
The Mere Presence of Opposite-Sex Others on Judgments of Sexual and Romantic Desirability: Opposite Effects for Men and Women

Sarah E. Hill
David M. Buss

University of Texas at Austin

Men's and women's mate preferences impose on each a unique set of adaptive problems that must be solved when judging the desirability of prospective mates. One potentially revealing source of information about an individual's desirability as a romantic partner is contained in the decisions made by same-sex others. The present studies predicted that men's and women's desirability assessments would be affected in opposite ways when target persons were depicted with members of the target's opposite sex. Study 1 (N = 847) documented that women rated men more desirable when shown surrounded by women than when shown alone or with other men (a desirability enhancement effect). In sharp contrast, men rated women less desirable when shown surrounded by men than when shown alone or with women (a desirability diminution effect). Study 2 (N = 627) demonstrated similar sexually divergent effects for estimates of the desirability of same-sex competitors.

Keywords: *judgment biases; social judgment; evolutionary psychology; desirability assessment; mate choice; mate choice copying*

Historically, empirical research on mate choice has focused on individuals' preferences in the absence of social contextual information. However, an increasing number of researchers in the biological and social sciences have begun to recognize the important role context plays in cross-sex desirability judgments (e.g., Dugatkin, 1992; Graziano, Jensen-Campbell, Shebilske, & Lundgren, 1993; Hill & Ryan, 2006; Jones, DeBruine, Little, Burriss, & Feinberg, 2007; Schlupp, Marler, & Ryan, 1994; Sigall & Landy, 1973). Contextual cues are predicted to inform desirability evaluations when there are few readily observable differences between potential

mates and mate quality discrimination between potential mates is costly in terms of time and energy (Wade & Pruett-Jones, 1990). Because—across species—many of the characteristics that females most prefer in their mates are not readily conveyed via physical appearance, research on the incorporation of contextual information into mating decisions has focused almost exclusively on women. However, contextual cues may provide critical information about aspects of desirability that go beyond mate quality. For men, contextual information bearing on the likelihood of mating success may also affect their desire for specific women as mates.

We advance two hypotheses about the sex-differentiated use of a specific type of contextual information in men's and women's judgments of opposite-sex targets' desirability. We hypothesize that (a) women will find men depicted with women more desirable than they find the same men depicted either alone or with other men (*a desirability enhancement effect*), and (b) men will find women depicted with men less desirable than they find the same women depicted either alone or with other women (*a desirability diminution effect*). A third hypothesis predicts that the desirability enhancement and diminution effects will be reflected in men's and

Authors' Note: This article was improved by comments from and discussions with Michael Ryan and the students from the Ryan and Buss labs, in addition to the helpful suggestions made by three anonymous reviewers. The authors also wish to thank all of the research assistants who assisted with these studies. Please address correspondence to Sarah E. Hill, Department of Psychology, California State University, Fullerton, 800 N. State College Blvd., Fullerton, CA 92834; telephone: 714-278-5904; e-mail: schill@fullerton.edu.

PSPB, Vol. 34 No. 5, May 2008 635-647

DOI: 10.1177/0146167207313728

© 2008 by the Society for Personality and Social Psychology, Inc.

women's judgments of intrasexual rivals such that (a) women will judge other women depicted with men as being less desirable to men than the same women depicted alone or with other women, and (b) men will judge other men depicted with women as being more desirable to women than the same men depicted alone or with other men.

Sex Differences in Mate Preferences

The evolution of mate preferences and behaviors are primarily affected by three interacting factors: the costs of mate choice, the reproductive benefits associated with that choice, and the ease with which individuals can discriminate adaptively relevant differences between members of the opposite sex (Pruett-Jones, 1992). Men's and women's mate preferences and, in turn, their abilities to discriminate quality differences between potential mates are thus expected to differ from one another on dimensions where the reproductive pay-offs associated with mate choice have recurrently differed between the sexes.

Throughout human evolutionary history, men's reproductive success has been primarily affected by gaining sexual access to women exhibiting cues correlated with reproductive capacity (Betzig, 1986; Buss, 1994/2003; Dawkins, 1986; Symons, 1979; Trivers, 1972; Williams, 1975). Evolutionary psychologists have thus proposed that men's mate preferences should reflect a preference for those cues most reliably correlated with this capacity, namely, a woman's youth and attractiveness. This hypothesis has been confirmed empirically both in the United States and cross-culturally (Buss, 1989, 1994/2003; Kenrick & Keefe, 1992; Singh, 1993; Symons, 1979).

Conversely, the primary avenue by which women have been able to directly augment the reproductive benefits potentially available to them through mate choice has been by securing a partner willing and able to invest in herself and her offspring (Buss, 1994/2003; Symons, 1979; Trivers, 1972). Researchers have demonstrated that women place a greater premium than do men on their potential mates' financial prospects and economic resources (Buss, 1989, 1994/2003; Buss & Schmitt, 1993), both of which bear on a man's investment potential. This logic has also yielded insight into sex differences in desire for sex without commitment (Byers & Lewis, 1988), the number of partners desired throughout one's lifetime (Buss & Schmitt, 1993), and the likelihood of consenting to sex with someone they just met (Clark & Hatfield, 1989).

Not all Mate-Value Assessments Are Created Equal

Because men's and women's mate preferences differ from one another, each sex confronts a unique set of adaptive problems when judging desirability differences between members of the opposite sex. Many of the attributes that women most desire in their mates (e.g., status, social dominance) cannot be assessed from a man's physical appearance alone. Research suggests that individuals attempting to make sense of such ambiguous social stimuli tend to rely on simple heuristics that incorporate available contextual information to increase the accuracy of their judgments (e.g., Gigerenzer & Todd, 1999; Tversky & Kahneman, 1974). Existing research supports this claim as it pertains to women's desirability judgments of men. Women have been found to incorporate cues pertaining to a man's socioeconomic status and willingness to invest in children—both of which women desire in their mates—into desirability judgments of male targets (La Cerra, 1994; Townsend & Levy, 1990). Women find male targets described as having high-status careers more desirable than those described as having low-status careers. Women also find men depicted exhibiting affection toward children more desirable than those depicted ignoring a child. One additional piece of contextual information that may inform women's desirability judgments is the presence of other women.

The presence of other women who appear to be interested in a man may provide valuable information about that man's quality and offer a more accurate indication of his real mate value than any one woman could make by herself (Graziano et al., 1993). Women are more selective than men in their mate choices due to their heavier obligatory parental investment (Symons, 1979; Trivers, 1972). The presence of other women who appear to be romantically interested in a man therefore suggests that he possesses at least some of the qualities that women prefer in their mates. Additionally, women who used the apparent desires of other women to guide their own preferences would have increased the probability that male children produced from sexual encounters with these men would be desirable to subsequent generations' women who would inherit this preference from their mothers (i.e., increase the likelihood of having *sexy sons*; R. A. Fisher, 1958). Using the presence of other women as an initial mate-value barometer allows women to gain valuable, relatively honest information regarding the quality of an unknown man without incurring the costs associated with gaining the information firsthand.

