

Why Mate Choices are not as Reciprocal as we Assume: The Role of Personality, Flirting and Physical Attractiveness

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Abstract: Based on a social relations perspective on mating, the actual and assumed reciprocity of mate choices was studied in a real-life speed-dating context. A community sample involving 382 singles aged 18–54 years filled out a questionnaire for the measurement of self-perceived mate value, sociosexuality, extraversion, and shyness and participated in free speed-dating sessions. Immediately after each date, choices and assumed choices were recorded. Measures of physical attractiveness and flirting behaviour were obtained by independent observers. Results show that actual mate choices are not reciprocal although people strongly expect their choices to be reciprocated and flirting behaviour is indeed strongly reciprocal. This interesting pattern of results was explained by investigating individual and dyadic effects of flirting, self-perceived mate value and physical attractiveness on mate choices. Results have important implications for understanding mating behaviour, sex differences and the (in)accuracies of mating decisions. Copyright © 2010 John Wiley & Sons, Ltd.

Key words: evolutionary psychology; social and personal relationships; social interaction; sex differences; dyadic and group analysis

INTRODUCTION

Mating—choosing and being chosen as a mate—is both a highly important and complex endeavour. The choice of a potential mate is one of the most consequential social decisions people face and successful mating is a prerequisite for family life and reproductive success. At the same time, however, mating involves highly ambiguous social behaviours and decisions under extreme uncertainty. Typically, people do not know exactly whom to choose as a mate, they are unsure about how to interpret the potential mates' behaviours, and wonder whether they are chosen as a mate themselves. Often enough, people are left with the impression of reciprocated interest and are disillusioned later on.

The association between choosing and actually being chosen as a mate (reciprocity of mate choices) and between choosing and assuming to be chosen as a mate (assumed reciprocity of mate choices) is one of the most challenging issues in mating research. To date, few is known about people's mate choice assumptions and whether and why mate choices are in fact reciprocal or not. The match between assumed and actual reciprocity is, however, extremely

important. It determines the accuracy with which people can estimate whether they are chosen by others or not (mate value accuracy; Back, Penke, Schmukle, & Asendorpf, 2010), an ability that has wide-ranging implications for social life and ultimately fosters reproductive success in a competitive mating market (Penke, Todd, Lenton, & Fasolo, 2007). Here we use a social relations approach to systematically examine mate choices and assumed mate choices within a real-life dating context. Specifically, we analyse how personality traits, flirting behaviour, and physical attractiveness might explain why the reciprocity of mate choices is often so astonishingly low.

PRIOR RESEARCH: THE LOW RECIPROCITY OF MATE CHOICES

When examining the reciprocity of mate choices, it is important to distinguish between reciprocity on an individual level and reciprocity on a dyadic level (Back & Kenny, 2010; Kenny, 1994; Kenny & Nasby, 1980). *Individual reciprocity* is the degree to which people's general amount of choices is reciprocated by (i.e. proportional to) the amount of choices they receive. Are people who choose many others as potential mates chosen more often by others? Or in other words: Are choosier people unpopular? *Dyadic reciprocity* is the extent to which men's specific relational choices are

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reciprocated by women's specific relational choices, and *vice versa* for women. Is a person who uniquely chooses a specific other person uniquely chosen by that specific person?

A few studies have recently looked at the individual and dyadic reciprocity of mate choices (e.g. Eastwick, Finkel, Mochon, & Ariely, 2007; Luo & Zhang, 2009). In line with research on the reciprocity of liking at zero acquaintance in general (Back, Schmukle, & Egloff, 2010a; Kenny, 1994), these studies found a positive but very small dyadic reciprocity and no individual reciprocity (Luo & Zhang, 2009) or even a negative individual reciprocity (Eastwick et al., 2007; Kurzban & Weeden, 2005). Thus, uniquely choosing a specific dating partner seems to be only weakly reciprocated, and the general tendency to choose many potential mating partners is not related or even inversely related to popularity as a mate.

Causes for this interesting pattern of results in the context of mating have not been systematically investigated. Also, prior studies did not systematically analyse sex differences in the reciprocity of mate choices. Moreover, to date, the assumed reciprocity of mate choices has not been investigated at all—although research in other social contexts suggests that assumed reciprocity should be rather high (Back et al., 2010a; Kenny, 1994). In the present study we contrast the actual reciprocity with the assumed reciprocity of mate choices. In doing so, we focus on the potential influence of personality, flirting behaviour and physical attractiveness in determining the low actual reciprocity of mate choices.

LOW RECIPROCITY OF MATE CHOICES: THE POTENTIAL INFLUENCE OF PERSONALITY, FLIRTING AND PHYSICAL ATTRACTIVENESS

According to a developmental social interaction perspective on personality and social relationships (PERSOC; Back et al., 2011) the actual reciprocity of mate choices cannot be fully explained by intrapersonal processes alone. Choosing others cannot directly influence being chosen, as both are decisions within independent minds. On an individual level, one's general tendency to choose more or less partners can only be related to one's general tendency to be chosen via other individual variables that are directly or indirectly associated with both individual mate choice components. Similarly, on a dyadic level, one's unique choice of a specific partner can only be reciprocated due to other dyadic variables that are directly or indirectly associated with both unique mate choices. For a complete account of mate choice reciprocity one has to consider the influence of stable dispositions (Principle 1 of the PERSOC model), the actual social interactions underlying mate choices (Principle 2 of the PERSOC model), the behaviours that make up these interactions (Principle 3 of the PERSOC model) and the processes that relate these variables (Principle 4 of the PERSOC model).

Here, we investigate actual dating interactions and explore the role of personality, physical attractiveness and flirting behaviour in determining the actual reciprocity of

mate choices. We will first summarize the potential influence of relevant personality traits, flirting behaviour and physical attractiveness on mate choices. Afterwards, the joint influence of these variables will be considered as potential explanations of the individual and dyadic reciprocity of mate choices.

Personality and mating

We consider four personality traits that are known to influence mating dynamics: Extraversion, shyness, self-perceived mate value and sociosexuality. Extraversion is characterized by expressive and cheerful behaviour and a tendency to seek contact with other people (Back, Schmukle, & Egloff, 2009; Borkenau & Liebler, 1992; Eaton & Funder, 2003; Levesque & Kenny, 1993; Mehl, Gosling, & Pennebaker, 2006; Riggio & Riggio, 2002). In the context of mating it should thus foster active flirting behaviour. Additionally, Luo and Zhang (2009) reported that extraversion is also related to reduced choosiness (in women) and higher popularity (in men). Inverse effects should be observed for the related trait of shyness, which is known to inhibit social interaction with strangers (Asendorpf, 1989) and the establishment of new relationships with peers (Asendorpf & Wilpers, 1998).

