

What Leads to Romantic Attraction: Similarity, Reciprocity, Security, or Beauty? Evidence From a Speed-Dating Study

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ABSTRACT Years of attraction research have established several “principles” of attraction with robust evidence. However, a major limitation of previous attraction studies is that they have almost exclusively relied on well-controlled experiments, which are often criticized for lacking ecological validity. The current research was designed to examine initial attraction in a real-life setting—speed-dating. Social Relations Model analyses demonstrated that initial attraction was a function of the actor, the partner, and the unique dyadic relationship between these two. Meta-analyses showed intriguing sex differences and similarities. Self characteristics better predicted women’s attraction than they did for men, whereas partner characteristics predicted men’s attraction far better than they did for women. The strongest predictor of attraction for both sexes was partners’ physical attractiveness. Finally, there was some support for the reciprocity principle but no evidence for the similarity principle.

Why we are attracted to some individuals but not to others is one of the fundamental questions in the study of close relationships. To date, hundreds of studies have been conducted to understand the mechanism of romantic attraction. These efforts have led to several well-established “principles” of attraction. However, a major limi-

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tation of previous attraction studies is that they have almost exclusively relied on well-controlled, laboratory-based experiments in which participants are provided with information that is systematically varied across conditions. The partner presented to the participants is oftentimes not real; more importantly, participants have no opportunity to interact with the partner or to develop a real relationship with the partner. It is thus not clear to what extent the principles of attraction based on these carefully manipulated experiments can be generalized to the real world. The current study is designed to address this limitation by examining predictors of initial romantic attraction and testing the robustness of the principles of attraction in a real-life setting—a speed-dating context.

Previous Research on Attraction—Principles of Attraction

Based on a comprehensive review of the huge volume of research on attraction, Berscheid and colleagues have identified a few principles of attraction in first encounters (for reviews, see Berscheid & Reis, 1998; Berscheid & Walster, 1978). Below, we briefly review four principles that are most relevant in a speed-dating setting.

The Similarity Principle

As the old saying “birds of a feather flock together” indicates, individuals should be attracted to others who share their own characteristics. According to balance theory (Heider, 1958), similar individuals like each other because they form a balanced system that leads to harmony and positive feelings, whereas an imbalance would cause psychological discomfort. Byrne (1971) argued that similarity should be attractive because it has many adaptive functions, including facilitating dyadic interactions, fostering a sense of familiarity and safety, and validating individuals’ self-concepts. Byrne and colleagues (e.g., Byrne, 1961; Byrne & Nelson, 1965) conducted a series of experimental studies in which they manipulated the degree of the overlap between participants’ attitudes and responses ostensibly provided by a stranger. The researchers indeed found strong and replicable evidence for a positive link between attitudinal similarity and attraction. With regard to the attractiveness of similarity on personality traits, the evidence overall is considerably weaker but nevertheless substantial (e.g., Herbst, Gaertner, & Insko, 2003; Klohnen & Luo, 2003; Wetzel & Insko, 1982).

Reciprocity

According to the reciprocity principle, people like others who like them, or, as Newcomb (1956) summarized, “attraction breeds attraction.” A number of experimental studies tested this idea by providing participants with bogus feedback ostensibly left by another person. Their results showed that the sheer knowledge of being liked by someone makes people more attracted to the partner (e.g., Aronson & Worchel, 1966; Condon & Crano, 1988; Curtis & Miller, 1986). Kenny and colleagues (Kenny, 1994; Kenny, Kashy, & Cook, 2006) distinguish two different types of reciprocity: general reciprocal liking and dyadic reciprocal liking. Whereas *general reciprocal liking* holds that individuals who generally like other people tend to be liked by others, *dyadic reciprocal liking* refers to the unique liking shared between two partners. Kenny (1994) conducted a meta-analysis on the two kinds of reciprocity, and the results indicated that whereas the evidence for general reciprocal liking was inconsistent (i.e., some studies showed a pattern of reciprocal liking whereas others showed unreciprocated liking), there was consistent and strong evidence for dyadic reciprocal liking.

Beauty (Physical Attractiveness)

There has been a great deal of evidence that partners' physical attractiveness is a reliable predictor of attraction in initial encounters (for a meta-analysis, see Feingold, 1990). More importantly, there is a pronounced sex difference in stated preferences of partner's physical appearance, with men placing greater value on beauty than do women (e.g., Buss, 1989; Buss & Schmitt, 1993). This pattern has been often cited as evidence for the evolutionary view of mate selection that men and women are evolved to have different mate preferences in order to maximize their success in gene reproduction. However, new evidence suggests that this sex difference, although consistently observed in stated preferences, is not observed in the actual choices people make in real-life dating situations (e.g., Eastwick & Finkel, 2008; Todd, Penke, Fasolo, & Lenton, 2007).

Security

This is a less widely recognized principle because it was developed after attachment theories were used as a framework to study romantic

relationships (see Hazan & Shaver, 1987). According to attachment theories, individuals differ in their capacity to create and maintain close relationships (e.g., Bowlby, 1973; Hazan & Shaver, 1987). It is hypothesized that people should be most attracted to secure partners (i.e., neither anxious nor avoidant) because they offer the best opportunities for forming close, emotional bonds (Chappell & Davis, 1998; Latty-Mann & Davis, 1996). Several experimental studies presented participants with scenarios or vignettes that described hypothetical partners with different attachment styles. Results consistently showed support for the security hypothesis (Chappell & Davis, 1998; Klohnen & Luo, 2003; Latty-Mann & Davis, 1996). We propose to extend the scope of security from attachment characteristics to nonattachment domains. We suggest that any positive trait associated with abilities to form a close relationship should help promote a secure relationship and thus should lead to greater attraction. Previous research has shown that traits such as extroversion, agreeableness, conscientiousness, positive affect, self-esteem, and low neuroticism and low negative affect tend to serve as relationship “buffers” and predict better relationship quality (e.g., Gattis, Berns, Simpson, & Christensen, 2004; Murray, 2006; Watson et al., 2004). Thus, we predict that partners possessing these adaptive traits should be more attractive.