Having a heightened desire for men who are simultaneously desired by other women does come at the cost of lowered odds of immediate success with the target. For women, however, the benefits associated with swift, prudent mate-value assessments outweigh this cost in most mating circumstances (Pruett-Jones, 1992). The primary reproductive benefit available to women through mate choice is resource investment. Thus, in cases where an already mated man's resource holdings are large enough that his ability to invest in a woman and her children would be greater than that which could be invested by his nonmated counterparts (i.e., surpassing the *polygyny threshold*), a woman's best mating option may be an already mated man (see Borgerhoff Mulder, 1988; Orians, 1969). That approximately 80% of all human societies practice polygyny makes it likely that this mating system has been a recurrent feature of human evolutionary history and that selection has likely not penalized women who have desired already-mated men (Ford & Beach, 1951; Murdock, 1967; Symons, 1979).

The presence of same-sex others also has heuristic value to men assessing the desirability of potential mates. If the evolutionary psychological reasoning detailed above is correct, we can predict that the presence of same-sex others will have precisely the *opposite* effect on men's judgments of women. Men's ability to discriminate mate-value differences between unknown women cannot be greatly improved by the presence of men with whom a woman may be romantically linked. Because women's mate value is more readily observable than men's (see Buss, 1994/2003; Kenrick & Keefe, 1992; Singh, 1993), a man's estimate of an unknown woman's mate value—even if made off a first impression—is likely to be somewhat accurate. The presence of other men who appear to be interested in a woman is thus unlikely to provide a better indication of the woman's quality than any man could make by himself. This is especially true in light of the fact that men tend to relax their standards when pursuing short-term mates (Buss & Schmitt, 1993); the mere fact that a woman appears to be paired with a man does not necessarily speak to her quality. The presence of other men, however, provides information of a different type to men engaged in a mate search: the intensity of intrasexual competition that will be required to secure a woman's reproductive resources. Women who appear to be mated or the target of multiple men's desires will be more difficult for any individual man to acquire as a mate. Choosing such a woman as a mate also increases a man's likelihood of investing in children that are not his genetic relatives.

Over the course of evolutionary time, reproductive advantages would have accrued to men who directed their mating efforts most intensely toward women who were sexually accessible and whose reproductive resources could be monopolized (Buss & Schmitt, 1993). Time, energy, and courtship resources devoted to women who were already mated or pregnant with another man's child would have interfered with men's successful pursuit of both long-term and short-term mating strategies. Men who invested their mating efforts in mated women also would have greatly increased their risk of incurring physical injury or even death at the hands of their romantic rivals (Buss, 2005; Daly & Wilson, 1988; Daly, Wilson, & Weghorst, 1982). Using the presence of other men as an availability heuristic would have provided men with information bearing on the costliness of pursuing a particular woman as a mate and the likelihood of being able to monopolize her reproductive resources if successful.

Although men benefit from sexual liaisons with other men's mates when low-risk opportunities present themselves (e.g., a woman's husband is out of town, physically nonthreatening, etc.), in general, men would have benefited from focusing their mating efforts on women with whom there was a relatively high probability of mating success. Existing research supports this claim. Men are less likely to pursue women who appear to be "hard to get" (Walster, Walster, Piliavin, & Schmidt, 1973). Over the course of evolutionary time, men who experienced a diminished desire response to women who appeared to be romantically linked to other men would have decreased the search time required to successfully secure long- and short-term mates and increased the likelihood of monopolizing those mates' reproductive resources. This would have had the effect of increasing a man's ability to take advantage of multiple mating opportunities while also decreasing his paternity uncertainty with mates successfully acquired.

Hypotheses about Mate-Screening Heuristics

Hypothesis 1: The desirability enhancement effect. Women possess a psychological adaptation that incorporates the presence of same-sex others into initial desirability assessments of men, rendering men depicted with women more desirable.

According to this hypothesis, women possess a cognitive adaptation designed to incorporate the presence of other women into desirability judgments of members of the opposite sex. The presence of same-sex others

augments the mate value—hence desirability—assessments of men who appear to be mated to or desired by same-sex others, yielding a desirability enhancement effect. Using such a heuristic device (a) increases the odds that the woman will focus her initial mating efforts on higher quality men (deemed desirable by the presence of other women), (b) increases the likelihood that she will bear sons who possess qualities desired by the next generation of women, that is, sexy sons (R. A. Fisher, 1958), and (c) lowers the costs associated with first-hand mate-value assessment. Women who used the desires of other women as a mate-value-assessment heuristic would not have had to spend valuable time out of their relatively short reproductive careers getting to know multiple individual men before narrowing their mating efforts to high-quality men. Not having to “start from scratch” in assessing men’s mate value also decreases the probability of incurring the huge fitness costs associated with having an unpropitious pregnancy or suffering from sexual or physical violence.

Hypothesis 2: The desirability diminution effect. Men possess a psychological adaptation that incorporates the presence of same-sex others into initial desirability assessments of women, rendering women depicted with men less desirable.

According to this hypothesis, men possess a cognitive adaptation designed to incorporate the presence of men into their desirability judgments of women such that they have a diminished desire response to women who exhibit cues associated with a lowered probability of being granted sexual access and paternity certainty. Such contextual information increases a man’s ability to quickly discriminate among women on the basis of the probability of achieving a successful mating outcome. The employment of such a heuristic device (a) increases the probability that a man will focus his mating efforts on those individuals with whom there is a relatively high probability of gaining sole sexual access, (b) decreases the likelihood of investing time and resources in another man’s child (i.e., decreases paternity uncertainty), and (c) decreases the likelihood of suffering physical harm at the hands of competitors.

Hypothesis 3: The rival assessment effect. Men’s and women’s judgments of their same-sex competitors will reflect the use of the desirability-assessment heuristics hypothesized for each sex. It is hypothesized that (a) men will judge their same-sex rivals as being *more* desirable to women when depicted with other women and (b) women will judge their same-sex rivals as being *less* desirable to men when depicted with other men.

Hypotheses 1 and 2 used an evolutionary perspective to propose that men and women use the presence of same-sex

others as desirability assessment heuristics. The current hypothesis predicts that the desirability enhancement effect and the desirability diminution effect will be reflected in men’s and women’s assessments of their same-sex rivals.

