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Reciprocation under status ambiguity: How dominance motives and spread of status value shape gift exchange

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ABSTRACT

How does status ambiguity affect reciprocation in gift exchange? We argue that actors in an exchange relationship delay reciprocation as a means of subtly claiming dominance when relative status is ambiguous. Using a two-step link-tracing sample of gift exchange dyads from an online social network site in the early days of social media, we analyze the probability of two-way exchange dyads and the timing of reciprocation while accounting for the nested and autocorrelated data structure. The results support the predicted inverted-U shape relationship between the hazard of reciprocation and status difference. This pattern is strongest when actors lack common foci of interaction from which relative status could be gauged accurately. In addition, a higher status individual tends to delay reciprocation longer than a lower-status individual, a finding consistent with the status competition explanation.

> Someone who pays less attention to you than you pay to her implicitly asserts that she is superior to you in status.
>
> Roger Gould, 2003

1. Introduction

Status differentiation in interpersonal relationships shapes the distribution of resources in social exchange. The higher status individual in an exchange relationship, for example, gains more than her lower status counterpart, net of the positional advantage derived from the structure of the exchange network in both simultaneous and turn-taking forms of exchange (Molm, 2003, 2010; Thye, 2000).[1] A mechanism behind this general tendency is the spread of status value (Berger and Fisek, 2006; Thye, 2000; Walker et al., 2011) where the value of an exchanged object is linked to the status of the giver. Since the value of the object that a higher status person gives is higher, the lower status person, in return, feels obligated to give more to the higher status person in frequency or quantity to compensate for the differences in status value and accept the resulting unequal distribution of resources. This explanation has held up well against experimental evidence where the experimenter could operationalize unambiguous status differences between exchange partners to test monotonic increases in the disparity of resource exchange as status gap increase. It is unclear, however, whether exchange behavior and the resulting resource distribution follow this same logic in situations where it is uncertain exactly who assumes higher status and who exerts dominance over whom.[2]

This paper focuses on how status ambiguities could prompt dominance competitions in the form of gift exchange. Recent studies of crime and deviance (Faris and Felmlee, 2011; Gould, 2003; Papachristos, 2009) argue that ambiguities in status raise the chances that two actors escalate aggression and resort to

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[1] Simultaneous exchange (e.g. market exchange) is also referred as negotiated or bilateral exchange and turn-taking exchange (e.g. gift) is referred to as reciprocal or unilateral exchange in the social exchange literature (Molm, 2003). Note that reciprocal exchange as a form highlights the asynchronicity of exchange and does not necessarily imply that transactions are reciprocal in a quid-pro-quo fashion.

[2] Here we differentiate between status as a visible and widely accepted status characteristic which is accepted and maintained at the collective level (Berger and Fisek, 2006) and dominance as an interpersonal or dyadic characteristic that one can figure out by observing "who decides what goes on in the relationship (Gould, 2003)." Holding higher position in status does not directly translate into corresponding arrangements in dyadic dominance.

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0378-8733/

violence in the process of establishing interpersonal dominance over the other. We draw key insights from this line of research with a Machiavellian conflict perspective and apply them to the quintessentially pro-social behavior, gift exchange. Specifically, we argue that when relative status is unclear, individuals subtly claim superiority and dominance through delayed gift reciprocation. As implicit status claims through delayed reciprocation succeed repeatedly and resources disproportionately cumulate over time in favor of one over the other, actors come to jointly perceive of the unequal distribution (i.e. the exchange ratio in quantity and/or frequency) as indicative of solidifying dominance relations (Berger and Luckmann, 1966; Blau, 1964; Gould, 2003; Homans, 1961; Leifer, 1998). Interpersonal dominance relations that solidify through these micro exchange processes may then become apparent to third-party others who collectively legitimate and uphold status hierarchies that exist beyond the immediate dyad (Martin, 2009).

Status ambiguity emerges in a number of situations; it could emerge (a) from incongruence in the combination of characteristics from which an individual's overall status is perceived (e.g. someone at the very bottom of the hierarchy in a high status occupation vs. someone who is at the very top in a slightly lower status occupation), or (b) from the creation of new domains of interaction where pertinent roles, norms, and status signals specific to the domain are not clearly established yet (e.g. online social space). We explore the latter situation, an example of which is Cyworld, one of the first online social network sites in the history of social media. The spatial-historical context of Cyworld as a new domain of online interaction, along with the sites's flourishing virtual gift exchange culture, lends a unique opportunity to observe pro-social micro-interactions that are both competitive and bonding in nature.[3]

In the following, we review the exchange theoretic explanation for reciprocity that focuses on the effect of clearly defined status differences and extend it by considering how status ambiguity and competition for dominance can affect reciprocation. Using gift exchange records from Cyworld, we test the hypotheses by modeling the probability of observing two-way gift exchanges in dyads and the timing of an individual's gift reciprocation. We conclude with a discussion of the results, limitations of the study, and a cautionary implication for how network analysts operationalize network ties.