Limitations of Previous Attraction Research

To date there have been hundreds of studies on attraction, and the results provide replicable evidence for the principles of attraction just reviewed. However, a major limitation of previous studies is that the vast majority of them are well-designed experiments conducted in a laboratory (for a few exceptions, see Byrne, Ervin, & Lamberth, 1970; Sprecher & Duck, 1994; Walster, Aronson, Abrahams, & Rottman, 1966). Their experimental procedure is more or less a version of the “bogus stranger paradigm” in which participants were provided with bogus information about a bogus partner in the format of pictures, vignettes, scenarios, or other descriptions. In some studies participants did interact with a real person; however, the partner was oftentimes a confederate acting in a predetermined manner to allow for experimental manipulation (e.g., Gold, Ryckman, & Mosley, 1984; Moreland & Beach, 1992). Thus there was no opportunity for a real relationship even when participants happened to like their partner. Paradigms like these have a very

important advantage—they allow researchers to have good control over the key aspects of the experiments and thus have good internal validity. However, it is not clear how much external validity they have. Given the bogus nature of the partner and, most importantly, the fact that participants oftentimes do not actually get to meet the partner and/or have an opportunity to move a step further beyond feeling attracted, these experiments are quite different from real life in terms of how attraction develops and how it affects one's life. It remains a question whether individuals will show the same pattern of attraction if they do have interactions with a real partner and do have a chance to continue if they like each other. In other words, it is not yet clear whether the principles of attraction primarily derived from laboratory experiments will operate in the same manner in the real world.

Related to this external validity issue, previous experiment-based studies are also limited in their scope of examination. These studies typically focused on only one principle of attraction and tested it on a limited number of domains. For example, many studies tested the role of attitudinal similarity (e.g., Byrne, 1961), partner similarity to self and ideal self (e.g., Wetzell & Insko, 1982), and positive reinforcement (e.g., Byrne & Nelson, 1965) in attraction. A number of studies tested similarity and security in attachment (e.g., Chappell & Davis, 1998; Klohnen & Luo, 2003). Other studies examined physical attractiveness or other background characteristics (e.g., Berscheid, Dion, Walster, & Walster, 1971). However, it is quite possible that the attraction principles may operate differently on different domains. For example, it is shown that similarity on attitudes and interests has stronger links to attraction than similarity on personality traits does (see Klohnen & Luo, 2003). Without simultaneously testing the effects of different attraction principles on various individual difference characteristics in the same study, we do not know the relative importance of each principle and the importance of different characteristics in their predictive power of attraction. The current study will address the limited scope issue by testing all four attraction principles on a wide range of domains including demographic characteristics, values, attitudes, interests, general personality (i.e., Big Five, affectivity, and self-esteem), and a specific personality domain of particular importance to relationships—attachment. To address the external validity issue, we examined attraction in a real-life setting—speed-dating.

Previous Speed-Dating Research

Speed-dating is a relatively new tool for the match-maker business and a useful research paradigm for studying real-life initial attraction. The typical procedure of speed-dating involves at least two sessions. There is usually a pre-event session where individuals provide their own information and state their preferences for potential partners. The dating service company or the researcher then makes arrangements for the at-event session where a set number of individuals of desired gender are invited to attend. At this event participants go on a series of brief “dates” with other attendees. These dates last a uniform number of minutes (typically from 3 to 8 min). After the event, participants typically indicate whether they would like to see their dates again. If two speed-daters are interested in seeing each other, they may be provided an opportunity to contact each other for a future, presumably more traditional, date (see Finkel, Eastwick, & Matthews, 2007).

Recently a few published studies have reported results based on data of speed-dating events with either primarily a commercial purpose or a research purpose. Interestingly all of them have examined the discrepancy between stated preferences and actual choices made after speed-dating (Eastwick & Finkel, 2008; Fisman, Iyengar, Kamenica, & Simonson, 2006; Kurzban & Weeden, 2005, 2008; Todd et al., 2007). Past mate preference research (as well as these speed-dating studies) has shown distinct sex differences in people’s stated partner preferences, with males preferring physical attractiveness and youth and females preferring social status and financial and emotional security (e.g., Buss, 1989). These findings have often been linked to the sex differences in reproduction and discussed as evidence for the evolutionary perspective (see Buss, 1989). However, available speed-dating studies consistently found that both men and women, in their actual partner choices, preferred partners with better physical attractiveness to the same extent. The results are fascinating in that they suggest that individuals’ expressed partner preferences do not match their actual choices in speed-dating. There is a clear discrepancy between results obtained in laboratories when participants imagine about their partner and results obtained in real-life or semi-real-life settings where participants actually have face-to-face interactions with real people and have an opportunity to start a real relationship from there. However,

because speed-dating is a brand-new concept in dating business and relationship research, the available speed-dating studies are limited in their examination and none has yet conducted a comprehensive test of attraction.

Methodological and Statistical Considerations

One of the biggest challenges that speed-dating researchers face is the relatively complicated research design and data structure. First, the dyads, or couples formed in a speed-dating setting, are not completely independent dyads as we normally see in couple research. For example, M males and N females participate in a speed-dating event. Note that M and N may or may not be the same. Each of the M men dated each of the N women and formed a total of $M \times N$ dyads. These dyads are not independent dyads because each dyad shared the same partner with some other dyads. It would be statistically inappropriate to simply treat the $M \times N$ dyads as independent dyads. Second, in addition to having individuals and dyads, speed-dating studies typically involve multiple groups. It is important to note that the groups are independent from each other. That is, each group is randomly selected from the population and independently yields results for the hypothesis under investigation. The researcher needs to make a conclusion about the population by aggregating results from all groups. Therefore, the statistical analyses targeted at speed-dating data need to be able to take care of the nonindependent nature of the data and to assimilate results from multiple groups.

