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It's the Attention That Counts:

Interpersonal Attention Fosters Intimacy and Social Exchange

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Abstract

Human friendship poses an evolutionary puzzle, since people behave more generously toward their friends than the tit-for-tat strategy stipulates. A possible explanation is that people selectively behave in a generous manner toward their true friends, but not toward fair-weather friends. Social psychological studies have suggested that people use a partner's attentiveness toward them as a cue to distinguish these two types of friends. Accordingly, it was hypothesized that people would increase their intimacy with a partner who was attentive to them. This hypothesis was tested by disentangling the frequent confounding between a partner's attention and the benefits provided by the attentive partner in two scenario experiments (Studies 1a and 1b) and three laboratory experiments (Studies 2a to 2c). In Study 1, a partner's attentiveness was manipulated independently of the benefit provided by the partner. In Study 2, the partner's attention was experimentally dissociated from any potential benefit. These studies consistently showed that the participants increased their intimacy with a partner when they received attention from the partner. This result implies that models of the evolution of friendship must incorporate information exchange regarding the valuation of the relationship, as well as the exchange of fitness-related costs and benefits.

Keywords: intimacy, friendship, attention, reciprocity, social exchange

1. Introduction

Friendship is often considered a human instance of mutual cooperation within a dyadic relation, or *reciprocal altruism* (Trivers, 1971). Reciprocal altruism can be maintained when each member of the relation uses the tit-for-tat (TFT) strategy (Axelrod & Hamilton, 1981). Some authors, however, have pointed out that human friends do not use TFT (Hruschka, 2010; Silk, 2003; Tooby & Cosmides, 1996). For example, friends tend to be more generous than TFT players (e.g., people do not hastily retaliate against a friend's failure to cooperate; McCullough, 2008). Nonetheless, such generosity leaves people vulnerable to exploitation by fair-weather friends, who only reap benefits from their "friendship" and do not reciprocate. Therefore, in order to better understand the evolution of friendship, it is necessary for researchers to know the proximate mechanisms of how people distinguish true friends from fair-weather friends (Tooby & Cosmides, 1996). This paper reports a series of experiments that tested whether people would use a partner's attention toward them as a cue to identify true friends. In particular, we tested the hypothesis that people adjust their intimacy with a partner in accordance with how much attention the partner pays to them.

1.1. Friendship and bond testing

Conducting a thorough review of ethnographic and psychological evidence, Hruschka (2010) argued that human friendship differs from TFT-based cooperation. First, whether one helps a friend is not contingent on the friend's previous behavior (e.g., Boster, Rodríguez, Cruz, & Marshall, 1995). Second, people help a friend even when they cannot expect future reciprocation from the friend (e.g., Leider, Möbius, Rosenblat, & Do, 2009). Due to such retrospective and prospective indifference about a friend's input, people are more tolerant of short-term imbalances in exchanges with friends than with strangers (e.g., Shapiro, 1980; Xue &

Silk, 2012).

According to Barclay (2013), human friendship must be understood in the context of biological markets, where friends exert their freedom to choose their partner by themselves. In biological markets, it is important for individuals to accurately assess a current partner's willingness to stay in the relationship and provide benefits to them in the future. Interestingly, being ahead of biological market theory, two scholars (a biologist and a social psychologist) independently proposed a similar solution to this problem. Zahavi (1997) and Kelley (1983) maintained that the strength of a bond can be tested by imposing some stress on a tested individual. According to these authors, true friends are those who will act in a pro-relationship manner even when doing so is costly. This test is called *bond testing* in biology, and s*tress/strain test* in social psychology.

The notion of bond testing was recently applied to seemingly functionless but potentially dangerous rituals, such as mutual eye-poking, in white-headed capuchins (*Cebus capucinus*) in Costa Rica (Perry, 2011). Although such bond testing habits seem rare in modern human societies, costly commitment rituals, such as the sharing of blood, are in fact common in ethnographic records (Hruschka, 2010). Buss (2000) noted that modern technologies, medicines, and laws eliminated naturally-occurring testing situations because they solved problems that used to be unsolvable without friends' costly assistance. Despite the shortage of bond testing rituals and situations, people in modern societies still seem capable of accurately assessing their friends' valuation of them (DeScioli & Kurzban, 2009).

Drawing on Dunbar and Shultz's (2010) argument, we propose that people use a partner's attention toward them as a cue to assess the strength of their bond. As we will discuss shortly, whether one pays attention to a partner can be a credible cue of his/her valuation of the

partner. There is also social psychological evidence illustrating the importance of social attention. When engaging in a joint task, people are more attentive to their friend's need for help than that of a stranger (Clark, Mills, & Corcoran, 1989). Moreover, people are interested in whether their partner is attentive to their need (Clark, Dubash, & Mills, 1998). These studies have shown that A is attentive to his/her friend B's needs, and B is interested in whether A is attentive. The present study addresses the remaining question: Will B adjust his/her attitude toward A in accordance with A's attention to him/her?