2. Reciprocity and the spread of status value

Research on how status differences affect exchange outcome hinges on the spread of status value theory, the idea that the perceived value of an object or resource is partly determined by the status of its possessor (Berger and Fisek, 2006; Ridgeway, 1991; Thye, 2000; Thye et al., 2006; Walker et al., 2011). An original rookie card of an exceptional athlete that is sold for hundreds of dollars (Thye, 2000) exemplifies how mundane objects can acquire symbolic and/or monetary value through the spread of status. Applying this theory to an experimental exchange setting, Thye (2000) showed that experimental subjects favored the resources of higher status subjects over those of lower status subjects despite equal monetary value, which resulted in the higher status subjects accumulating more resources, net of the bargaining power they derived from the structural positions in the exchange network (Cook et al., 1983). Moreover, the lower status subjects deemed the unequal distribution of resources proper, which suggests that status differences legitimate distributional inequalities (Lawler et al., 2009; Thye, 2000).

An important assumption built into these experiments is that material gains are the predominant motivation for exchange. However, day-to-day social exchanges are not driven by material motivations alone. They arise from a mix of symbolic/expressive (Blau, 1964; Molm et al., 2007; Zelizer, 1997) and dominance (Bienenstock and Bianchi, 2004; Blau, 1964) motivations along with instrumental motivations. Gifts, for example, often carry minimal instrumental value for both giver and reciprocator and are often "tokens of friendship and social bonds" with "pristine significance as symbols of interpersonal sentiments (Blau, 1964:111)". The gift could also be motivated by status, as "[a] person who gives others valuable [italics added] gifts or renders them important [italics added] services makes a claim for superior status by obligating them to himself (Blau, 1964:108)." In a similar spirit of status competition, but behaviorally the opposite, one may choose to delay or even ignore reciprocation since "someone who pays less attention to you than you pay to her implicitly asserts that she is superior to you in status (Gould, 2003:1151)." It is not difficult to imagine mixtures of symbolic motivations where a gift externally signifies social bonding while the hidden intention is to achieve dominance through it. Ulterior dominance motivations, in particular, are more likely to loom large in newly created social contexts (e.g. online social network platforms in the early 2000's) where norms that define social roles are still in the making and the concomitant opportunities for nonrole-specific action leave much room for negotiating status (Leifer, 1988).

Another important assumption in this line of research is that status distinctions are unmistakably clear to the exchanging actors. Perceptions of relative status form through a complex integrative process (Berger et al., 1992) where actors draw information from a range of widely accepted, or "diffuse", status characteristics such as race, gender, and education (Berger and Fisek, 2006; Ridgeway, 1991; Ridgeway and Correll, 2006) and from particular characteristics that obtain relevance only within a limited domain of interaction (e.g. popularity within an online social media site). When a domain-specific status characteristic does not consistently align with other diffuse status characteristics, those inconsistencies generate ambiguities for perceiving relative status. Furthermore, such an inconsistent domain-specific status characteristic that is measured on a continuous scale (e.g. number of followers on Twitter) can compound the confusion if the actors lack distributional information (e.g. What proportion of Twitter users have more than 5000 followers?) necessary for establishing points of reference for comparison.[4]

3. Status ambiguity and status competition

If status, along with symbolic/expressive bonding can motivate social exchange, but relative status is ambiguous to the actors, how do these conditions relate to exchange outcomes such as reciprocation? At a general level, Homans offers a concise explanation of how ambiguity or uncertainty in relative status can shape social

[3] Cyworld's "natural" social environment in which individuals exchange gifts with real-life friends and acquaintances provides a unique opportunity to systematically examine the classical notion of "social" exchange in contrast to economic exchange (Blau, 1964). Although observational studies of social exchange generally lack the fine controls afforded to experimental research that constitute the bulk of the social exchange literature, they enable researchers to observe exchange behaviors motivated by incentives other than economic ones that lab experiments invariably rely on (e.g. monetary compensation for experiment participation).

[4] Studies in status characteristics theory are in agreement that continuous-scale status characteristics, or "graded status characteristics, yield superior predictions for task performance and status-based inequality" (Foddy and Smithson, 1996; Melamed, 2013). However, Melamed (2013) finds that there is a diminishing returns to the predictive power of continuous scale status characteristics with decreasing status difference. This observation is consistent with our argument that smaller (continuous scale) status differences can compound noise.

interaction. When one's status is unmistakably higher, a condition Homans coined "social certitude (1961:326)," both actors do not experience status anxiety in their interaction; the higher status actor's large repository of status is not depleted through contact with the lower status actor and the lower status actor's self-worth is not threatened since the large status gap between them renders the comparison irrelevant. In the opposite situation where two actors are closely positioned on a continuous status dimension, anxiety may ensue on both for different reasons; the slightly superior actor may fear status threat or a leakage of her status while the lower status counterpart may fear the sense of inferiority in the course of interaction. Consequently, anxiety produced by status ambiguity leads to mutual avoidance and distancing. In the case of gift exchange, distancing and avoidance may take the form of delayed reciprocation or outright non-reciprocation. Although Homans offers a useful social–psychological account, his focus on passive avoidance as a response to status anxiety does not fit well within the context of gift exchange; gift exchange either occurs within preexisting relationships formed through a history of interactions or it signals the intention of relationship building, both of which presuppose engagement, not avoidance.

