwin 1871), attractiveness should be an arena in which women compete. Thus, a female's ultimate goal is to render herself maximally desirable to members of the opposite sex relative to others of the same sex who are striving to achieve the same goal (Buss & Dedden 1990). Investigations indicating that female faces are rated as significantly more attractive than male faces (Bernstein *et al.* 1982) support the claim that female attractiveness is of evolved importance, and hence, a potential vehicle for competition.

To assess female intrasexual competition with respect to attractiveness, participants were asked to rate the facial attractiveness of photographed female and males faces. Competitor derogation, specifically lower attractiveness rating, was perceived as an indication of competition. Since competitor derogation is the use of tactics to make a rival appear inferior relative to oneself, devaluing the facial attractiveness of a same-sex rival is interpreted as evidence that this phenomenon is occurring. Thus, it is hypothesized that women will rate female faces as less attractive than will men. Additionally, it is predicted that ratings of female attractiveness are influenced by fertility, such that when experiencing high levels of oestrogen (i.e. maximally fertile), women will be most derogating. To clarify, when a female finds a potentially 'good' mate, she will compete for him, and do so most fiercely when it is critical for conception. Subsequently, it is hypothesized that women experiencing high levels of oestrogen will rate female faces as less attractive than women experiencing low levels of oestrogen.

2. METHODS

(a) *Facial attractiveness stimuli*

Colour photographs of 35 female and 30 male faces were used to generate attractiveness ratings. The models were students in a first-year psychology class taken several years prior to the study (Geldart *et al.* 1999). For the purpose of standardization, the models were asked to display a neutral expression, wear a black smock and remove any accessories (jewellery and eyeglasses). Faces were presented in random order on a laptop computer. Response times and ratings, using a Likert-type scale (1, extremely unattractive to 7, extremely attractive), were recorded.

(b) *Participants and procedure*

Participants were first-year students; a total of 57 women (age (years): M(mean) = 19.09, s.d. = 1.21) and 47 men (M = 20.75, s.d. = 2.97) were included in the final sample. To demonstrate that the process is unique to females, male participants were included in the study for comparative purposes. To test the possibility of oestrogen effects, females were divided into two groups based on self-reported ovulatory cycle status. Ovulatory cycle days of 12–21, with day one representing commencement of menses, indicated participants with high oestrogen levels (n = 16), whereas low oestrogen levels (n = 41) were indicated by cycle days 1–11 and 22–28 of a standardized 28 day cycle. All female participants reported regularly occurring ovulatory cycles, were not pregnant and had not used oral or intravenous contraceptives in the previous three months. In addition, to approximate physiologically the 'environment of evolutionary adaptedness' (Tooby & Cosmides 1990, pp. 386–387) as closely as possible, participants currently using antidepressants or with a history of usage were excluded. Therefore, although they participated, 38 females were excluded due to contraceptive use, an additional 28 for antidepressant use, 23 because they had missed an ovulatory cycle in the past 12 months and eight because they were not heterosexual; three non-heterosexual males were also excluded.

Two two-way ANOVA models were created to test the hypotheses. In addition, response times for each hypothesis were examined via two-way ANOVA models because Quinsey *et al.* (1996) demonstrated that attractiveness ratings correlate with viewing time. All t-tests were two-tailed, and a significance level of $\alpha = 0.05$ was used.

3. RESULTS

(a) *Sex differences in attractiveness ratings*

To test whether women rated the female faces differently from men, a two-way ANOVA was performed. This comparison yielded a significant main effect for the sex of the stimulus face; $F_{1,102} = 375.39$, $p < 0.001$. Female faces were significantly rated as more attractive than male faces; mean rating by females (M_f) = 3.43 (s.d. = 0.75)

