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Trait/Financial Information of Potential Male Mate Eliminates Mate-Choice Copying by Women: Trade-Off Between Social Information and Personal Information in Mate Selection

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Abstract

Mate-choice copying occurs when people rely on the mate choices of others (social information) to inform their own mate decisions. The present study investigated women's strategic trade-off between such social learning and using the personal information of a potential mate. We conducted two experiments to investigate how mate-choice copying was affected by the personal information (e.g., trait/financial information, negative/positive valence of this information, and attractiveness) of a potential male mate in short-/long-term mate selection. The results demonstrated that when women had no trait/financial information other than photos of potential mates, they showed mate-choice copying, but when women obtained personality trait or financial situation information (no matter negative or positive) of a potential mate, their mate-choice copying disappeared; this effect was only observed for low-attractiveness and long-term potential partners. These results demonstrated human social learning strategies in mate selection through a trade-off between social information and personal information.

Keywords Mate-choice copying · Attractiveness · Personal information · Social information · Mate selection · Social learning

Introduction

Each day, animals must make adaptive decisions such as what to eat, who to mate or fight with, and which predators to avoid. Making such decisions entails acquiring, processing, and using social information or asocial information (see Kendal et al., 2005, 2018, for reviews). Social information is information that is acquired by an individual through a form of social influence (which includes social learning). Asocial information, which is also known as personal information, is information that is acquired by an individual through their own activities and interactions with the environment (asocial learning). For example, in deciding with whom to mate, people may simply copy others' mate choices (mate-choice copying; e.g., Eva & Wood, 2006; Pruett-Jones, 1992; Waynforth, 2007) (social learning), observe or search for personal information on potential mates (asocial learning), or adopt

a strategic trade-off between relatively cheap but potentially unreliable indirect social information (others' mate choices) and costly and likely accurate personal information (see Kavaliers et al., 2017; Kendal et al., 2005; and Kendal et al., 2018 for reviews). The present study sought to directly evaluate the trade-off between social information and personal information in mate selection in the laboratory with human participants. Before introducing related studies with human participants, we introduce studies on the trade-off between social information and personal information in animal mate selection. To unify concepts, we also use personal information to refer to information about the animals.

Trade-Off Between Social Information and Personal Information in Animal Mate Selection

Evidence for mate-choice copying has been shown in early animal research (e.g., Dugatkin & Godin, 1992; Witte & Ueding, 2003) and has been found mostly in female animals (e.g., Witte & Massmann, 2003; Witte & Ueding, 2003) and less in male animals (e.g., Schlupp & Ryan, 1997; Witte & Ryan, 2002). Ecological and ethological investigations of animal mate-choice copying have focused on questions of when,

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what, and whom to copy (for reviews, see Kavaliers et al., 2017; Kendal et al., 2018; Kendal et al., 2005) and concern about an evolutionary trade-off between less accurate but cheap social information or social learning strategies (see Kendal et al., 2018 for a review) versus acquiring accurate but costly personal information (e.g., Boyd & Richerson, 1985; see Kendal et al., 2005, for a review).

First, they found that copying occurred when asocial learning was costly. For example, Dugatkin (1996) examined two male to female guppy observers who possess a heritable preference for orange body coloration in male mates (Houde, 1988) and showed these female guppies that other female guppy models appeared to choose the male with the least orange coloration. The results demonstrated that when the orange coloration of the two males differed by 24% or less, female observers used the social information that was provided by the models. Thus, when females could potentially make an erroneous decision based on personal assessment, which could plausibly represent a cost in terms of reproductive success, they appeared to disregard personal information in favor of social information. However, when the male coloration differed by 40% or more, personal preference overrode social information, as females chose males with greater orange body coloration.

Second, individuals should use social information when they are uncertain, either because they have no relevant prior information or because their prior personal information is unreliable or outdated (Boyd & Richerson, 1985). Dugatkin and Godin (1993) reported that, following an observation period, smaller female guppies spent more time in proximity to a male that had seemingly been chosen by larger demonstrators, whereas larger females chose mates randomly with respect to the mate choice of smaller demonstrators. This suggests that guppies rely on social information in mate choice decisions when relevant personal information is lacking.

Mery et al. (2009) also considered the trade-off between social/public information and personal information. They observed that Drosophila melanogaster female prospectors increased their time in the attraction zones of poor-condition (in a poor food medium that was comprised of 25% of the standard nutrients) males but not of satisfactory-condition (in a rich food medium that was comprised of 100% of the standard nutrients) males after observing them with a model female. This suggests that females appraised prospective mates by exploiting public/social information and did so mainly when it contrasted with personal information. Social information also contrasted with personal information when the male coloration differed by 40% or more in Dugatkin (1996), while personal preference overrode social information. It is possible that whether personal information valued more than social information depends on whether the personal information is highly important for mating.

Trade-Off Between Social Information and Personal Information in Human Mate Selection

Mate-choice copying of humans (see Gouda-Vossos et al., 2018 for a meta-analysis) has been consistently documented in females (e.g., Anderson & Surbey, 2014; Bowers et al., 2012; Chu, 2012; Eva & Wood, 2006; Hill & Buss, 2008; Jones et al., 2015; Little et al., 2008, 2011a, 2011b; Place et al., 2010). However, regarding human males, the evidence is mixed: some studies report mate-choice copying (e.g., Yorzinski & Platt, 2010), while others do not (e.g., Hill & Buss, 2008).

Most studies on mate-choice copying compared the response of participants toward a target individual who is presented alongside an opposite-sex other (model) with those toward a target who is presented alone to measure the effect of mate-choice copying (Bowers et al., 2012). For example, if men were labeled as being married (Eva & Wood, 2006) or were paired with a female in a photo as a couple (Waynforth, 2007), then women considered the men to be more attractive than those who were labeled as being single.

Researchers have found that mate-choice copying is modulated by several factors (see Gouda-Vossos et al., 2018 for a review). However, few researchers have reviewed the literature on human mate-choice copying with respect to trade-offs. Here, we consider female mate-choice copying as an example to illustrate the trade-off between social information and personal information in human mate-choice copying.

The phenomenon of mate-choice copying in women could be regarded as copying when asocial learning would be costly and when observers were uncertain because they had no relevant prior information about the potential mate. According to parental investment theories (Buss, 1989; Trivers, 1972), females have to risk giving birth and commit to raising their children; hence, they pay substantial attention to whether their mate can invest in offspring. Therefore, women are likely to value a potential mate in terms of individual personality, social status, income, and intelligence (Fletcher et al., 2004; Sprecher et al., 1994; Wang et al., 2015). These qualities are important for offspring survival and female reproductive success (Buss, 1989; Feingold, 1992; Yue et al., 2005) but cannot be adequately assessed through a brief observation of facial and body traits (Waynforth, 2007). Thus, other women's choices could be regarded as a source of information about the value of potential mates (Place et al., 2010). By incorporating information about how often a man has been chosen by other women, a woman may reduce selection errors when sampling potential mates (Agrawal, 2001). Thus, the search for additional personal information that is not immediately observable typifies women's mate choices. Rodeheffer et al. (2016) provided evidence for this theory. They found that women rated men more positively on these
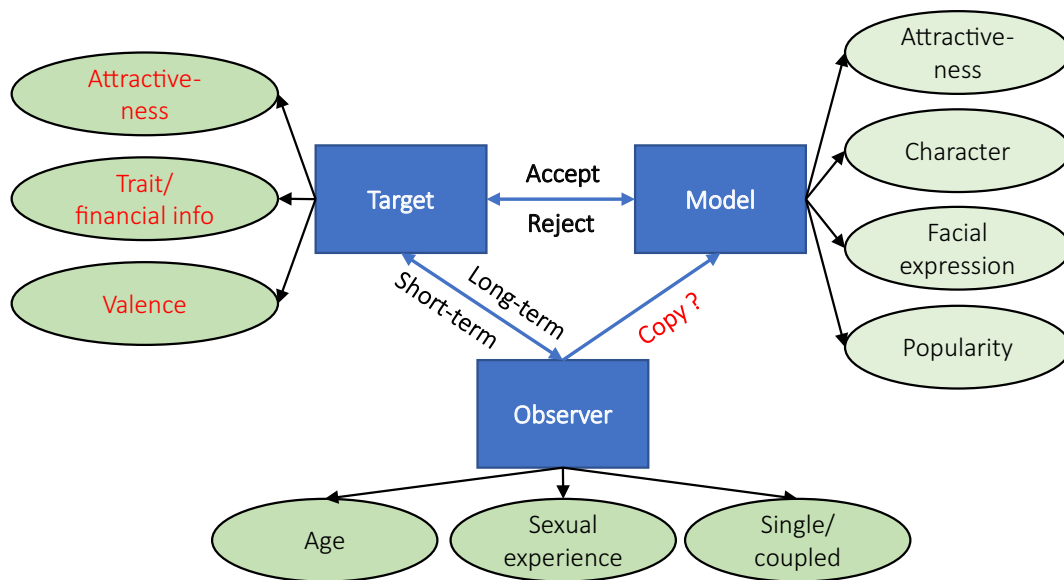
Fig. 1 Triad TOM (target-observer-model) model of mate-choice copying that is structured as a dyad decision scenario

unobservable qualities (e.g., intelligent, trustworthy, humorous, wealthy, romantic, goal-driven, adventurous, generous, and attentive to the needs of others) when the men were pictured with an attractive romantic partner than when those same men were depicted alone. These ratings mediated the desirability enhancement that was projected onto men from having an attractive romantic partner.