To address the nonindependence issue, we followed the Social Relations Model (SRM) approach that Kenny (1994) proposes for analyzing dyadic data. The key assumption of SRM is that for any dyadic variable (e.g., how much are you attracted to your partner), the score on this variable provided by any given participant can be viewed as an outcome of three effects: effects due to the *actor* (i.e., how much does this participant like every partner?), effects due to the *partner* (i.e., how much does everyone like this partner?), and effects due to the dyadic *relationship* between the actor and the partner (how much do these two individuals like each other?). Accordingly, the variance of this dyadic variable across all participants can be partitioned into three components: variance due to actor effect, partner effect, and

relationship effect.¹ Kenny (1998) has developed computer programs (e.g., BLOCKO and SOREMO) to accommodate different dyadic designs (e.g., round-robin and block designs). In the speed-dating case, the data fit a block design in which a group has two subgroups (men and women), and members of each subgroup only rate members of the other subgroup but do not rate members of their own subgroup. We used the program BLOCKO to conduct data analysis. For each subgroup, BLOCKO outputs the variance partition results. An extremely useful feature of SRM analyses is that because every individual's attraction score is partitioned into actor effect, partner effect, and relationship effect, we are able to correlate these actor, partner, and/or relationship effects with other variables such as self characteristics, partner characteristics, and couple characteristics, which would allow us to better understand the nature of these effects and to test the four attraction principles.

With regard to the multigroup issue, we believe that meta-analysis would be the best approach because it is able to pool results from independent samples and provide a more reliable estimate for population parameters. In the current study, BLOCKO outputs a correlation for men and women for every group. Because there are six groups, we obtain six individual correlations for each gender and perform a meta-analysis on these correlations. We also conduct a meta-analysis for sex differences.

METHOD

Participants

One hundred eight heterosexual college students (54 men and 54 women) who were currently single participated in the study at a large public university in the southeast in exchange for course credits. Participants were 19.5 years old on average ($SD = 1.79$ years).

1. To be more precise, actor, partner, and relationship effects are three sources of the systematic variance in a dyadic variable. The nonsystematic variance, also called error variance, is due to random errors. When the dyadic variable is measured by a single item, the relationship effect cannot be separated from errors. When the dyadic variable is measured by multiple items, SRM is able to separate the errors out of the relationship variance (see Kenny et al., 2006).

Procedure

The study contained three sessions: pre-event, at-event, and postevent. Sessions were a week apart from each other.

Pre-Event Procedure

After signing up for the speed-dating study, participants came to a laboratory room for the pre-event assessment at a designated time. They completed a packet that included a background questionnaire, inventories of political attitudes, personal values, interests, general personality, affectivity, attachment, and self-esteem. They were informed the date, time, and location of the speed-dating event after they finished the questionnaire. Each participant received a reminder call the day before the event.

At-Event Procedure

We conducted a total of six speed-dating events, each taking approximately 1 hr to complete. For each event, we allowed for a maximum of 10 women and 10 men. The actual size of the groups ranged from 14 individuals (8 women and 6 men) to 20 individuals. We hosted all speed-dating events in a classroom. In advance of each session, members of the research team configured the room so that there was a series of 10 dyadic seating areas. Refreshments were served throughout the event, consisting of cookies, chips, chocolates, water, canned Coke, and bottled juice.

When participants arrived for the event, a staff member checked them in immediately. Each participant received a name tag showing their first name and an assigned participant ID (e.g., 14 M Jeff). After putting on their name tags, participants were directed to another staff member for photograph shooting. Participants were provided a clipboard with a pile of 10 identical one-page at-event questionnaires that participants would complete following each date. They were then instructed to find their seats, which were marked with participant ID numbers.

After all participants arrived and were seated, an experimenter gave a welcome speech and briefly explained the procedure. Each speed-date was 5 min long. After each 5-min date, the experimenter rang a bell, which served as the cue for the male participants to rotate to the next position (the women remained in their seats throughout the event). After seat rotating, all participants completed the questionnaire regarding the date they just had before starting their next date. This procedure repeated till all couples had met. At the end of the event, participants signed up for a time to take part in the postevent assessment. It was made clear to

participants that if there was mutual interest in exchanging contact information for further interaction outside the study, participants may do so at their own risk.

Postevent Procedure

Before the postevent took place, staff members worked out an individualized feedback sheet for every participant. This feedback sheet listed the participant's response to the question "Would you be interested in seeing this partner again after the speed date event?" from the at-event questionnaire for every partner she or he had met at the event. The feedback sheet also listed each partner's response to the participant on this question. When participants arrived for the postevent, they received the feedback sheet along with the photos of the partners they had met. They then completed a one-page postevent questionnaire about their feelings and perceptions for each partner and a one-page questionnaire of self-ratings.

Materials

The majority of the assessment took place at the pre-event. Thus we describe pre-event measures in detail, followed by the at-event and postevent questionnaires. Reliabilities for all key measures are shown in Table 1.

Demographic Questionnaire

The demographic questionnaire included information regarding sex, age, ethnicity, height, weight, and religion.

Physical Attractiveness

Eight members of the research team independently rated the physical attractiveness of each participant's photo using a scale from 1 to 7, with 1 being *very unattractive*, 4 being *average*, and 7 being *very attractive*. The interrater agreement was .86. The average across all eight raters was used to indicate participants' physical attractiveness.