Intersexual and intrasexual competition are conceptually related. The mate preferences exhibited by one sex influence the domains in which mate competition occurs in the other sex (Buss, 1988). Correctly estimating the desirability of intrasexual rivals plays an important role in motivating a number of well-documented mate attraction and retention behaviors such as sexual and romantic jealousy (Buss, Larsen, Westen, & Semmelroth, 1992; Daly et al., 1982), mate guarding (Buss, 2002), derogation of competitors (Buss & Dedden, 1990), strategic self-promotion (Buss & Schmitt, 1993), and mate attraction tactics (Buss, 1988). When making judgments about one’s own desirability and the desirability of same-sex rivals, men and women employ the same desirability criteria used by members of the opposite sex when choosing mates (Buss, 1988, 1994/2003; Gutierrez, Kenrick, & Partch, 1999). Here, we hypothesize that men’s and women’s assessments of their same-sex mating rivals will reflect the use of the desirability-assessment heuristics described in Hypotheses 1 and 2. We predict that men will judge men depicted with women as being more desirable to women than when depicted alone or with members of their same sex and that women will judge women as being less desirable to men when depicted with men than when depicted alone or with members of their same sex. These predictions, if supported, will lend additional support for the desirability enhancement and desirability diminution hypotheses.

STUDY 1: DO MEN AND WOMEN USE THE PRESENCE OF SAME-SEX OTHERS AS A DESIRABILITY ASSESSMENT HEURISTIC?

To test the hypothesis that men and women use the presence of members of their same sex to inform desirability assessments of potential mates, we used a between-subjects design. We compared desirability ratings given to 10 opposite-sex targets (a) depicted alone, (b) depicted among members of the target’s opposite sex, or (c) depicted among members of the target’s same sex. The latter was included to rule out the possibility that any differences in desirability ratings given to men and women in the opposite-sex condition resulted from a general sociality effect (i.e., the target individual is perceived as more or less desirable because depicted with others). The desirability enhancement hypothesis predicts that women will judge male target persons as being significantly more desirable when surrounded by

women than when depicted alone or surrounded by other men. Conversely, the desirability diminution hypothesis predicts that men will judge female target persons as being significantly less desirable when surrounded by men than when depicted alone or surrounded by other women.

Method

Participants

The recruitment procedure for this study specified that participants must be heterosexual to participate. As a precautionary measure, participants were also asked about their sexual orientation at the beginning of the study so that data collected from any homosexual respondents could be removed from the final analysis. No participants needed to be removed for this reason. Four hundred seventy-eight heterosexual undergraduate women (159 rating the alone condition, 160 rating the same-sex condition, and 159 rating the opposite-sex condition) served as the female participants in this study (mean age = 18.94), and 369 heterosexual undergraduate men (123 participants in each of the three conditions) served as the male participants in this study (mean age = 19.24). Participants were assigned to groups based on the first letter of their last name and were then directed to fill out an online questionnaire within 24 hours of receiving the instructions. Participation partially fulfilled a course requirement for all participants.

Materials

A total of 10 target male stimuli and 10 target female stimuli depicted in three conditions (for a total of 30 stimuli of each sex) were selected by two research assistants blind to the purpose of the study. The stimulus photographs used in the study were chosen from a larger set of photographs (10 for each stimulus in each condition) based on the criterion of similarity in appearance of the target individual across the three conditions in which he or she was depicted. All of the targets were college-aged men and women between the ages of 18 and 22 (men: $M = 19.40$, women: $M = 18.90$). In the first condition, each target person is pictured sitting alone at a table in a university courtyard. In the second condition, each target is pictured sitting among 4 college-aged individuals who are of the target's opposite sex. In the third condition, each target is pictured seated among 4 college-aged members of the target's same sex in the same university courtyard setting. The pictures of each target were taken within 30 minutes of one another to ensure consistency in lighting, weather conditions, and the clothing and hair-style of the target across conditions.

In each of the pictures where targets were depicted among others, they were identified by a clearly marked arrow. The composition of individuals depicted with each target differed between photographs so that participants would not see any peripheral persons more than once. Nine undergraduate research assistants (four male and five female) blind to the purpose of the study rated the attractiveness of each of the peripheral persons in photographs that had been digitally altered such that the persons appeared alone. These ratings were collected to later control for any confound their attractiveness may have on targets' desirability ratings across conditions.

Procedure

On a 10-page computer-based rating instrument, participants judged the desirability of the 10 opposite-sex target persons on the basis of photographs. Participants read, "You will be asked questions that pertain to your initial impressions of individuals depicted in photographs. The ratings you give to each stimulus will be used to determine the suitability of the stimuli for a future research project." Participants rated each target on five characteristics pertaining to desirability as a romantic partner (items a through e). These items were (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) "If this person were to ask you on a date, what is the likelihood that you would say yes?" and (e) "In general, how desirable do you find this person?" 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*). Items appeared in the same order for all participants.

Results

We first created an attractiveness differential to serve as a potential covariate in our analyses. The attractiveness differential will allow us to control for any systematic differences in the attractiveness of peripheral individuals across photographs. Additionally, the attractiveness differential allows us to control for any linear contrast effects that might occur between the attractiveness of the target persons and the peripheral persons with whom they are depicted (although it is important to note that contrast effects are not always linear in nature). To calculate the attractiveness differential, we calculated the arithmetic mean of the attractiveness

ratings given to peripheral persons depicted with each target in the same-sex and opposite-sex conditions. Then, the mean attractiveness of the peripheral individuals was subtracted from the attractiveness scores given to each target to yield an attractiveness differential between the target and the peripheral individuals with whom each was depicted.

Next, a within-subjects desirability composite was created for each of the 10 stimuli by computing the arithmetic mean of the ratings given on each of the five desirability items (average within-target α s = .94 and .91 for men's and women's ratings, respectively). We then averaged desirability composite scores and attractiveness differentials across the 10 target persons, yielding one desirability composite and one attractiveness differential score for each participant.

A 2 (male vs. female targets) \times 3 (alone vs. depicted with same-sex others vs. depicted with opposite-sex others) ANOVA was first conducted to test whether the attractiveness differential between the targets and the peripheral individuals with whom they were depicted varied systematically by sex or condition. The results of the ANOVA revealed that there were significant main effects of both sex, $F(1, 840) = 91.59$, $p < .001$, partial $\eta^2 = .10$, and condition, $F(2, 840) = 16.80$, $p < .001$, partial $\eta^2 = .04$, on the attractiveness differentials. Across conditions, men were rated as being somewhat less attractive than the others with whom they were depicted (attractiveness differential: $M = -0.04$, $SD = 0.57$), whereas women were rated somewhat more attractive than the others with whom they were depicted (attractiveness differential: $M = 0.35$, $SD = 0.67$). Across sexes, the target persons depicted with others were rated more attractive than the peripheral persons with whom they appeared, and this difference was significantly greater in the opposite-sex condition than in the same-sex condition (opposite-sex attractiveness differential: $M = 0.33$, $SD = 0.76$; same-sex attractiveness differential: $M = 0.21$, $SD = 0.81$).