A personality facet specifically important in the context of mating is self-perceived mate value, the degree to which people think they are a valuable potential mate for others. This self-perception can be conceptualized as a context-specific 'sociometer', as it monitors one's exclusion or inclusion on the mating market (mate value sociometer; Kavanagh, Robins, & Ellis, 2010; Kirkpatrick & Ellis, 2001; Penke & Denissen, 2008; Penke et al., 2007). Similarly to the more general self-esteem sociometer processes (Back, Krause, Hirschmüller, Stopfer, Egloff, & Schmukle, 2009; Denissen, Penke, Schmitt, & van Aken, 2008; Leary & Baumeister, 2000) it is assumed that self-perceived mate value is a function of both positive social reactions (e.g. acceptance in flirtatious interactions) and the perceptions of one's own desirable characteristics (e.g. physical attractiveness; Todd, Penke, Fasolo, & Lenton, 2007). In turn, a higher self-perceived mate value might also foster popularity, for example by means of a more self-assured mating behaviour. Moreover, it should be related to the amount (choosiness) and kind (unique choices) of partners people choose themselves. Research shows that people with a higher self-perceived mate value are choosier and tend to search for mates with an equally high mate value (Kenrick, Groth, Trost, & Sadalla, 1993; Penke et al., 2007; Todd & Miller, 1999; White, 1980).

Another personality trait that is strongly related to mating behaviour and mating decisions is sociosexuality (Penke & Asendorpf, 2008; Simpson & Gangestad, 1991; Simpson, Wilson, & Winterheld, 2004). Unrestricted sociosexuality is characterized by the quantity of past short-term sexual encounters, positive attitudes towards uncommitted sex, and the intrinsic tendency to desire uncommitted sexuality (Penke & Asendorpf, 2008). Sociosexuality was found to be related to a more flirtatious behaviour towards opposite-sex

strangers (Penke & Asendorpf, 2008) and to a unique preference for more physically attractive mates (Fletcher, Simpson, Thomas, & Giles, 1999; Simpson & Gangestad, 1992).

Flirting behaviour and mating

When trying to understand the interplay of personality and social decisions, it is important to consider the actual behaviours involved (Back & Egloff, 2009; Back, Schmukle & Egloff, 2008, 2010b; Back *et al.*, 2011; Küfner, Back, Nestler, & Egloff, 2010). Flirting is obviously the most prominent candidate when it comes to investigating dating behaviour (Grammer, Honda, Juette, & Schmitt, 1999; Grammer, Kruck, Juette, & Fink, 2000; Penke & Asendorpf, 2008). As most communication behaviours, flirting is known to be reciprocal (Grammer, Kruck, & Magnusson, 1998). Flirting has also been found to foster people's mating success (Moore, 1985; Penke & Asendorpf, 2008). It is, however, unclear whether flirting behaviour is indeed an indicator of people's own mating interest, or whether it functions as a strategic behaviour to gather information while veiling one's own intentions (Grammer *et al.*, 1999, 2000). The determinants and consequences of unique flirting, over and above one's own flirtatiousness and the partner's tendency to be flirted at, are also not well studied.

Physical attractiveness and mating

Physical attractiveness, particularly observer-rated facial attractiveness, is an easily perceivable, salient and consensually positively valued cue in the mating context (Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000; Rhodes & Simmons, 2007). As a consequence, it is often found to be the most powerful predictor of popularity (Feingold, 1990; Kurzban & Weeden, 2005; Luo & Zhang, 2009; Todd *et al.*, 2007). It also affects people's choosiness (Kurzban & Weeden, 2005; Penke *et al.*, 2007), possibly due to people's self-perceptions (e.g. self-perceived mate-value; e.g. see above). Finally, because self-perceived mate value should be based on actual physical attractiveness and is related to a unique preference for physically attractive partners, similarity of physical attractiveness should also be related to unique mate choices (Feingold, 1988; Todd *et al.*, 2007).

Understanding the individual reciprocity of mate choices

Given the reciprocal nature of flirting behaviour it seems puzzling that mate choices are only mildly reciprocal on the dyadic level and even zero or negative on the individual level (Eastwick *et al.*, 2007; Kurzban & Weeden, 2005; Luo & Zhang, 2009). This apparent contradiction still needs to be investigated.

When considering the outlined effects of flirting behaviour, personality and physical attractiveness on the individual mate choice components, two factors might contribute to the non-positive individual reciprocity. First,

generally flirting a lot and generally being flirted at might not indicate generally choosing many potential mates or generally being chosen by many potential mates. However, while this would explain why the individual reciprocity of mate choices is not positive, it does not explain why it even tends to be negative (Eastwick *et al.*, 2007; Luo & Zhang, 2009). Second, as outlined above, we expect that one's physical attractiveness and one's self-perceived mate value positively predict being chosen by others but negatively predict choosing others. Moreover, physical attractiveness should be positively correlated with self-perceived mate value, as people partly use their own attractiveness to infer their mate value (Todd *et al.*, 2007). Taken together, these effects should contribute to the low or negative individual reciprocity of mate choices: Because the same attributes that make people popular should also make them choosier, popularity should be positively related to choosiness (i.e. a negative individual reciprocity of mate choices).

Understanding the dyadic reciprocity of mate choices

Little is known about unique mate choices in general and the determinants of dyadic reciprocities in particular. When considering the outlined effect of unique flirting behaviour, as well as personality and physical attractiveness relations on unique mate choices, two reasons might contribute to the positive (albeit small) dyadic reciprocity of mate choices. First, flirting particularly strong with a specific dating partner might affect both the unique own mate choices and the unique mate choices of the specific partner.

