Arch Sex Behav (2011) 40:1119–1127
DOI 10.1007/s10508-011-9806-5

ORIGINAL PAPER

Effects of Partner Beauty on Opposite-Sex Attractiveness Judgments

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Published online: 7 September 2011

Abstract Many studies show mate choice copying effects on mate preferences in non-human species in which individuals follow or copy the mate choices of same-sex conspecifics. Recent studies suggest that social learning also influences mate preferences in humans. Studies on heterosexual humans have focused on rating the attractiveness of potential mates (targets) presented alongside individuals of the opposite sex to the target (models). Here, we examined several different types of pairing to examine how specific social learning is to mate preferences. In Study 1, we replicated a previous effect whereby target faces of the opposite sex to the subject were rated as more attractive when paired with attractive than unattractive partner models of the same sex as the subject. Using the same paired stimuli, Study 2 demonstrated no effect of a paired model if subjects were asked to rate targets who were the same sex as themselves. In Study 3, we used pairs of the same sex, stating the pair were friends, and subjects rated targets of the opposite sex to themselves. Attractive models decreased targets' attractiveness, opposite to the effect in Study 1. Finally, Study 4 examined if attractive versus unattractive non-face stimuli might influence attraction. Unlike in Study 1, pairing with attractive stimuli either had no effect or decreased the attractiveness of paired target face images. These data suggest that social transmission of preferences via pairing with attractive/unattractive images is relatively specific to learning about mate preferences but does not influence attractiveness judgments more generally.

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Keywords Social transmission · Facial attractiveness · Mate choice copying · Learning · Beauty

Introduction

Individuals often learn from others and selection for social learning mechanisms may occur when there are costs to acquiring accurate behavioral information via individual learning (Richerson & Boyd, 2005). In terms of mate choice, using the judgments of others may be beneficial if it allows an individual to assess potential mates more quickly and efficiently than through individual trial and error.

Mate choice copying has been observed among females in a number of different non-human species (Brown & Fawcett, 2005; Dugatkin, 2000; Galef & Laland, 2005; White, 2004), including fish (Dugatkin & Godin, 1992, 1993; Godin, Herdman, & Dugatkin, 2005; Witte & Ryan, 2002) and bird species (Galef & White, 1998; Swaddle, Cathey, Correll, & Hodkinson, 2005; White & Galef, 2000). These studies have generally shown that, in choice tests where females observe another female (termed model) to be paired with one of two males (termed targets), female observers were subsequently more likely to prefer the target male they had seen paired over the male they had seen unpaired (Hoglund, Alatalo, Gibson, & Lundberg, 1995).

Inspired by work on non-human animals, research also suggests social learning may influence human mate preferences (for review, see Little, Jones, DeBruine, & Caldwell, 2011). While some research has shown that the presence of wedding rings on men did not increase women's preferences for those men (Uller & Johansson, 2003), other studies have found that images of men labeled as married were more attractive than those labeled as single (Eva & Wood, 2006) and that women rated men as more desirable when shown surrounded by women than when shown alone or with other men (Hill & Buss, 2008). Another

study has shown that women prefer pictures of men who were previously seen alongside images of other women who were looking at the face with smiling (i.e., positive) expressions than men who were previously seen alongside images of other women with neutral (i.e., relatively negative) expressions (Jones, DeBruine, Little, Burriss, & Feinberg, 2007). Women, therefore, appear to mimic the attitude of other women to particular men.

Alongside partnership status, simple presence, and expressions of attitude towards the male, the physical traits of the observed model may also play a role in social transmission. Previous studies have shown that men and women are influenced in their judgments of attractiveness by the apparent choice of attractive members of the same sex. Sigall and Landy (1973) used real individuals and found that positive characteristics were attributed more frequently to men who were paired with attractive rather than unattractive women. In this way, they showed that an attractive partner may radiate beauty. Such a phenomenon is suggestive of a sophisticated form of mate choice copying, whereby women use the attractiveness of a partner that a man can acquire in order to judge the man's own attractiveness.

A more recent study using images that were presented with a fictitious partner has shown that both men and women found a face paired with an attractive partner to be more attractive than one paired with an unattractive partner for a long-term but not a short-term relationship (Little, Burriss, Jones, DeBruine, & Caldwell, 2008). Other studies have also demonstrated a similar effect for women judging men's attractiveness from photographs (Waynforth, 2007). Effects that are relatively specific to long-term preferences in humans suggest that social information is being used to infer non-physical traits that make a target a good long-term partner, such as resources or intelligence, which may be difficult to determine from physical appearance alone. Other studies have shown that, when observing real interactions of couples who were videotaped while speed dating, individuals were more likely to be swayed by the preferences of attractive models (Place, Todd, Penke, & Asendorpf, 2010). Studies have also demonstrated that social learning can influence general preferences for particular traits beyond specific individuals. For example, pairing attractive models with faces with wide spaced eyes led to increased preferences for wide spaced eyes in novel faces (Little et al., 2011).