Political attitudes

To assess political attitudes, participants were asked to indicate whether they agreed or disagreed with seven statements reflecting a wide range of contemporary sociopolitical issues such as the legalization of abortion, public school prayer, the censorship of pornography, and the legalization of same-sex marriages (see Watson et al., 2004). Participants answered these items using a 5-point scale (1 = *disagree strongly* to 5 = *agree*

Table 1
Means and *SDs* for the Male and Female Participants on the Key Variables

Measure	α	Male		Female	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Demographic variables					
Age	NA (1)	19.66	1.93	19.35	1.65
Height	NA (1)	5.56	.46	5.21	.27**
Weight	NA (1)	169.65	31.76	130.81	19.81**
Physical attractiveness	NA (1)	3.86	.82	4.16	.81
Interest					
Fun activity	.69 (5)	3.17	.45	3.63	.44**
Sport activity	.69 (4)	3.24	.45	3.03	.61*
Habitual activity	.63 (3)	2.46	.67	2.45	.57
Art activity	.55 (5)	2.61	.63	2.94	.55**
Social activity	.51 (3)	3.15	.61	3.38	.58*
Value					
Extrinsic value	.71 (9)	3.80	.49	3.88	.51
Intrinsic value	.64 (6)	4.59	.42	4.67	.37
Political attitude	.68 (7)	3.09	.74	2.93	.72
Big Five Personality					
Neuroticism	.84 (8)	2.17	.64	2.57	.79**
Extroversion	.86 (8)	3.58	.71	3.89	.68*
Agreeableness	.79 (9)	3.93	.60	4.12	.58
Openness	.83 (10)	3.82	.61	3.65	.65
Conscientiousness	.78 (9)	3.52	.56	3.63	.60
Affectivity					
Positive affect	.77 (10)	3.78	.45	3.91	.49
Negative affect	.84 (10)	1.69	.38	1.87	.59
Attachment					
Avoidance	.80 (8)	3.03	.87	3.19	1.16
Anxiety	.76 (8)	3.58	.93	3.86	1.07
Self-esteem	.84 (10)	4.15	.52	4.07	.66
Attraction	.85 (3)	3.16	.95	2.98	1.04**

Note. $N = 108$. Values in parentheses are the number of items included in each measure.

*Men and women means differed at $p < .05$, two-tailed.

**Men and women means differed at $p < .01$, two-tailed.

strongly). A principal component analysis of the responses indicated a large general factor, which together accounted for 35% of the total variance. All items loaded .30 or above on the factor and were combined to compute an overall measure of political conservatism.

Personal Values

The 16-item measure of values was adapted from value inventories created by Rokeach and Ball-Rokeach (1989) and Schwartz and Bilsky (1990). Participants were asked to answer the following question: "How important is each of these values to you as a guiding principle in your life?" (1 = *not important* to 5 = *very important*). A principal component analysis of the responses revealed the presence of two factors, which together accounted for 34% of the total variance. Items that loaded .30 or above on each factor were used to compute the factor score. One factor was labeled "Extrinsic Values" and had 10 values, including power, wealth, social recognition, and such. The other factor was labeled "Intrinsic Values" and had six values, such as love, friendship, and self respect.

Personal interests

To measure personal interests, we developed a list of 20 activities that are popular among college students, such as sports, music, movies, and shopping. Participants reported the extent to which they enjoyed each activity using a 4-point scale ranging from "*don't enjoy at all*" to "*very much enjoy*." A principal component analysis of the responses suggests a five-factor structure, which accounted for 55% of the total variance. Items that loaded .40 or above on each factor were used to compute the factor score. The first factor was labeled "fun activity," which includes watching movies, shopping, eating out, and traveling. The second factor was labeled "sport activity," which includes playing sports, watching sports, exercising/working out, and hiking. The third factor was labeled "habitual activity" and included smoking, drinking, and religious activities (R). The fourth factor was labeled "art activity" and included listening to music, playing instruments, painting/drawing, photography, and reading. The final factor was labeled "social activity" and included going to a party/bar, meeting new people, and participating in club activities.

Big Five Personality Characteristics

Participants rated themselves on the Big Five Inventory (BFI; John & Srivastava, 1999). The BFI contains 8-item scales assessing neuroticism and extraversion, a 10-item openness scale, and 9-item measures of agree-

ableness and conscientiousness. Participants were asked to indicate the degree to which each item was descriptive of them on a 5-point scale ranging from *disagree strongly* to *strongly agree*.

Affectivity

Participants rated themselves on the trait form of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS is a 20-item inventory assessing negative affect (e.g., nervous, upset, irritable, ashamed, scared) and positive affect (e.g., enthusiastic, active, interested, proud, determined). Participants were asked to indicate on a 5-point scale (ranging from *very slightly or not at all* to *extremely*) "to what extent you generally feel this way."

Self-Esteem

Participants rated themselves on Rosenberg's (1965) 10-item self-esteem inventory using a 5-point scale (ranging from *strongly disagree* to *strongly agree*). Example items are "I feel that I have a number of good qualities" and "I feel I do not have much to be proud of" (R).

Adult Attachment

Participants completed a 16-item short version of Brennan, Clark, and Shaver's (1998) 36-item attachment measure, which yields scores on the dimensions of Anxiety and Avoidance. Participants used a 7-point scale (ranging from *strongly disagree* to *strongly agree*) to indicate how they typically feel and behave in their romantic relationships.

At-Event Questionnaire

The one-page at-event questionnaire asked participants about their immediate feelings and perceptions of the partner. Only feelings toward the partner were relevant to the results reported in this article. We first asked the question "Would you be interested in seeing this partner again after the speed-date event?" and participants answered "yes" or "no." Then participants responded to three more questions tapping their attraction to the partner: "How much do you like this person as a potential date?" "How interested are you in getting to know this person better?" and "How comfortable do you feel being around this person?" Participants used a 5-point scale ranging from 1 (*not at all*) to 5 (*very much*) to answer those questions. An average was computed across the three items to indicate attraction.

Postevent Questionnaire

The postevent questionnaire included a one-page self-questionnaire and a one-page partner questionnaire for each partner. Once again, only the three attraction questions are relevant to the current results. These questions and rating format were the same as the at-event questionnaire.