However, previous studies (see Gouda-Vossos et al., 2018 for a review) have found observers' information, models' information, the relationship between observers and models, and that between models and targets influence mate-choice copying, thereby suggesting that mate-choice copying is not a simple effect in which any male is judged more attractive when presented with a female (Waynforth, 2007). We suggest that mate-choice copying is a complex effect that is based on the trade-off among the information of the target, observer, model, and their relationships, which could be represented by a triad TOM (target-observer-model) model (see Fig. 1).

First, observers' information affects mate-choice copying. Older women (Little et al., 2015) and women with more sexual experience (Waynforth, 2007) were less influenced by the model that was presented, which is in line with the guppy study of Dugatkin and Godin (1993). These results suggest that experienced participants may have been more confident in their own choice of a mate or may have inferred more personal information on mates based on their experience and, therefore, referred to others' choice (social information) less often.

Second, model information affects mate-choice copying. Being looked at by a female model with a pleasant character (Chu, 2012) or smiling expression (Chu, 2012; Jones

et al., 2007) or being paired with an attractive (Little et al., 2008, 2011a, 2011b; Waynforth, 2007) or popular female model (Little et al., 2015) significantly increased the physical attractiveness of a male target. A male who was paired with an attractive romantic partner was rated with more unobservable positive qualities than when he was depicted alone (Rodeheffer et al., 2016), while a male who was shown with a less attractive model was rated less attractive than when he was shown alone (Waynforth, 2007). Therefore, the positive personal information of models may imply positive qualities of the target and amplify mate-choice copying, while the negative personal information of models (e.g., unattractiveness) may even reverse mate-choice copying.

Third, the relationship between the target and the observer (e.g., long/short-term relationship) affects mate-choice copying. Women who tended to seek long-term commitment were more easily affected by model choice than were those who were seeking short-term sexual relationships (Little et al., 2008; Waynforth, 2007). People are more selective when choosing long-term partners than short-term partners, regardless of gender (Stewart et al., 2000). Moreover, when choosing long-term partners, females require more unobservable information on potential partners, such as the ability to invest in offspring, and think highly of information that reflects family commitment (Bereczkei et al., 1997). However, when considering short-term relationships, women focus more on physical appearance than on other traits (Fletcher et al., 2004; Li & Kenrick, 2006). Therefore, more inferred information from model choice would be necessary for choosing a long-term partner than for choosing a short-term partner.

Fourth, the relationship between the observer and the model affects mate-choice copying. Men are more likely to mate copy models that they perceive as being relatively more attractive than themselves (Place et al., 2010), which is also in line with the guppy study of Dugatkin and Godin (1993). Based on the above first point and the second point, these results suggest that inexperienced observers showed more mate-choice copying and inferred more positive qualities from a better model.

Finally, the relationship between the model and the target (e.g., accept/reject) affects mate-choice copying. The mate-choice copying effect for single women depended on a decrease in attractiveness ratings when they perceived the models' mate rejection. However, mate-choice copying for coupled women relied on an increase in attractiveness ratings when they observed the models' mate acceptance (Deng & Zheng, 2015). Bressan and Stranieri (2008) also found that women with a partner preferred attached men, while single women did not. These results demonstrated a complex balance among the target, the observer, and the model. The reasons why single women are not attracted to attached men might be the low availability of attached men and the risk of mating with a man who might not invest in her children (Bressan & Stranieri, 2008). Thus, the cost of accepting a maladaptive mate for single women is higher than that of rejecting an adaptive mate, which might result in single women being more sensitive to the models' mate rejection decisions (Deng & Zheng, 2015). Furthermore, coupled women showed less mate-choice copying when the targets and models were in a committed romantic relationship than when in a temporary relationship, which may also be due to the low availability of the men who are in a committed romantic relationship.

Present Study

Few studies have examined the effect of targets' personal information on mate-choice copying. Waynforth (2007) manipulated the attractiveness of targets. Although they did not observe any prediction effect of initial male target attractiveness on mate-choice copying, their results indeed demonstrated an increasing tendency of mate-choice copying with lower male target attractiveness.

In the present study, we are interested in the effect of targets' personal information on the mate-choice copying of females. We are interested in trait information (e.g., personality traits) and financial information (e.g., financial situation) of male targets, which is direct and vital information for females' mate evaluation (Fletcher et al., 2004; Sprecher et al., 1994; Wang et al., 2015). We are also interested in the effect of the facial attractiveness of male targets on the mate-choice copying of females. According to the beauty-is-good stereotype (Dion et al., 1972; Lorenzo et al., 2010), attractive individuals are assumed to possess more socially desirable

personality traits and to be morally good (also see Eagly et al., 1991; Langlois et al., 2000 for reviews). Attractiveness is positively related to trustworthiness (Ferrari et al., 2017; Rodeheffer et al., 2016), friendliness, kindness, honesty (Dion et al., 1972), intelligence, humor, wealth, romance, goal-drivenness, adventurousness, generosity, attentiveness to the needs of others (Rodeheffer et al., 2016), and action goodness (Tsukiura & Cabeza, 2011).

The effect of these targets' personal information on mate-choice copying is investigated by examining how these targets' personal information (trait/financial information, the valence of the information, and facial attractiveness) interacts with targets' social information (others' mate choices) to influence their mate selection. Therefore, the preliminary objective of the current study was to investigate the trade-off between personal information (trait/financial information, the valence of the information, and facial attractiveness) and the social information (others' mate choices) of a potential mate in women's mate selection.

In Experiment 1, we manipulated trait/financial information (no, trait, or financial information) and information valence (negative or positive) (see Appendices 1 and 2) to examine whether these types of personal information affect mate-choice copying when the target faces were of low attractiveness. We used low-attractiveness target faces to guarantee mate-choice copying under the no trait/financial information condition since the results of Waynforth (2007) showed an increasing tendency for mate-choice copying with lower male target attractiveness. Since both trait and financial information is direct and important information for females in evaluating a potential mate (Fletcher et al., 2004; Sprecher et al., 1994), we hypothesized that females do not need to seek this information by observing other females' choices once they are provided with this information. Therefore, our first hypothesis is established as follows:

In Experiment 2, we manipulated targets' attractiveness (high or low) and trait/financial information (no, trait, or financial information) and information valence (negative or positive) to investigate the trade-off between personal information (trait/financial information, the valence of the information, and facial attractiveness) and social information (other's mate choices) on women's mate selection. We are interested in what happens when this personal information contrasts with social information, namely when trait/financial information of a potential mate is negative or he is unattractive but he has been chosen by another female, we are interested in whether female participants would value the negative trait/financial information or unattractive facial information or still show mate-choice copying. Mixed results have been obtained for animals when personal information contrasts with social information. Dugatkin (1996) found that personal preference overrode social information for female guppies. However, Drosophila melanogaster female

prospectors appraised prospective mates by exploiting public/social information and did so mainly when it contrasted with personal information (Mery et al., 2009). For humans, although Waynforth (2007) did not observe significantly more mate-choice copying for low-attractiveness targets than for highly attractive targets, such a tendency was identified. The habit quality personal information in Mery et al. (2009) and attractiveness in Waynforth (2007) may not be important or direct for mate selection. Therefore, our second hypothesis is established as follows:

H1: The provision of trait/financial information about a potential mate to a woman eliminates the woman's mate-choice copying.

H2: Whether personal information overrides social information depends on whether the personal information is vital or direct for mate selection

H2.1: For vital personal information such as trait/financial information, personal information overrides social information;

H2.2: For attractiveness information, social information is weighed more heavily for low-attractiveness faces than for highly attractive faces.

In Experiment 2, we also manipulated whether the relationship between the target and the observer was a short-term or long-term relationship. Types of personal information were weighed differently for a long-term relationship versus a short-term relationship. When choosing long-term partners, females require more unobservable information on potential partners, such as the ability to invest in offspring, and think highly of information that reflects family commitment (Bereczkei et al., 1997). However, when considering short-term relationships, women regard physical appearance as more important than other traits ((Fletcher et al., 2004; Li & Kenrick, 2006). Therefore, our third hypothesis is established as follows:

H3.1: Long-term decisions are more sensitive to trait/financial information.

H3.2: Short-term decisions are more sensitive to attractiveness information.

We use a revised two-round rating paradigm in the present study. The two-round rating paradigm has often been used in studies of mate-choice copying effects (e.g., Deng & Zheng, 2015; Place et al., 2010). In this paradigm, the first round is without a model, and the second round is with a model. The mate-choice copying effect size is defined as the round difference. We conjecture that the mere exposure effect (see Montoya et al., 2017 for a review) might be confounded by the mate-choice copying effect. Therefore, we revised this paradigm such that in the second round, only half the target faces were depicted with a model, and the other half were depicted without a model. Thus, the mate-choice copying effect in the revised paradigm could be measured by the round difference in the model condition (the mate-choice copying effect + the mere exposure effect) minus the round difference in the without model condition (the mere exposure effect).

Previous studies have shown that the physical attractiveness of models (Waynforth, 2007) and the emotional expression of models (Jones et al., 2007) can influence mate-choice copying. To rule out the influence of this visual information of models, similar to the silhouette descriptions in Anderson and Surbey (2014), we adopted previous romantic relationship experience ("He had been in 0 romantic relationships" or "He had been in 1 romantic relationship") (Anderson & Surbey, 2014) instead of pairing face images as the social information in the present study. For Chinese university students, it is common to have been in 1 (30.2%) or 2 (41.5%) romantic relationships, and only 3.8% of students have been in 0 romantic relationships (Luo, 2016).

For multiple comparisons in Experiments 1 and 2, we reported Bonferroni corrections.

Experiment 1

Method

Participants

A total of 170 Chinese females in China participated in the experiment and were randomly divided into three groups. All participants provided informed consent before participating and obtained payment after the experiment. One participant with incomplete data and twenty nonheterosexual participants were excluded. The remaining 149 participants (aged from 17 to 24, $SD = 1.39$) were assigned to the following groups: the no trait/financial information group (50), the trait information group (53), and the financial information group (46).