While most research on non-human animals has focused on the choices of females for males, males of some species also appear to mate choice copy. Generally, as males are often the chosen rather than the choosy sex, males may not need to mate-choice copy (e.g., in lek breeding bird species). In other mating systems, the benefits to males may lead to copying. For example, in sailfin mollies, males were found to follow the apparent preferences expressed by other males and this was potentially due to the short period of sexual receptivity in females leading to a need for males to efficiently identify females who are receptive (Schlupp & Ryan, 1997; Witte & Ryan, 2002). Research on humans has also demonstrated that men show copying-like effects (Little et al., 2008, 2011; Place et al., 2010), potentially because men, like women, value some non-physical aspects in opposite-sex long-term partners that can be inferred from the attractiveness of their partners.

While there is now evidence for social learning for both men and women in the context of judging the attractiveness of opposite-sex individuals based on the attractiveness of their current partner, such learning need not necessarily be limited to opposite-sex attractiveness judgments. For example, individuals may infer the attractiveness of same-sex competitors via observing their partners or moderate their attractiveness judgments based on the attractiveness of same-sex friendships of a particular individual. Indeed, recent work has shown that social learning can influence men's assessments of other men's dominance (Jones, DeBruine, Little, Watkins, & Feinberg, 2011). Attractiveness moderation may also be the result of more simple positive or negative associations so that pairing with positive images increases attractiveness or pairing with negative images decreases attractiveness. This latter potential effect is unlikely to explain all of the effects described above in terms of social learning, given that effects have been observed for long- but not short-term attractiveness judgments (Little et al., 2008). Nevertheless, simple positive associations could be at play in such effects.

The current series of studies examined the extent of social learning of attractiveness across sex of target and model by manipulating the sex of targets and models as well as presenting non-human pleasant and unpleasant stimuli. These studies were designed to test the specificity of social learning of attractiveness.

Defining the Attractiveness of Facial Stimuli

Here we use target to denote the face being rated by the participants and model to refer to the face that is paired with the target. We paired target faces with attractive and unattractive model faces based on sex-typicality. To create these faces, masculinity of shape was manipulated to adjust attractiveness. Femininity is reliably associated with the attractiveness of female faces (Perrett et al., 1998). While masculinity in male faces is not so consistently associated with attractiveness across different studies using different sets of stimuli (Little, Burt, Penton-Voak, & Perrett, 2001; Penton-Voak et al., 1999), previous studies using the same stimuli as used here have established that masculine versions were, on average, preferred over feminine versions in the male face set (Little et al., 2008; Little & Mannion, 2006). In the following experiments, we use the terms sex-typical (masculine male and feminine female faces) and sex-atypical (feminine male and masculine female faces) to describe both target and model faces. Sex-typical faces were attractive while sex-atypical faces were unattractive for both men and women in these stimuli.

Study 1: Attractiveness Ratings of Opposite-Sex Faces Paired with Attractive and Unattractive Same-Sex Faces

Study 1 was a partial replication of a previous study (Little et al., 2008) to again examine social learning of attractiveness in the context of opposite-sex mate preferences. In Study 1, we paired targets with sex-typical and sex-atypical models of the opposite-sex and had targets rated for long-term attractiveness (i.e., female participants judged male targets paired with female models and male participants judged female targets paired with male models).

Participants

A total of 36 women (aged 18–41 years, M = 24.2, SD = 6.6) and 42 men (aged 18–45 years, M = 28.9, SD = 8.8) took part in the study online. All participants were volunteers and were selected for being heterosexual and between the ages of 18–45 years.

Stimuli

All stimuli were constructed using established techniques (Little et al., 2001; Penton-Voak et al., 1999; Perrett et al., 1998; Rowland & Perrett, 1995; Tiddeman, Burt, & Perrett, 2001) for manipulating the appearance of face images in an objective, systematic manner (for technical details, including mathematical algorithms, see Rowland & Perrett, 1995; Tiddeman et al., 2001).

The base images were five male and five female facial composites. Composites were created from a set of 50 young adult faces (25 of each sex), photographed under standard conditions of lighting and focal distance and with sitters adopting a neutral expression. Each composite was created by averaging the shape and color of five randomly selected same-sex images, with no image being used in more than one composite. To make the composites, key points (174) were manually marked around the main features (e.g., points that outline the eyes, nose, and mouth) and the outline (e.g., jaw line, hair line) of each original face using specialist software. The average X–Y location of each point on the five faces to be included in each composite was then calculated and the originals morphed to the average shape before being superimposed to produce a photographic quality composite. Each composite was standardized on interpupillary distance and made perfectly symmetrical by being averaged with its mirror image prior to transformation.

All composites were transformed on a sexual dimorphism dimension using the linear difference between a composite of 50 males and 50 females following the technique reported in Perrett et al. (1998). Using the shape difference between male and female composites, the vector of sexual dimorphism can be parameterized allowing manipulation along the vector, described here as a percentage of the distance between male and female. Transforms represented 50% plus or minus the difference between these two composites. Transformations resulted in two images for each base face: one a masculinized version and the other a feminized version. These transforms were the stimuli used in the current experiments. Feminine faces were sex-typical for women and sex-atypical for men while masculine faces were sex-typical for men and sex-atypical for women. Examples of transformed images can be seen in Fig. 1.