1.2. Credibility of social attention

One might argue that social attention cannot be a credible cue of true friends because, unlike costly bond testing behaviors, social attention entails little cost and thus is fakeable. Nonetheless, as attention is a limited resource, paying attention to a certain partner necessarily reduces the amount of attention paid to other partners. As far as every potential partner is concerned about whether a person (A) is paying attention to him/her, A must allocate his/her attention to the potential partners according to his/her valuation of them.

Some might criticize the above argument by citing modern technologies (e.g., mobile phone) that enable people to cheaply connect with a larger number of partners than ever before. Nonetheless, as people tend to prefer having a relatively small number of close friends over having a lot of friends (Reis, 1990), the number of close others (or the size of a support clique) remains relatively small even in modern environments (Dunbar & Spoors, 1995). Moreover, research on mobile phone users' social networks has revealed that people tend to keep their active network size constant by replacing peripheral, old relationships with newly activated relationships (Miritello, Lara, Cebrian, & Moro, 2013a). In addition, it is noteworthy that the mobile phone technology does not provide "free" connections with a lot of others. Miritello et al.

(2013b) revealed that those with large mobile phone networks tend to spend less time per call than those with small networks. Therefore, the limited resource in the ancient environment (i.e., time) still functions as a constraint of network size. This may plausibly apply to another limited resource, namely, attention.

1.3. Is social attention a cue or a signal?

If A allocates his/her attention according to his/her valuation of partners, and the amount of attention allows the partners to credibly assess A's valuation of them, it might be more appropriate to call this "signal" than a "cue." However, we consider that it is premature to call social attention a signal because the term "signal" tends to be used in a more restricted manner than the term "cue." Maynard Smith and Harper (2003), for example, defined a signal as any act or structure that evolved because of its effect of altering other individuals' behavior. It is possible that attention allocation strategies evolved not to alter others' behavior but to alter one's own behavior (e.g., not to miss an important partner's predicaments). We shall revisit to this terminology issue in the general discussion section.

1.4. Intimacy as a proxy for perceived bond strength

The literature regarding close relationships suggests that perceived bond strength can be conceptualized as *intimacy*. According to Reis and Shaver (1988), intimacy has three building blocks: *understanding* (i.e., a partner accurately understands you), *validation* (i.e., a partner values your traits, attitudes, and opinions), and *caring* (i.e., a partner is concerned about your well-being). Validation and caring are especially relevant to the bond strength. That is, the higher the partner's valuation of you, the more likely the partner is to remain in the relationship with you; likewise, the more concern the partner has for your well-being, the more likely the partner is to help you when you are in dire need (see Reis, Clark, and Holmes, 2004, for a more recent

treatment of intimacy under the rubric of perceived partner responsiveness).

1.5. Dissociating attention from benefit

The hypothesis of the present study was that a partner's attention toward a target person would increase the target's intimacy with the partner. Self-evident as it might first appear, to our knowledge, there is no conclusive evidence to support this hypothesis. The difficulty accrues from the frequent confounding between attention and benefit: If a partner pays attention to your needs and behaves accordingly, he/she becomes your efficient support provider (Reis, 1990). In Study 1 (consisting of two scenario experiments), we wrote scenarios in which attention was manipulated independently of any benefits accruing from the partner's attentiveness. After confirming that attention itself was a determinant of intimacy in the scenario experiments (Study 1), we proceeded to test the hypothesis in a series of laboratory experiments, in which a partner's attention was experimentally dissociated from any potential benefit (Study 2).

2. Study 1

Two scenario experiments (Studies 1a and 1b) were conducted to test whether a partner's attention, independent of benefit, would promote intimacy.

2.1. Method

2.1.1. Participants

Participants in Study 1a were 312 Japanese undergraduates (196 males, 104 females, and 12 unreported; M_{age}±SD = 21.4±2.96 years), who completed a questionnaire in class. Three participants were omitted due to missing values.

Participants in Study 1b were 105 Japanese undergraduates (57 males and 48 females; M_{age}±SD = 19.3±1.85 years). As these two studies were conducted at different universities, there were no overlaps in participants.

2.1.2. Design and materials

Three support scenarios (i.e., advice, surprise, and moral support scenarios) were written for the experiments (see Table 1). To write these scenarios, we conducted a pilot study (N = 101, 55 females, M_{age}±SD = 18.79±1.98 years), in which we asked the respondents to describe real support events in an open-ended format, and then indicate whether the material or non-material aspects of the event were most important. Forty-seven events, for which the respondents considered the non-material aspects to be of central importance, included 16 advice, nine surprise, and seven moral support situations. For each of these three categories, we adapted one particular situation that was amenable to the manipulation of attention and benefit.