Second, at a more distal level, unique mate choices of both partners of a dyad can be analysed as a function of the relation between individual characteristics (personality, physical attractiveness) of one partner and individual characteristics of the other partner. The most common way to investigate such effects is to analyse the similarity of individual characteristics among partners. As outlined above, similarity in self-perceived mate value should be related to unique mate choice because self-perceived mate value is related to a preference for physically attractive mates and physical attractiveness itself fosters self-perceived mate value. For the same reasons, partner similarity in physical attractiveness should also predict unique mate choices because it fosters self-perceived mate value, which in turn is associated with a unique preference for physical attractiveness. A second way to look at such dyadic predictors of unique mate choices is to more directly analyse the theoretically plausible specific relations between personality characteristics of one partner and observable characteristics of the other partner that drive the potential similarity effects (Back, Schmukle, & Egloff, *in press*; Back *et al.*, 2011). As described above, the relation between sociosexuality and physical attractiveness (sociosexually more unrestricted individuals prefer more attractive partners) as well as the relation between self-perceived mate value and physical attractiveness (more favourable self-perceptions increase the selection standards for partner attractiveness) are two examples of such personality-cue relations. They might affect unique mate choices of both partners and thereby

contribute to the dyadic reciprocity of mate choices directly as well as via unique flirting behaviour (Fletcher et al., 1999; Kenrick et al., 1993; Penke et al., 2007; Simpson & Gangestad, 1992; Todd & Miller, 1999). However, effects of relations between individual variables on unique dyadic outcomes are typically small (Back et al., in press).

THE CURRENT STUDY

Based on the literature reviewed above, the current study analysed the reciprocity of mate choices in a real-life context. Specifically, we investigated previously unacquainted singles searching for a romantic partner using the *speed-dating* paradigm. Speed-dating is a popular form for singles to get to know other singles. During a speed-dating session, multiple men meet multiple women of similar age for very brief encounters, one after the other. After the dates, mate choices are recorded and in the case of a match (both dating partners choose each other) participants are provided with the opportunity to initiate further contact afterwards.

In comparison to traditional research designs (e.g. self-report of preferences for attributes of hypothetical partners, dyadic interactions between undergraduates in the laboratory, indirect inferences of preferences from traits of existing couples or self-presentations in and responses to lonely hearts advertisements), speed-dating has a number of important advantages (Asendorpf, Penke, & Back, in press; Finkel & Eastwick, 2008). First, it allows investigating mate choices within actual social interactions (Principle 2 of the PERSOC model, Back et al., 2011). Second, it accounts for the dyadic nature of dating and allows separating individual and dyadic components of mate choices, assumed mate choices and dating behaviour (Principle 3 of the PERSOC model). Third, processes between these components can be computed on an individual and a dyadic level (Principle 4 of the PERSOC model). Fourth, dispositional variables (e.g. personality traits, physical appearances) can be additionally included (Principle 1 of the PERSOC model; Back & Kenny, 2010; Back et al., in press; Kenny, 1994).

A number of studies have recently adopted the speed-dating design to investigate mating dynamics (Asendorpf et al., in press; Eastwick & Finkel, 2008; Fisman, Iyengar, Kamenica, & Simonson, 2006; Kurzban & Weeden, 2005, 2007; Luo & Zhang, 2009; Place, Todd, Penke, & Asendorpf, 2009, 2010; Todd et al., 2007). Here, we use the speed-dating design to investigate the reciprocity of mate choices. First, we directly compare the actual reciprocity of mate choices with the reciprocity people assume. Second, we analyse the effects of personality, flirting and physical attractiveness to explain the (low) reciprocity of mate choices.

METHOD

Participants

In the Berlin Speed-dating Study (see Asendorpf et al., in press, for a detailed description), a total of 190 men and

192 women aged 18–54 years ($M = 32.8$, $SD = 7.4$) completed an online self-report questionnaire for the assessment of various personality attributes. Afterwards they participated in one of 17 free speed-datings. Sessions included 17–27 ($M = 22.7$, $SD = 2.4$) men and women of about the same age (within-session age range: ± 4.8 years, with men being slightly older). All participants were singles, who were invited through email lists, links on various German webpages and advertisements in the media to participate in free speed-dating sessions. Participants did not receive any material incentive—their sole motivation to participate was to find a real-life romantic or sexual partner.

Speed-Dating Procedure

Men and women entered the speed-dating location from different streets and were guided to separate waiting rooms. Upon arrival, participants received a tag with a unique identity number and a scorecard. Moreover, a same-sex experimenter recorded brief video samples for the assessment of physical attractiveness. The actual ‘dates’ took place in booths equipped with two opposing chairs. Women were asked to take a seat in their booths before the men entered the scene. Similar to conventional speed-datings, men rotated through the booths until they had dated every female participant. Each interaction period lasted 3 minutes. After the men had left the booths, but before they entered the next, both men and women recorded their choices of the current ‘date’ on their scorecards. When everybody was finished, all men entered their next booth simultaneously. For the separate videotaping of each individual’s behaviour during the interactions the booths were each equipped with two digital cameras and two microphones.

Measures

Self-reported personality

The online questionnaire included self-report measures of sociosexuality (revised Sociosexual Orientation Inventory, Penke, 2011; Penke & Asendorpf, 2008), extraversion (NEO-FFI, Borkenau & Ostendorf, 1993), self-perceived mate value (Landolt, Lalumiere, & Quinsey, 1995) and shyness (Asendorpf & Wilpers, 1998).

Facial attractiveness ratings

Video capturing software was used to obtain digital pictures of participants’ faces from the pre-event video recordings. Size was standardized to identical interpupilar distance. Thirty heterosexual opposite-sex raters of similar age (15 for younger participants, 15 for older participants) judged the attractiveness of each picture on a scale from 1 (not attractive at all) to 7 (very attractive). Interrater reliabilities were satisfactory ($\alpha > .88$) such that the ratings could be aggregated across the raters.

Flirting ratings

Based on 4320 video clips (216 h in total) that showed single participants in individual 3-minute speed-dating interaction, each participant’s flirting behaviour during each interaction

was rated by two independent, trained raters. The interaction partners were not visible, but since the videos were presented with audio, they could be heard. All raters were unacquainted with the participants and blind to any other information gathered in this study. Care was taken that each pair of raters saw each participant only once, in one interaction. As a consequence, 26 pairs of raters were necessary who saw up to 303 videos. For each video, both raters provided flirting ratings every 30 seconds (indicated by a timed acoustic signal) on a scale from 1 (*not very much*) to 7 (*very much*) and labelled 'How much does this person flirt with the other person?'. Thus, each rater provided a total of six ratings for each participant he or she rated. All ratings were aggregated across the six 30-second-segments and two raters for each individual within each interaction (interrater reliabilities were acceptable with a mean α of .68).

Immediate dating outcome

Directly after each speed-dating interaction (which lasted 3 minutes), participants recorded on a scorecard whether they wanted to see this person again (yes/no; actual mate choice) and whether they expected that the person wanted to see them again (yes/no; assumed mate choice).

