



## Original Article

# Humans show mate copying after observing real mate choices<sup>☆</sup>

Skyler S. Place<sup>a,\*</sup>, Peter M. Todd<sup>a</sup>, Lars Penke<sup>b,c</sup>, Jens B. Asendorpf<sup>d</sup>

<sup>a</sup>Program in Cognitive Science and Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN 47401, USA

<sup>b</sup>Centre for Cognitive Ageing and Cognitive Epidemiology, University of Edinburgh, 7 George Square, EH8 9JZ Edinburgh, United Kingdom

<sup>c</sup>Department of Psychology, University of Edinburgh, 7 George Square, EH8 9JZ Edinburgh, United Kingdom

<sup>d</sup>Department of Psychology, Humboldt University of Berlin, D-10099 Berlin, Germany

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**Abstract**

When searching for a mate, one must gather information to determine the mate value of potential partners. By focusing on individuals who have been previously chosen by others, one's selection of mates can be influenced by another's successful search—a phenomenon known as mate copying. We show mate copying in humans with a novel methodology that closely mimics behavioral studies with non-human animals. After observing instances of real mating interest in video recordings of speed-dates, both male and female participants show mate copying effects of heightened short-term and long-term relationship interest towards individuals in dates they perceived as successful. Furthermore, the relative attractiveness of observers and observed plays a mediating role in whom an individual will choose to copy.

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**1. Introduction**

In mate choice, in order to determine the value of potential mates individuals must gather information. One source of such information is the mate decisions of others. By focusing on potential mates (or their particular qualities) who have been chosen by others, mate choices can be influenced by another's successful search. This process, known as mate copying (Dugatkin, 1992, 2000), has been widely documented in many animal species, mostly birds (Freed-Brown & White, 2009; Galef, 2008; Galef & White, 1998) and fish (Alonzo, 2008; Dugatkin, 1992). While many people may feel that their choice of a mate is an intensely personal and individual process, biologists have hypothesized that mate copying could also be present in humans (Brown & Fawcett,

2005; Dugatkin, 2000), and recent research has supported this idea (Eva & Wood, 2006; Jones, DeBruine, Little, Burriss, & Feinberg, 2007; Little, Burriss, Jones, DeBruine, & Caldwell, 2008; Waynforth, 2007); it may also underlie other sexual interactions including mate poaching (Schmitt & Buss, 2001). In non-human animals, mate copying has been studied primarily in the decision making of females, who are allowed to observe the courtship displays of males and the selections made among those males by their female peers. In humans, however, where mate choice decisions are typically mutual, men and women alike are choosing mates and being selective based on cues of mate value, particularly for long-term mating decisions (Todd & Miller, 1999; Todd, Penke, Fasolo, & Lenton, 2007). Thus, it is reasonable to expect that using social information could inform the decisions of both men and women, as has been found for animals with mutual mate choice (Frommen, Rahn, Schroth, Waltschyk, & Bakker, 2008). However, studies looking for these effects in humans have yielded mixed results, with some finding mate copying in both sexes (Little et al., 2008), while others found differences between the sexes (Hill & Buss, 2008), pointing to the need for further experimentation and perhaps new experimental designs.

Despite the present surge of interest in human mate copying, all of the studies published to date do not

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\* Corresponding author. Tel.: +1 812 856 0715.

E-mail address: [skyler.place@gmail.com](mailto:skyler.place@gmail.com) (S.S. Place).

incorporate a key component of this phenomenon: the necessity of accurately determining whether an individual being observed has chosen a particular other individual as a mate. For mate copying to make adaptive use of social information, the focal (observer) individual has to know when the model (the observed individual of the same sex as the observer) actually has mating interest towards the target (the opposite-sex observed individual); otherwise, the observer could copy an instance of non-interest and thereby make a poor mate choice decision.