RESULTS**Preliminary Analyses**

Before turning to the primary results, we first examined the descriptive statistics and sex differences on the key characteristics (Table 1). Compared to women, men were significantly taller and heavier. They engaged in more sport activities, whereas women engaged in more fun activities (e.g., shopping and travel), art activity, and social activity. No sex difference was found on values and political attitudes. In terms of personality, only two domains showed significant sex differences: Women rated themselves higher on neuroticism and extroversion than did men. Finally, men reported greater attraction to partners than women did. These results were largely consistent with previous research (e.g., Watson et al., 2004). However, it is interesting that no sex difference was found on the affectivity and attachment dimensions in the current sample, whereas

Table 2
Relative Variance Partitioning for Attraction

	Male Attraction			Female Attraction		
	Actor	Partner	Relationship	Actor	Partner	Relationship
Group 1	.25	.32	.43	.44	.09	.47
Group 2	.64	.08	.29	.37	.35	.29
Group 3	.33	.25	.44	.30	.26	.44
Group 4	.32	.21	.47	.29	.40	.31
Group 5	.27	.07	.67	.46	.21	.33
Group 6	.24	.32	.46	.26	.25	.39
Average	.34	.21	.46	.35	.25	.39

Note. Values are the percentage of the stable construct variance accounted for by actor, partner, and relationship, respectively. Errors are excluded from stable construct variance.

previous studies show that women tend to be more anxious and less avoidant, and they score higher on both affectivity dimensions than men do (e.g., Bartholomew & Horowitz, 1991; Watson et al., 2004).

Partitioning Variance in Initial Romantic Attraction: Actor, Partner, Relationship

We used the BLOCKO program (Kenny, 1998) to conduct an SRM analysis of the speed-dating data. Specifically, an analysis was performed separately for the male subgroup and female subgroup in each of the six groups. The SRM analysis is designed to partition the variance in the attraction scores into three sources: actor, partner, and relationship (excluding errors). BLOCKO outputs both absolute and relative variance partitioning of attraction. For ease of comparison, we only report the results of relative variance partitioning of the stable construct variance (i.e., free of errors). Table 2 shows the relative variance percentages for each of the three components for male and female attraction.

Overall, the results were quite similar across gender, although there was considerable variability across groups. For men, the amount of the variance solely due to the actor ranged from 24% to 64% with an average of 34%; partner effect took an average of 21% with a range of 7%–32%; for relationship effect, the range was 29% to 67% and the average was 46%. For women, self effect ranged from 26% to 46% with an average of 35%; partner effect ranged from 9% to 40% averaging 25%; and finally relationship effect accounted for 29%–47% with an average of 39%. Overall, the actor, the partner, and the unique dyadic relationship all accounted for a substantial portion of the stable variance of men's and women's attraction, with the dyadic relationship being the most important.

Who Is Attracted? Correlations Between Self Characteristics and Attraction

To test what self characteristics may have predisposed some individuals to be more attracted to partners than others, we computed a correlation between each of the 22 self characteristics and the actor effects of attraction. We did this for men and women separately within each of the six groups. Each group yielded a correlation for each characteristic and for each gender. We then conducted a meta-analysis based on these six correlations for men and women to

Table 3
Correlations Between Self Characteristics and Attraction

Self Characteristic	Attraction		<i>q</i>
	Male	Female	
Demographic variables			
Age	.03	-.43**	.49*
Height	.00	.01	-.01
Weight	.12	.35*	-.25
Physical attractiveness	-.32	-.29	-.02
Interest			
Fun activity	.32*	-.22	.55*
Sport activity	.17	.24	-.07
Habitual activity	.28	-.25	.55*
Art activity	.25	.50**	-.29
Social activity	.33*	.43**	-.11
Value			
Extrinsic value	.13	.05	.08
Intrinsic value	.25	.14	.11
Political attitude (conservatism)	-.52**	.06	-.63**
Big Five personality			
Neuroticism	.01	.05	-.05
Extroversion	.13	.43**	-.33
Agreeableness	.30	.19	.12
Openness	.20	.55**	-.41+
Conscientiousness	-.09	-.10	.01
Affectivity			
Positive affect	.04	.53**	-.55*
Negative affect	-.18	-.18	.00
Attachment			
Avoidance	-.18	-.11	-.07
Anxiety	.19	-.04	.23
Self-esteem	.24	.23	.01
Average of absolute value	.19	.24	.23

+ $p < .10$, * $p < .05$, ** $p < .01$, two-tailed.

estimate a more reliable population effect size using the fixed effect model, which assumes the population effect size is a fixed but an unknown constant (see Cooper & Hedges, 1994; Field, 2001; Hedges & Olkin, 1985). The homogeneity test of effect sizes across groups showed that homogeneity held for all 22 correlations for both men

and women, suggesting that the fixed effect model was appropriate. We computed a pooled correlation using six correlations from the individual groups and tested the statistical significance of this pooled correlation. Finally, we tested the statistical significance of sex difference in the pooled correlations and computed the effect size (q) for sex difference (see Cohen, 1988).

Table 3 presents these 22 correlations for men and women and the effect size (q) for sex difference. For men, only 3 of the 22 correlations reached statistical significance: fun activity, social activity, and conservatism. The three correlations suggest that a man would be more attracted to women if he enjoys fun activities (i.e., traveling, eating out, and shopping) and social activities and if he is liberal in political attitudes. For women, seven characteristics showed a significant correlation with attraction: age, weight, art and social activities, extroversion, openness, and positive affect. These correlations indicate that women who show more interest in men tend to be younger, heavier, more interested in art and social activities, extroverted, open, and cheerful. Meta-analyses of sex differences show that five characteristics had statistically significant sex differences: age, fun, habitual activity, conservatism, and positive affect. According to Cohen (1988), qs of .10, .30, and .50 indicate small, medium, and large effects, respectively. We see that all five significant sex differences were large effects and another three reached moderate effects (art activity, extroversion, and openness). On average, men's correlations had a mean size of .19 and women's was .24. Their average difference size was .23. These results indicate that self characteristics predicted women's attraction better than it did men's.