Materials

Twelve male faces were used as targets in this experiment, which were selected from Wang et al. (2015). Each face was converted into a grayscale image with a resolution of 223×268 pixels. The average facial attractiveness of these faces was 3.5 (on a 9-point scale, $1 = very\ unattractive$ and $9 = very\ attractive$), $SD = 0.26$.

Twelve items of trait information (six items of positive information and six items of negative information) (see Appendix 1) were adopted. Each information item consisted of two words. These 24 words were originally selected from among the personality trait words in Yang et al. (1999) and Wang and Cui (2005) and were used in Zhang et al. (2011).

Twelve items of financial information (see Appendix 2) were also considered, which included monthly income and

financial management information, with six items of positive information and six items of negative information. Here, the positive financial information describes an above average salary and various investment strategies, and the negative financial information describes a below average salary and finance management that is limited to savings contributions.

We adopted previous romantic relationship experience ("He had been in 0 romantic relationships" or "He had been in 1 romantic relationship") as the social information in the present study.

Design

We used a 3 (trait/financial information: no, trait, and financial) × 2 (valence: negative and positive) mixed design, in which the trait/financial information was manipulated as a between-subject variable and the valence was manipulated as a within-subject variable. The effect of mate-choice copying was regarded as a dependent variable.

Procedure

The experiment was programmed using the PsychoPy v1.82.01 software (Peirce, 2007) and was run on a Macbook with a 12-inch 2304 × 1440 pixel screen.

The participants were randomly assigned into three groups according to trait/financial information. Each participant completed two rounds of ratings of the same 12 target faces (see Fig. 2). In the first-round rating procedure, 12 target faces were presented randomly one by one at the center of the screen. Each face was displayed until a response was provided. For the no trait/financial information group, only a face was displayed. For the trait/financial information groups, trait/financial information was presented below the target face. The participants were asked to rate the attractiveness of each presented face on a 9-point Likert scale and to respond using the numbers on a keyboard, where 1 represented "*very unattractive*" and 9 represented "*very attractive*."

After the first-round rating procedure, the participants were asked to complete a questionnaire that included five types of information (gender, sexual orientation, romantic relationship status, major, and mate-choice preference) and a conformity scale (Mehrabian & Stefl, 1995) to prevent them from remembering their ratings in the first round. Then, they were allowed to take a short break.

In the second-round rating procedure, the trial procedure was the same as that in the first-round rating procedure except that social information ("He had been in 0 romantic relationships" or "He had been in 1 romantic relationship") was added between the target face and the trait/financial information. Half of the target faces were matched with the "He had been in 0 romantic relationships" description (0 relationship

condition), and the other half of the target faces were matched with the "He had been in 1 romantic relationship" description (1 relationship condition).

Twelve face images were divided into four subgroups with similar attractiveness. Each subgroup was randomly matched with one of the combinations of personal and social information: positive and 0 relationships, positive and 1 relationship, negative and 0 relationships, and negative and 1 relationship. The matching of four subgroups and four conditions was counterbalanced across participants. Within each condition, the faces and trait/financial information were randomly selected.

Results and Discussion

Because there was no negative/positive information in the no trait/financial information group, the mean mate-choice copying of each participant in the no trait/financial information group was assigned to both the negative and positive conditions for these participants. To explore whether this arbitrary assignment influences the statistical results, we also conducted multilevel analyses for Experiment 1 and Experiment 2 by designating each image as having been accompanied by 0 (no trait/financial information), −1 (negative information), or 1 (positive information) in a specified trial, with trials clustered within participants, and we obtained consistent results with ANOVA (see the supplemental material for details).

To clearly identify the effect of personal information on mate-choice copying, we subjected the mate-choice copying effect size to statistical analysis. In the present experiment, the mate-choice copying effect was measured by the round difference in the 1 relationship condition (the mate-choice copying effect + the mere exposure effect) minus the round difference in the 0 relationship condition (the mere exposure effect).

To clearly determine how the participants traded off personal information and social information, we also regarded social information as an independent variable and subjected the round difference to statistical analysis.

Mate-Choice Copying

The mean mate-choice copying effect size (see Fig. 3) for each participant in each condition was subjected to a 3 (trait/financial Information: no, trait, and financial) × 2 (valence: negative and positive) ANOVA of mixed design.

The results demonstrated a significant main effect of trait/financial information, with $F(2,146) = 3.34$, $p = 0.04$, and $\eta_p^2 = 0.04$. Multiple comparisons of Bonferroni showed a weaker mate-choice copying effect in the financial information group ($M = -0.19$, 95% $CI[-0.50, 0.13]$) than in the no trait/financial information group ($M = 0.38$, 95%
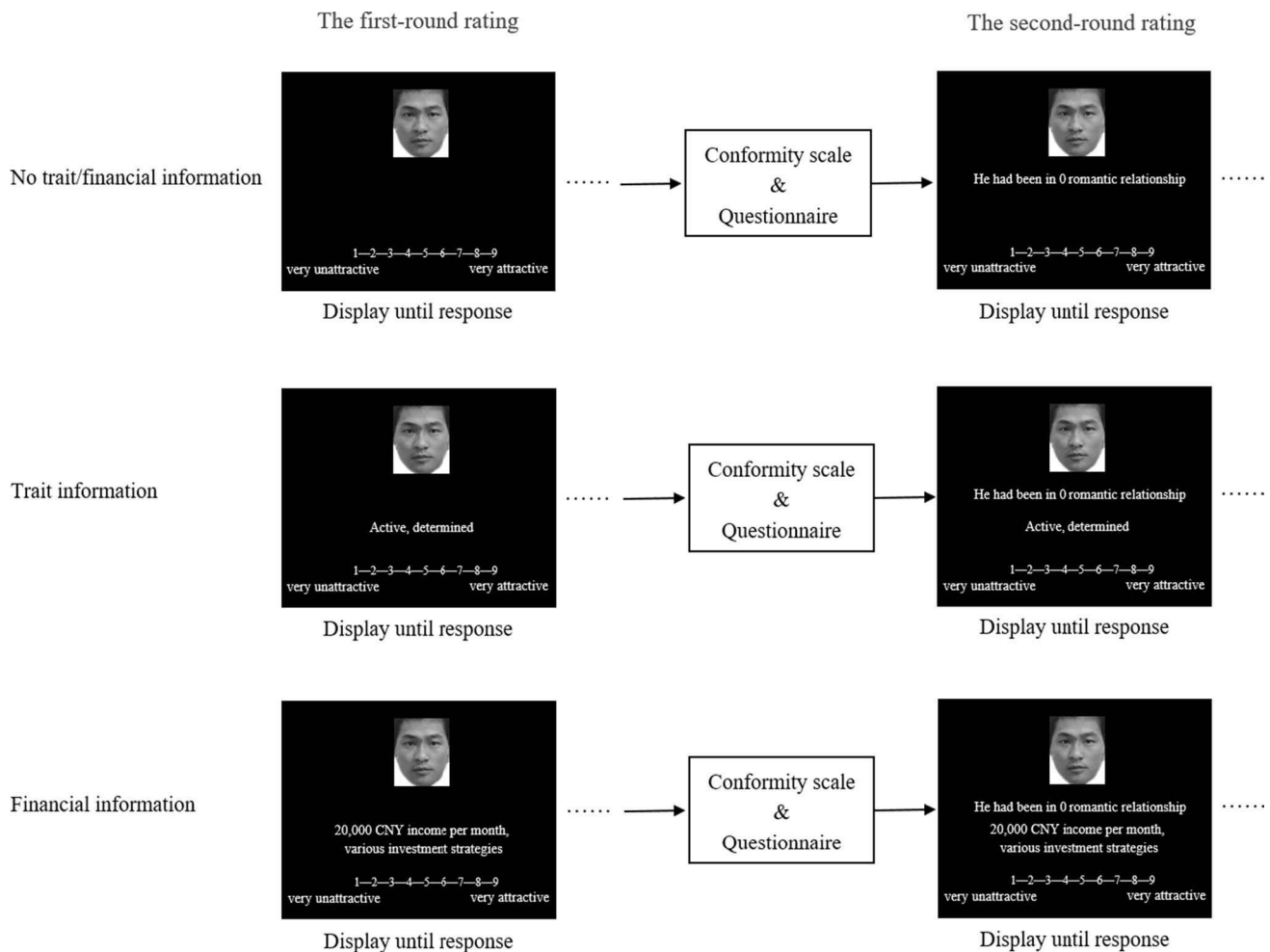
The first-round rating   The second-round rating

Fig. 2 Illustration of six trials in the first round and in the second round for the no trait/financial information group, trait information group, and financial information group in Experiment 1. Trait/finan-cial information was shown both in the first round and in the second round. Social information (0/1 relationship) was shown only in the second round

CI[0.08,0.68]), with $p = 0.03$. No significant differences were observed between the trait information group ($M = 0.12$, 95% CI[−0.18,0.41]) and the other two groups ($ps > 0.50$). The main effect of the valence and its interaction with the trait/financial information did not reach significance, namely $Fs < 0.13$ and $ps > 0.72$.

The *95% CI* of the mate-choice copying effect size in the no trait/financial information group did not include 0. This result indicated a significant mate-choice copying effect, which is consistent with most studies with Western participants (e.g., Anderson & Surbey, 2014; Eva & Wood, 2006) and Chinese participants (e.g., Liang et al., 2015), thereby supporting the validity of our manipulation of social information (He had been in 0/1 romantic relationships).