Study 1a employed a 2 (attention: present vs. absent) × 2 (benefit: present vs. absent) × 2 (time: long vs. short) between-participants factorial design. For example, the advice scenario described a situation where a friend listened to the participant's problem. Attention was manipulated by describing whether or not the friend had been aware of the participant having had some problem prior to the interaction. Benefit was manipulated by describing whether or not the friend's advice successfully solved the problem. Time was manipulated by the length of time the friend spent listening to the participant (30 minutes vs. 5 hours). The last factor, time, was included because, as we reviewed in the introduction section, it is a limited resource that is preferentially allocated to more intimate partners. However, time was not significant in Study 1a. Therefore, this factor was dropped from Study 1b that aimed at testing the replicability of Study 1a. In both experiments, the scenario order was counterbalanced by the Latin square design.

2.1.3. Dependent variables

After reading each scenario, the participants filled out a questionnaire regarding the relationship with the friend depicted in the scenario. *Intimacy* was assessed by three items

corresponding to understanding (How well do you think this friend understands you?), validation (How much do you think this friend accepts you?), and caring (How much do you think this friend cares for you?). For each scenario, Cronbach's α was within a reasonable range of .69 to .80. To examine whether intimacy would promote a reciprocal social exchange, the questionnaire also included the two items of *expectation of partner help* (How likely do you think this friend is to help you when you are in need?) and *willingness to help* (How willing are you to help the friend when he/she is in need?). These items were rated on a 5-point scale (1 = *not at all* to 5 = *very much*).

2.2. Results

2.2.1. Study 1a

To provide a general image of the result, we first tested the hypothesis by collapsing the three scenarios. For the nine items (three items × three scenarios), Cronbach's α was .76. The aggregated score was submitted to a 2 (benefit) × 2 (attention) × 2 (time) × 3 (scenario order) analysis of variance (ANOVA). We did not include sex as an independent variable for the sake of brevity (its main effect was not significant throughout the analyses reported in this subsection). The ANOVA revealed that only three main effects (benefit, attention, and order) were significant: $F_{1, 285} = 5.96$, $p = .015$, $\eta^2 = .017$ for benefit, and $F_{1, 285} = 35.36$, $p < .001$, $\eta^2 = .099$ for attention (throughout this paper, we abstain from interpreting the order effect and interactions involving order). Attention had a larger effect on intimacy than benefit did (Table 2 and Fig. 1a).

When the three scenarios were analyzed separately, the main effect of attention was consistently significant at the .01 level: $F_{1, 285}$'s > 7, η^2s = .053, .022, and .091 for the advice, surprise, and moral support scenarios, respectively. In contrast, the main effect of benefit was only marginally significant for the advice ($F_{1, 285} = 3.01$, $p = .084$, $\eta^2 = .009$) and surprise

scenarios ($F_{1, 285}$ = 3.30, p = .070, η^2 = .010). The main effect of time was significant only for the moral support scenario ($F_{1, 285}$ = 4.73, p = .030, η^2 = .014).

We then explored whether attention would promote social exchange (i.e., expectation of partner help and willingness to help). Collapsing the three scenarios, the social exchange variables were submitted to a series of 2 (benefit) × 2 (attention) × 2 (time) × 3 (scenario order) ANOVAs (Table 2). The main effect of attention was significant for expectation of partner help ($F_{1, 285}$ = 13.74, p < .001, η^2 = .042) and for willingness to help ($F_{1, 285}$ = 11.70, p < .001, η^2 = .036). In addition, the main effect of benefit was significant for willingness to help ($F_{1, 285}$ = 8.76, p = .003, η^2 = .027). The other effects were not significant.

Mediation analyses showed that the effects of attention on the social exchange variables were fully mediated by intimacy: Sobel's zs = 5.34 and 5.32 (p < .001 for both) for expectation of partner help and willingness to help, respectively.

2.2.2. Study 1b

Collapsing the three scenarios, intimacy (nine-item Cronbach's α = .82) was submitted to a 2 (benefit) × 2 (attention) × 2 (sex) × 3 (order) ANOVA. The main effects of attention and benefit were significant: $F_{1, 81}$ = 45.76, p < .001, η^2 = .319 for attention, and $F_{1, 81}$ = 6.60, p = .012, η^2 = .046 for benefit (see Table 2 and Fig. 1b). The other effects were not significant. Again, the effect size was larger for attention than for benefit.

When the three scenarios were analyzed separately, the main effect of attention was consistently significant at the .001 level: $F_{1, 81}$'s > 18, η^2s = .150, .230, and .214 for the advice, surprise, and moral support scenarios, respectively. The main effect of benefit was significant for the surprise scenario ($F_{1, 81}$ = 10.18, p = .002, η^2 = .081) and marginally significant for the advice scenario ($F_{1, 81}$ = 3.18, p = .078, η^2 = .025). (The main effect of order and the interaction between

order and sex were also significant for the moral support scenario.)

We then explored whether attention would promote social exchange (Table 2). A series of 2 (benefit) × 2 (attention) × 2 (sex) × 3 (order) ANOVAs revealed that the main effect of attention was significant for expectation of partner help ($F_{1, 81} = 8.50$, $p = .005$, $\eta^2 = .084$) and for willingness to help ($F_{1, 81} = 7.19$, $p = .009$, $\eta^2 = .072$). The main effect of benefit was not significant for either social exchange variable. (For willingness to help, the interaction between attention and order was also significant.)