The analysis also revealed a significant interaction between sex and stimulus condition, $F(2, 840) = 22.90$, $p < .001$, partial $\eta^2 = .05$. Because this interaction was significant, we proceeded to examine the simple effects of sex on the attractiveness differential (i.e., whether there were sex differences in the attractiveness differential between the targets and peripherals) within each of the two stimulus conditions where the target appears with others, $\alpha = .01$ to control for Type I error.

A significant effect was found for sex on attractiveness differential in both conditions in which targets were depicted with others; same sex condition: $F(1, 281) = 44.31$, $p < .001$, partial $\eta^2 = .14$, opposite sex condition: $F(1, 279) = 47.56$, $p < .001$, partial $\eta^2 = .15$. On average, male target persons were less attractive

than the peripheral men with whom they were depicted (attractiveness differential: $M = -0.47$, $SD = 0.79$), whereas female targets were, on average, more attractive than the peripheral women with whom they were depicted (attractiveness differential: $M = 0.13$, $SD = 0.71$). Male targets were also less attractive than the peripheral females with whom they were depicted (attractiveness differential: $M = -0.59$, $SD = 0.73$), whereas the female targets were slightly more attractive than the peripheral males with whom they were depicted (attractiveness differential: $M = 0.01$, $SD = 0.68$).

Because there was a significant sex difference in the attractiveness differentials of the male and female stimuli, a 2 (male vs. female targets) \times 3 (alone vs. depicted with same-sex others vs. depicted with opposite-sex others) univariate ANCOVA (with attractiveness differential serving as a covariate in this model) was conducted to assess men's and women's perceptions of target persons' desirability in each of the three stimulus conditions.

The results of the ANCOVA indicated significant main effects of both sex, $F(1, 838) = 610.89$, $p < .001$, partial $\eta^2 = .42$, and stimulus condition, $F(2, 838) = 18.90$, $p < .001$, partial $\eta^2 = .04$, on desirability ratings given to targets. The main effect of sex on desirability assessments indicated that men tended to judge women as being more desirable than women judged men (men's ratings of women averaged across conditions: adjusted $M [M_{adj}] = 5.17$; women's ratings of men averaged across conditions: $M_{adj} = 4.19$). The main effect of stimulus condition on desirability assessments indicated that across sexes, targets in the opposite-sex condition were rated more desirable than those in the same-sex or alone conditions (opposite-sex condition: $M_{adj} = 4.27$, alone condition: $M_{adj} = 3.94$, same-sex condition: $M_{adj} = 3.92$), p s = .03 and .02, respectively.

The analysis also revealed a significant interaction between stimulus condition and sex, $F(2, 838) = 129.35$, $p < .001$, partial $\eta^2 = .24$. Because this interaction was significant, we proceeded to examine the stimulus condition simple effects (i.e., the differences in desirability assessments made by men and women separately), with Bonferroni-corrected $\alpha = .025$ to control for Type I errors. Significant effects of stimulus condition on desirability assessments were found for both men's judgments of women, $F(2, 363) = 17.36$, $p < .001$, partial $\eta^2 = .08$, and women's judgments of men, $F(2, 474) = 290.65$, $p < .001$, partial $\eta^2 = .55$.

Follow-up tests were conducted to evaluate differences in desirability ratings among the three stimulus conditions within each sex, $\alpha = .008$ (.025 / 3) to control for Type I error over the three pairwise comparisons. As predicted by the desirability diminution hypothesis, women depicted with other men were rated significantly less desirable by men ($M_{adj} = 5.02$) than

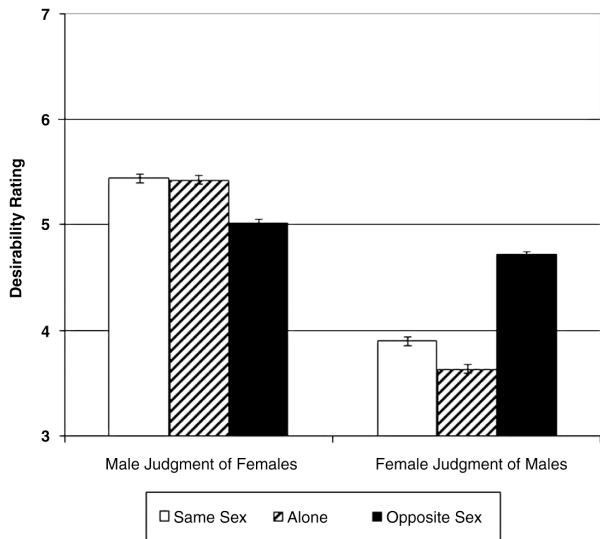


Figure 1 Opposite-sex desirability judgments based on stimulus condition.

were the same women depicted alone ($M_{\text{adj}} = 5.44$) or among same-sex peers ($M_{\text{adj}} = 5.45$), $p < .001$ for all comparisons. No differences were predicted for ratings given to women depicted alone or among same-sex peers, and none were found.

Follow-up tests also supported the desirability enhancement hypothesis. Men depicted with other women were rated significantly more desirable by women ($M_{\text{adj}} = 4.72$) than the same men depicted alone ($M_{\text{adj}} = 3.64$) or among same-sex peers ($M_{\text{adj}} = 3.91$), $p < .001$ for all comparisons (see Figure 1). Although no differences were predicted between ratings given to men depicted alone and men depicted with members of their same sex, the follow-up tests revealed that men were rated significantly more desirable when depicted with other men than when depicted alone ($p < .001$).

Discussion

We hypothesized that men and women use the presence of same-sex others to inform cross-sex desirability judgments in predictably different ways. The desirability enhancement hypothesis predicted that women would find men *more* desirable when depicted with women than when depicted alone or with other men. The desirability diminution hypothesis predicted that men would find women *less* desirable when depicted with men than when depicted alone or with other women. Both of these predictions were supported.

We were also able to preliminarily rule out two potential alternative hypotheses: (a) that these differences resulted from target persons' being depicted with others, in general or (b) that these differences resulted from systematic sex differences in the attractiveness of peripheral persons with whom targets were depicted. Men were rated significantly more desirable to women when depicted with women than they were when depicted with men. Women were rated significantly less desirable to men when depicted with men than they were when depicted with women. These findings lend support for the demonstrated effect resulting from the heuristic value that the presence of members of the assessor's same sex, *per se*, provide to men and women making desirability judgments of members of the opposite sex. Additionally, the desirability diminution and desirability enhancement hypotheses were supported even after controlling for sex differences in the desirability of peripheral persons with whom targets appeared.