Current paradigms to test mate copying in humans obviate the need for an observer to infer a model's mating interest, by presenting observers with a single explicit cue of a model's romantic interest or attraction toward each target. This has been done, for instance, by labeling photos of a target and model side-by-side as "in a relationship" (Eva & Wood, 2006; Little et al., 2008; Waynforth, 2007) or by showing photos of targets paired with smiling opposite sex models (Jones et al., 2007). This approach means that participants learn about the status of a relationship through social communication, bringing along with it issues of the authority and believability of the source of that communication (e.g., the experimenter). Each study has a somewhat different presentation methodology, but most compare pre-test or baseline ratings of attractiveness to ratings obtained in conditions where mating interest is present. This can involve comparing ratings of photos labeled as single or in a relationship, seen by different subjects (Eva & Wood, 2006), or comparing unlabeled paired photos to labeled paired photos, within subjects (Waynforth, 2007), or comparing photos shown alongside attentive smiling versus neutral-expression members of the opposite sex, within subjects (Jones et al., 2007). Researchers then analyze the differences between target attractiveness ratings made by observers before getting the mating information and after, to see whether the explicit cue of mating interest made the targets appear more attractive—an indication of mate copying. The study by Little et al. (2008) was different in that there was no control condition, and only pictures of paired couples were presented, with each picture being either masculinized or feminized to increase or decrease its attractiveness. The changes in observer interest toward the targets were then compared based on the degree of these morphological alterations.

In contrast, for non-human animal studies, researchers create settings where model and target individuals are able to interact naturally and make their own mate choices, which observers can witness in full (Dugatkin, 2000). Rather than the human studies' presentations of still photos of purported mates, whom the observers might perceive as not even being a legitimate realistic couple, the animal study stimuli are dynamic interactions with the full set of body motions, vocal calls, and other social signals that are integral to the species' courtship and mate choice process. Obviously, there is a large gap between the minimalistic stimuli used in human mate copying experiments and the

rich environments of animal research. This could be important for interpreting the results of recent human experiments: Are typical processes and levels of human mate copying elicited via still photos and single explicit cues of mating interest? Would human participants engage in less or more mate copying if they had to infer that interest themselves on the basis of observing real social interactions? Bridging the gap in experimental design by using more realistic presentations of interpersonal mating interest would give us a fuller understanding of when and how human mate copying happens in the real world, and could help overcome the small (or null) effect sizes and sometimes contradictory results of existing studies (Eva & Wood, 2006; Hill & Buss, 2008; Jones et al., 2007; Little et al., 2008; Uller, 2003; Waynforth, 2007).

To surmount the restrictions of using pictures of individuals as stimuli, we presented our participants with video clips of pairs of actual singles on real speed-dates. This allowed two key changes in methodology: First there were no explicit interest labels, and instead participants were told to judge the couples' interest in the interactions. Therefore instead of comparing judgments based on assigned categories (such as single or in a relationship), we can compare ratings based on how the participants perceived the success of the interactions. Second, by using video clips, participants were able to see and hear actual human mate choice interactions, so that multiple cues including tone of voice and nonverbal behavior could influence their interest judgments and their own ratings of the targets—and, hence, any mate copying that might occur. In addition, similar to the methodology of Little et al. (2008), we used measures of short-term and long-term relationship interest toward the targets (instead of just physical attractiveness ratings) to better understand when mate copying is used in mate choice.

Speed-dating as a research design aims to simulate initial mating relationship encounters at zero acquaintance, and since it is usually done with real singles and consequential choices, it does so more naturalistically than most other designs (Finkel, Eastwick, & Matthews, 2007; Penke, Todd, Lenton, & Fasolo, 2007). While speed-dating does not reflect mate choices that develop out of existing social relationships (e.g., friendships or work relationships), it likely captures a process involving newly encountered individuals that is relevant to many modern-day mate choice decisions and that could also have been important (even if infrequent) in our evolutionary past. Furthermore, it is analogous to laboratory mate copying work with other species where researchers use individuals who are not socially familiar with each other, and these results have been found to generalize to behavior in nature (Alonzo, 2008).