To determine whether mate choice copying would occur if trait/financial information was included with a photo of a potential partner, we used both equivalence testing (e.g., the TOST procedure; Lakens et al., 2018) and null hypothesis

testing to address the Type 2 and Type 1 errors, respectively. We selected −0.45/0.45 as the lower/upper equivalence bound and 0.05 as the alpha level.

For trait information, the equivalence test showed significance, with $t(52) = -2.44$ and $p = 0.009$, under equivalence bounds of −0.459 and 0.459 (on a raw scale) and an alpha of 0.05. The null hypothesis test showed nonsignificance, with $t(52) = 0.82$ and $p = 0.411$, under an alpha of 0.05. Based on both the equivalence test and the null hypothesis test, we conclude that the observed effect is not statistically different from zero and is statistically equivalent to zero.

For financial information, the equivalence test showed significance, with $t(45) = 1.85$ and $p = 0.035$, under equivalence bounds of −0.473 and 0.473 (on a raw scale) and an alpha of 0.05. The null hypothesis test showed nonsignificance, with $t(45) = -1.19$ and $p = 0.238$, under an alpha of 0.05. Based on both the equivalence test and the null-hypothesis test, we
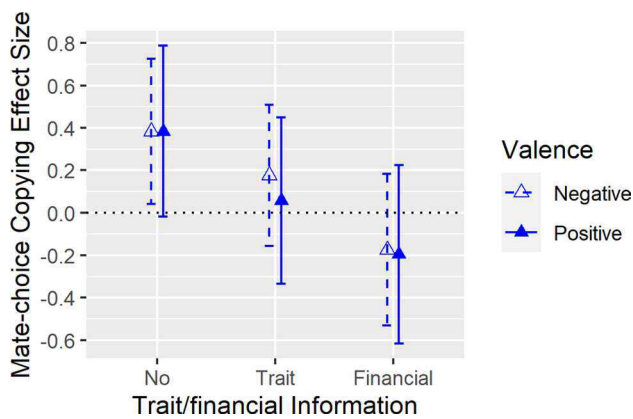
Fig. 3 Mate-choice copying effect size (round difference under the 1 relationship condition—round difference under the 0 relationship condition) as a function of the trait/financial information (no/trait/financial) and valence (negative/positive) in Experiment 1. The error bars represent the 95%CI. A mate-choice copying effect was observed in the no trait/financial information group but not in the trait/financial information groups

conclude that the observed effect is statistically not different from zero and is equivalent to zero.

These results demonstrated that women's mate-choice copying disappeared when personal trait/financial information of potential mates was provided, which is consistent with H1. Interestingly, this occurred regardless of whether the trait/financial information was negative or positive. Thus, trait/financial personal information, regardless of whether it is negative or positive, overrides social information, thereby supporting H2.1.

Round Difference

To investigate the trade-off between personal information and social information, the rating change from round 1 to round 2 was regarded as a dependent variable (round difference). The mean round difference (see Fig. 4 for the original ratings and round difference) for each participant in each condition was subjected to a 2 (trait/financial information: no, trait, and financial) $\times$ 2 (valence: negative and positive) $\times$ 2 (social information: 0 relationships and 1 relationship) ANOVA of mixed design.

The results demonstrated a significant main effect of valence, with $F(1, 146) = 6.30$, $p = 0.01$, and $\eta_p^2 = 0.04$, with a smaller round difference ($M = -0.02$) under the negative condition than under the positive condition ($M = 0.23$). The trait/financial information $\times$ social information interaction reached significance, with $F(2, 146) = 3.34$, $p = 0.04$, and $\eta_p^2 = 0.04$. No other main effects or interactions reached significance ($ps > 0.11$).

The simple effect test of the trait/financial information $\times$ social information interaction showed that the enhancement effect of the 1 relationship condition (the mate-choice copying effect + the mere exposure effect), in comparison with the 0 relationship condition (the mere exposure effect), only appeared in the no trait/financial information group ($p = 0.01$) and not in the other two groups ($ps > 0.24$). This result demonstrated a trade-off between trait/financial information (no/trait/financial) and social information (0/1 relationship), namely if there is no trait/financial information about a potential mate, people tend to copy other people's mate choices, whereas if trait/financial information is available about the potential mate, regardless of whether it is negative or positive, people will not copy other people's choices. This result accords with the result regarding the mate-choice copying effect size.

Experiment 2

Because the trait/financial information that is presented in the first round takes precedence over social information that is added in the second round, the sequence of presenting personal and social information might confound with the disappearance of the mate-choice copying effect in trait/financial groups in Experiment 1. To address this issue, no trait/financial information was provided in the first-round rating in Experiment 2 (see Fig. 5). Instead, the trait/financial personal information was presented only in the second-round rating simultaneously with social information. This manipulation could rule out the primacy effect of trait/financial information being caused by presenting it in the first round.

The second objective of Experiment 2 was to examine whether the effect of trait/financial information was exclusive to low-attractiveness faces and what would occur if trait/financial information (especially negative information) was provided for highly attractive faces. Hence, highly attractive faces were considered, and facial attractiveness was manipulated as an independent variable in Experiment 2.

Because we only asked participants to rate the attractiveness of the target in Experiment 1, not mentioning taking the target as a potential mate, this may not be regarded as an valid mate-choice task. Therefore, participants were asked to judge the attractiveness of a face as a potential long-term mate and as a potential short-term mate in Experiment 2.

Method

Participants

Another 168 Chinese female students participated in the experiment and were randomly divided into three groups. All

Fig. 4 Round differences (Round2-Round1, gray bars) as a function of trait/financial information (no/trait/financial), valence (negative/positive), and social information (0/1 relationship) in Experiment 1. The error bars represent the 95%CI. The enhancement effect of the 1 relationship condition, compared with the 0 relationship condition, was only observed in the no trait/financial information group and not in the other two groups. To be more informative, we presented the two rounds of original attractiveness ratings (blue points) here
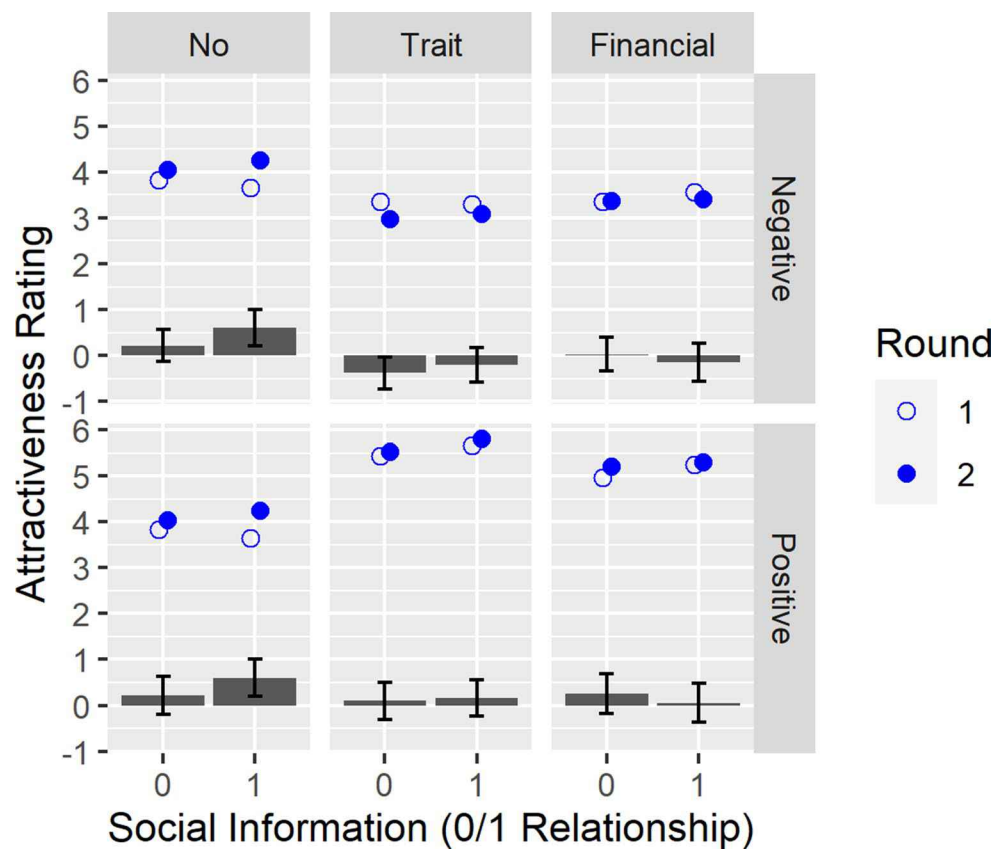
had normal or corrected-to-normal vision. One participant who was left-handed and nine nonheterosexual participants were excluded from the data analyses. The remaining 158 participants (aged from 17 to 26, $M = 20.03$, and $SD = 1.99$) were assigned to three groups: the no trait/financial information group (52), the trait information group (53), and the financial information group (53).

Materials

The low-attractiveness faces that were used in Experiment 2 were the same as those in Experiment 1. Additionally, 12 highly attractive faces from Wang et al. (2015) were used in the current study. Their facial attractiveness ($M = 5.5$ on a 9-point Likert scale, 1 = very unattractive and 9 = very attractive, $SD = 0.46$) was significantly higher than that ($M = 3.5$ and $SD = 0.26$) of low-attractiveness faces, with $t(22) = 13.11$, $p < 0.001$, and Cohen's $d = 5.35$.

The trait, financial, and social information were the same as in Experiment 1, as were the conformity scale and the questionnaire.

The experiment was programmed using the E-Prime 2.0 software (http://pstnet.com) and was run on Legend computers with a 23-inch 1920×1080 pixel screen.

