Overestimation bias in mate competition

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Abstract

It has been proposed that selection has shaped the human mind to be predictably biased in domains where the costs of false-positive and false-negative errors have been asymmetrical throughout human evolutionary history. Using this logic, the current study predicts that men and women systematically overestimate the degree to which members of the opposite sex find their same-sex mating competition desirable. Ten photographs of opposite-sex targets were shown to a sample of men ($n=123$) and women ($n=159$), and they were asked questions pertaining to each target's desirability as a mate. The same photographs, this time with sex of target and participant being the same, were shown to a second group of men ($n=105$) and women ($n=103$), and they were asked to estimate the desirability of the depicted individuals to members of the opposite sex. Consistent with the mate competition overestimation bias hypothesis, men and women consistently overestimated the degree to which members of the opposite sex find members of their same sex attractive and desirable as potential mates.
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1. Introduction

Human social life contains much uncertainty. Emotions, desires, and intentions are often kept private or intentionally concealed, making it necessary for individuals to rely on imperfect estimates of others' internal states when making decisions about how to interact in social situations (Buss, 2000). Errors in estimates of others' intentions and desires are thus a recurrent feature of human social life and likely have been that way throughout human evolutionary history. There are two ways to err when inferring others' internal states: (a) inferring a psychological state that is not present or (b) failing to infer a psychological state that is present. According to signal detection theory (Wiley, 1994) and error management theory (EMT; Haselton & Buss, 2000), the optimal design for systems fashioned to reason under uncertainty is to err in the direction that has been least costly over evolutionary time (see also Cosmides & Tooby, 1996; Nesse & Williams, 1998; Tomarken, Mineka, & Cook, 1989). Accordingly, human decision-making adaptations have been hypothesized to make predictable errors in domains where decisions must be made without perfect

information. One such sphere of uncertainty is the domain of mate competition.

When competing for mates, an individual's optimal mating strategy critically depends not only on the mate value of existing potential mates but also on the mate value of one's same-sex mating competition (Hill & Reeve, 2004; Kenrick, Li, & Butner, 2003). Thus, it is likely that selection has shaped a rich array of cognitive adaptations designed to approximate the desirability of members of one's own sex to current or potential mates. Although the best possible system for estimating one's same-sex mating competition would be to be able to perfectly infer the desirability of all rivals to all members of the opposite sex, such a system is implausible due to the unstable nature of mate preferences. Individual differences and temporal shifts in mate preferences—coupled with the fact that individuals often conceal the totality of their preferences for strategic purposes—make it likely that assessments regarding the formidability of intrasexual rivals will almost always contain some degree of error. There are two types of errors that can occur when assessing the desirability of one's same-sex mating competition: (a) assuming intrasexual rivals are more desirable to the opposite sex than they actually are or (b) assuming intrasexual rivals are less desirable to the opposite sex than they actually are.

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Erring on the side of assuming rivals are more desirable than they actually are increases the probability that individuals will (a) continue to maintain or improve their current desirability to current or potential mates, (b) be sufficiently proactive in attaining a mate given their same-sex competition, (c) be sufficiently vigilant in retaining their current mate, and (d) prevent inflated expectations about the quality of mates that can be attracted, which could lead to wasted time and effort in competitions that would ultimately be lost. However, overestimating rivals' desirability can also be costly. Overestimating one's mating competition can come at the cost of performing more mate attraction or retention tactics than are truly necessary (e.g., Buss, 1988a, 2000; Buss & Shackelford, 1997) and lowered self-confidence, which could potentially lead to settling for lower quality or fewer mates than may have been attracted in light of less favorable evaluations of rivals.

There is a somewhat different cost/benefit tradeoff associated with assuming rivals are less desirable than they actually are. Underestimating the desirability of intrasexual rivals prevents wasted effort spent performing unnecessary mate-retention and mate-attraction tactics. Additionally, underestimation may increase the likelihood that individuals are self-confident in their mating pursuits, potentially leading to greater or more desirable mating opportunities. Men especially might benefit from increased self-confidence, as women prefer confident and socially dominant men as both long- and short-term mates (Buss, 1989; Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002). However, underestimating the formidability of the mating competition is also associated with a number of costs. Underestimating rivals and, in turn, how much effort needs to be applied to accomplish mate-attraction and mate-retention strategies can lead to (a) failure to attract a mate, (b) failure to retain a mate, (c) wasted mating effort in competitions that will ultimately be lost and, for men, (d) compromised paternity (see Buss, 1994; Symons, 1979; Trivers, 1972). Furthermore, since individuals tend to be biased in a self-serving way to protect self-esteem and maintain a positive view of themselves (see Dunning, Heath, & Suls, 2004, for a review), underestimating the desirability of one's rivals can be an especially costly error.