Mediation analyses showed that the effects of attention on the social exchange variables were fully mediated by intimacy: Sobel's *z*s = 5.45 and 5.06 ($p < .001$ for both) for expectation of partner help and willingness to help, respectively.

2.3. Discussion

Study 1 provided support for the hypothesis that a partner's attention would promote intimacy. Across the three scenarios, the effect of attention was consistently significant. On the other hand, although benefit also fostered intimacy to some extent, it failed to reach the significance level for some scenarios. The results also showed that intimacy would facilitate social exchange; that is, the sense of intimacy increased the participants' expectation that their partner would help them in the future as well as their willingness to help the partner.

Apparently contradictory to the findings reviewed in the introduction section, time did not foster intimacy. However, it is noteworthy that previous studies have revealed that people use intimacy to adjust their time allocation strategy (Miritello et al., 2013a, 2013b; see also Witting et al., 2008, for evidence in female baboons). Therefore, whether people would use their partner's time allocation strategy as a cue to adjust their intimacy was not tested directly. Although the present study failed to confirm this latter proposition, it is possible that the null

effect was due to the methodology. The effect of time might arise from the actual experience of spending time together. Future studies should more thoroughly explore the effect of time on intimacy.

An important limitation of Study 1 was that attention was always accompanied by an altruistic act (i.e., listening to the participant's problem, giving a gift, providing moral support). Therefore, it was not clear whether attention itself, but not attention accompanied by an altruistic act, had the intimacy-promoting effect. Study 2 addressed this problem.

3. Study 2

Study 2 comprised three laboratory experiments intended to test whether mere attention dissociated from an altruistic act would foster intimacy. As Reis et al. (2010) noted, it is difficult to involve real friends in this kind of experiment because their intimacy would be substantially influenced by the quality of their real relationship. Therefore, we deviated from the friendship context to a situation involving a temporary partnership with a stranger.

Studies 2a and 2b compared the attention and no attention conditions, and they differed only in the operationalization of the no attention condition. Study 2c tested whether intimacy would be correlated with the amount of attention. There was no participant overlap across the three studies. All three studies were approved by the Institutional Review Board at the first author's institute.

3.1. Common procedure for the three studies

3.1.1. Experimental task

The three studies shared the condition in which the participants received a partner's attention in a joint task. Therefore, we will first explain the common procedure.

The participants first received the following instructions: Each participant is paired with

another participant (who was actually a computer program and whose sex was not revealed to the participant). The dyad members then independently solve 20 difficult trivia questions using a laptop computer. The questions are in multiple choice format, and there are four answer options. For each correct answer, a participant will earn 10 Japanese yen (10 US cents).

The cover story for attention was as follows: There are two roles; Players 1 and 2. Player 1 is allowed to monitor the question on which Player 2 is currently working. When Player 1 finds that Player 2 happens to be working on the same question that he/she is, Player 1 is allowed to click the hint button on the computer display. When Player 1 clicks the hint button, two incorrect options will be automatically removed from Player 2's computer display, and thus the hints make the quiz easier. On Player 2's computer display, there is a signal whose color turns from red to blue when Player 1 chooses to monitor Player 2.

After receiving the above instructions, all participants were assigned the role of Player 2 in an apparently random manner. In addition, they were told that they had been assigned to the no hint condition, in which Player 1 was still allowed to monitor Player 2, but was not allowed to give hints to Player 2. Therefore, Player 1's monitoring behavior (i.e., attention) was dissociated from any potential benefit in the task. Before playing the quiz game, the participants completed a questionnaire designed to assess their understanding of the task. All participants correctly understood the task.

After completing the quiz game and post-task questionnaires, the participants were fully debriefed and paid 700 Japanese yen (approximately 7 US dollars) for their participation. At the time of recruitment, the participants had been told that they would earn 500 JPY plus extra money depending on their performance on an experimental task.

3.1.2.Manipulation of a partner's attention

In the attention condition, the computer was programmed to turn the signal blue with a probability of .80 for each quiz. Therefore, the signal turned blue, on average, in 16 out of 20 quizzes, so that the participants received frequent attention from their partner.

3.1.3. Dependent variables

After finishing the quiz game, the participants filled out the questionnaires containing four intimacy items: understanding (If you became friends with the partner, how well do you think this person would understand you?), validation (If you became friends with the partner, how much do you think this person would accept you?), caring (How much did the partner care for you?), and an additional reversed item corresponding to caring (How much do you agree that this partner had little concern for you?). These items were rated on a 7-point scale (1 = *not at all* to 7 = *very much*). The four items were aggregated as the intimacy score (Cronbach's $\alpha = .72$, for the entire sample of Study 2).

The participants' interest in being friends with the partner was also assessed by two items: "How much are you interested in being friends with the partner?" and "How much do you agree that the partner and you will be good friends?" These items were aggregated as the *interest in friendship* score ($r_{107} = .50$, $p < .001$).