One additional alternative hypothesis was not ruled out by Study 1, however. Study 1 left the possibility open that the desirability enhancement and diminution effects were the result of nonverbal cues given off by the male and female targets depicted with members of the opposite sex. We conducted a follow-up study to test this alternative. In this study, the original photographs of target persons depicted with opposite-sex others were cropped so that targets appeared alone in each photograph. Comparisons were then made between attractiveness ratings given to targets originally depicted with members of the opposite sex and the same targets depicted alone.

Two groups of male and female undergraduates from the University of Texas then judged the attractiveness of the digitally altered photographs of members of the opposite sex as part of an extra-credit exercise. The first group of men ($n = 9$) and women ($n = 10$) rated the attractiveness of opposite-sex target persons depicted alone. A second group of men ($n = 10$) and women ($n = 11$) rated the attractiveness of opposite-sex target persons originally depicted with members of the opposite sex. The arithmetic mean of the attractiveness ratings given to each target in each condition was first calculated within each sex to create a single dependent variable: attractiveness.

A 2×2 (Gender of Stimulus \times Condition) univariate ANOVA was then conducted to test for differences between attractiveness ratings given to target persons in each of the two conditions. The results of the ANOVA revealed no significant interaction between gender and condition on attractiveness ratings given to targets, $F(1, 36) = 0.816$, $p = .372$. No significant main effects were found for sex of rater (mean ratings given by men: 5.60, $SD = 0.82$; women: 5.10, $SD = 0.80$), $F(1, 36) = 3.74$, $p = .061$, or condition (mean rating given to targets depicted alone = 5.41, $SD = 0.78$, mean rating given to

targets originally depicted with members of the opposite sex = 5.30, $SD = 0.91$), $F(1, 36) = 0.173$, $p = .680$. These findings suggest that the desirability enhancement effect is not the result of nonverbal cues' being given off by targets but rather the result of the presence of members of the opposite sex and the heuristic value it provides to men and women making desirability judgments.

An unanticipated result of Study 1 was that women rated men depicted with same-sex others as being more desirable than the same men depicted alone. This result suggests that targets' sociality in general may have played some role in the predicted desirability enhancement effect. Women may simply find men who appear to be socially gregarious more attractive than their solitary counterparts. It is alternatively possible that women perceived the men depicted with other men as being more desirable due to their appearing more socially dominant than the same men depicted alone, as social dominance is a characteristic that women value in potential mates (Buss & Barnes, 1986; Gutierrez et al., 1999). Similarly, women may have found male targets depicted with other men more desirable because the presence of others suggests that the target persons must have at least some desirable personality characteristics, such as dependability and stability, both of which are traits that both men and women desire in their mates (Buss, 1991; Buss & Shackelford, 1997). Lastly, given the importance that male cooperative coalitions have played for large-game hunting, food sharing, and defending against attacks throughout most of human evolutionary history, it is possible that women simply find men who have a large number of same-sex friends more desirable due to their being part of a large coalition. Over evolutionary time, women who exhibited a heightened preference for men who were members of successful same-sex coalitions likely would have fared better than their counterparts who were less concerned with coalition membership.

STUDY 2: ARE MEN'S AND WOMEN'S DESIRABILITY ASSESSMENT HEURISTICS REFLECTED IN ASSESSMENTS OF MATING RIVALS?

To test the hypothesis that men and women use the presence of opposite-sex others to inform their judgments of same-sex rivals' desirability, we used a 2 (men vs. women) \times 3 (targets depicted alone vs. targets depicted with same-sex others vs. targets depicted with opposite-sex others) between-subjects design. The rival assessment effect predicts that (a) men will rate male targets depicted with women as being significantly more desirable to women than the same targets depicted

alone or with other men, and (b) women will rate female targets depicted with men as being significantly less desirable to men than the same targets depicted alone or with other women.

Method

Participants

As with Study 1, all participants in this study were heterosexual. Three hundred eighteen heterosexual undergraduate men (106 participants in each condition) and 309 heterosexual undergraduate women (103 participants in each of the three conditions) served as the participants in this study (mean age of participants was 19.68 and 18.37 for men and women, respectively). None of the participants in Study 2 had served as participants in Study 1. Participants were assigned to groups based on the first letter of their last name and were then directed to fill out an online questionnaire within 24 hours of receiving the instructions. Participation partially fulfilled a course requirement for all participants.

Materials

The same stimulus photographs used in Study 1 were used in Study 2. As in Study 1, in the first condition, each target person is pictured sitting alone at a table in a university courtyard. In the second condition, each target is pictured sitting among four college-aged members of the same sex in the same setting. In the third condition, each target is pictured sitting among four college-aged members of the opposite sex in the same university courtyard setting.

Procedure

The procedure was the same as in Study 1. Participants in Study 2 were asked to make judgments about the desirability of same-sex targets to members of the opposite sex on the same five desirability dimensions used in Study 1. The questions only differed in their being framed such that participants were asked about their perceptions of the desires of the opposite sex rather than their own desires (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?").

Results

As with Study 1, we first subtracted the mean attractiveness of the peripheral individuals from the attractiveness

scores given to each target by participants to yield an attractiveness differential between the target and the peripheral individuals with whom each was depicted. Next, a within-subjects desirability composite was created for each of the 10 stimuli by computing the arithmetic mean of the ratings given on each of the five desirability items (average within-target $\alpha = .93$ and $.92$ for men's and women's ratings, respectively). We then averaged desirability composite scores and attractiveness differentials across the 10 target persons, yielding one desirability composite and one attractiveness differential score for each participant.

A 2 (male vs. female targets) \times 3 (alone vs. depicted with same-sex others vs. depicted with opposite sex others) ANOVA was first conducted to test whether the attractiveness differential between the targets and the peripheral individuals with whom they were depicted varied systematically by sex or condition. The results of the ANOVA revealed that there were significant main effects of both sex, $F(1, 621) = 96.63, p < .001$, partial $\eta^2 = .14$, and condition, $F(2, 621) = 116.24, p < .001$, partial $\eta^2 = .27$, on the attractiveness differentials. The main effect of sex on attractiveness differential indicated that although both male and female target persons were rated as being more attractive than the others with whom they were depicted across conditions, the attractiveness differential was greater for women than for men (women's attractiveness differential: $M = 0.56, SD = 0.60$, men's attractiveness differential: $M = 0.21, SD = 0.48$). The main effect of condition indicated that there was a greater attractiveness differential between target and peripheral persons in the same-sex condition than in the opposite-sex condition (same-sex attractiveness differential: $M = 0.62, SD = 0.57$, opposite-sex attractiveness differential: $M = 0.52, SD = 0.66$) across sexes.