Mate copying could function as a shortcut for learning about features relevant to an individual animal's mate value that are not fully observable at first glance (Hill & Ryan, 2006), a possibility that has also been proposed for humans (Little et al., 2008). While studies have shown

that valid information on all kinds of characteristics relevant for mate choice, including not only physical traits but also personality traits and intelligence (Borkenau, Mauer, Riemann, Spinath, & Angleitner, 2004) and socioeconomic status (Kraus & Keltner, 2009), can be gathered from short observations, these quick initial judgments vary in accuracy. Since the accuracy of person judgments increases over time with acquaintance (Biesanz, West, & Millevoi, 2007; Funder & Colvin, 1988), the accuracy of first impressions could be improved by combination with the impressions formed by others over longer periods of interaction with the target individual. In line with this, models of adaptive mate copying situations in monogamous species predict the highest rates of copying when females can be sure that others have had enough time to learn about and judge males (Dubois, 2007). Additionally, social information (and mate copying) could be used to determine social popularity and prestige, which are typically more prominent in short-term mate choice (Buss & Schmitt, 1993). In either case, the decision to copy another's mate selection could stem from simply the presence of same-sex interest, or it could involve assessing the mate values of the model and target, or even how the model's and target's mate values compare to that of the observer (Hill & Ryan, 2006; Vukomanovic & Rodd, 2007; and see discussion in Vakirtzis & Roberts, 2009; Witte & Godin, in press). To test for these possibilities, we first gathered independently rated attractiveness measures of the models and targets as proxies for their mate value, and then used these values to test whether observers blindly copied the selections of all models or if they were affected by *absolute* model mate value. We also compared model and target attractiveness ratings to self-attractiveness ratings made by the observers to see if the *relative* mate value of models and targets influenced observers' mate copying.

In sum, we designed this study to look for effects of mate copying in both short-term and long-term mate choice, by both sexes, and among targets, models, and observers with different absolute and relative mate values. While we expected both men and women to utilize mate copying because both sexes need to gather information on potential mates that might not be available on first glance to make adaptive mate choice decisions, the manner in which they are influenced by the social information could differ.

## 2. Methods

### 2.1. Participants

Observers comprised 40 women (mean age 20.0) and 40 men (mean age 19.8) recruited from the Indiana University psychology participant pool and compensated with course credit. All were over 18 years old, heterosexual, and with no knowledge of the German language (because the stimuli were in German; see next section).

### 2.2. Stimuli

We used photos of individuals and videos of the same individuals on speed-dates taken from the Berlin Speed Dating Study (BSDS), carefully controlled speed-dating sessions run at Humboldt University in Berlin (for details see methods of: Place, Todd, Penke, & Asendorpf, 2009). Speed-dating is designed to allow singles to meet a large number of possible suitors in a short period of time (Finkel et al., 2007). All BSDS participants were actual singles from the general population motivated to find a partner. At the end of each 3-min speed-date, individuals recorded whether or not they were interested in seeing the other person again, and after the session mutually interested pairs were given each others' contact information, so they could arrange future meetings. For this experiment, stimuli were created from the interactions of 8 men and 8 women (all in their 20's) from three different speed-dating sessions.

The 16 individuals used in our stimuli were selected to have had at least one date where there was mutual interest, which we showed to one set of participants, and a different date where there was mutual disinterest, shown to the other participants. This partially removed the impact of individual differences in target and model attractiveness and other features from our key variable, romantic interest. Both participant groups saw four positive and four negative interactions, and were explicitly informed that the videos (in contrast to the natural distribution of speed-dating interactions) all showed either mutual interest or mutual disinterest, with 50% of each type.

Frontal facial photographs of each of the 16 individuals smiling were cropped to reduce cues from clothing, and their size was standardized to identical interpupillary distance. Videos showed 10 s of interaction from the exact middle of each 3-min date, as previous research (Place et al., 2009) demonstrated that this length and location results in high accuracy for participants' ratings of romantic interest. The videos were framed to capture body language and potential eye contact, and included conversation in German.

### 2.3. Procedure

Participants reported their age, sex, and relationship status, and also rated their self-perceived attractiveness via a single item measure, "How attractive do you think you are?" (from 1=very unattractive to 9=very attractive). Participants then viewed randomly-ordered photos of the 8 opposite-sex daters (targets), and made two ratings (from 1=not very interested to 9=very interested) of each: a short-term relationship measure, "How interested would you be in this person as a short-term partner for a brief affair or a one-night-stand?", followed by a long-term relationship measure, "How interested would you be in this person as a long-term partner for a committed, exclusive relationship?" Next, participants watched video clips of each just-rated target individual interacting with another person (the model) in a speed-date. Participants judged the mutual romantic

interest present in each interaction and answered “Do you think the couple were interested in/attracted to each other? (yes/no)” Following each video, the photo of the opposite-sex target in that clip was presented again, and participants re-rated that individual on the two interest measures. This process was repeated for all eight interactions.