Studies of deviance and interpersonal violence (Faris and Felmlee, 2011; Gould, 2003; Papachristos, 2009) provide a more adequate theoretical basis for considering how reciprocation in exchange occurs under status ambiguity. Gould (2003) explains interpersonal violence as stemming from an arms race for dominance between similar status individuals. When relative status is unclear (e.g. nominally symmetric social ties, such as "friends" or "neighbors"), relationships tend to be unstable and actors have the tendency to clarify status ambiguities, often by escalating from minor status provocations (e.g. jokes) to serious violence. Here, the opponents cannot ignore those minor provocations since each provocative iteration that is not reciprocated cements the dominance relation in the long run (Berger and Luckmann, 1966; Gould, 2003; Lawler et al., 2009). Actors aware of such effects of cumulative status claims on cementing dominance relations attempt to counter them from the outset through escalated counter-aggression.

We apply Gould's cumulative status consolidation framework to understand how status ambiguity affects reciprocity in pro-social gift exchange. Since a gift expresses the perceived nature and value of a relationship, it is also the case that the way a gift is reciprocated (e.g. content, form, timing, and the manner in which the gift is returned), can signal how the reciprocator perceives her relative status vis-à-vis the initial giver (Leifer, 1988; Zelizer, 1997). For example, a guest's hasty reciprocation soon after a dinner invitation signals an unwillingness of the guest to remain indebted to the host, and subtly signals her lack of trust (Blau, 1964; Coleman, 1988). The opposite situation where the guest indefinitely delays future reciprocation is considered equally rude. Similarly, long delayed reciprocation or, in the limiting case, non-reciprocation in a gift exchange relationship can signal disregard for the other. As an exchange relationship plays out over time, if one manages to strike the right balance between delaying reciprocations longer than the time it takes the exchange partner to reciprocate, but no longer than some threshold at which the relationship is at risk of falling apart, she may be able to gradually shift the exchange ratio in her favor. In the end, actors may infer dominance post hoc from the skewed exchange ratio and even view it as legitimate (Lawler et al., 2009), just as repeated minor aggressions can transform nominally symmetric social relationships into qualitatively hierarchical dominance relations.

If both actors recognize that delayed or withheld reciprocation can be employed as a possible tactic to enhance one's dominance under status ambiguity, it is valid to question whether sustained exchange is possible between actors whose status difference is unclear. We argue that the inherent ambiguities of asynchronous, turn-taking exchange, such as gift giving, do not readily allow the actors to recognize such strategic motivations. Because exchange occurs sequentially over time while the actors neither bargain nor clearly specify the expectations regarding repayment (Blau, 1964; Molm, 2003), they cannot merely interpret their partners' delayed reciprocation as a strategic behavior aiming to gain an upper hand in the relationship. After all, the resulting inequality from slight delays could either be "the result of an actor's intentionally paying less for another's favors, or an unanticipated side effect of an actor's exchange with another partner (Molm, 2003: 14)." This high level of motivational ambiguity is precisely what leads individuals to develop interpersonal trust for their exchange partners despite the risk of being "suckered" (Cook et al., 2007; Kollock, 1994; Yamagishi and Yamagishi, 1994; Yamagishi et al., 1998). Such motivational ambiguity is compounded when the context itself in which gifts are exchanged is not well defined in terms of specific roles and norms from which actors can interpret the meanings of particular actions by others (Leifer, 1988).

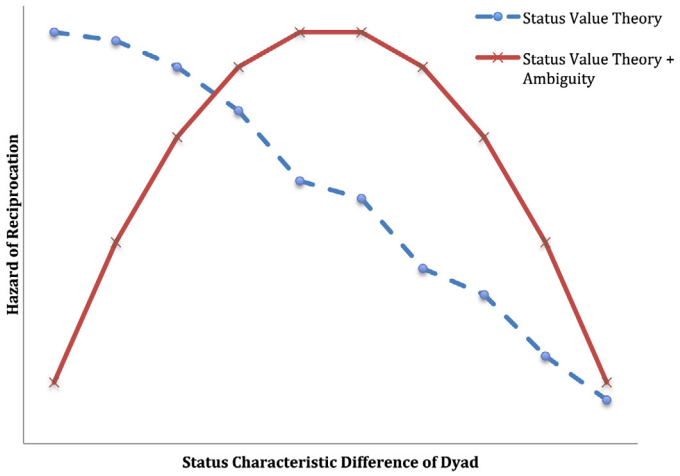

Fig. 1. Contrast of the hypothesized reciprocation patterns.

Recognizing dominance as a motivation in gift exchange in situations of status ambiguity leads to several modified predictions from those of the status value theory in exchange. First, the status value theory in exchange which does not assume status ambiguity predicts that larger differences on a continuous-scale status dimension negatively correlates with deviations from equal exchange. (dashed line in Fig. 1). However, if some level of status ambiguity exists and is higher for exchange partners who are closer to each other on that status dimension, dominance motivations may prevail and actors would show the tendency to delay reciprocation, causing a larger deviation from equal exchange (left half of solid line in Fig. 1). Applying Gould's logic of status competition in the exchange context, one might predict that status ambiguity may prompt actors to reciprocate in a timely manner than to delay in order to avoid loss of face. In fact, such examples abound in current and the classical anthropological literature where excessive giving is the hallmark of high status individuals (Bienenstock and Bianchi, 2004; Mauss, 1950; Sahlins, 1963; van De Ven, 2002). Bearman (2005) offers a more modern example of timely reciprocation. He observes that the status-insecure nouveau riche in New York City apartments tend to assert their higher status through frequent tipping to the doormen, while older, established residents tend to reciprocate in lump sum Christmas gift money. Our opposite prediction (i.e. delaying reciprocation), however, is based on two key observations. First, the anthropological examples of excessive giving for acquiring status occur in the presence of third-party observers who collectively wield sanctioning power over violators