Who Is Attractive? Correlations Between Partner Characteristics and Attraction

Next we turn to the question of what characteristics make a partner attractive. To test this, we correlated individuals' self characteristics with their partner effects of attraction (i.e., how much attraction each individual received from their dates). Thus, these correlations show what others like about the individual as a partner. This is another way to ask what partner characteristics predict the actor's attraction. Homogeneity tests failed to hold 19% of the time for both genders. This relatively high violation rate of homogeneity suggested that the effect size tended to vary randomly from sample

Table 4
Correlations Between Partner Characteristics and Attraction

Partner Characteristic	Attraction		<i>q</i>
	Male	Female	
Demographic variables			
Age	.39*	-.07	.48*
Height	-.03	.15	-.18
Weight	-.42**	-.04	-.40
Physical attractiveness	.80**	.88**	-.27
Interest			
Fun activity	-.27	-.39	.13
Sport activity	.46*	.48**	-.02
Habitual activity	-.28	-.05	-.24
Art activity	-.09	-.15	.06
Social activity	.06	.18	-.13
Value			
Extrinsic value	-.15	.03	-.18
Intrinsic value	.13	-.23	.37
Political attitude	.60**	.28	.40
Big Five personality			
Neuroticism	-.36*	.26	-.63**
Extroversion	.50**	.06	.49*
Agreeableness	.52**	.26	.31
Openness	-.39	-.04	-.37
Conscientiousness	.50**	.17	.38
Affectivity			
Positive affect	.37	.21	.17
Negative affect	-.62*	-.03	-.70**
Attachment			
Avoidance	-.45	-.02	-.46*
Anxiety	-.42*	-.07	-.38
Self-esteem	.42**	.30	.14
Average of absolute value	.38	.20	.31

* $p < .05$, ** $p < .01$, two-tailed.

to sample. Therefore we adopted the random effect model to conduct the meta-analysis. We followed Hedges and Vevea's (1998) procedure to compute and test the statistical significance of the pooled correlations. Table 4 presents the pooled correlations for men and women and the effect sizes (q) of sex difference.

We found men's attraction was significantly correlated with 12 partner characteristics: partner's age, weight, physical attractiveness, sport activity, conservatism, all Big Five dimensions except openness, negative affect, anxiety, and self-esteem. These correlations suggest that men are more attracted to women who are older, lighter, physically attractive, athletic, conservative, extroverted, agreeable, and conscientious and who have high self-esteem. They are less attracted to women who are heavier, more neurotic, anxious, and grumpy. For women, only two partner characteristics showed a statistically significant correlation with their attraction: physical attractiveness and sport activity, indicating that women are strongly drawn to men who are good-looking and athletic. We observe significant sex differences on five characteristics: age, neuroticism, extroversion, negative affect, and avoidance. In terms of the magnitude of these sex differences, there were 2 large effects (neuroticism and negative affect) and 10 medium effects (age, weight, intrinsic values, conservatism, extroversion, agreeableness, openness, conscientiousness, avoidance, and anxiety). On average, men had a mean correlation of .38, whereas women only had .20. The average size of sex difference was .31. These results provide strong evidence for sex difference on the link between partner characteristics and attraction, suggesting that we are much better able to predict attraction for men than for women using partner characteristics. It is particularly noteworthy that the only significant correlation that replicated across gender is on physical attractiveness, where both genders showed an extremely strong, positive correlation ($r_s > .80$).

Does Similarity Lead to Attraction?

To test whether the similarity between two partners played a role in initial attraction, we first computed the absolute difference score between the two partners on each characteristic for every couple. To eliminate potential confounding effects from the traits scores that went into the calculation of difference scores, we regressed difference scores on the two trait scores (i.e., men's and women's score on the dimension) and saved the residuals. We then correlated these residuals of difference scores with the relationship effects of men's attraction and of women's attraction within each group. Note that relationship effects capture the unique liking between every

Table 5
Correlations Between Couple (Dis)similarity and Attraction

Difference Score	Attraction		<i>q</i>
	Male	Female	
Demographic variables			
Age	.02	-.03	.05
Height	-.05	-.04	-.01
Weight	.02	-.05	.07
Physical attractiveness	-.02	-.07	.05
Interest			
Fun activity	.02	.09	-.06
Sport activity	-.01	-.03	.02
Habitual activity	.01	.00	.01
Art activity	-.05	-.01	-.03
Social activity	-.09	-.02	-.07
Value			
Extrinsic value	-.03	-.01	-.02
Intrinsic value	.04	.00	.04
Political attitude	-.13	-.11	-.02
Big Five personality			
Neuroticism	-.06	-.05	-.01
Extroversion	-.02	-.04	.01
Agreeableness	.07	-.05	.12
Openness	-.05	.06	-.11
Conscientiousness	.00	.03	-.03
Affectivity			
Positive affect	-.06	.00	-.06
Negative affect	.03	.00	-.03
Attachment			
Avoidance	-.03	-.09	.06
Anxiety	.02	.00	.02
Self-esteem	-.05	-.04	-.01
Average of absolute value	.04	.04	.04

couple. We computed a correlation on every characteristic within each group and then computed a pooled correlation based on these individual correlations. Homogeneity held for all 22 dimensions, and thus the fixed effect model was applied in the meta-analysis. Table 5 presents the pooled correlations for men and women along with the

effect size of sex differences. None of the 44 correlations reached statistical significance; in fact, the maximum magnitude of these correlations was only .13. The average effect size of sex difference was negligible ($< .05$).

Is There Evidence for Reciprocal Liking?