3.2. Study 2a

3.2.1. Method

Participants were 29 Japanese undergraduates (10 males and 19 females, $M_{age} \pm SD$ = 19.3±0.89), after excluding one participant who suspected the use of deceptive procedures. The participants were randomly assigned to either the attention or no attention condition. In the attention condition, the signal turned blue 80 percent of the time, while in the no attention condition, it never turned blue.

3.2.2. Results and discussion (Study 2a)

Throughout Studies 2a to 2c, there were no significant effects involving sex. Therefore, sex was not included in the reported analyses.

Consistent with the hypothesis, intimacy was higher in the attention condition (4.58±.82) than in the no attention condition (2.82±.79), $t_{27} = 5.91$, $p < .001$, $d = 2.20$ (Fig. 2). Although interest in friendship was not affected by the attention manipulation, $t_{27} = 1.04$, $p = .306$, it was significantly correlated with intimacy, $r_{27} = .38$, $p = .045$.

It is noteworthy that intimacy in the no attention condition was significantly lower than the mid-point of the scale (i.e., 4), $t_{13} = 5.60$, $p < .001$. Informal responses in the debriefing session revealed that some participants had negative impressions of the partners who had not monitored the participants. Therefore, it is possible that the significant attention effect was due to the reduced intimacy in the no attention condition, rather than the increased intimacy in the attention condition. Although intimacy in the attention condition was significantly greater than the scale's mid-point, $t_{14} = 2.77$, $p = .015$, it was desirable to test the hypothesis in a study involving a more "neutral" control condition. Study 2b was designed to create such a neutral control condition.

3.3. Study 2b

3.3.1. Method

Participants were 44 Japanese undergraduates (21 males and 23 females, M_{age}±SD = 19.0±1.32), after excluding one participant who suspected the use of deceptive procedures. To determine the sample size, we conducted a power analysis assuming that the attention condition would replicate Study 2a and the control condition would induce the neutral response. The result indicated that 50 participants would be sufficient to achieve the 80% standard.

The participants were randomly assigned to either the attention condition or the *no intention* condition. The attention condition was exactly the same as the attention condition in Study 2a. In the no intention condition, the participants were explained that the computer would determine when the participants' current quiz would appear on Player 1's computer, and thus their partner was unable to *intentionally* pay attention to them. In both the attention and no intention conditions, the signal turned blue 80 percent of the time.

3.3.2. Results and discussion (Study 2b)

As predicted, intimacy was higher in the attention condition (4.67±.67) than in the no intention condition (3.63±1.00), $t_{42} = 4.10$, $p < .001$, $d = 1.27$ (Fig. 2). In Study 2b, intimacy in the no intention condition did not significantly differ from the scale's mid-point, $t_{19} = 1.67$, *ns*. Therefore, we considered the no intention condition to be a neutral control condition. In addition, intimacy in the attention condition was significantly greater than the scale's mid-point, $t_{23} = 4.84$, $p < .001$. In Study 2b, interest in friendship was greater in the attention condition (3.85±1.17) than in the no intention condition (3.10±1.39), $t_{42} = 1.96$, $p = .057$, $d = 0.59$. As in Study 2a, it was significantly correlated with intimacy, $r_{42} = .68$, $p < .001$.

The results of Study 2b showed that a partner's *intentional* attention fostered intimacy and interest in friendship. Given this encouraging result, we proceeded to examine how much intimacy would correspond to the frequency of the partner's attention. Accordingly, Study 2c including low, middle, and high attention conditions was conducted.

3.4. Study 2c

3.4.1. Method

Participants were 36 Japanese undergraduates (18 males and 18 females, M_{age}±SD = 18.84±0.79), after excluding two participants who suspected the use of deceptive procedures.

The participants were randomly assigned to the low, middle, or high attention condition. To determine the sample size, we conducted a power analysis assuming that the high attention condition would replicate Studies 2a and 2b, the middle attention condition would be similar to the no intention condition in Study 2b, and the low attention condition would be similar to the no attention condition in Study 2a. The result indicated that the 80% power for the omnibus ANOVA would be achieved by the sample size of 11 per condition.

The computer turned the signal blue with a probability of .20, .50, and .80 for each quiz in the low, middle, and high attention conditions, respectively. The high attention condition was exactly the same as the attention condition in the previous two studies, except that after completing the intimacy questionnaire, the participants were asked to recall how many times the signal had changed during the quiz game.

3.4.2. Results and discussion (Study 2c)

The main effect of the amount of attention on intimacy was significant, $F_{2, 33} = 3.97$, $p = .028$, $\eta^2 = .194$ (Fig. 2). Tukey's HSD test indicated that intimacy in the high attention condition (4.65±.22) was marginally higher ($p = .055$) than in the middle attention condition (3.79±.20), and significantly higher ($p = .048$) than in the low attention condition (3.77±.32).