DOI 10.1098/rsbl.2004.0160

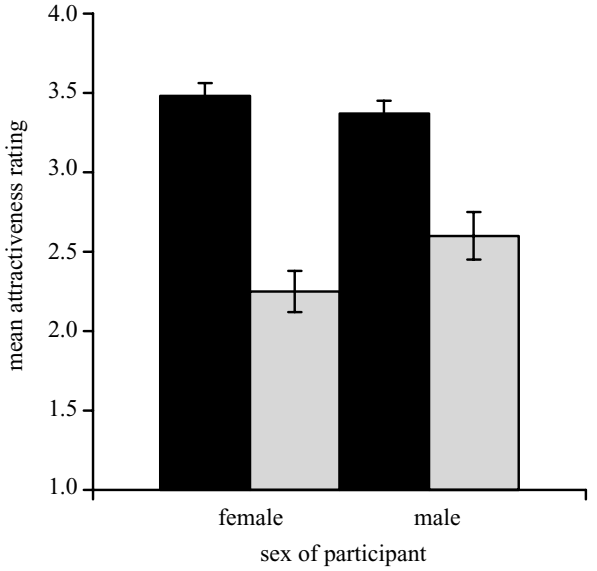

Figure 1. Sex differences in mean ratings of facial attractiveness. Ratings ranged from 1 (extremely unattractive) to 7 (extremely attractive). Bars represent the average attractiveness ratings (±s.e.) by participants. Female faces (black bars) were rated significantly more attractive than male faces (grey bars). Women and men rated female faces similarly, but women rated male faces significantly less attractive than men.

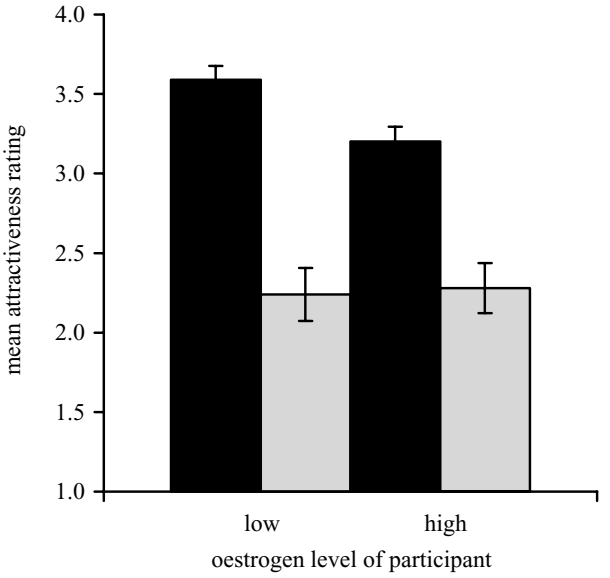

Figure 2. Oestrogen-induced differences in mean ratings of facial attractiveness. Ratings ranged from 1 (extremely unattractive) to 7 (extremely attractive). Bars represent the average attractiveness ratings (±s.e.) by participants in either a high or low oestrogen phase. Female faces (black bars) were rated as significantly more attractive than male faces (grey bars). Women with high oestrogen levels rated female faces as significantly less attractive than did women with low oestrogen levels, but there was no corresponding significant difference for male faces.

and mean rating by males (M_m) = 2.41 (s.d. = 0.85). The interaction between the sex of the faces and the sex of the participants was also significant; $F_{1,102} = 20.01$, $p < 0.001$. Independent samples *t*-tests revealed a non-significant difference for female faces; $t_{102} = 0.75$, $p > 0.05$. As shown in figure 1, women and men rated female faces similarly ($M_f = 3.48$, s.d. = 0.61 and $M_m = 3.37$, s.d. = 0.89). By contrast, male faces were rated as significantly less attractive by women than men; $t_{102} = -2.14$, $p = 0.04$; $M_f = 2.25$ (s.d. = 0.60) and $M_m = 2.60$ (s.d. = 1.04).

A two-way ANOVA revealed a significant main effect of response time for the sex of the faces; $F_{1,102} = 45.57$, $p < 0.001$. Female faces were viewed for significantly longer than male faces; $M_f = 4.14$ (s.d. = 1.51) and $M_m = 3.65$ (s.d. = 1.40) (times in seconds). The interaction between the sex of the faces and the sex of the participants was not significant; $F_{1,102} = 1.43$, $p > 0.05$.