Procedure

Participants were presented with a short online questionnaire assessing their age, sex, and sexual orientation. Participants were then presented with paired images. Each male or female target image was presented on the left-hand side of the screen for rating and appeared in both masculinized and feminized form over the course of the task. Each of the 10 target images (the five composites of the opposite-sex to the participant in both their sex-typical and sex-atypical versions) was shown paired with an opposite-sex face twice: once with an attractive sex-typical face and once with an unattractive sex-atypical face. The model was always presented on the right-hand side of the screen. In total, participants rated 20 images for attractiveness.

Participants were presented with the following instructions: "Please rate the following faces for attractiveness as a long-term partner. Definition of long-term partner: You are looking for the type of person who would be attractive in a long-term relationship. Examples of this type of relationship would include someone you may want to move in with, someone you may consider leaving a current partner to be with, and someone you may, at some point, wish to marry (or enter into a relationship on similar grounds as marriage). Please rate only the left-hand image. The person on the right is their partner."

For each image, participants were presented with a 7-point scale from low attractiveness (1) to high attractiveness (7). Within the instructions, participants were told that the persons on the right were the romantic partners of the persons on the left. Image pairs were presented in a random order and rating the face on the scale initiated the next trial.

Results

Figure 2 shows the mean attractiveness ratings for Study 1 as a function of Target Face and Model Face. A 2 (Subject Sex: Male vs. Female) × 2 (Target Face: Sex-typical vs. Sex-atypical) × 2 (Model Face: Sex-typical vs. Sex-atypical) within-subjects analysis of variance (ANOVA) yielded a significant main effect of Target Face, $F(1, 76) = 15.69$, $p < .001$, a significant main effect of Model Face, $F(1, 76) = 10.40$, $p = .002$, and a borderline Target Face × Model Face interaction, $F(1, 76) = 3.41$, $p = .069$. There was also a borderline main effect of subject sex, $F(1, 76) = 2.90$, $p = .093$. No other effects or interactions were significant, all Fs$(1, 76) < 1$.

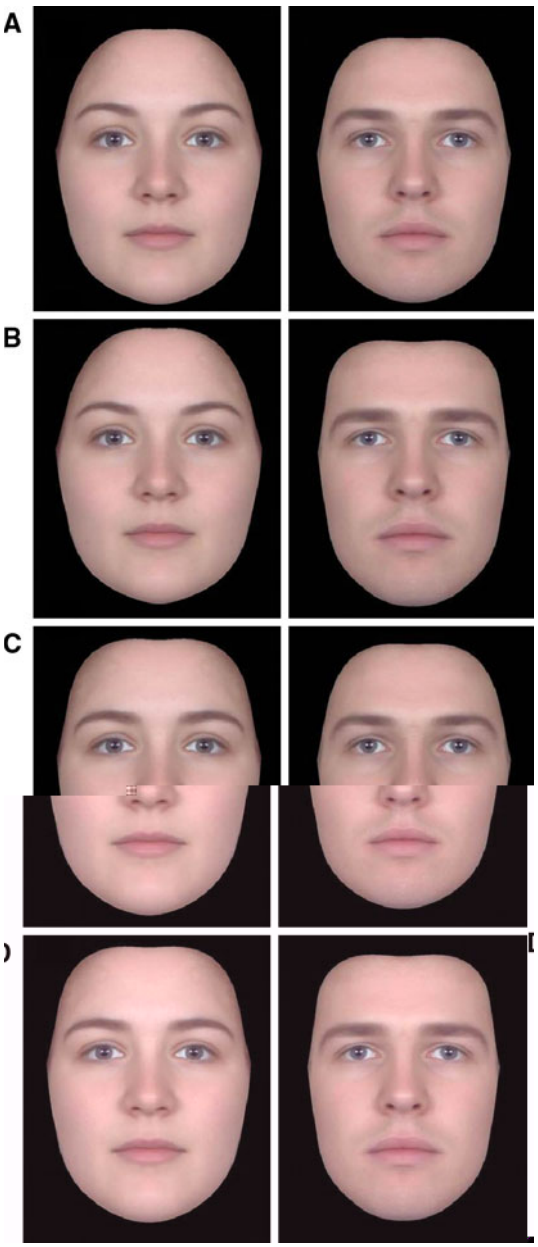

Fig. 1 Example face pairs shown to male participants in Study 1: Sex-typical female/sex-atypical male (**a**), sex-typical female/sex-typical male (**b**), sex-atypical female/sex-atypical male (**c**), sex-atypical female/sex-typical male (**d**). Masculine is sex-typical for male faces and sex-atypical for female faces and feminine is sex-atypical for male faces and sex-typical for female faces. Female participants saw the same pairs but with male faces on the left

Sex-typical target faces were rated as more attractive than sex-atypical target faces and faces paired with sex-typical model faces were rated more highly than faces paired with sex-atypical model faces. The interaction reflected that there was a larger effect of Model Face for sex-atypical than for sex-typical faces. The marginal main effect of Subject Sex simply reflected that men rated the female faces they saw higher than women rated the male faces they saw (3.9 vs. 3.6).