### 3. Results

To look for mate copying effects, we assessed participant observers’ change in their own romantic attraction to the opposite-sex speed dater targets as a consequence of the social information they *perceived* from watching the videos—that is, whether they thought the model was interested in the target. Fig. 1 presents these results for both short- and long-term relationship ratings made by male and female observers.

For rating changes for short-term relationships, both male and female observers showed significant mate copying effects, seen in Fig. 1 by comparing the perceived-interest bars to their respective no-perceived-interest bars,  $t(39)=-3.13$ ,  $p<.003$ ,  $d=.49$  for female observers and  $t(39)=-2.83$ ,  $p<.007$ ,  $d=.39$  for males. These same differences in rating changes were also present for long-term relationships in both sexes,  $t(39)=-2.78$ ,  $p<.008$ ,  $d=.44$  for female observers and  $t(39)=-2.48$ ,  $p<.018$ ,  $d=.45$  for males. Note that while men and women showed comparable rating changes (around .5 on a 9-point scale across conditions), their actual pattern of responses differed: Female observers’ significant effects depended on a decrease in ratings when they perceived no interest in the interactions, while the male observers’ significant effects arose more from a greater increase in ratings when they perceived interest on the date. Whether observers were single versus in a relationship did not change the magnitude of mate copying they showed, nor did

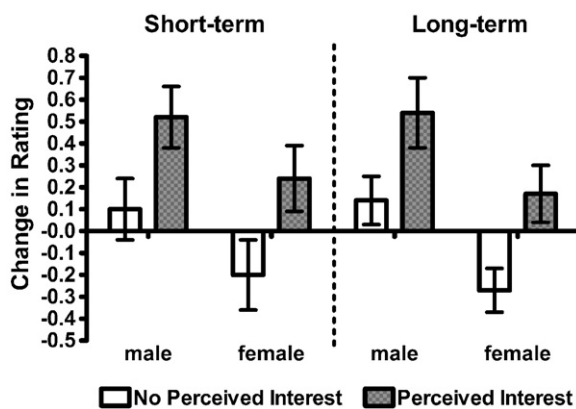


Fig. 1. Changes in ratings of target attractiveness for short- and long-term relationships, separated by perceived interest (present or absent), made by male and female observers. Error bars are  $\pm 1$  S.E.M. Mate copying is measured in terms of the difference in rating changes between the no-perceived-interest and perceived-interest cases.

observers’ self-perceived attractiveness. Finally, it is worth noting that not all participants exhibited any influence of social information—34 of 40 male participants changed their ratings in at least one trial, but only 23 of 40 females.

We next tested how mate copying is influenced by the *relative* attractiveness of the targets and models compared to observers. In particular we were interested in whether observers focus on using social information from models whom they judge as at least as attractive as themselves. Target and model photos were rated for physical attractiveness (1–9 Likert scale) by three men and three women (ages 19–22, Cronbach’s  $\alpha=.81$ ). We assessed the observers’ sensitivity to social information by looking for *any* changes they make in their pre-test to post-test ratings of target relationship desirability, not just mate copying (positive changes). For each sex of the observers, we ran four multilevel modeling analyses (short-term or long-term rating changes predicted by either self-target or self-model attractiveness differences), with eight stimulus videos (level 1) nested in 40 observers (level 2) and both predictors centered at their grand-mean level across all participants. For male observers, there were significant effects of self-target attractiveness differences on short-term and long-term rating changes of target attraction, standardized  $\beta=-.22$ ,  $p<.001$ , and  $\beta=-.14$ ,  $p<.013$  respectively; the self-model attractiveness difference also significantly affected changes in long-term target attraction,  $\beta=-.14$ ,  $p=.045$ . Thus, as the difference between the (self-perceived) attractiveness of the male observer and that of the target or model increased (i.e., the observer thought he was more attractive than the people he was observing), his changes in relationship-interest ratings generally decreased. This negative beta weight is also consistent with a male observer showing greater mate copying of individuals whose attractiveness approaches or surpasses his own. For female observers, none of the beta weights were significant, indicating little effect of self-other attractiveness comparison (possibly because of women’s lower rate of making *any* change in ratings, as mentioned above). Finally, we tested the direct effects of *absolute* target and model attractiveness on actual mate copying, and found only that men copied attractive (male) models more, similar to what Waynforth (2007) found for women.