Design

We adopted a 3 (trait/financial information: no, trait, and financial)×2 (valence: negative and positive)×2 (attractiveness: high and low) mixed design in which trait/financial information was manipulated as a between-subject variable and the remaining two variables were manipulated as within-subject variables. The effects of mate-choice copying on both short-term and long-term mate choices were regarded as dependent variables.

Procedure

The procedure in Experiment 2 (see Fig. 5) was the same as that in Experiment 1 except for the following points.

At the beginning of the experiment, the participants were instructed that they would see photos and were asked to rate their attractiveness on a 9-point Likert scale while supposing that the persons in the photos were their long-term partners or short-term partners. A long-term partner was defined as "someone you are willing to live with, someone you want to leave your current partner to be with, someone you would like to marry" (Little et al., 2008). A short-term partner was defined as follows: "Your relationship only lasts for a short
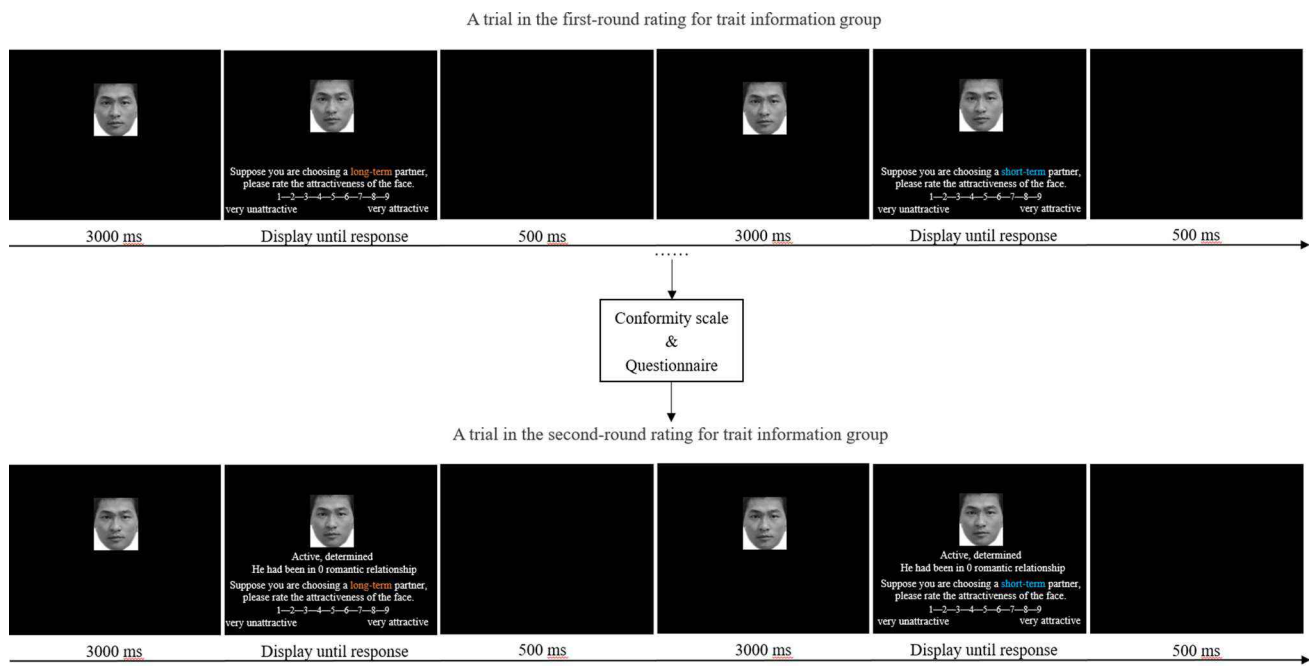
A trial in the first-round rating for trait information group

| 3000 ms | Display until response | 500 ms | 3000 ms | Display until response | 500 ms |

Conformity scale
&
Questionnaire

A trial in the second-round rating for trait information group

| 3000 ms | Display until response | 500 ms | 3000 ms | Display until response | 500 ms |

Fig. 5 Illustration of two trials in the first round and in the second round for the trait information group in Experiment 2. Personal (trait/financial) information and social information (0/1 relationship) are shown only in the second round

time. For example, someone you may date once, someone you may have an affair with or someone you may have a one-night stand with" (Little et al., 2008). Participants completed both long-term and short-term ratings for one target face in a trial. The order of the two ratings was counterbalanced across participants.

In the first-round rating, each trial began with a face image being displayed at the center of the screen for 3000 ms, which was followed by the display of an instruction ("Suppose you are choosing a long-term partner, please rate the attractiveness of the face") and a 9-point Likert attractiveness scale (1 = very unattractive to 9 = very attractive) with and below the face image until the participant responded. Then, a black screen was displayed for 500 ms. After that, the face image appeared again for 3000 ms, which was followed by the display of an instruction ("Suppose you are choosing a short-term partner, please rate the attractiveness of the face") and a 9-point scale with and below the face image until the participant responded. Then, a black screen was displayed for 500 ms. In the second-round rating, the trial procedure was identical to that in the first-round rating except that for the trait/financial group, trait/financial information and social information were presented between the face image and the attractiveness scale; however, for the no trait/financial information group, only social information was presented.

Twenty-four face images were divided into eight subgroups: four high-attractiveness subgroups and four low-attractiveness subgroups. Each subgroup was randomly matched with trait/financial and social information in four combinations: positive and 0 relationships, positive and 1 relationship, negative and 0 relationships, and negative and 1 relationship. Other counterbalances were the same as those in Experiment 1.

Results and Discussion

As in Experiment 1, to clearly identify the effect of personal information on mate-choice copying, we subjected the mate-choice copying effect size to statistical analysis. In the present experiment, the mate-choice copying effect was measured by the round difference in the 1 relationship condition (the mate-choice copying effect + the effect of trait/personal information + the mere exposure effect) minus the round difference in the 0 relationship condition (the effect of trait/personal information + the mere exposure effect).

To clearly determine how the participants traded off personal information and social information, we also regarded social information (0/1 relationship) as an independent variable and subjected the round difference to statistical analysis. In this experiment, the round difference included the effect of trait/personal information because this information only appeared in the second-round rating in this experiment, which differs from that in Experiment 1.

Mate-Choice Copying

Mate-choice copying was measured via the same approach as in Experiment 1. The means of the mate-choice copying effect for long-term and short-term mate evaluation (see Fig. 6) were subjected to a 3 (trait/financial information: no, trait, and financial) × 2 (valence: negative and positive) × 2 (attractiveness: high and low) multivariate analysis of variance (MANOVA) of mixed design.

The results demonstrated a significant multivariate interaction effect between trait/financial information and attractiveness, with Roy's largest root = 0.04, $F(2, 155) = 3.18$, $p = 0.04$, and $\eta_p^2 = 0.04$.

Univariate analyses for long-term ratings showed a significant interaction between trait/financial information and attractiveness, with $F(2, 155) = 3.18$, $p = 0.04$, and $\eta_p^2 = 0.04$, whereas this interaction did not reach significance for short-term ratings, with $F(2, 155) = 1.47$, $p = 0.23$, and $\eta_p^2 = 0.02$. No other main or interactive effects were identified for long-term ratings ($ps > 0.18$) or short-term ratings ($ps > 0.23$).

The simple effect test for the interaction of trait/financial information and attractiveness for long-term ratings showed that for low-attractiveness faces, the mate-choice copying effect ($M = 0.27$, $95\%CI[0,0.55]$) in the no trait/financial information group was stronger than that ($M = -0.15$, $95\%CI[-0.42,0.13]$) in the trait information group ($p = 0.04$) and marginally stronger than that ($M = -0.08$, $95\%CI[-0.36,0.19]$) in the financial group ($p = 0.07$). No difference was observed between the trait group and the financial group ($p = 0.76$). This result was consistent with the mate-choice copying result in Experiment 1 and with our hypothesis. Nevertheless, no simple main effect of trait/

financial information was identified for faces with high attractiveness, with $F(2, 155) = 0.83$, $p = 0.44$, and $\eta_p^2 = 0.01$. No mate-choice copying was observed for the no trait/financial information group ($M = 0$ and 95% $CI[-0.36,0.37]$).

As in Experiment 1, the 95% CI of the mate-choice copying effect size in the no trait/financial information group for faces with low attractiveness was above 0. This result demonstrated a significant mate-choice copying effect, which replicated the result of Experiment 1. Interestingly, for faces with high attractiveness, no mate-choice copying effect was identified in the no trait/financial information group. This result was consistent with that of Waynforth (2007), who identified an increasing tendency of the mate-choice copying effect with lower male target attractiveness, provided direct evidence that target attractiveness affects mate-choice copying, and demonstrated a trade-off between target personal attractiveness information and social information in target attractiveness rating, thereby supporting H2.2.

To determine whether mate choice copying for faces with low attractiveness will occur if trait/financial information is included with a photo of a potential partner, we adopted both equivalence testing and null hypothesis testing to address Type 2 and Type 1 errors, respectively. We selected $-0.45/0.45$ as the lower/upper equivalence bounds and 0.05 as the alpha level.