RESULTS

Descriptive statistics

Descriptive statistics for the personality and attractiveness variables as well as for the percentages of being chosen and assuming to be chosen can be found in Table 1. With regard to gender differences, men were more sociosexually unrestricted and had higher scores in shyness than women. Women were more extraverted, reported a higher mate value, and were rated as more physically attractive than men. Men and women did not differ in how much they were chosen, or assumed to be chosen. Table 2 provides intercorrelations for personality variables and physical attractiveness.

As a prerequisite for subsequent analyses, we conducted social relations analyses (Back & Kenny, 2010; Kenny, 1994; Kenny, Kashy, & Cook, 2006) to check whether all observed dyadic variables (mate choices, assumed mate choices, flirting) contained a significant amount of actor-, partner- and relationship variance, which was the case (Table 3).¹ Thus, participants differed with regard to their tendency to choose more or less partners (actor variance; *choosiness* differences), their tendency to be chosen more or less often as a partner (partner variance; *popularity* differences) and their idiosyncratic choice of a specific partner (relationship variance; *unique choice* differences). Moreover, with regard to assumed mate choices, they differed in their tendency to assume receiving more or less choices from others (actor variance), their tendency that others assume receiving more or less choices from oneself (partner variance) and their

unique assumptions to be chosen by a specific other (relationship variance). Finally, participants differed in their tendency to show more or less flirting behaviour towards others (actor variance; *flirtatiousness* differences), their tendency to evoke more or less flirting behaviour from others (partner variance; differences in *being flirted at*) and flirting behaviour towards a specific partner (relationship variance; *unique flirting* differences).

Assumed and actual reciprocities

Assumed and actual reciprocities were calculated according to formulas provided by Kenny (1994).² With regard to assumed reciprocity, three aspects were analysed (cf. Kenny, 1994): *Perceiver assumed reciprocity* is the degree to which people who choose many others assume that they are often chosen by others. *Generalized assumed reciprocity* is the extent to which people who are chosen by many others are assumed to choose many others. *Dyadic assumed reciprocity* is the extent to which a person who uniquely chooses a specific other person assumes that s/he is uniquely chosen by that specific person. As expected, assumed reciprocities were all positive and medium to strong in magnitude (Table 4). Participants who were more popular were also expected to chose more often (generalized assumed reciprocity), a finding that was somewhat more pronounced for men, $t = 2.30$, $p < .05$. Moreover, participants who chose potential mates more often (who were less choosy), tended to also expect more choices by potential mates (perceiver assumed reciprocity). Finally, uniquely choosing a specific dating partner was related to uniquely expecting to be chosen by this partner (dyadic assumed reciprocity).

Two types of actual reciprocities were analysed. *Individual reciprocity* is the degree to which people's amount of choices is reciprocated by (i.e. proportional to) the amount of choices they receive. *Dyadic reciprocity* is the extent to which men's specific relational choices are reciprocated by women's specific relational choices, and *vice versa* for women. Actual reciprocities can be found in the last two rows of Table 4. Reciprocities on the individual level depended on sex, $t = 2.58$, $p < .05$. For women, choosing more men (being unchoosy) and being chosen by men more often (being popular) was unrelated. For men,

²Assumed reciprocities refer to relations between matching actual choice and assumed choice components (actor-actor correlation, partner-partner correlations, intrapersonal relationship-relationship correlation) and were calculated using bivariate social relations analyses. Actual reciprocities refer to relations between actual choice components within the SRM (actor-partner correlation, interpersonal relationship correlation) and were calculated using univariate social relations analyses (Kenny, 1994). All effects were computed for each group and then averaged across groups. Covariances were tested for significance by using a two-tailed one-sample t test with group as the unit of analysis (see Kenny, 1994, p. 236; Kenny et al., 2006, p. 213). Relationship effects are per definition independent of actor and partner effects as well as differences on the group-level. Thus, for dyadic analyses identical results emerge when just correlating the respective relationship effects across the whole sample. Both kinds of SRM correlations, assumed and actual reciprocities, are corrected for the unreliability of actor- and partner-effects. Uncorrected correlations based on correlations between read out actor- and partner-effects for men and women (calculated as described by Kenny, 1994) were .59 and .40 for generalized assumed reciprocity, .36 and .37 for perceiver assumed reciprocity and -.26 and .04 for individual reciprocity.

¹Following suggestions by Kenny (1994, p. 236; Kenny et al., 2006, p. 213), all variances were computed separately for each group and then averaged across groups. For significance testing, group was used as the unit of analysis and one-tailed one-sample t tests were applied.

however, the individual reciprocity was significantly negative: Men who chose more women (had a low choosiness) tended to be chosen less (had a lower popularity). On a dyadic level, there was only a very small but significant positive correlation between uniquely choosing a specific dating partner and uniquely being chosen by this partner (dyadic reciprocity).

These small, absent or even negative actual reciprocities are in sharp contrast to the positive and rather strong assumed reciprocity of mate choices. People expect their mate choices to be reciprocal but generally, they are not. In the following, we explore if flirting, personality and physical attractiveness can explain this discrepancy on both an individual and dyadic level.

Individual reciprocity analyses

One possibility to explain the low individual reciprocity of mate choices would be that dating behaviour in general is not reciprocal, leading to unreciprocated choices. However, this is not the case: Flirtatiousness (actor effects flirting) and being flirted at (partner effects flirting) correlate strongly, $r = .65$, $p < .001$, both for men, $r = .68$, $p < .001$, and women, $r = .69$, $p < .001$.³ But why does this not translate into reciprocal choices? The answer can be found when looking at the correlation between individual flirting and actual mate choice components (Table 5): While one's own flirtatiousness and being flirted at is related to being chosen more often, these flirting components are not related to generally choosing others. In sum, flirting affects popularity but not choosing others and does thus not lead to a positive individual reciprocity of mate choices.

Even though these results are able to explain the lack of positive individual reciprocity for women, they can not explain the results for men, where social relations analyses revealed a negative individual reciprocity of actual mate choices of $-.41$ (corresponding to a correlation of $-.26$ between actor and partner effects of choices, see Footnote 1). Why are men who are choosier (choose women less often) more popular? As hypothesized, individual characteristics might play a role: Particularly, men who are more physically attractive and have a higher self-perceived mate-value (partly due to their higher attractiveness) should (a) be more popular due to their visible attractive characteristics and at the same time (b) be choosier because they have more alternatives. As a result interindividual differences regarding physical attractiveness and self-perceived mate value should foster a positive correlation between choosiness and popularity, that is, a negative individual reciprocity.