Here, it is hypothesized that when assessing the desirability of mating rivals, the lesser costly error is erring on the side of overestimation. In mating—as in any social competition—those who underestimate their opponents ultimately increase the risk of defeat because they are underprepared for the competition. Conversely, individuals who overestimated their intrasexual rivals, anticipating fierce mating competition, would have been sufficiently motivated to continue striving to maintain or augment their own mate value and perform necessary mate retention tactics, which increase the likelihood of successful mating outcomes. The general prediction derived from the hypothesis is that men's and women's estimates of how desirable their same-sex competition is to members of the opposite sex will be higher than the actual desirability ratings given by men and women to members of the opposite sex. More specifically, I predict that (a) desirability ratings given to male stimuli by male participants will exceed ratings given to the same stimuli by female participants, (b) desirability ratings given to female stimuli by female participants will exceed ratings given to the same stimuli by male participants, and (c) the sex-linked pattern of results bearing on Predictions a and b will not hold true for characteristics that not bear directly on the target's desirability as a mate.

2. Methods

2.1. Stimulus materials

Ten stimulus photographs of each sex were used for this experiment. Male stimuli were college-aged men between the ages of 18 and 22 (mean=19.40). Female stimuli were college-aged women between the ages of 18 and 21 (mean=18.90). Each stimulus was pictured sitting alone at a table in a university courtyard, and all photographs were taken within a 2-h period to ensure that lighting and weather conditions were consistent across photographs.

2.2. Participants

The recruitment procedure specified that participants must be heterosexual to participate. Participants were asked about their sexual orientation at the beginning of the study so that data collected from homosexual respondents could be removed from final data analysis. One hundred fifty-nine heterosexual undergraduate women and 123 heterosexual undergraduate men served as participants rating opposite-sex individuals (mean age: women=18.94; men=19.24). One hundred five heterosexual undergraduate men and 103 heterosexual undergraduate women served as participants rating same-sex individuals (mean age: men=19.36; women =19.08). Participation partially fulfilled a course requirement for all participants.

2.3. Materials and procedure

On a 10-page online experiment, participants judged the desirability of 10 same- or opposite-sex targets on the basis of photographs. The instructional set read: "You will be asked questions that pertain to your initial impressions of each depicted individual. The ratings that you give to each stimulus will be used to determine whether the stimuli are suitable for a future research project." Participants rated each target on five characteristics pertaining to desirability as a romantic partner (Items a–e). For judgments pertaining to members of the opposite sex, these items were as follows: (a) "How attractive do you find this person?"; (b) "How desirable is this person to you as a prospective sexual partner?"; (c) "How desirable is this person to you as a prospective long-term romantic partner (i.e., a committed romantic partner)?"; (d) "How sexually desirable do you find this person"; and (e) "In general, how desirable do you

find this person?". The participants rating members of their same sex were given the same questions, but the questions were framed such that they asked about their perceptions about the desires of the opposite sex (e.g., for the question "How attractive do you find this person?", the same-sex version read "How attractive do you think that members of the opposite sex find this person?").

The participants also rated each stimulus on three characteristics not directly related to desirability as a mate (Items f–h). These items were as follows: (f) "How extraverted do you think that this person is?"; (g) "How desirable is this person to you as a prospective friend?"; and (h) "How politically involved do you think that this person is?". These items were included not only to distract the participants from the true meaning of the study but also to explore whether the overestimation bias, if it exists, is specific to mating or is a general psychological feature that operates across social domains. As with the desirability questions, participants rating members of their same sex were given the same questions, but the questions were framed such that they were asked about their perceptions about the desires of the opposite sex. All ratings were made on 10-point rating scales (e.g., for the question "How attractive do you find this person?", the ratings ranged from 1 (*not at all attractive*) to 10 (*very attractive*), with 5 corresponding to (*moderately attractive*). The items appeared in the same order for all participants.

3. Results

Ratings were averaged across the 10 stimuli for each of the eight items rated by participants. Next, a within-subjects desirability composite was created by computing the arithmetic mean of the ratings provided for the five items pertaining to desirability as a mate. All items were highly intercorrelated (perceptions of same-sex targets' desirability: $\alpha = .94$ and $\alpha = .89$ for men and women, respectively; perceptions of opposite-sex targets' desirability: $\alpha = .93$