(b) *Influence of oestrogen level on attractiveness ratings*

To test the influence of oestrogen level on facial attractiveness ratings, a two-way ANOVA was performed. The sex of the faces yielded a significant main effect on attractiveness ratings ($F_{1,55} = 356.07$, $p < 0.001$) as female faces were rated as significantly more attractive than male faces ($M_f = 3.48$, s.d. = 0.61 and $M_m = 2.25$, s.d. = 0.60). As shown in figure 2, the interaction between the sex of the faces and oestrogen level was significant; $F_{1,55} = 12.62$, $p = 0.001$. Female faces were rated by women as significantly less attractive during periods of low viewer oestrogen than during high oestrogen; $t_{55} = 2.25$, $p = 0.03$; $M = 3.59$ (s.d. = 0.56) and $M = 3.20$ (s.d. = 0.67), respectively. By contrast, male faces were not rated as significantly different due to oestrogen level; $t_{55} = 0.20$, $p > 0.05$.

A two-way ANOVA yielded a significant main effect of the sex of the faces for response times ($F_{1,55} = 23.18$, $p < 0.001$) as female faces were viewed by females for significantly longer than males faces ($M_f = 4.27$, s.d. = 1.21 and $M_m = 3.70$, s.d. = 1.09). The interaction between the sex of the faces and oestrogen level was significant; $F_{1,55} = 3.95$, $p = 0.05$. Female faces were viewed by females for a slightly, but not significantly, longer duration during phases of low viewer oestrogen than during high viewer oestrogen; $t_{55} = 1.34$, $p > 0.05$; $M = 4.40$ (s.d. = 1.28) and $M = 3.93$ (s.d. = 0.95), respectively. Likewise, male faces were viewed for a similar duration during phases of low and high female viewer oestrogen; $t_{55} = 0.23$, $p > 0.05$; $M = 3.72$ (s.d. = 1.06) and $M = 3.65$ (s.d. = 1.18), respectively.

4. DISCUSSION

To date, to my knowledge, there seems to have been no investigation of female intrasexual competition using experimental methodology. This study addresses this deficiency and adds a relevant and theoretical complement to research on female mate choice that has primarily focused on the features that females desire in potential mates, but has neglected the behaviours that females perform to obtain these mates.

The findings of the current study demonstrate the occurrence of female intrasexual competition in the arena of attractiveness. The hypothesis that women will rate female faces as less attractive than men is not supported by the rating data, nor by the response times. It is possible that female attractiveness is not susceptible to a sex difference in perception because of its evolved importance. By

contrast, women rated male facial attractiveness as significantly lower than did men. Owing to their direct methods of competition to intrasexually compete, men do not need to assess each other's attractiveness. Women must assess men as potential mates, and consequently should attend to male attractiveness.

The second hypothesis, that women in the high oestrogen phase will be more derogating of female facial attractiveness than women in the low oestrogen phase, is supported by the rating data, and with a similar trend for response times. If women compete intrasexually for 'good' mates via attractiveness, it would be advantageous to have heightened levels of competition when it matters most—during times critical for reproduction. It remains to be determined whether this competition is directed at acquiring short-term or long-term mates.

The lack of a significant oestrogen influence on judgements of male attractiveness is not surprising. The potential effects of ovarian hormones on judgements of male attractiveness have not been agreed upon in the literature. For example, Johnston *et al.* (2001) found a female preference for masculine faces during phases of heightened fertility, whereas Koehler *et al.* (2002) did not find a predicted hormonal influence on preferences for symmetrical male faces. Since male attractiveness appears to be related to gene quality (Thornhill & Gangestad 1993), it may be immune to brief, hormonally mediated fluctuations.

A further contribution of the present study is the novel endocrinological approach. Typically, researchers fractionate participants' ovulatory cycles into a series of phases, but there is no consensus and a wide array of techniques are employed. Silverman & Phillips (1993) used a 'menstruating' versus 'non-menstruating' dichotomy. Penton-Voak *et al.* (1999) used the distinction of a high conception phase (the presumed day of ovulation) versus a low conception phase (the days immediately following ovulation, the days before and during menses). Instead, using a fractionation that reflects a broad range of oestrogen variation, such as high versus low oestrogen, researchers can more confidently rely on participants' self-reported ovulatory status. However, a direct hormonal assay is the only way of precisely measuring the concentration of ovarian hormones.