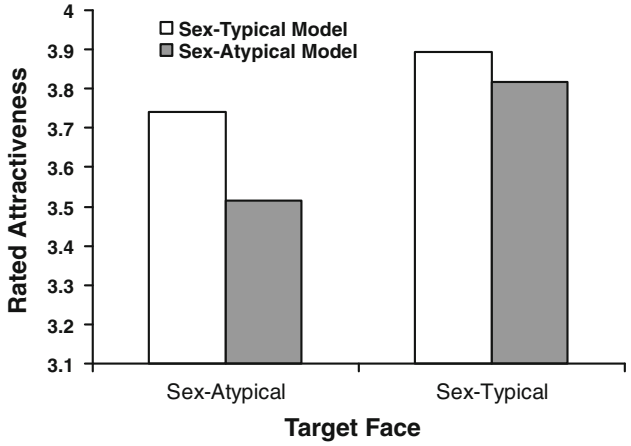

Fig. 2 Study 1: Mean ratings of attractiveness for judges rating opposite-sex targets paired with same-sex models. Scores were split by sex-typicality of the target face (sex-typical/sex-atypical) and sex-typicality of the model face (sex-typical/sex-atypical)

Discussion

Study 1 demonstrated that, for both men and women, the sex-typicality, and so attractiveness, of model partners influenced the attractiveness of target individuals as potential long-term partners. This result was consistent with previous findings (Little et al., 2008). Such results are suggestive of a mate-preference copying-like mechanism, whereby unavailable information about an individual's quality can be inferred by the relative attractiveness of their current partner. There was a close to significant effect of target face attractiveness, such that sex-atypical, or less attractive, faces benefited most from pairing with a sex-typical, attractive model.

Study 2: Attractiveness Ratings of Same-Sex Faces Paired with Attractive and Unattractive Opposite-Sex Faces

Study 2 represented a simple change to Study 1: instead of rating opposite-sex faces paired with same-sex faces, participants rated same-sex faces paired with opposite-sex faces (i.e., female participants judged female targets paired with male models and male participants judged male targets paired with female models). Study 2 then examined whether men and women used information based on partner attractiveness to guide their judgments of own-sex attractiveness.

Participants

A total of 51 women (aged 18–43 years, $M = 28.6$, $SD = 6.6$) and 52 men (aged 18–44 years, $M = 31.1$, $SD = 7.4$) took part in the study online. All participants were volunteers and were selected for being heterosexual and between the ages of 18–45 years.

Stimuli

The same image pairs used in Study 1 were used.

Procedure

The procedure was identical to Study 1 except that participants were instructed to rate same-sex target faces paired with opposite-sex model faces. As it was inappropriate to ask self-reported heterosexual participants about the attractiveness of a same-sex individual for a romantic relationship, participants here were simply asked to rate the faces for attractiveness.

Results

Figure 3 shows the mean attractiveness ratings for Study 2 as a function of Target Face and Model Face. A 2 (Subject Sex: Male vs. Female) × 2 (Target Face: Sex-typical vs. Sex-atypical) × 2 (Model Face: Sex-typical vs. Sex-atypical) within-subjects ANOVA yielded a significant main effect of Target Face, $F(1, 101) = 12.36, p < .001$, and a significant main effect of Subject Sex, $F(1, 101) = 37.47, p < .001$. No other main effects or interactions were significant, all Fs$(1, 101) < 1$.

Sex-typical target faces were rated as more attractive than sex-atypical target faces and faces paired with sex-typical model faces were not rated differently than faces paired with sex-atypical model faces. The main effect of Subject Sex reflected that men rated the male faces they saw lower than women rated the female faces they saw (2.9 vs. 4.1).

Discussion

Study 2, using identical stimuli to those used in Study 1 but asking participants to rate same-sex images, demonstrated no moderation of target attractiveness according to model attractiveness. These findings suggest that the effect seen in Study 1 might be relatively specific for mate preferences and that any social learning mechanism for determining attractiveness based on partner attractiveness does not affect same-sex judgments.

Study 3: Attractiveness Ratings of Opposite-Sex Faces Paired with Attractive and Unattractive Opposite-Sex Faces

Study 3 extended the findings of Studies 1 and 2 by asking participants to rate the attractiveness of opposite-sex faces (as in Study 1) but paired with opposite-sex model faces (as in Study 2). Study 3 presented the target and model as friends and then addressed whether individuals would use the attractiveness of friends who are the same sex in their judgments of attractiveness.