The analysis also revealed a significant interaction between sex and stimulus condition, $F(2, 621) = 35.06, p < .001$, partial $\eta^2 = .10$. Thus, we proceeded to examine the simple effects of sex on the attractiveness differential (i.e., whether there were sex differences in the attractiveness differential between the targets and peripherals) within each of the two stimulus conditions where the target appears with others, $\alpha = .01$ to control for Type I error.

A significant effect was found for sex on attractiveness differentials in both conditions in which targets were depicted with others, same sex condition: $F(1, 207) = 18.12, p < .001$, partial $\eta^2 = .08$; opposite sex condition: $F(1, 207) = 92.98, p < .001$, partial $\eta^2 = .31$. In the same-sex condition, although both male and female target persons were perceived as being more attractive than the same-sex peripheral persons with whom they were depicted, women's attractiveness differential was significantly greater than men's (women's attractiveness differential: $M = 0.78,$

$SD = 0.54$, men's attractiveness differential: $M = 0.46, SD = 0.55$). Women's attractiveness differential was also significantly greater than men's in the opposite sex condition (women's attractiveness differential: $M = 0.89, SD = 0.57$, men's attractiveness differential: $M = 0.16, SD = 0.53$).

Because there was a significant sex difference in the attractiveness differentials of the male and female stimuli, a 2 (male vs. female targets) \times 3 (alone vs. depicted with same-sex others vs. depicted with opposite sex others) univariate ANCOVA (with attractiveness differential serving as a covariate in this model) was conducted to assess men's and women's perceptions of same-sex target persons' desirability to members of the opposite sex in each of the three stimulus conditions.

The results of the ANCOVA indicated significant main effects of both sex, $F(1, 620) = 872.74, p < .001$, partial $\eta^2 = .59$, and stimulus condition, $F(2, 620) = 141.43, p < .001$, partial $\eta^2 = .31$, on desirability ratings given to targets. The analysis also revealed a significant interaction between stimulus condition and sex, $F(2, 620) = 215.14, p < .001$, partial $\eta^2 = .41$.

As with Study 1, the main effect of sex on desirability assessments indicated that female target persons were judged to be more desirable than male target persons (women's ratings of female targets averaged across conditions: $M_{\text{adj}} = 6.02$; men's ratings of male targets averaged across conditions: $M_{\text{adj}} = 5.14$). The main effect of stimulus condition on desirability assessments indicated that across sexes, targets in the alone condition were rated significantly more desirable than targets in either the opposite- or same-sex conditions (alone condition: $M_{\text{adj}} = 5.92$, opposite-sex condition: $M_{\text{adj}} = 5.57$, same-sex condition: $M_{\text{adj}} = 5.26$), $p < .001$ for all comparisons. Additionally, target persons in the same-sex condition were rated significantly less desirable than targets in the alone or opposite sex conditions across sexes, $p < .001$ for all comparisons. However, these results were not the focus of the current study. Because the interaction between sex and stimulus condition was significant, we proceeded to examine the stimulus condition simple effects (i.e., the differences in desirability assessments made by men and women separately), Bonferroni-corrected $\alpha = .025$ to control for Type I errors.

Significant effects of stimulus condition on desirability assessments were found for both men's, $F(2, 314) = 133.53, p < .001$, partial $\eta^2 = .46$, and women's, $F(2, 305) = 164.69, p < .001$, partial $\eta^2 = .52$, same-sex judgments. Follow-up tests were conducted to evaluate differences in desirability ratings among the three stimulus conditions, $\alpha = .008$ ($.025 / 3$) to control for Type I error over the three pairwise comparisons within each sex. As predicted by the rival assessment hypothesis, men judged male targets depicted with females as being significantly

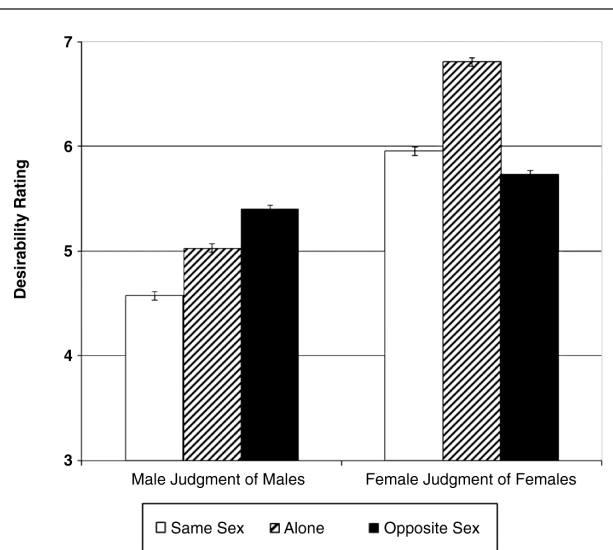


Figure 2 Same-Sex Desirability Judgments Based on Stimulus Condition

more desirable to women ($M_{\text{adj}} = 5.40$) than they rated the same targets depicted alone ($M_{\text{adj}} = 5.04$) or among same-sex peers ($M_{\text{adj}} = 4.58$), $p < .001$ for all comparisons. Conversely, women judged female targets depicted with males as being significantly less desirable to men ($M_{\text{adj}} = 5.73$) than the same targets depicted alone ($M_{\text{adj}} = 6.81$) or among same-sex peers ($M_{\text{adj}} = 5.96$), $p < .001$ for all comparisons. An unanticipated result of the planned comparisons revealed that both men and women judged targets depicted with same-sex others as being significantly less desirable to members of their opposite sex than the same targets depicted alone, $p < .001$ for all comparisons (see Figure 2).

Discussion

There is a conceptual link between the mate preferences exhibited by one sex and the domains in which mate competition occurs in the other—mate preferences drive patterns of intrasexual competition (Buss, 1988). Because men and women tend to judge the desirability of same-sex mating rivals based on the desirability criteria set by the opposite sex, it was hypothesized that men's and women's judgments of their same-sex competitors should reflect the use of the desirability assessment heuristics tested in Study 1. It was predicted that (a) men would judge male target persons depicted with women as being more desirable to women than they judged the same target persons depicted alone or with other men and that (b) women would judge female target persons depicted with men as being less desirable to

men than they judged the same target persons depicted alone or with other women. Study 2 demonstrated support for both of these predictions. Although future research is needed to uncover the precise nature of the mechanisms involved in these competition assessment processes (e.g., social learning, evolved cognitive structures, etc.), these findings lend additional support for the desirability enhancement and diminution effects.

An unanticipated result from the current study was that both men and women judged targets depicted with same-sex others (men with men and women with women) as being significantly less desirable to members of the opposite sex than the same target persons depicted alone. One potential explanation for this result is that men and women assume that any individual man or woman is less desirable to members of the opposite sex when there are multiple individuals to choose from than when the target is the only choice. Existing research has demonstrated that people tend to be more satisfied with the quality of individual options when there are fewer options from which to choose (Schwartz, 2004). Future research may uncover what processes are responsible for this effect and its absence in cross-sex desirability judgments.