The effect of attention on interest in friendship was not significant in Study 2c. However, it was significantly correlated with intimacy ($r_{34} = .49$, $p = .002$). (In the low attention condition, a female participant scored the highest among the entire sample of Study 2. Excluding this participant made the effect of attention marginally significant, $F_{2, 32} = 2.96$, $p = .066$, M±SDs = 4.25±.92, 3.38±.96, and 3.50±.97 in the high, middle, and low attention conditions, respectively.)

The participants accurately recalled the frequency of the signal change (r_{34} between actual and estimated frequency = .85, $p < .001$): a paired sample t-test indicated that the

difference between the actual and estimated frequencies of the signal change was not significant, $t_{35} = 1.01$. More importantly, actual frequency was significantly correlated with intimacy, $r_{34} = .45$, $p = .006$.

Study 2c revealed that the participants' memory regarding the partner's attention was fairly accurate, and the amount of the partner's attention was a significant determinant of intimacy toward the partner.

4. General Discussion

The two lines of studies showed that a partner's attention to a target person fostered intimacy. This effect was observed even when attention was dissociated from immediate or potential benefits. The heightened intimacy then promoted the participants' willingness to engage in a social exchange with the partner (Study 1) or interest in friendship (Study 2). As the effect of attention was larger for intimacy than other variables, such as social exchange variables or interest in friendship, it seems that intimacy is a proximate emotional mechanism that allows people to behave differently toward true friends than fair-weather friends. The present results suggest that people emotionally distinguish the two types of friends (i.e., adjust the level of intimacy towards the two types of friends), rather than consciously know who are the true friends and who are not.

4.1. Signaling attention

In the introduction section, we argued that attention may not be a *signal*. It is noteworthy that attention to a partner's needs is often expressed in a conspicuous manner, such as providing emotional support or sharing good news.

Unlike instrumental support, emotional support (e.g., moral support in Study 1) is often associated with little fitness-enhancing benefit. Nonetheless, emotional support effectively leads

to a recipient's adjustments as much as (if not more than) instrumental support does (e.g., Malecki & Demaray, 2003). It is also noteworthy that the timely provision of emotional support conveys that the support provider is paying constant attention to the recipient. As emotional support is more conspicuous than mere attention, we surmise that the provision of emotional support may serve as a signal of attention (i.e., a less visible cue). At the same time, support-seeking behaviors may be conceived as bond testing behaviors, that is, a recipient's active attempt to assess the strength of the bond (Zahavi, 1977). These conceptualizations yield some testable hypotheses. First, emotional support, if provided spontaneously, can be cheap but should be delivered in a timely fashion. Second, emotional support provided according to the recipient's demand must be costly because the primary interest of the demanding recipients is not receiving support itself but to knowing how high a cost the partner is willing to incur to maintain the relationship.

The timely sharing of good news may also signal attention to a partner's needs, as it also requires constant attention to the partner. Argyle and Henderson (1984) listed "sharing news of success" as one of most important rules of friendship. Reis et al. (2010) recently experimentally demonstrated that sharing good news promoted a sense of intimacy. Furthermore, Dunbar and Shultz (2010) pointed out that mimicry and behavioral synchronization may also be signals because both require constant attention and are known to promote a sense of intimacy or cooperative behavior (e.g., Lakin, Jefferis, Cheng, & Chartrand, 2003; Wiltermuth & Heath, 2009).

In sum, although attention itself may not be a signal, it can be behaviorally manifested in several ways: emotional support, good news-sharing, mimicry and synchronization. All of these are not directly fitness-enhancing for recipients, but they seem to have a

relationship-cementing function. They might be signals that evolved to alter recipients' attitudes and behaviors toward signalers.

4.2. Bond testing in a romantic relationship

So far, we have discussed social attention in the context of friendship. However, the strength of a bond or commitment is also a concern with consequences in the romantic context. Therefore, it is reasonable to assume that social attention will strengthen romantic relationships as well. However, there is a notable difference between friendships and romantic relationships: Partner betrayals can be more damaging to the betrayed party in the romantic context than in the friendship context. For instance, partners' extra-marital affairs are associated with paternity uncertainty for males, and the loss of paternal investments in children for females. Therefore, romantic partners might well require more than cheap attention signals. In support of this prediction, Yamaguchi and Ohtsubo (unpublished data) recently revealed that cheap signals (e.g., emotional support accompanied by little cost) are less effective in the romantic context than in the friendship context, while costly signals (e.g., expensive gifts) are equally effective in both types of relationship.

4.3. Limitations of the study

A limitation of the present study is its exclusive reliance on the self-report measure of intimacy. It is desirable to have some convergent evidence employing different measures. A possible alternative measure is experimental games, such as the trust game and the dictator game. For example, as it is known that people give more to a friend than a stranger in the dictator game (Leider et al., 2009), it would be interesting to investigate whether the participants would allocate more resources to their partner in the attention condition than in the no attention (or low attention) condition. It would also be possible to test whether participants pay more attention to

an attentive partner by assigning the Player 1 role to the participants in the experimental setting of Study 2. How often they monitor the partner is a measurable index of attention (cf. Clark et al., 1989).