To test the hypothesis that the negative individual reciprocity for men is due to self-perceived mate value and physical attractiveness, we first calculated correlations of personality variables and physical attractiveness with actual mate choice components, while controlling for speed-dating session (see Table 6). As expected, physical attractiveness

and self-perceived mate value were both positively related to choosiness and popularity, and this pattern tended to be stronger for men than for women. Moreover, self-perceived mate value was positively correlated with physical attractiveness (see Table 2), backing up the idea that this personality variable is partly due to the self-perception of one's own attractiveness. Shyness showed a pattern that is reverse to the self-perceived mate value results: Men that were rather shy were less choosy and less popular. Moreover, shyness was negatively related to physical attractiveness. Sociosexuality and extraversion predicted popularity for men, but were unrelated to choosiness as well as physical attractiveness.

Correlational results thus support the idea that the positive correlation between choosiness and popularity for men might be due to parallel effects of physical attractiveness on these individual mate choice components, partly mediated by self-perceived mate-value. To test these assumptions more formally, we computed an unrestricted path analysis using MPlus Version 6 (Muthén & Muthén, 2010) that represents the assumed interdependencies between physical attractiveness, self-perceived mate value, choosiness and popularity for men, with speed-dating session statistically controlled (Figure 1). As expected, the original correlation between choosiness and popularity of $.26$ was reduced to $.08$ when considering the influence of self-perceived mate-value and physical attractiveness. Non-parametric bootstrapping analyses (Efron & Tibshirani, 1993) using 5000 bootstrap samples indicated that this reduction of $.176$ is highly significant, $p < .001$, (lower 95%CI = $.076$; upper 95%CI = $.279$).⁴

As can be seen in Figure 1, self-perceived mate value had not only an effect on choosiness but also on popularity. Theoretically, the latter need to be explained by observable cues: A higher self-perceived mate value is not directly observable for interaction partners and has thus to result in some sort of behaviour (e.g. flirting) to influence the speed-dating partners' choices (see Back et al., 2011). Given that self-perceived mate-value indeed correlated with flirtatiousness (see Table 7), we also specified an alternative path model that additionally included the effects of physical attractiveness on being flirted at, of self-perceived mate value on flirtatiousness, of flirtatiousness on being flirted at and of both flirting components on popularity, with speed-dating session statistically controlled (Figure 2). This model fits the data well, $\chi^2(4) = 7.63$, $p = .11$, CFI = $.98$, SRMR = $.01$, and results in a reduction of the original correlation between choosiness and popularity from $.26$ to $.12$. Nonparametric bootstrapping analyses again indicated that this reduction of $.139$ is significant, $p < .05$, 95%CI [$.017$, $.271$]. When shyness replaced self-perceived mate-value in the path analysis as a potential personality predictor of choosiness and popularity, effects were considerably lower. In a model including both personality variables simultaneously, shyness

³All subsequent individual reciprocity analyses are based on read out actor- and partner-effects. They are performed across the whole sample and statistically control for speed-dating session.

⁴We additionally performed multiple group analyses accounting for the participants' age. No significant differences between younger and older participants were found for any of the reported effects.

Table 1. Descriptives personality, physical attractiveness, actual and assumed mate choices

	Men		Women		d_{sex}	p_{sex}
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Self-perceived mate value	3.17	.96	3.59	.88	.45	< .01
Sociosexuality	3.17	.82	2.76	.79	-.52	< .01
Extraversion	3.42	.58	3.60	.54	.31	< .01
Shyness	2.66	.92	2.41	.79	-.29	< .01
Physical attractiveness	2.50	.75	3.16	.90	.80	< .01
Being chosen	.33	.25	.36	.24	.12	.22
Assuming to be chosen	.37	.24	.40	.23	.13	.20

Note: d_{sex} is the effect size for the comparison between men and women. Positive effect sizes indicate higher values for women.

Table 2. Intercorrelations personality and physical attractiveness

	2	3	4	5
1. Self-perceived mate value	.22**	.30**	-.50**	.38**
2. Sociosexuality		.17**	-.22**	-.10
3. Extraversion			-.58**	.09
4. Shyness				-.18**
5. Physical attractiveness				

** $p < .01$.

showed no incremental effects over self-perceived mate value.

In sum, individual analyses show that mate choices are not reciprocal on an individual level for women and are even negative for men. The positive correlation between choosiness and popularity could be explained by the effects of physical attractiveness and self-perceived mate value: More facially attractive people and those who think that they have a high mate value choose dating partners less often, but they are chosen more often, partly because they flirt more and evoke more flirtatious reactions.

Dyadic reciprocity analyses

On the dyadic level, a very small but significant positive correlation between unique mate choices of men and women was found ($r = .061$), indicating that specific mate choices (independent of general choosiness and popularity) have a slight tendency to be mutual. We analysed why this dyadic reciprocity turned out to be so small and explored if one can still identify variables that contributed to it. As outlined above, there are a number of relations between individual characteristics of two partners that might have parallel effects on unique mate choices for men and women, thereby fostering the dyadic reciprocity of mate choices: unique flirting, similarity of self-perceived mate value, similarity of physical attractiveness, the relation between one partner's self-perceived mate value and the other partner's attractiveness and the relation between one partner's sociosexuality and the other partner's attractiveness.

To test these ideas, we first calculated relationship effects of flirting behaviour (two for each dyad: Unique male flirting and unique female flirting) using the formula provided by Kenny (1994). Furthermore, we calculated similarity scores

(one for each dyad) as the absolute difference of the z-standardized individual scores and personality-attractiveness relations (two for each dyad) as the absolute difference of the z-standardized personality and attractiveness scores. We then computed an actor-partner interdependence model (APIM) for distinguishable dyad members (Kenny et al., 2006) using MPlus (Muthén & Muthén, 2010). This model represents the assumed effects of individual relations and unique male and female flirting on unique male and female choices. All variables were standardized before computing the model across the entire sample (i.e. across men and women; see Kenny et al., 2006, p. 179).⁵

The most consistent result emerged when including similarity in self-perceived mate value as the individual relations variable in the unrestricted APIM model (Figure 3). Unique flirting was strongly reciprocal. Moreover, unique male flirting predicted unique male choices and unique female flirting predicted unique female choices. These effects were, however, quite small. There were no effects of unique flirting on the other sexes' unique choices. Furthermore, there were small effects of similarity in self-perceived mate value on unique flirting for men and women. Direct effects of similarity in self-perceived mate value on unique choices differed between sexes, $\chi^2(1) = 6.33$, $p = .01$, with small effects on unique male choices, but not unique female choices. As a result of these low and sex-specific effects, the original correlation between unique mate choices of men and women of .061 was only slightly reduced

⁵Dyadic reciprocity analyses were conducted across sessions. In contrast to individual analyses there is no need to control for speed-dating session when performing dyadic analyses because they rely on relationship effects which are per definition not affected by group differences. Consequently, when controlling for group, identical results emerge and all group effects equal zero.