For trait information, the equivalence test was significant, with $t(52) = -2.32$ and $p = 0.012$, under equivalence bounds of -0.502 and 0.502 (on a raw scale) and an alpha of 0.05. The null hypothesis test showed nonsignificance, with $t(52) = -0.94$ and $p = 0.348$, for an alpha of 0.05. Based on both the equivalence test and the null hypothesis test, we conclude that

Fig. 6 Mate-choice copying effect size as a function of trait/financial information (no/trait/financial), valence (negative/positive), and attractiveness (high/low) for long-term decisions and short-term decisions in Experiment 2. The error bars represent the 95%CI. There was a significant interaction between trait/financial information and attractiveness for long-term ratings. For low-attractiveness faces, there was a mate-choice copying effect in the no trait/financial information group, which was stronger than that in the trait/financial information group. For highly attractive faces, there is no main effect of trait/financial information
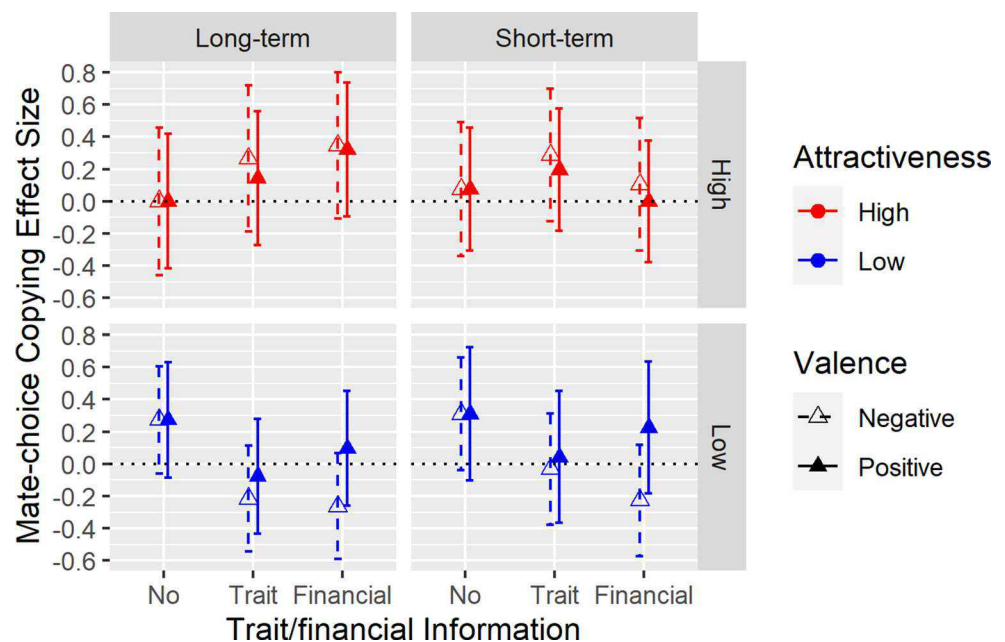
the observed effect is statistically not different from zero and is statistically equivalent to zero.

For financial information, the equivalence test was significant, with $t(52) = 2.58$ and $p = 0.006$, under equivalence bounds of -0.398 and 0.398 (on a raw scale) and an alpha of 0.05. The null hypothesis test showed nonsignificance, with $t(52) = -0.69$ and $p = 0.493$, under an alpha of 0.05. Based on both the equivalence test and the null hypothesis test, we conclude that the observed effect is statistically not different from zero and is equivalent to zero.

These results for low-attractiveness faces indicated that women's mate-choice copying disappeared when personal trait/financial information of potential mates was provided, regardless of whether the information was negative or positive, which is consistent with the result of Experiment 1, thereby supporting H1 and H2.1. This effect of trait/financial information only occurred for long-term decisions and not for short-term decisions, thereby supporting H3.1. However, for faces with high attractiveness, no such effect of trait/financial information is identified, and no mate-choice copying was observed for the no trait/financial information group, thereby supporting H2.2. The trade-offs will be investigated in detail based on the round difference results.

Round Difference

Similar to the analysis in Experiment 1, the mean round differences for long-term and short-term scenarios (see Fig. 7 for the original ratings) were subjected to a 3 (trait/financial information: no, trait, and financial) × 2 (valence: negative and positive) × 2 (social information: 0 relationships and 1 relationship) × 2 (attractiveness: high and low) multivariate analysis of variance (MANOVA) of mixed design. See Table 1 for the statistical results.

Trade-Off Among Trait/Financial Information, Attractiveness, and Social Information

As presented in Table 1, the three-way interaction of trait/financial information × attractiveness × social information reached significance for long-term decisions but not for short-term decisions (see Fig. 8).

We separated attractiveness and conducted a 2 (trait/financial information) × 2 (social information) repeated measure ANOVA for long-term decisions (see Fig. 8 and Table 2). For low-attractiveness faces, the interaction reached marginal significance ($p = 0.07$). The simple effect test showed a significantly higher round difference for 1 relationship ($M = 0.40$) (the mate-choice copying effect + the effect of trait/financial information + the mere exposure effect) than for 0 relationships ($M = 0.12$) (the effect of trait/personal information + the mere exposure effect) for the no trait/financial information group ($p = 0.05$) but not for the other two groups ($ps > 0.29$).

This result was consistent with the round difference result in Experiment 1 and the mate-choice copying results in Experiments 1 and 2, thereby supporting that the effect of trait/financial information on mate-choice copying occurs only for low-attractiveness faces.

However, for highly attractive faces, no significant interaction between trait/financial information and social information ($p = 0.44$) was observed, which is consistent with the mate-choice copying results in Experiment 2.

The three-way interaction of trait/financial information × attractiveness × social information indicated a trade-off among direct personal (trait/financial) information, attractiveness, and social information (0/1 relationship) in long-term decision scenarios but not in short-term decision scenarios. The trade-off between trait/financial information (no/trait/financial information) and social information (0/1 relationship)—the modulation effect of trait/financial information on mate-choice copying, regardless of whether the information is negative or positive—only occurred for low-attractiveness faces and not for highly attractive faces, which replicated the results of Experiment 1 and was consistent with H1, H2.1, and H2.2. However, this effect was observed only in long-term decision scenarios and not in short-term scenarios, in combination with larger main effects of trait/financial information and attractiveness in the long term than in the short term (see Table 1), thereby supporting H3.1, namely long-term decisions are more sensitive to trait/financial information, but not supporting H3.2, according to which short-term decisions are more sensitive to attractiveness information.

Trade-Off Among Trait/Financial Information, Valence, and Attractiveness

As presented in Table 1, the main effects of trait/financial information, valence, and attractiveness and all their two-way and three-way interactions reached significance or marginal significance in long-term decisions and in short-term decisions. Therefore, here, we report further analysis of only the three-way interaction of trait/financial information × valence × attractiveness (see Fig. 9 and Table 3).

We separated attractiveness and conducted a 2(trait/financial information) × 2(valence) repeated measure MANOVA (see Fig. 9 and Table 3). For highly attractive faces, a significant interaction of trait/financial information and valence was observed both for long-term decisions and for short-term decisions ($ps < 0.001$). For low-attractiveness faces, the interaction of trait/financial information and valence was also observed both for long-term decisions and short-term decisions ($ps < 0.001$), in contrast to the lack of interaction between trait/financial information and valence in Experiment 1. This result demonstrated that presenting (positive/negative) trait/financial information in the first round in
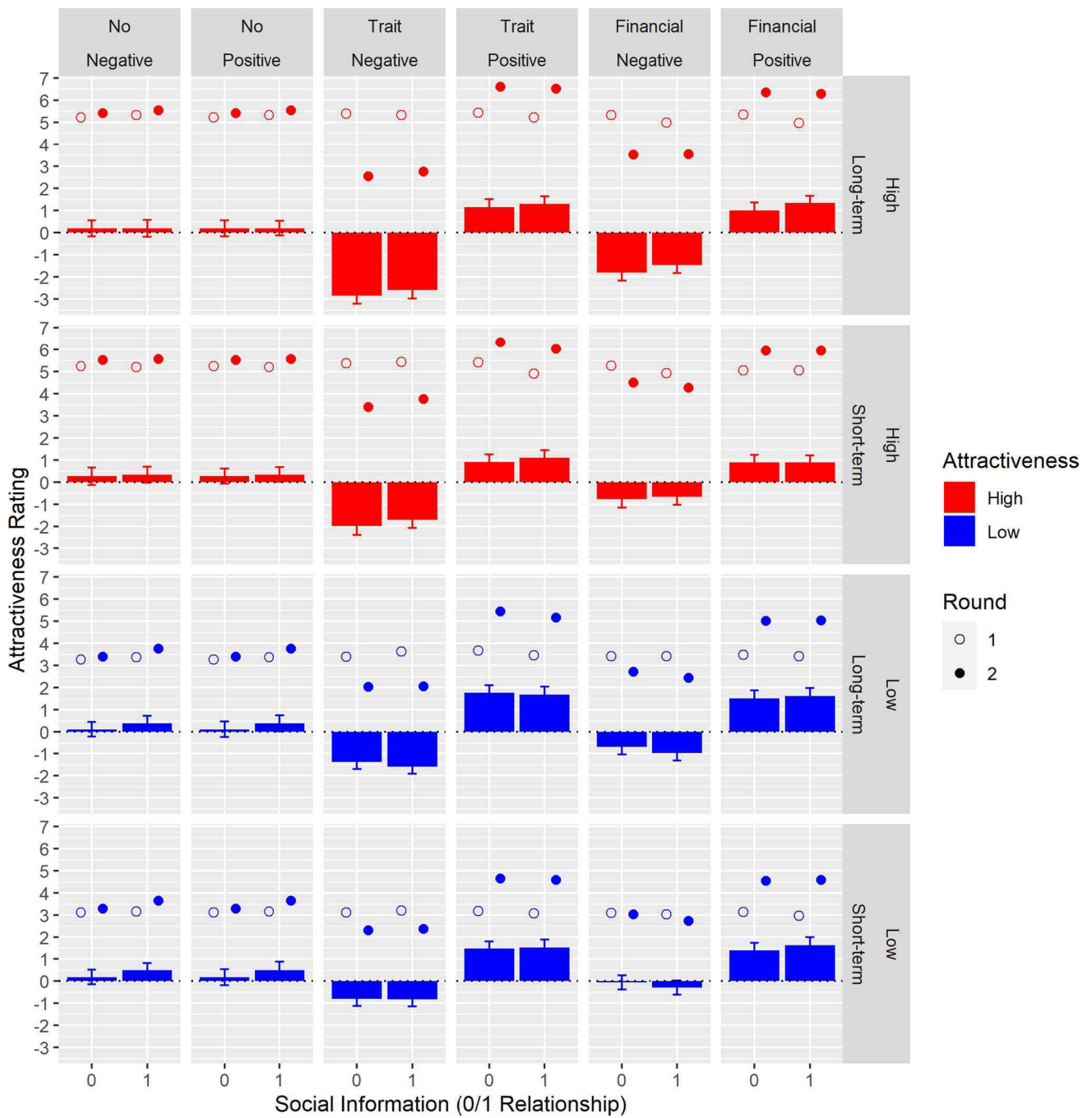
Fig. 7 Round differences (Round2-Round1, bars) as functions of trait/financial information (no/trait/financial), valence (negative/positive), and social information (0/1 relationship) for low-attractiveness faces for long-term decisions (A), for low-attractiveness faces for short-term decisions (B), for highly attractive faces for long-term decisions (C), and highly attractive faces for short-term decisions (D) in Exper-

iment 2. The error bars represent the 95%CI. To be more informative, we present two rounds of original attractiveness ratings (points) here. The round difference for 1 relationship = the mate-choice copying effect + the effect of trait/financial information + the mere exposure effect. The round difference for 0 relationship = the effect of trait/personal information + the mere exposure effect