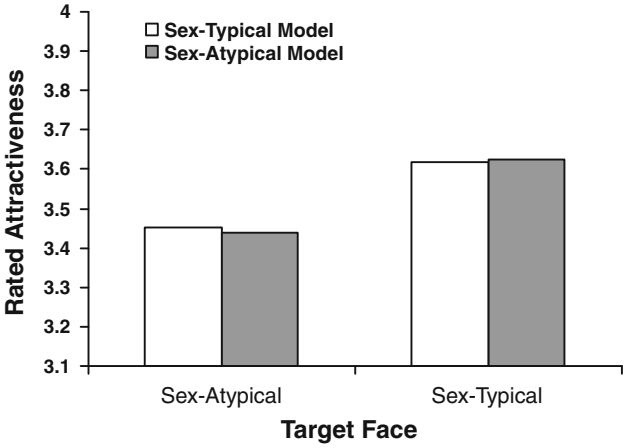

Fig. 3 Study 2: Mean ratings of attractiveness for judges rating same-sex targets paired with opposite-sex models. Scores were split by sex-typicality of the target face (sex-typical/sex-atypical) and sex-typicality of the model face (sex-typical/sex-atypical)

Participants

A total of 53 women (aged 18–43 years, M = 28.1, SD = 6.8) and 55 men (aged 18–44 years, M = 31.3, SD = 7.3) took part in the study online. All participants were volunteers and were selected for being heterosexual and between the ages of 18–45 years.

Stimuli

The same images used in Study 1 were used. Faces were paired with a face of a different identity but of the same sex.

Procedure

The procedure was identical to Study 1 except that participants rated opposite-sex target faces paired with opposite-sex model faces (i.e., women judged male targets paired with male models and men judged female targets paired with female models).

Results

Figure 4 shows the mean attractiveness ratings for Study 3 as a function of Target Face and Model Face. A 2 (Subject Sex: Male vs. Female) × 2 (Target Face: Sex-typical vs. Sex-atypical) × 2 (Model Face: Sex-typical vs. Sex-atypical) within-subjects ANOVA yielded a significant main effect of Target Face, $F(1, 106) = 11.41, p = .001$, a significant main effect of Model Face, $F(1, 106) = 8.72, p = .004$, but no interaction between Target Face and Model Face, $F(1, 106) = 1.99$. There was also a borderline significant main effect of Subject Sex, $F(1, 106) = 3.38, p = .069$. No other interactions were significant, all Fs$(1, 106) < 1$.

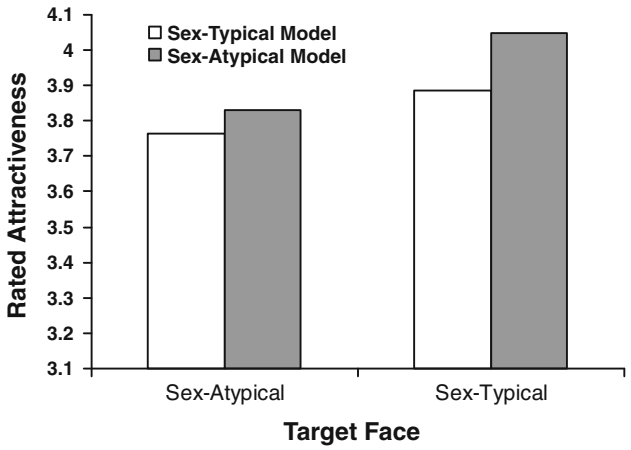

Fig. 4 Study 3: Mean ratings of attractiveness for judges rating opposite-sex targets paired with opposite-sex models. Scores were split by sex-typicality of the target face (sex-typical/sex-atypical) and sex-typicality of the model face (sex-typical/sex-atypical)

Sex-typical target faces were rated as more attractive than sex-atypical target faces and faces paired with sex-typical model faces were rated as less attractive than faces paired with sex-atypical model faces. The main effect of Subject Sex reflected that men rated the female faces they saw higher than women rated the male faces they saw (4.0 vs. 3.7).

Discussion

Study 3 demonstrated that, in contrast to the findings of Study 1, pairing a target with a sex-typical, attractive friend decreased the target's attractiveness while pairing with a sex-atypical, unattractive friend increased the target's attractiveness. This finding was consistent with previous research also demonstrating similar contrast effects, whereby comparison with attractive images makes rated images less attractive (Geiselman, Haight, & Kimata, 1984; Wedell, Parducci, & Geiselman, 1987), and may reflect a mechanism of relative attractiveness judgments. Rather than radiating beauty, in fact, the reverse was true: the presence of sex-typical, attractive same-sex (to the target) individuals caused target faces to be perceived as less attractive.

Study 4: Attractiveness Ratings of Opposite-Sex Faces Paired with Pleasant and Unpleasant Non-Face Stimuli

Studies 1 to 3 addressed learning from the choices of others by showing targets paired with models presented as partners or friends. Study 4 removed the social relationship to address whether simple pairing with pleasant or unpleasant non-human stimuli could affect the attractiveness of target faces. This was done by asking participants to rate the attractiveness of opposite-sex faces (as in Studies 1 and 3) but paired with flowers/thorns as pleasant/unpleasant model images.

Participants

A total of 71 women (aged 18–44 years, $M = 28.5$, $SD = 6.3$) and 74 men (aged 18–45 years, $M = 29.8$, $SD = 7.5$) took part in the study online. All participants were volunteers and were selected for being heterosexual and between the ages of 18–45 years.