Table 3. Variance partitioning for actual mate choices, assumed mate choices and flirting behaviour.

Parameter	Choices		Assumed choices		Flirting	
	Men	Women	Men	Women	Men	Women
Actor variance	.13**	.09**	.18**	.13**	.29**	.28**
Partner variance	.16**	.20**	.07**	.11**	.05**	.03**
Relationship + error variance	.70**	.72**	.75**	.75**	.66**	.68**

Note: *N* = 2160 dyads in 17 sessions.
 ** *p* < .01.

Table 4. Assumed and actual reciprocity of mate choices

	Men	Women
Assumed reciprocities		
Generalized assumed reciprocity	.70**	.48**
Perceiver assumed reciprocity	.36**	.36**
Dyadic assumed reciprocity	.33**	.38**
Actual reciprocities		
Individual reciprocity	-.41**	.01
Dyadic reciprocity	.061**	

Note: *N* = 2160 dyads in 17 sessions.
 ** *p* < .01.

Table 5. Correlations of individual flirting components with individual components of actual mate choices

	Flirting			
	Flirtatiousness		Being flirted at	
	Men	Women	Men	Women
Actual mate choice				
Choosiness	.05	-.03	.09	.05
Popularity	.50**	.32**	.56**	.31**

** *p* < .01.

to .057 when considering the influence of similarity in self-perceived mate value and unique flirting in the model. Nonparametric bootstrapping analyses indicated that this reduction of .003 is not significant, *p* = .246, 95%CI [-.003, .010]. Similarity in physical attractiveness had no additional significant effect on unique flirting or unique mate choices but predicted similarity in self-perceived mate value

($\beta = .067, p < .01$). The respective APIM model did not result in a further reduction of the dyadic reciprocity correlation.

Similar non-significant reductions of the dyadic reciprocity correlation were found for alternative models with sociosexuality-attractiveness and self-perceived mate value-attractiveness relations as predictors of unique flirting and unique mate choices.

DISCUSSION

The low actual reciprocities of mate choices

Based on a community sample of real-life speed daters we were able to show that actual mate choices are not reciprocal, although people strongly expect their choices to be reciprocated and dating behaviour (flirting) is indeed strongly reciprocal. These results illustrate why dating and flirting is such a fascinating experience: The outcome is hard to predict. Some authors even argue that the inherent ambiguity in dating is an important functional aspect: In mating situations people (particularly women) try to use ambiguous or deceptive behavioural strategies in order to learn more about the others' intentions without revealing too much about one's own intentions (Grammer et al., 1999, 2000). To assume reciprocity in dating situations can be viewed as a form of self-deception that helps to display more confidence and behave self-assured in this highly ambiguous social context (cf. von Hippel & Trivers, in press).

The low actual and high assumed reciprocity of mate choices also helps to explain why the accuracy of metaperceptions in the mating context seems to be rather low (Back et al., 2010). When guessing how likely it is that

Table 6. Correlations of personality and physical attractiveness with individual components of actual mate choices

Personality	Actual mate choice					
	Choosiness			Popularity		
	All	M	W	All	M	W
Self-perceived mate value	.25**	.27**	.16*	.36**	.42**	.25**
Sociosexuality	-.02	.05	-.01	.13*	.30**	.08
Extraversion	.05	.04	.05	.10	.16*	.02
Shyness	-.17**	-.18*	-.14	-.17**	-.23**	-.07
Physical attractiveness	.24**	.25**	.08	.52**	.52**	.51**

** *p* < .05,
 ** *p* < .01.

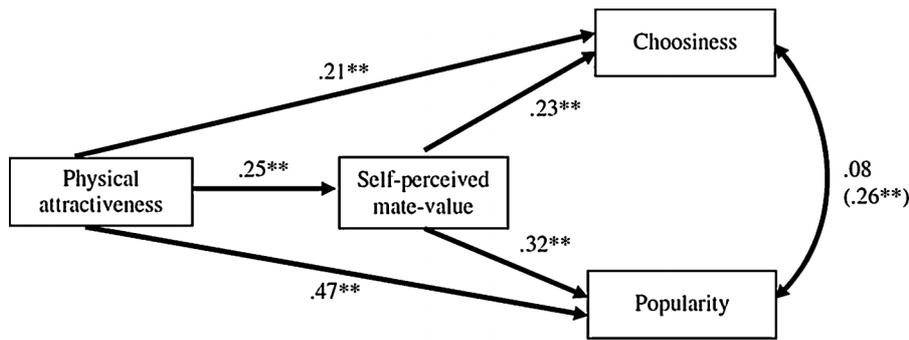


Figure 1. A path model representing the standardized effects of physical attractiveness and self-perceived mate value on choosiness and popularity for men. The value outside parentheses refer to the correlation between the residuals of choosiness and popularity when taking the effects of physical attractiveness and self-perceived mate value into account. The value in parentheses refers to the correlation of choosiness and popularity before taking the effects of physical attractiveness and self-perceived mate value into account. ** $p < .01$.

Table 7. Correlations of personality and physical attractiveness with individual components of flirting behaviour

Personality	Flirting behaviour					
	Flirtatiousness			Being flirted at		
	All	M	W	All	M	W
Self-perceived mate value	.15**	.24**	.01	.12 [†]	.27**	.09
Sociosexuality	.15**	.23**	.14	.22**	.27**	.15 [†]
Extraversion	.19**	.14 [†]	.20**	.09	.14	.13
Shyness	-.05	-.05	-.04	-.07	-.22**	.04
Physical attractiveness	.20**	.20**	.17 [†]	.13 [†]	.28**	.22**

[†] $p < .05$,
** $p < .01$.

they will be chosen as a mate, people mainly seem to rely on an invalid cue: Their own interest to choose this potential mate. But why does the high-assumed reciprocity of mate choices not translate into actually reciprocal mate choices? Here, we analysed this puzzling pattern by looking at the influence of flirting and personality on mate choices.