Finally, we tested whether the reciprocity principle of attraction was supported by our data, that is, whether people's initial attraction in a speed-dating context is contingent on how much their partner likes them. As noted earlier, Kenny and colleagues (Kenny, 1994; Kenny et al., 2006) distinguish two different types of reciprocity: general reciprocity and dyadic reciprocity. In SRM, general reciprocity is tested by correlating each person's actor effect with his or her own partner effect of attraction across all individuals in the group. In other words, we are correlating how much a person likes others in general and how much he or she is liked by others in general. This is performed for men and women separately. Dyadic reciprocity is tested by computing a correlation between the male partner's and the female partner's relationship effect of attraction across all couples within each group. Thus the dyadic reciprocity correlation captures the specific mutual liking between the two members of the dyads. Each group produced two general reciprocity correlations, one for men and one for women, and one dyadic reciprocity correlation. Homogeneity held for the relationship dyadic correlation and men's general dyadic correlation but failed to hold for women's general dyadic correlation. We therefore used the fixed effect model in the first two meta-analyses and random effect model for the other one. The general reciprocity correlation was $-.17$ (*ns*) for men and $-.42$ (*ns*) for women. The dyadic reciprocity correlation was $.18$ (*ns*). The fact that both general reciprocity correlations are negative suggests that people (particularly women) who generally like others more are liked less by their partners. This serves as evidence against reciprocity. The dyadic reciprocity correlation, although positive in direction, did not reach statistical significance and thus did not provide strong support for the reciprocal liking principle.

Because previous literature shows that knowing the partner likes oneself leads one to like the partner better, we reasoned that the postevent attraction scores should provide a better opportunity

to test evidence for reciprocal liking after participants had a chance to see their partners' reactions toward themselves. If reciprocal liking is true, then the reciprocity correlations based on postevent attraction ratings should be significant and positive. The three correlations were .18 (*ns*) for men's general reciprocity, $-.25$ (*ns*) for women's general reciprocity, and $.45$ ($p < .01$) for the dyadic reciprocity correlation, respectively. Given that the two general reciprocity correlations were insignificant and one was negative, there was little support for general reciprocal liking. The dyadic reciprocity correlation was statistically significant and positive, indicating that after receiving partners' feedback, participants showed a strong tendency of reciprocal liking.

DISCUSSION

To summarize, we observed several key findings from this speed-dating data set. First, initial attraction obtained in this real-life setting was a function of the actor, of the partner, and, most importantly, of the unique relationship between the actor and the partner. All three components contributed to a substantial amount of variance in romantic attraction. This is consistent with Kenny's (1994) conclusion based on his meta-analysis for general liking.

We then went on to test the specifics of the actor effect, partner effect, and relationship effect. That is, what characteristics of the actor (i.e., self characteristics), the partner, and of the relationship between the two partners mattered in attraction? We used self characteristics to predict attraction to test what characteristics predispose people to be more attracted to just any partner. We found that women showed seven significant associations whereas men only had three. In contrast, when partner characteristics were used to predict attraction, we found the opposite—whereas men showed 12 significant links, women had only 2. The strongest predictor of attraction was partner's physical attractiveness, and this was well replicated across sex. For the relationship effect, we examined two mechanisms at the dyadic level: reciprocity—the extent to which the two partners like each other—and similarity—the extent to which the two partners are similar to each other. Our results indicate that people like their partners better if they know their partners also like them. However, there was no evidence for the idea that similarity boosts attraction.

Theoretical Contributions to Attraction Literature—What Leads to Attraction?

One main goal of the current research is to test to what extent the principles of attraction based on laboratory experiments can be generalized to the real world. It is time for us to revisit each of these key principles of attraction.

Beauty

It is remarkable that the strongest predictor of initial attraction in a speed-dating context was partner's physical attractiveness, and, most importantly, men and women showed an extremely similar pattern. This finding was highly consistent with the results reported in several other speed-dating studies we mentioned earlier (Eastwick & Finkel, 2008; Fisman et al., 2006; Kurzban & Weeden, 2005, 2008; Todd et al., 2007). It therefore seems a very solid finding that men and women are equally strongly drawn to physically attractive partners. This finding, however, appears to be inconsistent with the widely accepted finding in evolutionary research indicating a fundamental sex difference in their preferences for long-term partners—whereas men prefer youth and physical attractiveness in their partners, women give more weight to partners' earning potential and commitment to a relationship. Evolutionary research does suggest that these sex differences in mating preferences tend to diminish or even disappear when short-term mating contexts are primed (e.g., Li & Kenrick, 2006). One may argue that speed-dating fits better a short-term context rather than a long-term mating context. It is important to note that some of the published speed-dating studies (Kurzban & Weeden, 2005, 2008; Todd et al., 2007) were not based on college student samples but on community adult samples. These participants actually paid to participate in the commercial speed-dating service with the hope to find a life partner. This should be considered as more like a long-term context. Nevertheless, they yielded a similar pattern as found in the college student based samples in Eastwick and Finkel and the current research. Moreover, Eastwick and Finkel did an excellent job ruling out several potential alternative explanations for this finding. For example, even when explicitly asked to consider long-term partners, both sexes continued to favor physical attractiveness. Thus, the lack of sex difference on preference of

physical attractiveness does not seem to be due to differences in the mating strategy people are taking.

Then how do we reconcile these findings? We consider a fundamental difference between mating preference research and attraction research—whereas mate preference or ideal partner research focuses on conscious, rational cognitions about an ideal partner, attraction research studies less conscious and more spontaneous feelings and behaviors. The difference in findings from these two fields indicates that human beings' rational, conscious mind can be independent from their behaviors in real-life encounters. In our particular case, it seems that women's attraction feeling is dominated by partners' physical attractiveness, just as their male counterparts, even though it is possible that when prompted to think about preferences for a potential mate, women would give priority considerations to characteristics like earning potential. Would that suggest that humans' conscious, rational thoughts are more a product of evolutionary principles, whereas their actual behaviors can be irrational and not necessarily in their best interests (in terms of reproductive success)? This question warrants further examination.

Security

In our test for evidence of security, we expanded the examination from attachment to other positive personality domains. Results indicated that women's attraction was predicted only by partners' physical attractiveness and sport interests. Note that none of the positive traits, including partners' attachment characteristics, predicted women's attraction. Men's attraction was significantly related to partner's age, conservatism, extroversion, agreeableness, conscientiousness, high self-esteem, low neuroticism, anxiety, and negative affect. This suggests that partner security is very important to men's attraction, and security is not just restricted to attachment dimensions; however, this was not the case for women. Two of our findings appear to contradict evolutionary principles: (1) Men preferred older women, and (2) women did not care that much about partners' attachment security and other positive traits, whereas these characteristics did matter to men. Evolutionary research has demonstrated that men prefer younger partners because youth is associated with increased reproductive potential, and women typically pay great attention to partner characteristics such as being caring

and secure because these are important qualities for raising children (e.g., Buss, 1989). It is important to note that these findings are only limited to college students. The participants in our sample ranged from 17 to 26 years. One possibility is that within this age range and in the context of attraction in college students, men like mature women better and women are not quite concerned about partner characteristics that are critical to raising children.