and $\alpha = .91$ for men and women, respectively). The three non-mating-specific items were analyzed independently as ratings given to these items were not highly intercorrelated (perceptions of same-sex targets: $\alpha = .16$ and $\alpha = .18$ for men and women, respectively; perceptions of opposite-sex targets: $\alpha = .46$ and $\alpha = .56$ for men and women, respectively). A mixed-model, 2 (men vs. women) × 2 (male vs. female stimuli) ANOVA was conducted to assess the overall pattern of men's and women's perceptions of targets, and $p = .01$ for each item was tested to mitigate the potential for Type I errors. A main effect of target's sex was found for target's desirability as a mate [$F(1, 487) = 752.51, p < .001$], extravertedness [$F(1, 487) = 52.35, p < .001$], and friendliness [$F(1, 487) = 10.09, p = .002$]. Compared with male targets, females were judged to be significantly more desirable as mates (female targets: mean = 5.75, S.D. = 0.86; male targets: mean = 4.24, S.D. = 0.80) and extraverted (female targets: mean = 6.58, S.D. = 0.84; male targets: mean = 6.04, S.D. = 0.76). Male targets were judged to be significantly friendlier than females (male targets: mean = 6.82, S.D. = 0.86; female targets: mean = 6.57, S.D. = 0.80). The analysis also revealed a significant interaction between the sex of the rater and the sex of the target on judgments of the target's desirability [$F(1, 487) = 535.53, p < .001$]. There was no significant interactions found for any of the non-mating-specific items, although friendliness approached significance [$F(1, 487) = 4.79, p = .03$].

Two Bonferroni-corrected planned contrasts ($\alpha = .005$ for each pair of contrasts) compared men's and women's ratings of each target. As predicted by the desirability overestimation bias hypothesis, men's estimations of the male stimuli's desirability to the opposite sex (mean = 4.97, S.D. = 0.52) were significantly greater than the desirability as assessed by women raters [mean = 3.75, S.D. = 0.54; $F(1, 263) = 329.24, p < .001$]. Similarly, women's estimations of female stimuli's desirability to the opposite sex (mean = 6.40, S.D. = 0.45) were significantly greater than

Table 1
Results by sex of stimuli

Male stimuli

Item	Female raters			Male raters			F (p)	Effect size (partial η^2)
	n	Mean	S.D.	n	Mean	S.D.		
Desirability	159	3.75	0.54	106	4.97	0.52	329.24 (<.001)	0.56
Extraverted	159	6.01	0.76	106	6.10	0.77	0.92 (NS)	0.00
Friendly	159	6.88	0.81	106	6.72	0.92	2.15 (NS)	0.01
Politically involved	159	5.09	0.78	106	5.23	0.63	2.39 (NS)	0.01

Female stimuli

Item	Male raters			Female raters			F (p)	Effect size (partial η^2)
	n	Mean	S.D.	n	Mean	S.D.		
Desirability	123	5.19	0.72	103	6.40	0.45	217.95 (<.001)	0.49
Extraverted	123	6.52	0.81	103	6.64	0.87	1.16 (NS)	0.01
Friendly	123	6.65	0.72	103	6.47	0.89	2.71 (NS)	0.01
Politically involved	123	5.20	0.65	103	5.12	0.84	0.78 (NS)	0.00

the desirability as assessed by male raters [mean=5.19, S.D.=0.72; $F(1, 224)=217.95$, $p<.001$]. No significant differences were found in men's and women's judgments of the non-mating-specific items (see Table 1).

4. Discussion

Using the evolutionary logic of signal detection theory and EMT, it was hypothesized that men and women overestimate the desirability of same-sex rivals to members of the opposite sex. The following predictions that were derived from this hypothesis were both confirmed: (a) men would judge other men to be more desirable to women than women actually found them and (b) women would judge other women to be more desirable to men than men actually found them. The results lend initial support for the hypothesis that selection has shaped men's and women's mate competition assessment mechanisms to err on the side of overestimation when evaluating the desirability of mating rivals. The current study adds to a growing body of research on adaptations designed to facilitate successful intrasexual competition. The overestimation bias may play an important role in motivating a number of well-documented mate-attraction and mate-retention behaviors such as sexual and romantic jealousy (Buss, Larsen, Westen, & Semmelroth, 1992; Daly, Wilson, & Weghorst, 1982), mate guarding (Buss, 1988a), derogation of competitors (Buss & Dedden, 1990), strategic self-promotion (Buss & Schmitt, 1996), and mate-attraction tactics (Buss, 1988b).

There were no significant differences found between opposite-sex ratings and same-sex estimations of the non-mating-specific items (Items f–h). The remarkable degree of convergence on these items was surprising, although it should be noted that there was more variability in these items (i.e., the standard deviation is larger) than for the mating-specific items. This suggests that there is not as much convergence between the sexes on these ratings as may first appear, although there is more than one might expect given that these ratings were based solely on photographs. Others have also demonstrated interrater agreement on an array of attributes not normally thought to be conveyed by facial appearance (e.g., Alley, 1988; Berry, 1993; Cunningham, Barbee, & Pike, 1990), making this likely to be a reliable effect. Although no specific predictions were made about the exact pattern of these results, findings are consistent with the hypothesis that the overestimation bias is specific to assessments of characteristics related to mate competition.