Experiment 1 concealed the different effects of positive and negative trait/financial information.

The simple effect test showed that compared with no trait/financial information, negative trait/financial information significantly decreased the attractiveness rating, and this

effect of trait information was larger than that of financial information for long-term decisions and for short-term decisions ($ps < 0.001$ for highly attractive faces and $ps < 0.01$ for low-attractiveness faces). From Fig. 9, this decrease is larger for long-term decisions than for short-term decisions and

Table 1 3 (Trait/financial information) × 2 (valence) × 2 (attractiveness) × 2 (social information) ANOVA statistical results for the round difference in Experiment 2

	df	Long-term			Short-term		
		F	p	η_p^2	F	p	η_p^2
Trait/financial information (TFI)	2, 155	7.53	**.001**	.09	4.45	**.01**	.06
Valence (V)	1, 155	484.59	**.001**	.76	249.26	**.001**	.62
Attractiveness (A)	1, 155	57.75	**.001**	.27	42.84	**.001**	.22
Social Information (SI)	1, 155	1.87	.17	.01	2.67	.11	.02
TFI × V	2, 155	129.46	**.001**	.62	71.32	**.001**	.48
TFI × A	2, 155	12.46	**.001**	.14	10.05	**.001**	.12
TFI × SI	2, 155	0.23	.80	.00	.48	.62	.01
V × A	1, 155	17.15	**.001**	.10	3.02	***.08***	.02
V × SI	1, 155	0.36	.55	.00	0.30	.58	.00
A × SI	1, 155	1.81	.18	.01	0.03	.87	.00
TFI × V × A	2, 155	5.53	**.01**	.07	4.80	**.01**	.06
TFI × V × SI	2, 155	0.31	.73	.00	0.35	.70	.01
TFI × A × SI	2, 155	3.18	**.05**	.04	1.47	.23	.02
V × A × SI	1, 155	1.45	.23	.01	1.62	.21	.01
TFI × V × A × SI	2, 155	0.40	.67	.01	0.77	.47	.01

Note: Significant results at the .05 level are presented in bold. Marginally significant results at the .10 level are presented in bold and italics
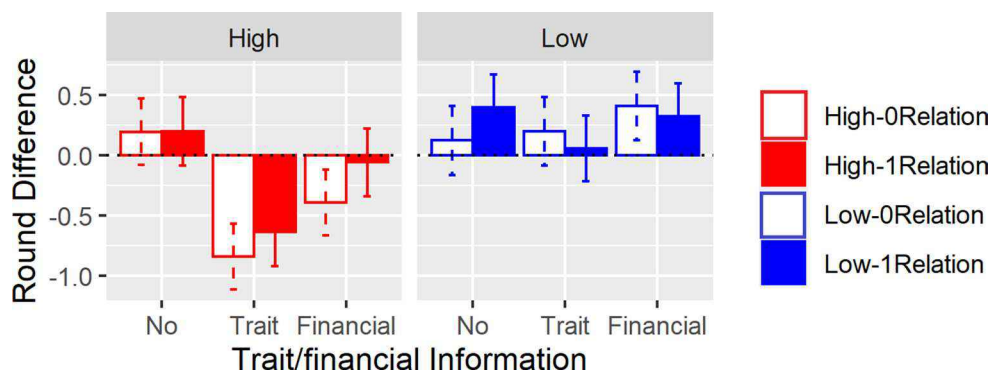

Fig. 8 Round difference as a function of trait/financial information (no/trait/financial), attractiveness (high/low), and social information (0/1 relationship) for long-term decisions in Experiment 2. The error bars represent the 95%CI. For highly attractive faces, no significant interaction between trait/financial information and social information was observed. For low-attractiveness faces, the interaction reached marginal significance. The simple effect test showed a significantly higher round difference for 1 relationship (the mate-choice copying effect + the effect of trait/financial information + the mere exposure effect) than 0 relationships (the effect of trait/personal information + the mere exposure effect) for the no trait/financial information group but not for the other two groups

larger for highly attractive faces than for low-attractiveness faces. Compared with no trait/financial information, both positive trait information and financial information increased attractive ratings ($ps < 0.01$ for highly attractive faces and $ps < 0.001$ for less attractive faces), and no difference was observed between trait information and financial information ($ps > 0.50$ for highly attractive faces and $ps > 0.46$ for less attractive faces). However, according to Fig. 9, this increase

is larger for low-attractiveness faces than for highly attractive faces and larger for long-term decisions than for short-term decisions.

The three-way interaction of trait/financial information × valence × attractiveness in the long term and in the short term indicated trade-offs among several types of personal information (no/trait/financial information, valence of the information, and attractiveness) in both long-term

Table 2 Further analysis of the 3 (trait/financial information)×2 (attractiveness)×2 (social information) round difference in the long-term decision scenario in Experiment 2

	df	Long-term			Short-term		
		F	p	η_p^2	F	p	η_p^2
Separate Trait/Financial Information (Attractiveness×Social Information)							
No	1, 51	1.49	.23	.03	–	–	–
Trait	1, 52	2.73	*.10*	.05	–	–	–
Financial	1, 52	4.23	**.05**	.08	–	–	–
Separate Attractiveness (Trait/Financial Information×Social Information)							
Low attractiveness	2, 155	2.65	*.07*	.03	–	–	–
High attractiveness	2, 155	0.83	.44	.01	–	–	–
Separate Social Information (Trait/Financial Information×Attractiveness)							
0 relationships	2, 155	14.84	**.001**	.16	–	–	–
1 relationship	2, 155	2.39	*.10*	.03	–	–	–

Note: Significant results at the .05 level are presented in bold. Marginally significant results at the .10 level are presented in bold and italics
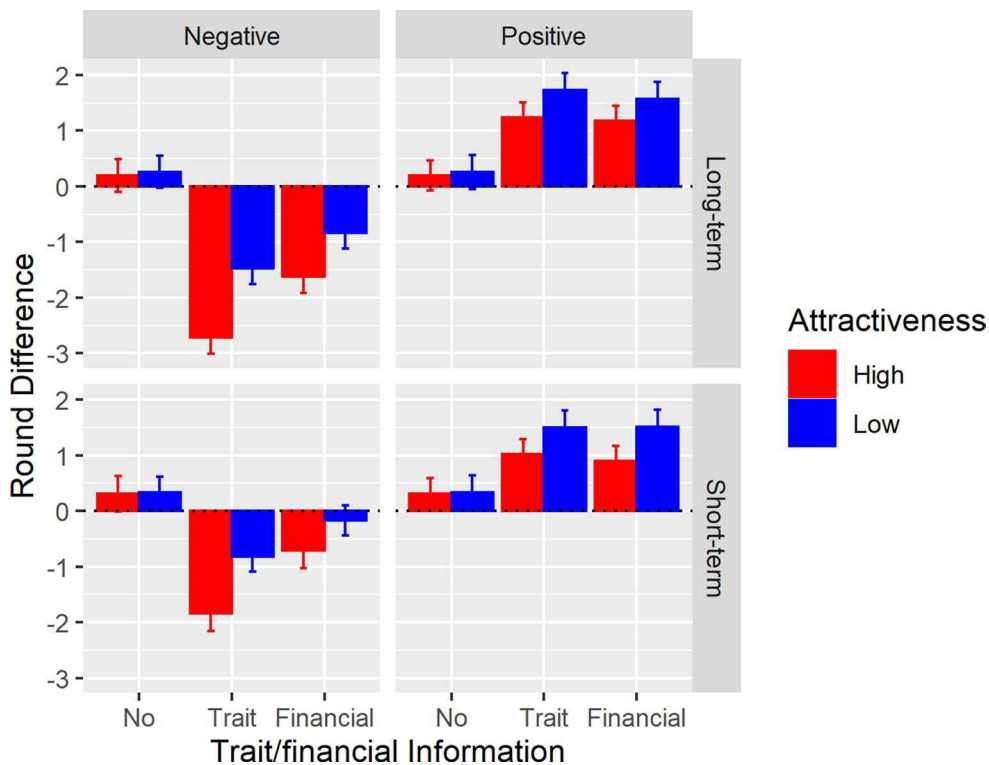