We did not test the important assumption of the hypothesis: those who are paying attention to a particular partner are more strongly committed to the relationship than those who are not paying attention. This assumption must be empirically tested before concluding that attention is a credible cue of friendship.

4.4. Conclusion

The present study showed that a partner's attention increases a target person's intimacy with the partner. The effect of attention did not rely on whether it brought immediate benefits from the relationship. This result has an important implication for the evolution of human reciprocity. Although typical models of reciprocity focus solely on the costs and benefits accruing from social exchanges, the results of the present study suggest that social signals, which convey information regarding partners' unobservable qualities (e.g., willingness to stay in the relationship), must also be incorporated in the models for us to fully understand human reciprocity and friendship.

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Table 1

Three Scenarios Used in Study 1b (Italics Signify Manipulation of Attention and Benefit, and the Words in Parentheses Indicate the Corresponding Conditions)

Advice Scenario
You have been worried about some problem for a while. When you were having a conversation with your same-sex friend, you happened to mention the problem. The friend said, "*I was thinking you look a bit blue these days*" (**attention**) / "*I didn't know that you had that problem*" (**no attention**). On that day, the friend listened to you for about three hours. The advice *solved your problem* (**benefit**) / *did not solve your problem* (**no benefit**). Some days later, you happened to meet the friend. *The friend asked you, "How are those things going?"* (**attention**) / *The friend and you talked about yesterday's TV show* (**no attention**). You thanked the friend again for his/her advice.
Surprise Scenario
One of your same-sex friends brought you a birthday cake two days after your birthday. In fact, you had an important test a day after your birthday (i.e., yesterday). So, you were working hard to prepare for the test on your birthday. *The friend remembered that you had the test, and in order not to bother you, he/she scheduled this surprise visit two days after your birthday* (**attention**) / *The friend was reminded of your birthday by another friend, and happened to visit you on the day after your test* (**no attention**). The friend obtained a CD of your favorite singer as a giveaway, and he/she gave it to you. In fact, *you were planning to buy the CD tomorrow* (**benefit**) / *Unfortunately, you just bought the same CD today* (**no benefit**). You and the friend chatted while eating the cake. The friend wished you "happy birthday" again and left your place.
Moral Support Scenario
At the campus library, you were working hard on your course assignment on the due date. In a rush to finish it, you missed a class. Last week, you told your friends that you were going to skip the class to finish the assignment. After class, *remembering what you had said last week, one of your same-sex friends came to the library, and said, "Just came to see how things are going with you"* (**attention**) / *One of your same-sex friends came to the library to return a book and happened to find you there and talked to you. He/she didn't remember what you had said last week* (**no attention**). The friend stayed with you until you finished the assignment. While waiting, the friend said, "Don't forget to attach the reference list, or you won't get the credit." *In fact, you had forgotten about it, so the friend's comment was very helpful* (**benefit**) / *You remembered it and had already attached it to your assignment* (**no benefit**). After completing the assignment, you left campus with the friend.

Table 2

Mean Intimacy, Expectation of Partner Help, Willingness to Help as a Function of Attention and Benefit

		Intimacy		Expectation of Partner Help		Willingness to Help	
Study 1a		No Benefit	Benefit	No Benefit	Benefit	No Benefit	Benefit
No Attention	*M*	3.72	3.81	3.57	3.61	3.78	3.95
	SD	(0.42)	(0.35)	(0.62)	(0.49)	(0.57)	(0.45)
Attention	*M*	3.96	4.10	3.79	3.86	3.98	4.17
	SD	(0.44)	(0.40)	(0.60)	(0.60)	(0.58)	(0.52)
Study 1b		No Benefit	Benefit	No Benefit	Benefit	No Benefit	Benefit
No Attention	*M*	3.65	3.84	3.55	3.53	3.78	3.81
	SD	(0.44)	(0.43)	(0.58)	(0.66)	(0.47)	(0.73)
Attention	*M*	4.17	4.39	3.91	3.95	4.15	4.14
	SD	(0.33)	(0.34)	(0.52)	(0.84)	(0.42)	(0.81)