The role of flirting

Flirting during the 3-minutes dates in the present study was highly reciprocal both on an individual and dyadic level. That is, habitually flirtatious persons were generally more flirted at and unique flirting towards a specific dating partner was related to receiving flirtatious responses from speci-

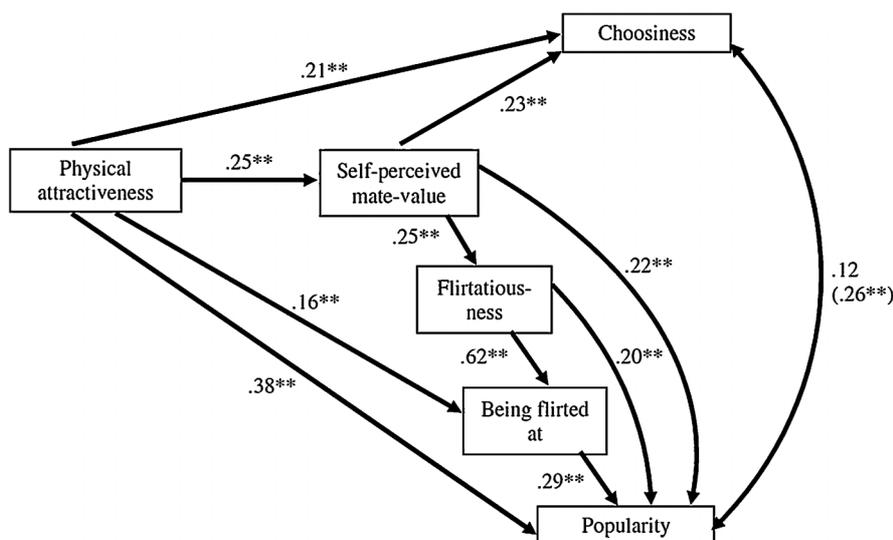


Figure 2. A path model representing the standardized effects of physical attractiveness, self-perceived mate value and flirting components on choosiness and popularity for men. The value outside parentheses refers to the correlation between the residuals of choosiness and popularity when taking the effects of physical attractiveness, self-perceived mate value and flirting components into account. The value in parentheses refers to the correlation of choosiness and popularity before taking the effects of physical attractiveness, self-perceived mate value and flirting components into account. ** $p < .01$.

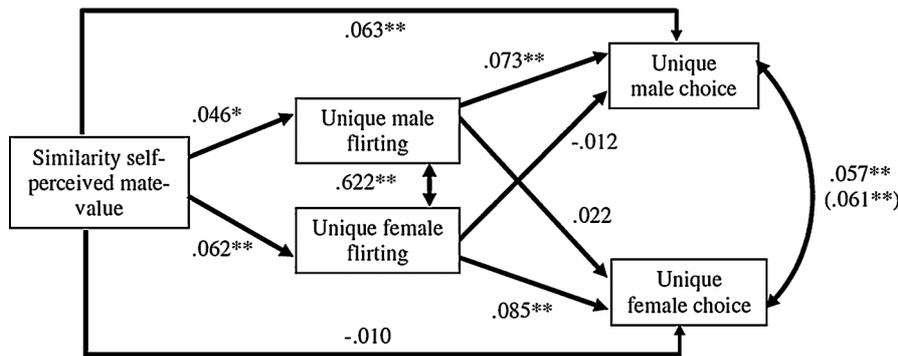


Figure 3. A path model representing the standardized effects of similarity in self-perceived mate value and unique flirting on unique mate choices for men and women. The value outside parentheses refers to the correlation between the residuals of unique mate choices when taking the effects of similarity in self-perceived mate value and unique flirting for men and women into account. The value in parentheses refers to the correlation of unique mate choices of men and women before taking the effects of similarity in self-perceived mate value and unique flirting for men and women into account. * $p < .05$, ** $p < .01$.

cally this partner. So why did this reciprocal behaviour not lead to reciprocal choices? The answer to this question can be found when looking at the effects of flirting on choosing and being chosen.

On an individual level, one's own flirtatiousness strongly predicted generally being flirted at, but the effects of both flirting components on popularity were considerably lower. Thus, receiving many flirtatious responses to the own flirtatiousness is not necessarily related to being chosen as a mate particularly often. Even more importantly, flirtatiousness and generally being flirted at were not at all related to the own number of choices: People are more or less choosy irrespective of how much they flirt or how much others flirt with them.

These results are in line with those of Grammer et al. (2000) who found that specific behavioural flirting acts are not or only weakly related to actual interest in the other person in initial heterosexual dyadic interactions. Flirting seems not to be a direct expression of one's mating interest. Rather, flirting can be conceptualized as a strategic behaviour that includes deception and ambiguous actions in the service of detecting others' intentions while veiling one's own mating interest (Grammer et al., 2000). Additionally, people may reciprocate flirting in the absence of mating interest just because they are motivated to keep interactions with others running as smooth as possible. Finally, flirting may be done to appear more attractive, not because one is attracted to the other person but to exaggerate one's qualities as a mate: Being more popular through habitual flirting allows keeping potential mates available.

There was no strong reciprocity of mate choices on the dyadic level either. But interestingly enough, the underlying flirting dynamics responsible for the lack of reciprocity were considerably different. In contrast to general flirtatiousness, unique flirting with specific dates was an indicator of mating interest. Although the effect sizes were rather low, men and women who uniquely flirted with a specific potential mate uniquely chose this person later on. This time, however, there was no effect of flirting on being chosen: Uniquely flirting at a specific person did not lead to being specifically chosen by this person later on. Again, this was true for men and women.

Future studies should shed more light on the different role of flirting for mating choices on the individual and dyadic level. In particular, it could be analysed whether longer dates

lead to more parallel effects of flirting on choosing and being chosen, thereby increasing the individual and dyadic reciprocity of mate choices. Is flirtatiousness and being flirted at unrelated to choosing others at all or is general flirting behaviour at later time points more informative regarding one's generalized mating interest (cf. Grammer et al., 2000)? Is uniquely flirting at specific others completely ineffective in eliciting unique interest in this person or is more time needed to make a convincing and consistent proposal by means of unique flirting? Such analyses might also include more fine-grained measures of flirting behaviour that include a wide range of specific behavioural acts as well as more Gestalt-like behaviour patterns (Grammer et al., 1998, 1999, 2000; Penke & Asendorpf, 2008).

The role of personality and physical attractiveness

Personality was related to general dating behaviour (flirting) and dating outcomes (mate choices). For instance, extraverts as well as men with a more unrestricted sociosexuality flirted more. Self-perceived mate value was related to choosiness and popularity. Moreover, it led to more flirtatiousness and a higher tendency to evoke flirtatious responses, but only in men. Shy men were less choosy, evoked less flirting and were less popular. Moreover, facial attractiveness was related to self-perceived mate value, own flirtatiousness, the tendency to be flirted at, as well as popularity and men's choosiness.