Stimuli

The same face image pairs used in Study 1 were used here. Additionally, five pictures of flowers and five pictures of thorn bushes were retrieved from a Google image search. Images were selected by the first author for being of high image quality (i.e., high resolution, did not appear pixilated). These were used as model stimuli and replaced sex-typical/sex-typical model faces used in previous studies. Images are available from the corresponding author upon request.

Procedure

The procedure was identical to Study 1 except that participants rated opposite-sex target faces paired with pleasant and unpleasant non-face model images described above (i.e., female participants judged male targets paired with non-human "models" and male participants judged female targets paired with non-human "models").

Results

Figure 5 shows the mean attractiveness ratings for Study 4 as a function of Target Face and Model Image. A 2 (Subject Sex: Male vs. Female) × 2 (Target Face: Sex-typical vs. Sex-atypical) × 2 (Model Image: Pleasant vs. Unpleasant) within-subjects ANOVA yielded a significant main effect of Target Face, $F(1, 143) = 39.74$, $p < .001$, no significant main effect of Model Image, $F(1, 143) < 1$, and a borderline Target Face × Model Image interaction, $F(1, 143) = 3.33$, $p = .070$. There was no main effect of Subject Sex, $F(1, 143) = 1.39$. No other interactions were significant, all Fs$(1, 143) < 1$.

Sex-typical target faces were rated as more attractive than sex-atypical target faces and faces paired with pleasant model images were rated as less attractive than faces paired with unpleasant model images, though this was true mainly for sex-typical, attractive target faces.

Discussion

Study 4 demonstrated that a simple association with pleasant and unpleasant stimuli was an unlikely explanation for the results of Study 1. There was no clear impact of paired model stimuli on target attractiveness and the interaction between target and model stimuli indicated an effect in same direction as seen in Study 3 for

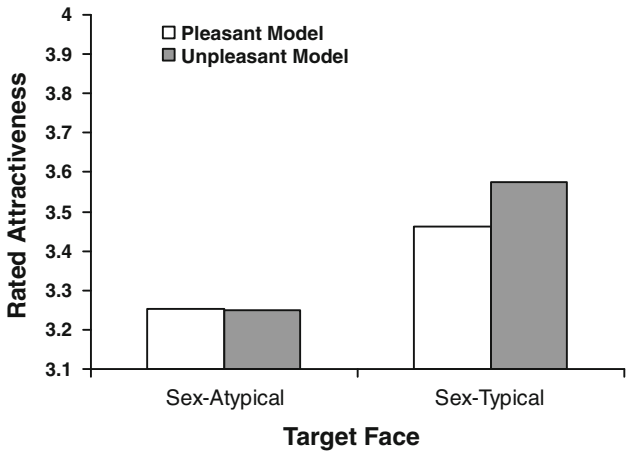

Fig. 5 Study 4: Mean ratings of attractiveness for judges rating opposite-sex target faces paired with pleasant and unpleasant non-human models. Scores were split by sex-typicality of the target face (sex-typical/sex-atypical) and the pleasantness of the image paired with it (pleasant/unpleasant)

same-sex pairs. Pairing with pleasant stimuli decreased attractiveness of sex-typical targets, while pairing with unpleasant stimuli increased attractiveness. The latter finding suggests that, at least for sex-typical, attractive targets, there is a contrast effect with non-human stimuli affecting human social judgments. Why this was mainly true for sex-typical, attractive faces is unclear and such effects can be usefully studied further.

General Discussion

The four studies described here demonstrate that social learning of attractiveness was relatively constrained to observing opposite-sex targets paired with same-sex models. Study 1, using opposite-sex targets paired with same-sex models, was the only study to show an effect of pairing in which the attractiveness of the target was increased by pairing with a sex-typical, attractive model, a finding consistent with previous results (Little et al., 2008). There also appeared to be stronger effects when faces were sex-atypical and less attractive, suggesting that the benefits of an attractive partner might be stronger for less attractive individuals. Participants did not find targets more attractive when paired with sex-typical, attractive models when judging same-sex targets paired with opposite-sex models (Study 2) or when judging opposite-sex targets paired with opposite-sex models (Study 3). Both Studies 2 and 3 thus indicated a relatively specific effect of social influence on attractiveness judgments dependent on sex of the judge, target, and model. The attractiveness of target images was not generally influenced by pairing with pleasant/unpleasant non-human stimuli and, for sex-typical images, pairing with pleasant stimuli decreased their attractiveness (Study 4), also suggesting limited influence of a simple positive association explanation for the significant effects in Study 1.

The findings of Study 1 were consistent with a sophisticated copying-like process, whereby individuals copy the choices of attractive individuals (as the attractive sex-typical model increased attraction to the target). This may represent a biased form of copying whereby individuals are most inclined to follow the choices of attractive people in mate choice. Because attractive individuals are likely to be most able to be selective of partners, it can be inferred that the partner they have chosen possesses attractive qualities that may not be physical. A physically attractive partner may then act as an indirect advertisement of quality.