of the norm of reciprocity. Hence, excessive delays in reciprocation are easily spotted and sanctioned. Second, the exchanged objects mentioned in the above examples all carry non-trivial monetary or practical utility for the receiver, which creates a strong sense of indebtedness that is resolved by promptly paying back either in kind or through excessive expressions of gratitude (Blau, 1964). This pressure to discharge the feeling of indebtedness may lead the capable reciprocator to pay back in kind sooner than later. However, these two conditions do not apply to the exchange context we investigate. While we elaborate on the exchange context below, it is useful to point out that the gift transactions in Cyworld are not explicit to third parties and a typical Cyworld gift is weighed more by its expressive value than by its monetary value; a typical gift ranges from 50 cents to a dollar. Therefore, delaying reciprocation, or "paying less attention" as Gould puts it, becomes a viable strategy for claiming dominance.

On the other hand, when the distance between exchange partners on a continuous-scale status dimension is sufficiently far and indisputably clear, increasing distances should be associated with longer delays in reciprocation and, as Thye's theory would predict, increase the deviation from equal exchange (right half of solid line in Fig. 1).

Hypothesis 1A. Among all exchange dyads, the probability of a two-way exchange dyad will be a concave (inverted U-shape) function of the distance between exchange partners on a continuous-scale status dimension.

Hypothesis 1B. The delay in an individual's reciprocation to her exchange partner will be a convex (U-shape) function of their distance on a continuous-scale status dimension.

Hypothesis 1A states that exchange partners with a small difference on a continuous-scale status dimension (i.e. with high status ambiguity) will have a lower probability of being reciprocal than those with moderate differences. At the other extreme, exchange partners with a large status difference (and no status ambiguity) will also have a low probability of being reciprocal compared to those with moderate status differences. Other factors being equal, the resulting pattern should be an inverted U-shape. Hypothesis 1B expresses the same idea in terms of the timing of reciprocation. If an individual receives a gift from someone closely positioned on a continuous-scale status dimension (i.e. high ambiguity), she may delay reciprocation longer than she would otherwise with someone of moderate difference. At the other end, if the exchange partner who gives the gift stands at a sufficiently distant position on that dimension (with no status ambiguity), she would delay reciprocation longer than she would otherwise with someone moderately different. Hence, the U-shape.

The above predictions implicitly assume that the continuous status dimension is the only source of information from which individuals gauge status. Therefore, additional sources of information could counteract the noise in a domain-specific status dimension and reduce status ambiguity. For example, sharing multiple foci of interaction with an exchange partner could lead to richer information that could be drawn upon to accurately gauge relative status while placing less weight on the noisy domain-specific status dimension. If individuals place smaller weight, the rate at which the delay in reciprocation changes with respect to the said status dimension should be smaller. On the contrary, when the exchange partners have no other information than their distance on the status dimension, the rate of change in the delays in reciprocation should be larger. In short, we predict that having more information about an exchange partner will moderate the effect of status ambiguity on reciprocation.

Hypothesis 2A. The concave relationship in Hypothesis 1A will be more prominent between exchange partners who share fewer foci of interaction.

Hypothesis 2B. The convex relationship in Hypothesis 1B will be more prominent between exchange partners who share fewer foci of interaction.

Comparing higher and lower status individuals by their timing of reciprocation provides an additional opportunity to test the differences in delayed reciprocation depending on the relative status of the reciprocator. Here, we apply prospect theory (Kahneman et al., 1990; Kahneman and Tversky, 1979) which states that humans have a bias towards loss aversion in situations of uncertainty. If status ambiguity does in fact motivate individuals to delay reciprocation as we argue, then the higher status exchange partner is likely to delay reciprocation longer due to stronger loss aversion (Magee and Galinsky, 2008; Pettit and Lount, 2010; Pettit et al., 2010). If competition is not operating, on the other hand, a higher status actor's timing of reciprocation should not differ significantly from a lower status actor's timing of reciprocation.

Hypothesis 3. The delay in reciprocation of a higher status person in an exchange dyad will be longer than the delay of a lower status person in an exchange dyad when status difference is small.

4. Materials and methods

Cyworld, one of the first online social network sites in the history of social media, was founded in 1999 in South Korea and boasted over 20 million registered users by 2006 (boyd and Ellison, 2007; Chosunilbo, 2007). While the underlying motivational basis of the users had not changed much since the beginning of the service and the basic functionality and design of the site had been implemented for some year's prior to 2006, new features and tools were still being introduced in 2006 to an ever-growing user base. Against this backdrop of new tools for interaction, combined with a large influx of new users to the site each year, conventions, etiquette, and informal role relations were still in the making. A unique feature of the site was that users could purchase digital gift items that could be used to decorate profile pages (e.g. wall papers, emoticons, avatar attire, background music). These 400,000 items as of 2006 typically ranged from 50 cents to less than five dollars and had constituted a major source of revenue for the company (Schonfeld, 2006).

Similar to many other social network sites around the world, Cyworld users engage in an attention economy propelled by self-expressive motivations and reciprocal attention exchange (Jung et al., 2007; Hjorth, 2007).