Because individual characteristics, particularly self-perceived mate value and physical attractiveness, tended to affect choosiness and popularity similarly, they contributed to the low individual reciprocity of male mate choices. This is in line with mating market models, where highly popular people are predicted to be more careful in their choices and unpopular people are predicted to be more indiscriminate (Penke et al., 2007). It should be noted that some of the paths in our individual-level models (Figures 1 and 2) require additional mediational explanations. For instance, although the effect of physical attractiveness on choosiness is partly mediated by self-perceived mate value, there is still a direct path. Theoretically, some sort of self-perceptions must be involved that mediate this effect (cf. Back et al., 2011, Principle 4 of the PERSOC model). Moreover, the direct path of self-perceived mate value on

popularity that is not mediated by flirting components needs to be explained by some sort of observable behaviours. Future studies should thus include additional trait self-perceptions related to one's attractiveness and value as a potential mate as well as a number of additional behavioural measures that characterize the mating process.

Consistent with prior studies on real-life mate choices in speed-dating (Eastwick & Finkel, 2008; Kurzban & Weeden, 2005; Luo & Zhang, 2009), effects of personality similarities and personality-attractiveness relations on mate choices were weak. For men (but not for women) there was a direct effect of partner similarity in self-perceived mate value on their unique choices. Additionally, similarity in self-perceived mate value predicted men's and women's unique flirting behaviour. Again the effects were comparatively weak. Generally, it is plausible that stronger partner similarity effects need more time to emerge than the 3 minutes provided in our study. Moreover, other similarities might play a bigger role in explaining dyadic reciprocities, particularly those that are easily observable, like similarities in clothing and subcultural scene preferences (Back *et al.*, in press).

Future studies should additionally investigate personality traits as moderators of mating dynamics. For example, the ability to judge one's own mate value is moderated by men's sociosexuality and women's agreeableness (Back *et al.*, 2010). Moreover, individual differences of the targets being judged may also play a role. Place *et al.* (2009), for instance, found that people differ in how much a third person can judge their romantic interest in a dating partner.

Sex differences

An interesting sex difference was revealed at the individual level. Whereas both men and women assumed to be chosen by popular individuals, and men and women who were not very choosy thought to be popular, the individual reciprocity of actual mate choices was sex-specific: Being popular and choosy was unrelated for women but positively related for men. On average, the more a man was chosen by women (the more popular he was as a potential mate) the less he chose women (the choosier he was). This interesting finding can be explained when looking at the effects of individual characteristics on choosiness and popularity. For men, self-perceived mate value and facial attractiveness are more consistently and more strongly related to both choosiness and popularity than for women. Moreover, for men, but not for women, self-perceived mate value is related to flirtatiousness and being flirted at, which in turn are both related to popularity. Another possible explanation not examined here is that women react more negatively than men to subtle behavioural indicators of indiscriminateness (= low choosiness; cf. Eastwick *et al.*, 2007).

LIMITATIONS AND FUTURE RESEARCH

Relating the current study to the PERSOC model (Back *et al.*, 2011), several extensions are desirable for future research. First, we have only investigated a limited set of individual

dispositions (Principle 1 of the PERSOC model). Other personality variables might also be relevant. It would for example be interesting to include measures of narcissism, since this trait has been shown to influence first impressions in general (Back *et al.*, 2010b) and short-term mating in particular (e.g. Jonason, Li, Webster, & Schmitt, 2009; Rhodewalt & Eddings, 2002). Moreover, future studies should also include relationship dispositions, i.e. interindividually different and relatively stable internal characteristics of individuals directly related to specific others of the existing social network of individuals. Differences with regard to the number of social partners, relationship satisfaction or the perceived intimacy, trust and reciprocity of existing relationships might have an influence on mating dynamics.

Second, we have only investigated a single social interaction unit for each dating dyad. Including multiple subsequent social interaction units over a longer period of time would allow for a better understanding of the mutual influence between dispositions and mate choices over time (Principle 2 of the PERSOC model). Such a longitudinal approach would also help to find out how long it takes until people realize their wrong assumptions regarding the reciprocity of mate choices, if it occurs to them at all.

Third, for understanding the complex individual and dyadic processes (Principle 4 of the PERSOC model) of mating, a far more detailed assessment of the mediating actual behaviours and interpersonal perceptions (Principle 3 of the PERSOC model) would be desirable. Here, we included a single global behavioural measure of flirting. Future research should include both, a variety of more specific verbal, nonverbal and paraverbal flirting behaviours as well as other behavioural domains (e.g. nervousness, dominance, expressiveness, responsiveness). Moreover, future studies should also include various interpersonal perceptions (e.g. perceptions and metaperceptions of liking, attractiveness, intelligence, similarity) within the dating interaction. This would allow analysing the intra- and interpersonal dynamics underlying the absent or even negative actual reciprocity of mate choices in more detail. Finally, it would be interesting to explore why assumed reciprocities are comparatively high. Possible mechanisms could for example be mental consistency (Heider, 1958; Newcomb, 1961) or self-enhancement (Markus, 1980; Sedikides, 1993; Taylor & Brown, 1988).

CONCLUSIONS

The present study showed that actual mate choices are not reciprocal, even though people strongly expect their choices to be reciprocated, both on an individual and dyadic level. By applying a real-life speed-dating paradigm, we were able to look at the potential role of flirting, personality and physical attractiveness in explaining this puzzling pattern of results. First, although flirting itself was strongly reciprocal individually and on a dyadic level, flirting did not influence choosing and being chosen as a potential mate in parallel ways. On a dyadic level, unique flirting predicted one's own unique mate choices, but not uniquely being chosen by this

specific person. On an individual level one's general flirting habit predicted how often one is being chosen as a mate, but did not influence how easily one chooses others. Second, personality and physical attractiveness did also work against strong reciprocal mate choices. On the dyadic level, the influence of similarity in self-perceived mate-value, similarity in physical attractiveness and personality-attractiveness relations on unique mate choices was only weak. On the individual level, physical attractiveness and self-perceived mate value influenced choosing others and being chosen in opposite directions, at least for men: The more attractive and the higher the self-perceived mate value of a man, the more likely he was chosen by women (i.e. the more popular he was as a potential mate) but the less often he chose women (i.e. the choosier he was). In sum, by taking a closer look at the role of flirting, personality and physical attractiveness in actual dating and mate choices, the present study helps to explain the puzzling pattern of high assumed but low or even negative actual reciprocity of mate choices. Future studies might adopt our componential social relations modelling approach for more fine-grained analyses of the behavioural and personality determinants as well as the time course of flirting behaviour and mate choices.

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