As noted, the influence of an attractive partner appears to apply only when rating opposite-sex faces and not same-sex faces (Study 2). Likewise, the presence of an attractive same-sex model friend decreased, not increased, target attractiveness (Study 3). These data suggest a relatively specialized social learning mechanism for acquiring information about potential opposite-sex partners: a mechanism that is relatively specific to mate preferences based on inferences from their partner's attractiveness. Simple proximity to an attractive other person is not enough to increase target attractiveness.

In humans, as most individuals will partner during their lives (Vandenberg, 1972), indiscriminately valuing individuals with partners is unlikely to be a useful mechanism for identifying high quality partners. Humans bring two factors to a parenting relationship: a level of parental investment and potential heritable genetic benefits (such as genes for high quality immune systems). Social information may be more useful for judging the former given such information is not immediately available. In other species without parental care, mate choice copying most likely occurs because individuals are able to acquire information about the genetic quality of a prospective mate (Witte & Ryan, 2002) and so may not show such specific copying effects. In humans, both men and women value positive personality traits in long-term partners (Buss & Schmitt, 1993), traits which may be usefully inferred by examining the attractiveness of a person's partner.

Given that information inferred from current partners may be adaptive in future partner choice, it is interesting to consider the cases where we did not observe effects of model attractiveness. There was no effect in Study 2 when participants were asked to judge targets of the same-sex as themselves. Potentially, same-sex targets are not interesting to heterosexual judges, but this seems unlikely given not all of the opposite-sex images used were likely to be very attractive to our participants. Indeed, previous studies show much agreement between men and women on attractiveness judgments (Langlois et al., 2000), which further suggests that participants did not rate same-sex faces randomly. It appears there is some disruption in informational effects transferring from the partner and perhaps this is reflected in some aspect of motivation in the task when examining same-sex individuals. For example, individuals may not be as interested in examining the partners of same-sex individuals.

Studies 3 and 4 showed greater departure from Study 1, demonstrating that pairing with an attractive model or pleasant non-human stimuli, at least for sex-typical faces, decreased attractiveness of targets. While opposite to the findings of Study 1, these findings were in line with previous studies that have shown such negative contrast effects, whereby presentation alongside an attractive model decreased target image attractiveness (Geiselman et al., 1984; Wedell et al., 1987). Such mechanisms likely function to monitor the level of attractiveness in a population and adjust individual choosiness. This may be explained in terms of computing an average attractiveness for a population. For example, someone rated as average or even high in a student population would likely be rated low in a population of celebrities. The effect of non-human stimuli on judgments of faces was unexpected and repeatability of this effect should be examined in future studies. Overall, Studies 3 and 4 demonstrated a very different effect to that seen in Study 1, emphasizing the functional specificity of the kind of social learning effects found when opposite-sex targets were paired with same-sex models.

In summary, the studies presented here extend work on the social transmission of mate preference in humans. We demonstrated that both men and women used information about the attractiveness of model partners to inform their own judgments of targets attractiveness. This effect appeared relatively specific to preferences associated with mate-choice (opposite-sex but not same-sex targets) and romantic partnerships (same-sex but not opposite-sex models). We also found limited influence of simple pairings of positive/negative stimuli on judgments of target attractiveness. While our experimental approach lacks real world ecological validity, our results demonstrate such effects occur under minimal conditions and such effects are likely to have greater impacts on preferences: seeing real couples allows greater discrepancies in attractiveness than we use here and such pairings will be observed for longer periods of time and with more realistic cues to partnership. Indeed, because analogous effects to our Study 1 can be seen when observers judge attractiveness of real couples interacting (Place et al., 2010), we would expect our results to apply in other real world settings. Overall, the current work then highlights flexibility of human mate preferences while suggesting that social learning of attractiveness represents a somewhat specialized learning mechanism concerning potential mates.

Acknowledgment Anthony Little is supported by a Royal Society University Research Fellowship.

References

Brown, G. R., & Fawcett, T. W. (2005). Sexual selection: Copycat mating in birds. *Current Biology, 15*, R626–R628.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204–232.

Dugatkin, L. A. (2000). *The imitation factor: Evolution beyond the gene*. New York: Free Press.

Dugatkin, L. A., & Godin, J. G. J. (1992). Reversal of female mate choice by copying in the guppy (Poecilia-Reticulata). *Proceedings of the Royal Society of London Series B-Biological Sciences, 249*, 179–184.

Dugatkin, L. A., & Godin, J. G. J. (1993). Female mate copying in the guppy (Poecilia-Reticulata)—age-dependent effects. *Behavioral Ecology, 4*, 289–292.

Eva, K. W., & Wood, T. J. (2006). Are all the taken men good? An indirect examination of mate-choice copying in humans. *Canadian Medical Association Journal, 175*, 1573–1574.

Galef, B. G., & Laland, K. N. (2005). Social learning in animals: Empirical studies and theoretical models. *BioScience, 55*, 489–499.

Galef, B. G., & White, D. J. (1998). Mate-choice copying in Japanese quail, *Coturnix coturnix japonica*. *Animal Behaviour, 55*, 545–552.