> There can be the gift of visiting someone's mini-hompy, the gift of leaving a message in the visitors' [guest] book (and then the return gift of answering it), the gift of asking someone to be your "cyberrelative" or cybuddy, the gift of sharing a photograph with someone or the gifts of dotoris or cybergifts for one's home page. All these processes can be seen as contributing to individual social capital. (Hjorth, 2007:400)

These interactions at different levels are each classified (e.g. textual posts, comments to those posts, guestbook comments, photo posts, and comments to photo posts), quantified, and prominently displayed on a user's profile page, or "minihome," providing an overall impression about the amount of attention one receives from others on Cyworld. And perhaps due to these, by design, excessive quantitative displays of the overall interactions of oneself and of her friends on the site, Cyworld users may be more prone to interpersonal comparisons of popularity (Oh, 2004). When users are nudged into this game of popularity comparisons, reciprocity in interactions becomes an important norm to abide by, because if you do

not leave a digital trace on my minihome when I repeatedly do so on yours, the quantitative summaries would suggest to us and to our common audience (i.e. Cyworld friends) that I am relatively less worthy of future attention. As such, this comparability of quantified attention becomes the source of status competition. We maintain that, operating under this logic of attention exchange, purchased virtual gift items in Cyworld also embody this attention-giving, and hence status-giving aspect. While media reports collectively suggest that Cyworld gifts have been used as substitutes for or additions to offline gifts for conventional occasions (Cameron, 2005; Maeil Business Newspaper, 2006), Cyworld users are likely to attach to these gifts the additional meaning of gifting attention and contributing to the recipients on-site popularity, with the understanding that similar attention will be reciprocated either in kind or through other available means of communication on the site.

We test our hypotheses using gift exchange records during a six-month observation window in early 2006. The data for the current study are a link-traced sample of Cyworld users, previously drawn from the Cyworld database for conducting a separate study.[5] From the population of non-celebrity, individual users, we started from 100 randomly selected seed users and traced their Cyworld friends (1st order friends) and the friends of their friends (2nd order friends) as shown in Fig. 2(a). Similarly, from the same 100 random seeds, we traced all the users who either gave a gift to or received a gift from the seeds. This set of users, regardless of their Cyworld friendship status with the seeds, constituted the 1st order gift exchange partners. Subsequently, we identified the 2nd order gift exchange partners, those who gave a gift to or received a gift from the 1st order gift exchange partners regardless of Cyworld friendship status (Fig. 2(b)). A total of 160,835 Cyworld users including the seeds were identified through the above two link tracing procedures. Among them, the 1160 individuals identified through the gift exchange link tracing procedure (i.e. the seeds, the 1st and 2nd order gift exchange partners) constituted the final data for analysis. Information obtained from the remaining 159,675 individuals was used to calculate the number of friends of the 1160 individuals. Although data were drawn from Cyworld's comprehensive database, there were some missing values possibly resulting from users who joined Cyworld before the detailed records of its users were recorded in the database.

The vast majority of gift exchange dyads in our sample are embedded within existing social contexts of one type or another. For example, 87% of the seeds' gift exchange partners are Cyworld friends.[6] Among the other 13% of non-friend gift exchange partners of the seeds, 18.7% are friends of the seeds' friends (2nd degree friends) and about 7% of the non-friend exchange partners share at least one common group affiliation within Cyworld.[7] There appears to be no significant difference in the mean number or monetary amount of gifts exchanged between friends vs. non-friends.[8]

4.1. Outcome variables

We construct two sets of outcome measures for two corresponding analytic strategies (discussed below), one at the dyad level and the other at the individual level. The dyad level outcome variable is a dichotomous measure coded 1 if both individuals in a gift exchange dyad gave each other at least one gift and 0 if only one individual gave the other at least one gift during the six-month observation window. This is a proxy measure for reciprocity, which in the ideal setting would be measured as the proximity to unity (1:1) of the ratio of gifts two individuals received from each other. However, choose the binary measure, given that the mean number of gifts users gave was only 0.85 (S.D. = 1.4) during our observation window. The individual level outcome variable measures the time (in days) it takes for a user to reciprocate a gift from the point at which she received the first gift from a particular exchange partner within the observation window.

4.2. Independent variables: difference in page views

The key domain-specific status measure is the total number of page views ("visits") that appear on users' profile pages. Each time someone views a user's profile page, this number is incremented and displayed on the user's page for any visitor to see. It is essentially a measure of popularity that quantifies the amount of attention a user draws from other users. We equate popularity with status in the context of online social network sites for the following reasons. First, online social network sites and social media in general are characterized by an attention economy where information is abundant while people's attention is scarce. Hence, receiving large attention in social media (e.g. number of followers on Twitter) often becomes the source of influence in the diffusion of information, the formation of public opinion and in viral marketing (Aral et al., 2013; Bakshy et al., 2011). Second, ethnographic evidence on Cyworld suggests that users themselves are attuned to the increases of their page views as well as of others and seek to increase page views when the numbers stagnate compared to their friends (Cameron, 2005; Oh, 2004).[9] Although total page view is a crude status measure which correlates with a host of observed (e.g. tenure and activity level on Cyworld) and unobserved (e.g. SES and occupation) confounding factors, ethnographic research suggests it is the heuristic through which users infer one's popularity over others (Oh, 2004). Therefore, we interpret a large difference in page views as indicating to the users a large status difference while a small difference as indicating to the users a smaller difference in status. However, when the page view difference is smaller than an unknown, yet arguably low, threshold, we maintain that the users' perceptions of status difference becomes increasingly ambiguous rather than progressively smaller because of its noisy and confounded nature. We use the log-transformed absolute difference in page views to measure the difference in status as perceived by the users. The log-transformation is useful for theoretical and practical reasons. Theoretically, the ambiguity in status difference is expected to exist at rather small differences in page views, but quickly diminish as those differences increase. Hence, the concavity in reciprocity and in the hazard of reciprocation should each exhibit a steep upward slope from 0 page view difference to a rather small (raw) page view difference, reach the inflection point, and gradually decrease over a wider range of increasing page view difference. The log-transformation is adequate for this functional form. Practically, we assume decreasing marginal effect of page view difference on reciprocation – the change in the timing of reciprocation is likely to be larger when page view difference increases from 0 to 1000