Reciprocity

We examined two types of reciprocity, general and dyadic reciprocity, according to Kenny's (1994) terms. We found little evidence for general reciprocity because none of the four general dyadic correlations reached statistical significance and three of them were not in the expected direction. These findings are consistent with Eastwick, Finkel, Mochon, and Ariely's (2007) report of negative at-event general reciprocity correlations in their speed-dating study and also generally consistent with Kenny's (1994) meta-analyses suggesting that evidence for general reciprocity was mixed and weak.

For dyadic reciprocity, the at-event correlation was weak and not significant. The post-event correlation was much stronger and statistically significant at the .01 level. Note that Eastwick et al. (2007) also found a weak at-event dyadic reciprocity correlation ($r = .14$ for romantic desire and $r = .20$ for chemistry) in their speed-dating study. However, they did not report any postevent result. Taken together, we conclude that before people had a chance to know their partners' reactions to them, the evidence for dyadic reciprocal liking was weak. This is likely to be due to the fact that people were not sure about how their partners felt about them. After they were informed of partners' responses, there was strong evidence that they were more attracted to partners who also liked them. This suggests that the reciprocity principle may operate at a conscious level; that is, people need to be aware of others' feelings toward them for strong reciprocal liking to occur.

Similarity

One of the most striking findings in current research is the lack of evidence for the attractiveness of similarity. None of the 22 characteristics showed a substantial link between similarity and attraction.

This was replicated in both sexes. This finding presents a strong contrast to previous experimental attraction research that suggested that similarity between two partners, particularly similarity on attitudinal domains, is a strong predictor of attraction. We believe that the inconsistency can be explained at least partially by the differential external validity that previous experimental research and current speed-dating research have. When everything is well controlled in experiments—that is, when similarity is the only variable being varied and extraneous variables are controlled so that they do not play a significant role in affecting attraction—similarity does turn out to be a predictor of attraction. In other words, individuals do prefer similar partners over dissimilar ones. However, when attraction is examined in a real-life context and nothing is being manipulated, attraction is likely affected by a host of factors, and similarity does not seem to carry much weight in predicting attraction in the first 5 min. It appears that although people have a preference for similar partners, similarity is clearly not the most important determinant of initial attraction. However, it is likely that similarity may play a much more important role later on in the relationship development (e.g., Luo & Klohnen, 2005).

We found an intriguing paradox in our results: The variance partition results suggest that the dyadic relationship between two partners was able to account for the most variance in speed-dating attraction. However, reciprocity and similarity—the two important principles of attraction that operate at the dyadic level—did not account for much speed-dating attraction. This suggests that there must be some other dyadic variables that are important to initial attraction but that we have not examined, at least in the current study. An important next step for attraction researchers may be to find out what these variables or processes might be.

Methodological Contributions to Attraction Research

Speed-Dating as a Research Paradigm

Because previous attraction research is predominantly conducted using laboratory-based experiments that lack ecological validity, it is important to replicate previous findings using a paradigm that mimics real-life settings. Speed-dating provides such a useful research paradigm to study initial romantic attraction because participants have an opportunity to meet and interact with the partner and also have an oppor-

tunity to start a relationship if they wish. Our findings indeed show important differences between laboratory-based findings and naturalistic setting-based results, suggesting that exclusively relying on well-controlled experiments to study attraction is not sufficient. We enthusiastically echo Finkel et al.'s (2007) advocacy of using speed-dating as a new research paradigm for studying attraction. It is important to note that just because speed-dating utilizes a naturalistic setting does not mean experimental manipulations are forbidden. It is completely legitimate and possible to incorporate manipulations in speed-dating to test certain hypotheses. For instance, to test how one's behaviors and perceptions are influenced by partner's feedback, a researcher may wish to have a confederate interact with naïve participants in a particular manner.

Statistical Analyses: Combining SRM and Meta-Analysis

Given the unique design of speed-dating and, more generally, the dyadic nature of interpersonal attraction or any dyadic behavior, Kenny's SRM is a very useful tool to examine how much the self (or actor), the partner, and the relationship contribute to the prediction of attraction and what characteristics of each of these components predict attraction. Because our study involved multiple groups, which is common in speed-dating events, we suggest using SRM to obtain the individual estimate within each group, followed by a meta-analytic procedure to obtain a pooled estimate across all groups. We hope these approaches will help researchers handle data analyses for speed-dating research and other dyadic research.

Limitations and Conclusions

We would like to conclude by noting a couple of limitations of the current study. First, participants in the sample were college students in a fairly large public university in the southeast. It is possible that the mechanisms underlying these college students' initial attraction in a speed-dating context might be considerably different compared to participants in a commercial speed-dating service who are seriously looking for life partners. It would be important for future research to replicate the current findings in non-college-student adults. Second, although speed-dating provides a window for us to examine attraction

in a real-life context, it is definitely not the only channel or the most common situation where people first meet their future partners.

In spite of the limitations, we believe that the current findings have greatly enriched and expanded our understanding of initial romantic attraction. Comparing our speed-dating findings and previous experimental findings on attraction, we notice several striking similarities and differences. We found support for the principle of beauty, and, very importantly, there was no sex difference on this principle. We were also able to find support for the expanded security principle; however, important sex differences were observed. There was support for dyadic reciprocity (at a conscious level), whereas no evidence was found for similarity. We hope that these findings will inspire future research to better understand the processes underlying initial romantic attraction.

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