Fig. 9 Round difference as a function of trait/financial information (no/trait/financial), valence (negative/positive), and attractiveness (high/low) for long-term decisions and short-term decisions in Experiment 2. The error bars represent the 95% CI. The round difference = 1/2 the mate-choice copying effect + the effect of trait/financial information + the mere exposure effect. Compared with no trait/financial information, negative information significantly decreased the attractiveness rating, and this effect of trait information was larger than that of financial information. From Fig. 9, this decrease is larger for long-term decisions than for short-term decisions and larger for highly attractive faces than for low-attractiveness faces. Compared with no trait/financial information, positive information increased the attractiveness rating. This increase was the same for trait information and financial information. However, according to Fig. 9, this increase is larger for low-attractiveness faces than for highly attractive faces and larger for long-term decisions than for short-term decisions

Table 3 Further analysis of the 3 (trait/financial information)×2 (valence)×2 (attractiveness) of the round difference in Experiment 2

	df	Long-term			Short-term		
		F	p	η_p^2	F	p	η_p^2
Separate Attractiveness (Trait/Financial Information×Valence)							
Low attractiveness	2, 155	94.36	**.001**	.55	54.67	**.001**	.41
High attractiveness	2, 155	114.10	**.001**	.60	60.00	**.001**	.44
Separate Trait/Financial Information (Valence×Attractiveness)							
No	–	–	**–**	–	–	**–**	–
Trait	1, 52	14.91	**.001**	.22	8.34	**.01**	.14
Financial	1, 52	4.12	**.05**	.07	0.17	.68	.00
Separate Valence (Trait/Financial Information×Attractiveness)							
Negative	2, 155	17.27	**.001**	.18	12.16	**.001**	.14
Positive	2, 155	2.66	***.07***	.03	4.71	**.01**	.06

Note: Significant results at the .05 level are presented in bold. Marginally significant results at the .10 level are presented in bold and italics

and short-term decision scenarios. Compared with no trait/financial information, the provision of personal negative trait information decreases attractiveness ratings, especially for highly attractive faces; the provision of personal negative financial information exerts the same effect but to a lesser extent. However, the provision of positive personal trait information increases attractiveness ratings, especially for faces with low attractiveness. Financial information exerts similar effects to the same extent. These effects are larger in long-term decisions than in short-term decisions, which supports H3.1, namely long-term decisions are more sensitive to trait/financial information, but does not support H3.2, according to which short-term decisions are more sensitive to attractiveness information.

General Discussion

The present study manipulated social information (previous relationship experience) and direct personal information (positive/negative trait/financial information) of the target in Experiment 1 and manipulated the attractiveness of the target and the relationship between the target and observer (long/short-term) in Experiment 2 to examine the trade-offs between social information and personal information in females' mate choices.

Both Experiments 1 and 2 showed mate-choice copying in the no trait/financial information group, which is consistent with most studies with Western participants (e.g., Anderson & Surbey, 2014; Eva & Wood, 2006) and Chinese participants (e.g., Deng & Zheng, 2015; Liang et al., 2015), thereby supporting the validity of our manipulation of social information (He had been in 0/1 romantic relationships). However,

we found that the mate-choice copying effect only occurred for faces with low attractiveness and in long-term decision scenarios, and the mate-choice copying effect disappeared when female participants were provided trait/financial information about a male target. These results demonstrated a trade-off between social information (others' mate choices) and personal information in mate selection.

Trade-Off Between Social Information and Personal Information

First and importantly, mate-choice copying disappeared in female participants when the trait information or the financial information of potential mates was presented in long-term decisions but not in short-term decisions. Personality and income constituted the primary information that women valued when selecting a mate (Fletcher et al., 2004; Sprecher et al., 1994; Wang et al., 2015; Yue et al., 2005), especially for a long-term partner (Bereczkei et al., 1997), but were not easily accessible via direct observation of faces. The results demonstrated that if there were other ways for women to acquire this direct vital personal information on potential mates, they would not refer to the model's mate choice (social information), which supports H1, for long-term decisions but not for short-term decisions, which supports H3.1.

Second, both positive and negative information eliminated mate-choice copying to the same extent, namely the women judged the man's attractiveness based on personal information rather than on whether this man had been selected by another woman regardless of the consistency of these two types of information. This result provides further evidence that the trait information and the financial information of potential mates are vital for women's mate selection (Fletcher

et al., 2004; Sprecher et al., 1994; Wang et al., 2015; Yue et al., 2005), especially for choosing a long-term partner (Bereczkei et al., 1997). Consistent with the results for female guppies of Dugatkin (1996), personal information overrode social information when the personal information was vital for mate selection, thereby supporting H2.1.

Third, both Experiments 1 and 2 found a significant mate-choice copying effect for low-attractiveness male targets but not for highly attractive male targets. If a man was chosen by a woman, then the man would be considered to have other potential positive qualities (Rodeheffer et al., 2016). These potential qualities make him more attractive than his physical appearance (Wang et al., 2015) according to the "what is good is beautiful" effect (Gross & Crofton, 1977; Little et al., 2006). This effect might be even stronger for low-attractiveness male targets, namely although according to the "what is beautiful is good" effect, lower attractiveness is a worse quality (e.g., Dion et al., 1972; Eagly et al., 1991; Lorenzo et al., 2010) and provides information that conflicts with social information, female participants valued social information even more and showed mate-choice copying. This result was consistent with the result for female Drosophila of Mery et al. (2009): public social information was exploited more than personal information, mainly when it contrasted with personal information, thereby supporting H2.2.

It seems that whether personal information overrides public social information depends on whether the personal information is vital and direct information. Orange body coloration in male guppies in Dugatkin (1996) is vital personal information for heritable mate preference, and the trait/financial information in the present study is vital personal information for human females' mate choice. Therefore, when this information is required and certain, it is preferred over social information. However, the food medium condition in Mery et al. (2009) and the facial attractiveness in the present study are not vital for mate choice. Therefore, they are not preferred over public social information.

Trade-Off Among Personal Information

We manipulated several types of targets' personal information, and the results provide new evidence of trade-offs among these personal information (no/trait/financial information, the valence of the information, and facial attractiveness) in both long-term and short-term mate selection scenarios.

Compared with no trait/financial information, the provision of personal negative trait information decreased attractiveness ratings, especially for highly attractive faces; the provision of personal negative financial information had the same effect but to a lesser extent. However, the provision of

positive personal trait and financial information increased attractiveness ratings, especially for faces with low attractiveness, with no extent difference between these two types of information. These effects were larger in long-term decisions than in short-term decisions, which supported H3.1, namely long-term decisions are more sensitive to trait/financial information, consistent with Bereczkei et al. (1997); but did not support H3.2, according to which short-term decisions are more sensitive to attractiveness information. These short-term results in the present study are inconsistent with previous research (Fletcher et al., 2004; Li & Kenrick, 2006). This inconsistency is not due to cultural difference because both Western and Eastern female participants prioritized physical attractiveness significantly more than other traits such as kindness, liveliness, social level, and creativity in short-term rating (US and Singapore in Li et al., 2011; UK and China in Zhang et al., 2019). One reason for the inconsistency may lie in different methods. The method used in previous research is more like a subjective feeling of priority preference such as the forced choice task about a short-term fling partner who was described as attractive/active or who was described as warm/trustworthy (Fletcher et al., 2004) or a budget allocation on several characteristics such as physical attractiveness, social level, and kindness etc. (Li et al., 2011; Li & Kenrick, 2006; Zhang et al., 2019). However, in the present study, we manipulated the potential mates' attractiveness by showing their real face pictures.

Conclusions

This study showed that when women had no trait/financial information other than photos of potential partners, they showed mate-choice copying, but when women obtained trait or financial information (regardless of whether negative or positive) about a potential mate, their mate-choice copying disappeared; this effect was only observed for low-attractiveness and long-term potential partners. These results demonstrated human social learning strategies in mate selection through a trade-off between social information and personal information. The current study proposed a triad TOM model. One limitation of this study is that we only manipulated the negative/positive trait/financial information and facial attractiveness of the target. Future studies of human mate-choice copying are needed to explore trade-offs among other types of social information and personal information. The other limitation of this study is that it only involved Chinese female participants. Male participants or participants from other cultures may value different types of personal information in mate selection, which must be considered in future studies of human mate-choice copying.

Appendix

Appendix 1: Trait Information

Positive	Negative
Generous (大方), large-minded (心胸宽阔)	Uncommunicative (沉默寡言), selfish (自私)
Active (活跃), determined (有决心)	Negligent (粗心), impatient (没耐心)
Enterprising (有进取心), calm (冷静)	Dilatory (拖延), inhospitable (感情冷淡)
Affectionate (重感情), honest (诚信)	Edgy (急躁), disagreeable (难相处)
Decisive (果断), patient (有耐心)	Indecisive (优柔寡断), listless (无精打采)
Self-possessed (镇静), confident (自信)	Phlegmatic (冷漠), apprehensive (焦虑不安)

Appendix 2: Financial Information

1,000 CNY ≈ 145 USD in 2016.

The average salary per month in nonprivate enterprises was 7344.67 CNY in Guangzhou, 2016. (http://www.gzstats.gov.cn/tjgb/qtgb/201706/t20170623_26472.html).

Experiments 1 and 2 were run mainly in 2016.

Positive	Negative
20,000 CNY income per month, various investment strategies	4,000 CNY income per month, finance management limited to savings contributions
19,000 CNY income per month, various investment strategies	3,900 CNY income per month, finance management limited to savings contributions
18,000 CNY income per month, various investment strategies	3,800 CNY income per month, finance management limited to savings contributions
17,000 CNY income per month, various investment strategies	3,700 CNY income per month, finance management limited to savings contributions
16,000 CNY income per month, various investment strategies	3,600 CNY income per month, finance management limited to savings contributions
15,000 CNY income per month, various investment strategies	3,500 CNY income per month, finance management limited to savings contributions

Declaration

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