[5] This unconventional sampling design for data collection was originally used to replicate Grannis (2010) on estimating the characteristic path length of the largest connected components of the Cyworld friendship and gift exchange networks (Kim et al., 2006). We adjust for the consequent homophily and selection biases by adopting multilevel models as described in Section 4.6.

[6] We report only the features of the seeds' friends since they are a true random sample and our data contain complete friendship information for them.

[7] Groups in Cyworld are called "clubs." See the description of control variables for more detail.

[8] See Appendix D for a discussion on the characteristics of non-friend gift exchange ties.

[9] Anecdotally, the popularity of illicit hacking tools that artificially increase page views testifies to its prominence as an outward sign of popularity and status in Cyworld (Park, 2005). Cyworld promptly responded with counter measures to prohibit such hacks.

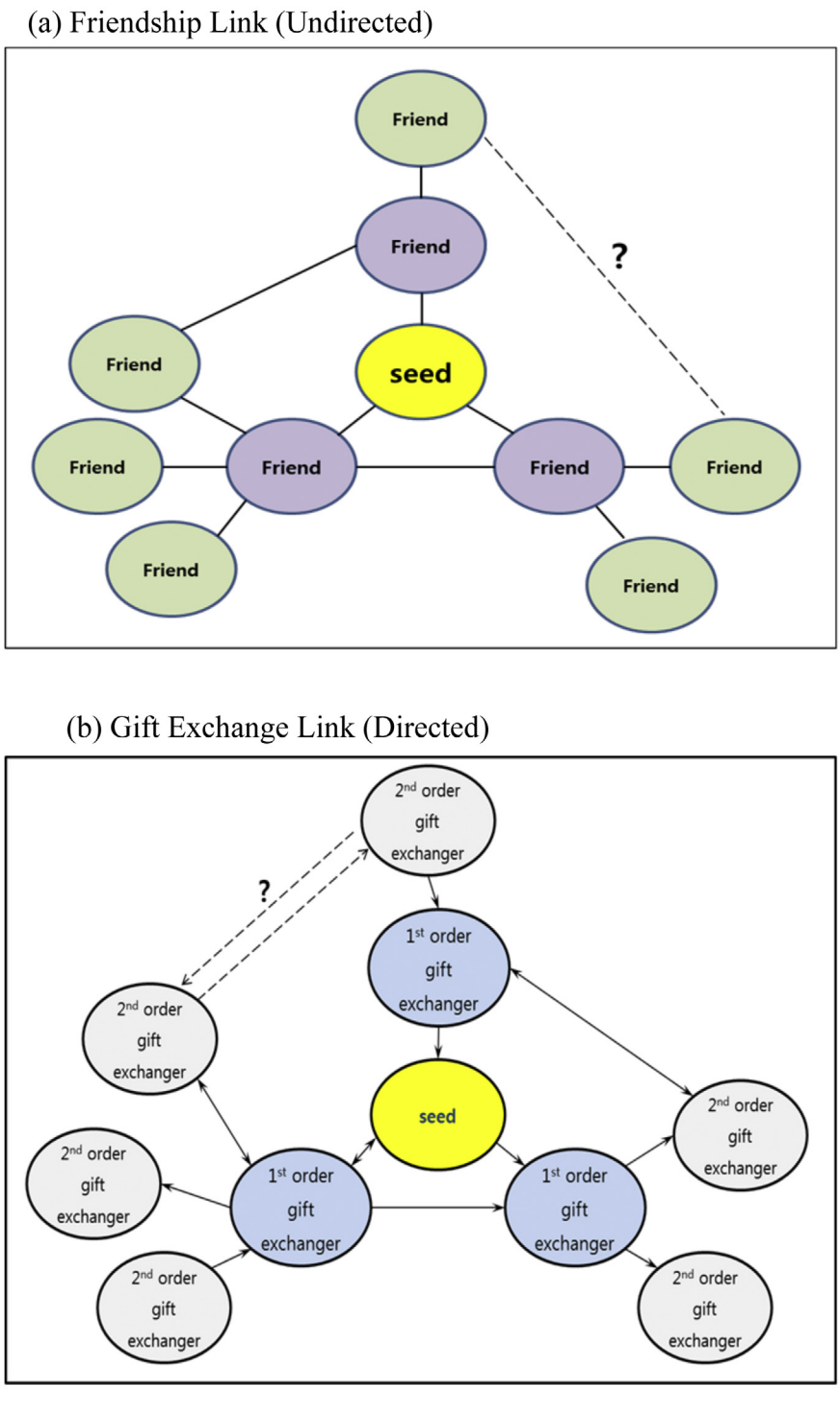

Fig. 2. Link tracing sampling design. (a) Friendship link (undirected). (b) Gift exchange link (directed).

compared to when page view difference increases from 1,000,000 to 1,001,000.