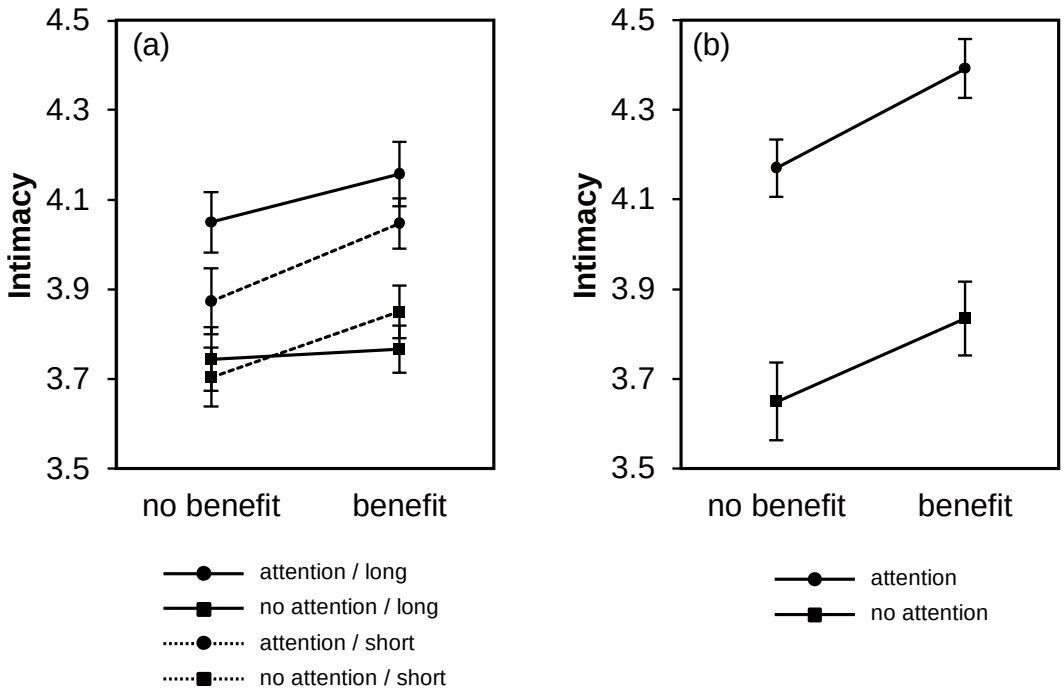

Fig. 1. Mean intimacy as a function of attention, benefit, and time for Study 1a (Fig. 1a). Mean intimacy as a function of attention and benefit for Study 1b (Fig. 1b).

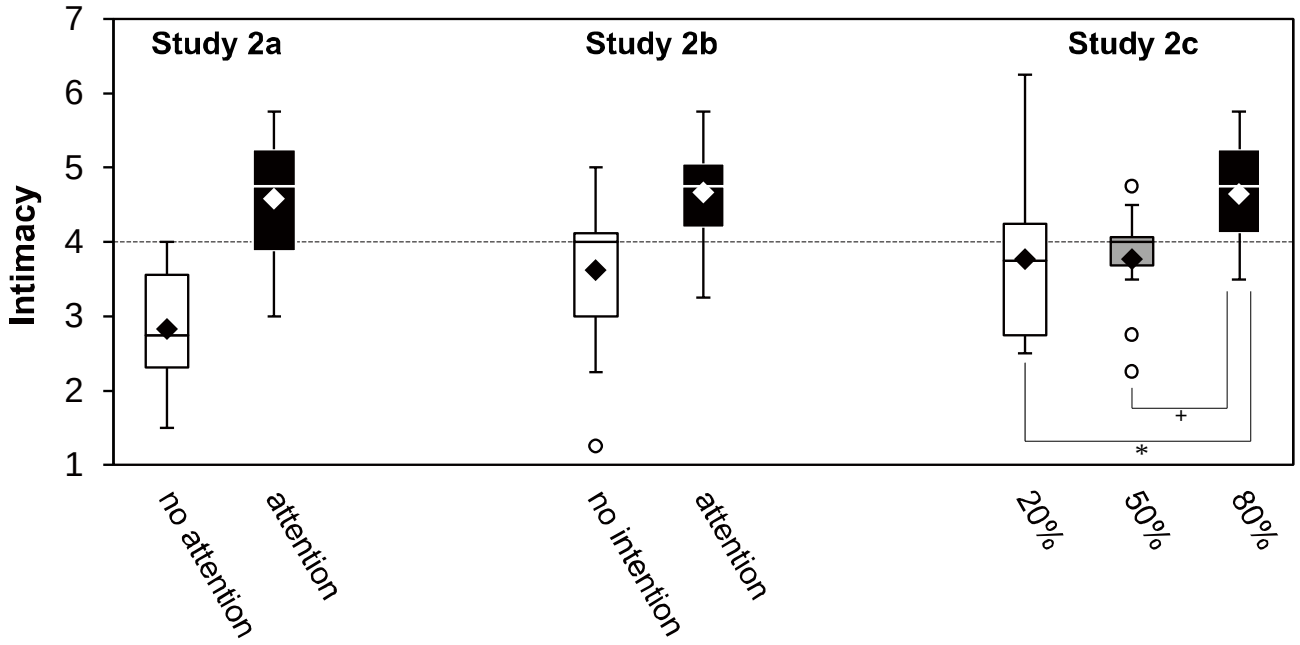

Fig. 2. Box plots of intimacy as a function of experimental conditions in Studies 2a to 2c. Study 2a compared the attention condition (the partner paid attention 80% of the time) with the no attention condition (0%). Study 2b compared the attention condition with the no intention condition, in which the partner was not allowed to pay attention to the participants. Study 2c compared the high attention condition (80%) with low attention (20%) and middle attention (50%) conditions. Diamonds indicate means. Circles indicate outliers (i.e., data points greater or smaller than 1.5×interquartile range) within each condition.