A limitation of the current study is that the design does not allow for any examination of intrasexual competition from any perspective other than competitor derogation. Since intrasexual competition is composed of self-promotion and competitor derogation (Schmitt & Buss 1996), future investigations need to address self-promotion. Follow-up research should examine how women attempt to draw attention to themselves in a naturalistic environment, such as at dance clubs, where the competition for mate acquisition is pronounced.

A second factor that warrants consideration is relationship status. Schmitt & Buss (1996) report a difference in self-promotion and competitor derogation tactics depending on the desired length of a relationship. It is possible that relationship status, in terms of one's desired relationship duration and feelings of commitment, has an impact on the strength of female intrasexual competition.

It should be noted that attractiveness is probably only one of several ways in which women intrasexually compete. Women may derogate other women's fidelity, promiscuity or maternal aptitude, for example, in addition to, or as an alternative to derogating their attractiveness. Future research is needed to address these alternative vehicles of competition. Further research is also required to determine whether female derogation of other women's faces is solely due to intrasexual competition, and not to other processes.

In conclusion, female faces were found to be more attractive than male faces. Women's oestrogen level influences assessments of potential competitors, such that other women are derogated when it is most critical to select a mate of 'good' quality. By contrast, judgements of male attractiveness were not significantly influenced by oestrogen level.

Acknowledgements

The author thanks Suzanne MacDonald, Anthony Cox, Martin Voracek, Sybil Geldart, J. Anderson Thomson and Aaron Clarke for their comments and support.

Bernstein, I. H., Lin, T. & McClellan, P. 1982 Cross- vs. within-racial judgements of attractiveness. *Percept. Psychophys.* **32**, 495–503.

Buss, D. M. 1989 Sex differences in human mate preferences: evolutionary hypotheses tested in 37 cultures. *Behav. Brain Sci.* **12**, 1–49.

Buss, D. M. & Dedden, L. A. 1990 Derogation of competitors. *J. Soc. Pers. Relat.* **7**, 395–422.

Darwin, C. 1871 *The descent of man and selection in relation to sex*. London: John Murray.

Geldart, S., Maurer, D. & Henderson, H. 1999 Effects of the height of the internal features of faces on adults' aesthetic ratings and 5-month-olds' looking times. *Perception* **28**, 839–850.

Johnston, V. S., Hagel, R., Franklin, M., Fink, B. & Grammer, K. 2001 Male facial attractiveness: evidence for hormone-mediated adaptive design. *Evol. Hum. Behav.* **22**, 251–267.

Koehler, N., Rhodes, G. & Simmons, L. W. 2002 Are human female preferences for symmetrical male faces enhanced when conception is likely? *Anim. Behav.* **64**, 233–238.

Palombit, R. A., Cheney, D. L. & Seyfarth, R. M. 2001 Female–female competition for male 'friends' in wild chacma baboons, *Papio cynocephalus ursinus*. *Anim. Behav.* **61**, 1159–1171.

Penton-Voak, I. S., Perrett, D. I., Castles, D. L., Kobayashi, T., Burt, D. M., Murray, L. K. & Minamisawa, R. 1999 Female preference for male faces changes cyclically. *Nature* **399**, 741–742.

Quinsey, V. L., Ketsetzis, M., Earls, C. & Karamanoukian, A. 1996 Viewing time as a measure of sexual interest. *Ethol. Sociobiol.* **17**, 341–354.

Schmitt, D. P. & Buss, D. M. 1996 Strategic self-promotion and competitor derogation: sex and content effects on the perceived effectiveness of mate attraction tactics. *J. Pers. Soc. Psychol.* **70**, 1185–1204.

Silverman, I. & Phillips, K. 1993 Effects of estrogen changes during the menstrual cycle on spatial performance. *Ethol. Sociobiol.* **14**, 250–270.

Thornhill, R. & Gangestad, S. 1993 Human facial beauty: averageness, symmetry and parasite resistance. *Hum. Nat.* **4**, 237–269.

Tooby, J. & Cosmides, L. 1990 The past explains the present: emotional adaptations and the structure of ancestral environments. *Ethol. Sociobiol.* **11**, 375–424.

Wilson, M. I., Daly, M. & Weghorst, S. J. 1980 Household competition and the risk of child abuse and neglect. *J. Biosoc. Sci.* **12**, 333–340.