4.3. Club joint affiliation

Cyworld provides semi-public spaces on their site called "clubs" akin to Facebook groups, but more firmly grounded in preexisting offline organizations. Typically, users who share common interests, attend the same school, or work in the same company can collectively interact through these venues. The number of clubs to which two individuals are jointly affiliated is used to measure shared foci of interaction and the certainty of their perceptions of relative status with respect to the exchange partner.[10]

[10] In essence, club joint affiliation is a measure of relational embeddedness in social groups (Feld, 1981). One may wonder if a similar measure of relational embeddedness within common network neighbors (i.e. triadic closure) may predict reciprocation (Granovetter, 1985). While this is an important first step for considering local structural effects beyond the dyad, the link-tracing sampling design does not allow accurate measurement of a tie's common neighbors unless it includes a seed (84 dyads). Despite these limitations, we examined two models that assess the effect of common friends on reciprocation. In the first model, we only included the

4.4. Controls

Previous studies imply that a user's activity level on Cyworld (e.g. writing posts, uploading photos) may cause a spurious correlation between page views and gift exchange behavior, leading to biased estimates. First, page views and activity level may be correlated as users who seek attention may more actively post or those who are simply more communicative may gain more page views as an intended or unintended consequence (Oh, 2004). As one's activity level increases, personal network size should grow as well, leading to delayed responses in interactions including gift reciprocation. Second, other studies find that activity level and monetary expenditures on Cyworld are positively correlated (Han and Kim, 2008; Jung et al., 2010). Therefore, differences in activity level may correlate with differences in page views and differences in monetary expenditures, respectively. We address these potential confounds by controlling for activity level as measured by the logged difference in the number of posted photos between two exchange partners (Chapman and Lahav, 2008).[11] The log-transformation reduces the heavy skew of the distribution, thereby reducing unequal variance and increasing efficiency in estimation.

Although the vast majority of exchange dyads are Cyworld friends as noted above, the perceived ambiguity in status might be determined partly by friendship status. Hence we adjust for these differences by adding a binary measure (friends = 1, 0 otherwise). Related to friendship status, we also include the differences in the number of friends between exchange partners as page view difference may simply reflect the difference in the total number of friends.[12] Age, gender, and region homogeneity of the exchange partners are added to adjust for the effects of homophily (Goodreau et al., 2009; McPherson et al., 2001).[13] Specifically, the absolute age difference between gift exchange partners is used as a measure of age dissimilarity. Regional homogeneity is measured as a dummy variable with same region exchange dyads coded as one and zero otherwise. For gender, we include two dummy variables, one indicating male to male exchange partners and the other indicating female to female exchange partners. The omitted reference category of the two gender dummies is cross gender gift exchange partners.

A wish box is a virtual wish list found in a user's profile page that lists the Cyworld virtual items the user would like to receive as gifts. Since, other things being equal, listing more items in the wishbox could induce more gifts from network neighbors, we add to the models the logged difference in the number of "wishbox" items between two gift exchange partners. Compared to new-comers, long time Cyworld users are likely to have made more friends, have joined more clubs, be more active purchasers and givers of virtual items and, most importantly, have more page views. Therefore, we include in the models the difference in the number of days since registration to control for these potential confounds. We also add two variables exclusively for modeling the time to reciprocation at the individual level. First, a dummy variable indicating that the reciprocator has higher page views than the initial giver is added for modeling time to reciprocation. This dummy variable is included in two interaction terms to test Hypothesis 3: one with page view difference and the other with the quadratic term of page view difference. The second variable is the monetary value of the gift the initial giver gave to the reciprocator. Although the low price range of Cyworld gifts are not likely to affect reciprocation, we account for this possibility, nevertheless. The actual prices of the gifts were converted into ratios to prevent reverse estimation of Cyworld's revenue from virtual item sales.

4.5. Additional controls for link-tracing sample design

The two-wave link-tracing sampling design from the friendship and gift exchange networks imposes a number of problems related to the boundary specification problem (Laumann et al., 1983). First, while the snowball sampling procedure ensures accurate nodal degree measurement of the seeds and their first order friends, the degrees of the second order friends is undercounted since sampling stops at the second wave. Second, if a seed's gift exchange partner is not a Cyworld friend, we do not have information on that exchange partner's friends, because she is not included in the friendship network snowball sample. In fact, this problem occurs with all gift exchange dyads that include first order gift exchange partners (i.e. wave 1) who are not friends with the seeds. We use multiple imputation to address these sampling issues that distort the degree difference measurement (see Appendix A for details of the multiple imputation procedure). We further account for this problem by including a dummy variable where 1 indicates that at least one individual in an exchange dyad is not a seed or a first order friend, and 0, otherwise.