GENERAL DISCUSSION

Desirability Assessment Heuristics

According to the evolutionary metatheory of sex differences, men's and women's different mating psychologies have evolved in response to recurrently different adaptive problems that each sex has had to solve (Buss, 1989, 1994/2003; Symons, 1979). These divergent mate preferences, in turn, present each sex with a different set of assessment problems when evaluating the desirability of members of the opposite sex. The current studies support the general hypothesis that the presence of same-sex others has heuristic value to men and women assessing the desirability of unknown opposite-sex targets. Men judged women depicted with other men as being *less* desirable than the same women depicted alone or with other women. Conversely, women judged men depicted with other women as being *more* desirable than the same men depicted alone or with other men. The current studies found additional support for the proposed hypotheses in the form of men's and women's judgments of their same-sex competitors. Men judged other men depicted with women as being significantly more desirable to women than the same targets depicted alone or with other men. Women judged other women depicted with men as being significantly less desirable to men than the same targets depicted alone or with other

men. It is rare in the field of psychology for the same manipulation have opposite effects on women and men (see Clark & Hatfield, 1989, for an exception), but these effects were precisely those predicted by the evolution-based hypotheses.

A “mate-choice copying” effect analogous to that found for women in these studies has been demonstrated in females of other species (see, e.g., Dugatkin, 1992, 1998; Hill & Ryan, 2006; Schlupp et al., 1994). Similarly, the current studies complement existing social psychological research on the important role played by contextual factors on women’s mate-value evaluations. Prior research has demonstrated that women’s evaluations of men’s physical attractiveness can be influenced by ratings given to the men by other women (Graziano et al., 1993) and that women have a heightened preference for male faces when other women are observed smiling at those faces (Jones et al., 2007). There is also evidence that suggests that men paired with attractive romantic partners receive more favorable personality evaluations by strangers than men paired with less attractive partners (Sigall & Landy, 1973). The current study, however, is the first study to predict and demonstrate that men find potentially mated females—as indicated by the woman being surrounded by other men—to be less desirable. The studies presented in this article also ruled out the alternative hypothesis that the demonstrated desirability enhancement and diminution effects resulted from the mere presence of *any* others with target persons. Rather, we demonstrate that it is the heuristic value inherent in the presence of members of the targets’ opposite sex, *per se*, that is responsible for the predicted effects.

One interesting but unanticipated result from the current studies was that women were judged by both men and women as being significantly more desirable than were the men. 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 (M. L. Fisher, 2004). Similarly, others have found that men rate women as being sexier than women rate men (Abbey, Cozzarelli, McLaughlin, & Harnish, 1987; Abbey & Melby, 1986).

It is also possible that this discrepancy is driven by adaptations possessed by men that have been shaped to facilitate success in short-term mating. Because men have been shaped by selection to have a heightened

preference for sexual variety (Symons, 1979; Trivers, 1972), men may possess an adaptation that systematically augments their perceptions of all women’s desirability. This adaptation would increase the proportion of “mateable” women in a man’s mating pool, hence increasing his probability of finding an acceptable mate. Because men and women tend to judge the desirability of same-sex mating rivals based on the desirability criteria set by the opposite sex, inflated perceptions of women’s desirability would also be reflected in women’s judgments of men’s preferences, accounting for this effect in both of the sexes. Regardless of the explanation, this result does not undermine the key results or explanation of the primary findings of the current studies.

Limitations

Although support was found for the research hypotheses proposed in this article, they should be interpreted with a degree of caution. The effect sizes were small, generally, and were especially small for the desirability diminution effect. Future research is needed to test the reliability of the demonstrated effects in light of the small effect sizes. The current studies relied on participants’ assuming that opposite-sex peripheral persons were romantically interested in targets. This assumption needs to be tested in future studies, as it is possible that participants assumed peripheral individuals to be relatives or friends of the targets.

Another limitation of the studies centers on the fact that we explored the effects of opposite-sex others on judgments of men’s and women’s desirability *in general*. A desirability composite was used due to the significant overlap between scores given to targets on all five dimensions of desirability explored in this study, including ratings given for desirability as long-term versus short-term mates. It is likely that—because long- and short-term mate preferences overlap to a significant degree (Buss & Schmitt, 1993; Gangestad & Simpson, 2000)—the methods used in the current study were not sophisticated enough to disambiguate the nuanced differences between these different types of desirability, if they exist. Future research using a forced-choice or budget-allocation method (e.g., Li, Bailey, Kenrick, & Linsenmeier, 2002) may provide a more thorough understanding of how the presence of opposite-sex others affects judgments of men’s and women’s long-term versus short-term desirability.

CONCLUSIONS

This research tested hypotheses about how the presence of same-sex others affects men’s and women’s

desirability judgments of opposite-sex targets. The desirability enhancement effect hypothesis predicted that women should find men more desirable when depicted with women than when alone or with other men, whereas the desirability diminution hypothesis predicted that men should find women depicted with men less desirable than when depicted alone or with other men. The findings in this article supported these hypotheses and cast doubt upon the alternative hypotheses that proposed that any differences in ratings given to men and women resulted from a general sociality effect (i.e., the targets being presented with other individuals, regardless of their sex) or due to differences in body language or the attractiveness of peripheral persons. We are not aware of any existing alternative theoretical perspectives that would have predicted that this experimental manipulation would have the *opposite* effects on men and women. These findings highlight that men and women may use the same social cues in qualitatively different ways based on the different evolutionary significance of the cue to each sex.