An unanticipated result of this study was that both men and women rated female stimuli as being significantly more desirable than male stimuli. It is possible that this discrepancy is an artifact of using college-aged stimuli. The features associated with attractiveness in women are associated more with youthfulness, whereas men's attractiveness emphasizes more mature features that peak at a later age (see Mathes, Brennan, Haugen, & Rice, 1985;

Symons, 1979). Past research assessing averaged attractiveness ratings using a larger sample of stimulus photographs (35 female and 30 male faces) also demonstrated that men and women rate female faces significantly more attractive than they rate male faces of a similar age (Fisher, 2004). The discrepancy between the rated attractiveness of male and female stimuli found in this experiment may accurately reflect men's and women's perceptions of the attractiveness of college-aged men versus college-aged women.

It is important to note that although the overestimation bias has been hypothesized primarily to motivate mating effort, this article does not empirically demonstrate the consequences of the overestimation bias on information processing mechanisms related to such effort. Future research is needed to explore the role, if there is any, played by the overestimation bias in the activation of such attentional and motivational mechanisms. An additional limitation of the current study relates to the questions used to approximate desirability in this experiment. The current study demonstrated an overestimation effect on five items related to mating desirability. However, a critical test for the hypothesis will be determining whether individuals also overestimate the opposite sex on other important characteristics related to mate value (e.g., status, resources) and whether overestimation is sex differentiated in domains where men's and women's mate preferences differ. Emerging research bearing on these issues looks promising. Recently, Burriss and Little (2006) demonstrated that men tend to overestimate rivals' dominance—a characteristic important to a man's mate value—at times when the threat of these rivals is the greatest (i.e., around the time of their mates' ovulation). These results are consistent with the overestimation bias hypothesis, suggesting that the bias may occur across domains relevant to mate competition and at times when mate competition cues are most salient. Further research is needed to explore whether individuals overestimate the formidability of competitors on further mate-choice-related characteristics in addition to exploring sex differences and ovulatory shifts in overestimation, if they exist.

A note of caution relates to potential interactions between self-serving biases in self-perceptions (Dunning et al., 2004) and the overestimation bias. Individuals tend to be biased in self-serving ways when making self-assessments in a variety of domains. It is thus possible that the demonstrated overestimation effect reflects the fact that individuals inflate estimations of their rivals in a way that is complementary to their own self-serving biases. In this case, overestimating rivals would simply work to counteract self-serving biases such that individuals accurately estimate their own relative mate value. Although this is a plausible alternative hypothesis, to be supported, it first has to be demonstrated that (a) self-serving biases exist when individuals rate their desirability as a mate and characteristics related to desirability and (b) individuals overestimate themselves and their same-sex peers proportionately. A future study may

disentangle these issues by comparing the degree to which individuals overestimate their rivals with the degree to which they overestimate their own desirability to the opposite sex.

Additional research is needed to more fully understand how the demonstrated effect plays out in actual mate competition and how contextual information may affect the overestimation bias. For instance, according to the overestimation bias hypothesis, selection has shaped men's and women's competition assessment mechanisms to overestimate their same-sex mating competition such that it motivates individuals to perform behaviors that facilitate successful mate competition (whether acquiring more resources, enhancing attractiveness, mate guarding, or derogating one's competitors). Individuals should thus overestimate their mating competition most readily when actually engaged in a mate search or when estimating the desirability of rivals to their own mates. Furthermore, for mated individuals, the stability of their current mating relationship and the presence or absence of mate value discrepancies between oneself and one's partner may affect the degree to which they overestimate the desirability of their rivals. Individuals who are involved in stable, long-term relationships with mates of equal or lower mate value may overestimate their mating competition less than individuals who suspect that their current mate may defect or be readily poached by a competitor. Data bearing on these and other issues may provide a deeper understanding of the contextual cues that influence the overestimation bias.

Future research might also explore how the overestimation bias affects self-perceptions of mate value. For instance, researchers have demonstrated that men and women tend to modulate estimates of their own desirability based on comparisons with other men and women, respectively, via contrast effects (e.g., Gutierres, Kenrick, & Partch, 1999; Kenrick & Gutierres, 1980; Kenrick, Montello, Gutierres, & Trost, 1993; Kenrick, Neuberg, Zierk, & Krones, 1994). A complementary line of research might explore how these contrast effects interact with the overestimation bias in developing self-perceptions of desirability and, ultimately, how these dual effects affect mating behavior. Research on these and other issues may lead to a more thorough understanding of the interplay between men's and women's perceptions of their same-sex peers, intrasexual competition, and success in the mating market.

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