### 4. Discussion

We found that naturalistic stimuli of human romantic interest—videos of speed-dating interactions between real singles—led to robust mate copying effects, producing behavioral patterns not seen in previous studies. While some past research has shown mate copying only in women (Jones et al., 2007) and primarily for long-term relationships (Little et al., 2008), our results suggest that both men and women are influenced by social information when making both short-term and long-term relationship attractiveness judgments. The strength of the mate copying effect was found to

be similar in men and women, but the pattern of rating changes producing the effect differed: Men showed an increase in relationship interest in all conditions, whereas women exhibited a decrease after seeing a date where the individuals were not interested in each other and an increase only if the individuals were mutually interested. This pattern could be a manifestation of more general sex differences in mate choice, with women being more picky and less sexually available to all potential suitors (Grammer, Kruck, Juette, & Fink, 2000; Trivers, 1972), possibly also pointing to women's use of a quality assessment heuristic that takes negative model interest as evidence of lower male target quality (Vakirtzis & Roberts, 2009).

We also found that male observers were more likely to change their relationship ratings when viewing attractive models, and models (and targets) whose attractiveness approached or surpassed their own. This suggests that men are also more likely to mate copy models not only who are attractive, but also who they see as being relatively more attractive than themselves. Since self-perceptions of mate value and attractiveness relate to the amount of prior mating success in men (Penke & Asendorpf, 2008, Study 1), this corresponds to Waynforth's (2007) conclusions that mate copying is used more by sexually inexperienced individuals (and to similar findings in animals: Dugatkin & Godin, 1993).

The increase in mating interest that occurs with mate copying is only one possible use of social information regarding the romantic interests of others (Westneat, Walters, McCarthy, Hatch, & Hein, 2000)—the opposite effect of decreased interest is possible as well. Previous studies have found male competition effects, where interest from model females towards a target male decreased observer males' attractiveness ratings of him (Jones et al., 2007). We did not test for same-sex effects, but found only increased relationship interest from male observers making opposite-sex ratings (Fig. 1). Whether this was because our design (asking about interest in having relationships rather than explicit decisions to pursue a target as a mate, as well as the participants only observing instead of directly interacting with the target and model) did not include sufficient cues to elicit feelings of competition on the part of the male participants, or because the costs of male competition are outweighed by the benefits of more attractive mates, must be assessed by further studies.

The use of naturalistic stimuli in our experiment also presented new challenges that require further investigation. Due to the rich information content in the video presentations we employed, it is difficult to ascertain the most important sources of the observer's change in interest in a target. This change could stem from the behavior of the model or the target—that is, the observation of the interest shown by another person of the observer's sex, or the flirtatious response seen from the potential partner—or both. To determine what combination of social (model) and direct (target) information is driving the overall change in interest

toward the target, further experiments using videos showing only the targets or the models are underway, similar to control studies with other species (e.g., White & Galef, 1999, 2000a, 2000b). Additionally, the presentation of male/female pairs of daters does not allow us to tell whether there could be similar social-influence effects caused by models of the same sex as the target—that is, if a man watches two women interact in a positive manner, does that make either (or both) of the women more attractive? This possibility awaits testing (but see Hill & Buss, 2008 for group influences on individual desirability), though we expect that any such generalized interest effect should be smaller than the functional use of mate-relevant interest shown by models of the opposite sex to the target.

Inspired by studies of mate copying in animals, we have used naturalistic presentations of romantic interest in humans to show mate copying effects for both men and women, for short- and long-term relationship judgments, influenced (for men at least) by the relative and absolute attractiveness of models and targets. By paying attention to the mating success of others, humans, like other animals, appear to skew their preferences toward those partners deemed desirable by (some of) their peers.

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