REFERENCES

- Abbey, A., Cozzarelli, C., McLaughlin, K., & Harnish, R. J. (1987). The effects of clothing and dyad sex composition on perceptions of sexual intent: Do women and men evaluate these cues differently? *Journal of Applied Social Psychology, 17*, 108-126.
- Abbey, A., & Melby, C. (1986). The effects of nonverbal cues on gender differences in perceptions of sexual intent. *Sex Roles, 15*, 283-298.
- Betzig, L. (1986). *Despotism and differential reproduction: A Darwinian view of history*. Hawthorne, NY: Aldine.
- Borgerhoff Mulder, M. (1988). Is the polygyny threshold model relevant to humans? Kipsigis evidence. In C. G. N. Mascie-Taylor & A. J. Boyce (Eds.), *Mating patterns* (pp. 209-230). Cambridge, UK: Cambridge University Press.
- Buss, D. M. (1988). The evolution of human intrasexual competition: Tactics of mate attraction. *Journal of Personality and Social Psychology, 54*, 616-628.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses testing in 37 cultures. *Behavioral and Brain Sciences, 12*, 1-49.
- Buss, D. M. (1991). Evolutionary personality psychology. *Annual review of psychology*. Palo Alto, CA: Annual Reviews, Inc.
- Buss, D. M. (2002). Human mate guarding. *Neuroendocrinology Letters Special Issue, 23*, 23-29.
- Buss, D. M. (2003). *Evolution of desire*. New York: Basic Books. (Original work published 1994)
- Buss, D. M. (2005). *The murderer next door: Why the mind is designed to kill*. New York: Penguin.
- Buss, D. M., & Barnes, M. L. (1986). Preferences in human mate selection. *Journal of Personality and Social Psychology, 50*, 559-570.
- Buss, D. M., & Dedden, L. A. (1990). Derogation of competitors. *Journal of Social and Personal Relationships, 7*, 395-422.
- Buss, D. M., Larsen, R. J., Westen, D., & Semmelroth, J. (1992). Sex differences in jealousy: Evolution, physiology, and psychology. *Psychological Science, 3*, 251-255.
- Buss, D. M. & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204-232.
- Buss, D. M., & Shackelford, T. K. (1997). Susceptibility to infidelity in the first year of marriage. *Journal of Research in Personality, 31*, 193-221.
- Byers, E. S., & Lewis, K. (1988). Dating couples' disagreements over the desired level of sexual intimacy. *Journal of Sex Research, 30*, 270-282.
- Clark, R. D., & Hatfield, E. (1989). Gender differences in receptivity to sexual offers. *Journal of Psychology and Human Sexuality, 2*, 39-55.
- Daly, M., & Wilson, M. (1988). *Homicide*. Hawthorne, NY: Aldine.
- Daly, M., Wilson, M., & Weghorst, S. J. (1982). Male sexual jealousy. *Ethology and Sociobiology, 3*, 11-27.
- Dawkins, R. (1986). Wealth, polygyny, and reproductive success. *Behavioral and Brain Sciences, 9*, 190-191.
- Dugatkin, L. A. (1992). Sexual selection & imitation: Females copy the mate choice of others. *The American Naturalist, 139*, 1384-1389.
- Dugatkin, L. A. (1998). Genes, copying, and female mate choice: Shifting thresholds. *Behavioral Ecology, 9*, 323-327.
- Fisher, M. L. (2004). Female intrasexual competition decreases female facial attractiveness. *Proceedings of the Royal Society of London Behavioral Supplement, 271*, S283-S285.
- Fisher, R. A. (1958). *The genetical theory of natural selection* (2nd ed.). New York: Dover.
- Ford, C. S., & Beach, F. A. (1951). *Patterns of sexual behavior*. New York: Harper & Row.
- Gangestad, S. W., & Simpson, J. A. (2000). On the evolutionary psychology of human mating: Trade-offs and strategic pluralism. *Behavioral and Brain Sciences, 23*, 573-587.
- Gigerenzer, G., & Todd, P. M. (1999). Fast and frugal heuristics: The adaptive toolbox. In G. Gigerenzer, P. M. Todd, & The ABC Research Group (Eds.), *Simple heuristics make us smart* (pp. 3-36). New York: Oxford University Press.
- Graziano, W. G., Jensen-Campbell, L. A., Shebilske, L. J., & Lundgren, S. R. (1993). Social influence, sex differences, and judgments of beauty: Putting the interpersonal back in interpersonal attraction. *Journal of Personality and Social Psychology, 65*, 522-531.
- Gutierrez, S. E., Kenrick, D. T., & Partch, J. J. (1999). Beauty, dominance, and the mating game: Contrast effects in self-assessment reflect gender differences in mate selection. *Personality and Social Psychology Bulletin, 25*, 1126-1134.
- Hill, S. E., & Ryan, M. J. (2006). The role of female quality in the mate copying behavior of sailfin mollies. *Proceedings of the Royal Society of London: Biology Letters, 2*, 203-205.
- Jones, B. C., DeBruine, L. M., Little, A. C., Burriss, R. P., & Feinberg, D. R. (2007). Social transmission of face preferences among humans. *Proceedings of the Royal Society Biological Sciences, 274*, 899-903.
- Kenrick, D. T., & Keefe, R. C. (1992). Age preferences in mates reflect sex differences in reproductive strategies. *Behavioral and Brain Sciences, 15*, 75-133.
- La Cerra, M. M. (1994). *Evolved mate preferences in women: Psychological adaptations for assessing a man's willingness to invest in offspring*. Unpublished doctoral dissertation, University of California, Santa Barbara, Department of Psychology.
- Li, N. P., Bailey, J. M., Kenrick, D. T., & Linsenmeier, J. A. W. (2002). The necessities and luxuries of mate preferences: Testing the tradeoffs. *Journal of Personality and Social Psychology, 82*, 947-955.
- Mathes, E. W., Brennan, S. M., Haugen, P. M., & Rice, H. B. (1985). Ratings of physical attractiveness as a function of age. *Journal of Social Psychology, 125*, 157-168.
- Murdock, G. P. (1967). *Ethnographic atlas*. Pittsburgh, PA: University of Pittsburgh Press.
- Orians, G. H. (1969). On the evolution of mating systems in birds and mammals. *The American Naturalist, 103*, 589-603.
- Pruett-Jones, S. (1992). Independent versus non-independent mate choice: Do females copy each other? *The American Naturalist, 140*, 1000-1009.
- Schwartz, B. (2004). *The paradox of choice: Why more is less*. New York: Harper Collins.
- Schlupp, I., Marler, C. A., & Ryan, M. J. (1994). Benefit to male sailfin mollies of mating with heterospecific females. *Science, 263*, 373-374.

- Sigall, H., & Landy, D. (1973). Radiating beauty: Effects of having a physically attractive partner on person perception. *Journal of Personality and Social Psychology*, 28, 218-224.
- Singh, D. (1993). Adaptive significance of waist-to-hip ratio and female physical attractiveness. *Journal of Personality and Social Psychology*, 65, 293-307.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Townsend, J. M., & Levy, G. D. (1990). Effects of potential partner's costume and physical attractiveness on sexuality and partner selection. *Journal of Psychology*, 124, 371-389.
- Trivers, R. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man: 1871-1971* (pp. 136-179). Chicago: Aldine.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185, 1124-1130.
- Wade, M. J., & Pruett-Jones, S. G. (1990). Female copying increases the variance in male mating success. *Proceedings of the National Academy of Sciences*, 87, 5749-5753.
- Walster, E., Walster, G. W., Piliavin, J., & Schmidt, L. (1973). "Playing hard to get": Understanding an elusive phenomenon. *Journal of Personality and Social Psychology*, 26, 113-121.
- Williams, G. C. (1975). *Sex and evolution*. Princeton, NJ: Princeton University Press.

Received September 21, 2006

Revision accepted October 23, 2007