Geiselman, R. E., Haight, N. A., & Kimata, L. G. (1984). Context effects on the perceived physical attractiveness of faces. *Journal of Experimental Social Psychology, 20*, 409–424.

Godin, J. G. J., Herdman, E. J. E., & Dugatkin, L. A. (2005). Social influences on female mate choice in the guppy, *Poecilia reticulata*: Generalized and repeatable trait-copying behaviour. *Animal Behaviour, 69*, 999–1005.

Hill, S. E., & Buss, D. M. (2008). The mere presence of opposite-sex others on judgments of sexual and romantic desirability: Opposite effects for men and women. *Personality and Social Psychology Bulletin, 34*, 635–647.

Hoglund, J., Alatalo, R. V., Gibson, R. M., & Lundberg, A. (1995). Mate-choice copying in black grouse. *Animal Behaviour, 49*, 1627–1633.

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 of London Series B-Biological Sciences, 274*, 899–903.

Jones, B. C., DeBruine, L. M., Little, A. C., Watkins, C. D., & Feinberg, D. R. (2011). 'Eavesdropping' and perceived male dominance rank in humans. *Animal Behaviour, 81*, 1203–1208.

Langlois, J. H., Kalakanis, L., Rubenstein, A. J., Larson, A., Hallamm, M., & Smoot, M. (2000). Maxims or myths of beauty? A meta-analytic and theoretical review. *Psychological Bulletin, 126*, 390–423.

Little, A. C., Burriss, R. P., Jones, B. C., DeBruine, L. M., & Caldwell, C. A. (2008). Social influence in human face preference: Men and women are influenced more for long-term than short-term attractiveness decisions. *Evolution and Human Behavior, 29*, 140–146.

Little, A. C., Burt, D. M., Penton-Voak, I. S., & Perrett, D. I. (2001). Self-perceived attractiveness influences human female preferences for sexual dimorphism and symmetry in male faces. *Proceedings of the Royal Society of London Series B-Biological Sciences, 268*, 39–44.

Little, A. C., Jones, B. C., DeBruine, L. M., & Caldwell, C. A. (2011). Social learning and human mate preferences: A potential mechanism for generating and maintaining between-population diversity in attraction. *Philosophical Transactions of the Royal Society B-Biological Sciences, 366*, 366–375.

Little, A. C., & Mannion, H. (2006). Viewing attractive or unattractive same-sex individuals changes self-rated attractiveness and face preferences in women. *Animal Behaviour, 72*, 981–987.

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

Perrett, D. I., Lee, K. J., Penton-Voak, I. S., Rowland, D. R., Yoshikawa, S., Burt, D. M., et al. (1998). Effects of sexual dimorphism on facial attractiveness. *Nature, 394*, 884–887.

Place, S. S., Todd, P. M., Penke, L., & Asendorpf, J. B. (2010). Humans show mate copying after observing real mate choices. *Evolution and Human Behavior, 31*, 320–325.

Richerson, P. J., & Boyd, R. (2005). *Not by genes alone: How culture transformed human evolution*. Chicago: University of Chicago Press.

Rowland, D. A., & Perrett, D. I. (1995). Manipulating facial appearance through shape and color. *IEEE Computer Graphics and Applications, 15*, 70–76.

Schlupp, I., & Ryan, M. J. (1997). Male sailfin mollies (*Poecilia latipinna*) copy the mate choice of other males. *Behavioral Ecology, 8*, 104–107.

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.

Swaddle, J. P., Cathey, M. G., Correll, M., & Hodkinson, B. P. (2005). Socially transmitted mate preferences in a monogamous bird: A non-genetic mechanism of sexual selection. *Proceedings of the Royal Society of London Series B-Biological Sciences, 272*, 1053–1058.

Tiddeman, B. P., Burt, D. M., & Perrett, D. I. (2001). Prototyping and transforming facial texture for perception research. *IEEE Computer Graphics and Applications, 21*, 42–50.

Uller, T., & Johansson, L. C. (2003). Human mate choice and the wedding ring effect: Are married men more attractive? *Human Nature, 14*, 267–276.

Vandenberg, S. G. (1972). Assortative mating or who marries whom? *Behavior Genetics, 2*, 127–157.

Waynforth, D. (2007). Mate choice copying in humans. *Human Nature, 18*, 264–271.

Wedell, D. H., Parducci, A., & Geiselman, R. E. (1987). A formal analysis of ratings of physical attractiveness: Successive contrast and simultaneous assimilation. *Journal of Experimental Social Psychology, 23*, 230–249.

White, D. J. (2004). Influences of social learning on mate-choice decisions. *Learning & Behavior, 32*, 105–113.

White, D. J., & Galef, B. G. (2000). 'Culture' in quail: Social influences on mate choices of female *Coturnix japonica*. *Animal Behaviour, 59*, 975–979.

Witte, K., & Ryan, M. J. (2002). Mate choice copying in the sailfin molly, *Poecilia latipinna*, in the wild. *Animal Behaviour, 63*, 943–949.