4.6. Analysis

We test the curvilinear relationship between reciprocation and status difference using two analytic strategies, each corresponding to the dyadic level and the individual level, respectively. For the dyad level analysis, we use multilevel logistic regression models for predicting the probability of a gift exchange dyad being reciprocal within the observation window (Hypothesis 1A). That is, among all gift exchange dyads, the multilevel logistic regression models predict the probability of containing a gift transfer from B to A, given a gift transfer from A to B. This analysis of dyad level reciprocity requires a multilevel approach to account for the interdependencies among gift exchange dyads that are caused by potentially homophilous gift exchange associations captured by the two-wave snowball sampling approach we used for data collection. Failing to account for such correlations among gift exchange dyads can result in (a) overestimation (a) of the model fit, and (b) of individual regression coefficients, due to inflated degrees of freedom (Raudenbush and Bryk, 2001). Specifically, we use a two-level multilevel logistic regression model (random intercept, fixed slopes model) where all the exchange dyads are considered as clustered in the first order exchange partners (van Duijn et al., 1999; Wellman and Frank, 2001). This is because all observed exchange dyads in each two-step egocentric exchange network include at least one first order exchange partner as shown in Fig. 2(b). Accordingly, the attributes of the exchange ties and of the first order exchange

84 dyads that included a seed. In the second model, we imputed the number of common friends and ran the same model on all 1156 exchange dyads. Neither model yielded a significant common friend effect and the main relationship between status difference and reciprocation remained significant (results available upon request).

[11] Related to activity level, offline socio-economic status (e.g. income), which is unobserved in our data, is another potential factor that could cause a spurious correlation between page views and gift reciprocation. That is, SES may affect page views of a user and also correlate with her monetary expenditures on Cyworld including gift purchases (Jung et al., 2010). We maintain, however, that the effect of SES on page views is largely mediated by activity level (Jung et al., 2010), such that conditioning on activity level in our models block the backdoor causal path (Pearl, 2000) between page views and gift reciprocation where SES is involved (i.e. page views ← activity level ← offline SES → monetary expenditure → gift reciprocation) and reduce potential bias in our estimate (Morgan and Winship, 2007).

[12] The main results of the analyses are robust to the different functional forms of both degree difference and the difference in photos. That is, log-transforming the degree difference or taking the raw difference in photos (instead of logging) does not alter the curvilinear relationship between reciprocity and page-view difference. Summary tables of these robustness checks are available upon request.

[13] To register for Cyworld, the site required a user to provide her real name along with the government-issued Resident Registration Number, which encodes an individual's real name, region of birth, age, and gender. This requirement eliminates false demographic information and naturally limits the user population to Korean citizens.

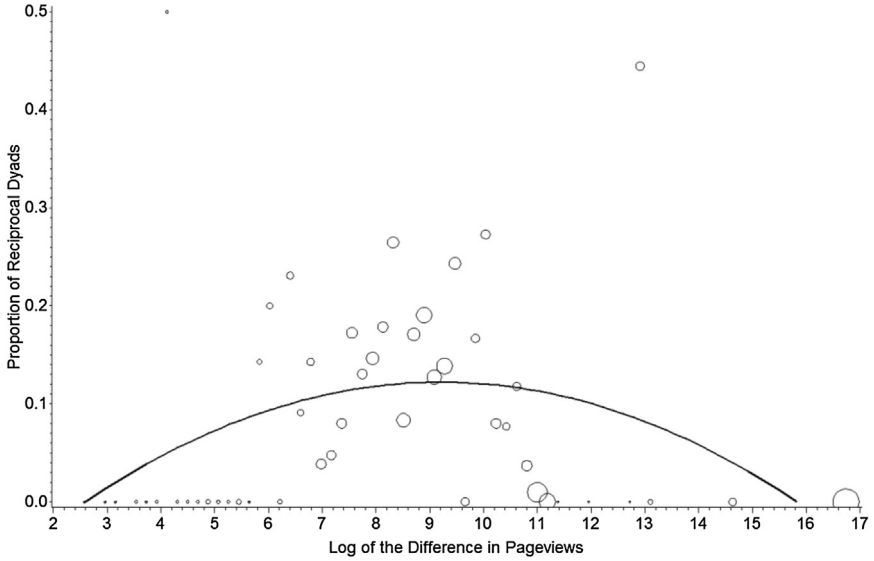

Fig. 3. Reciprocity and status difference.

partners' partners (i.e. both the seeds and the second order gift exchange partners) constitute the level-1 unit variables. The models do not include level-2 predictors for the random intercept since the purpose of using the multilevel framework is only to account for the nested data structure and homophily bias rather than to examine meaningful differences among the first order gift exchange partners.[14]

For the individual level analysis, the objective is to model the time it takes for ego to give a return gift to a specific alter after receiving a gift from that alter. Therefore, we use Cox regression (Allison, 2010) to estimate the proportional hazard of reciprocating a gift. These individual level models offer a more nuanced understanding of reciprocation than the dyad level models as the dependent variable in the individual level models (i.e. timing of reciprocation) contains more information than a simple binary measure used in the dyad level models. The individual level models are also more tightly coupled methodologically with the core argument we make as the delay in reciprocation, not outright non-reciprocation that the dyad level models implicitly assume, is of primary theoretical interest. Alternatively, one can understand the difference of the two strategies as a matter of time-scale; the dyad level models try to predict which dyads are more likely to observe reciprocations within six months while the individual level models predict the continuous time hazard of reciprocation within the six-month observation window.

5. Results

5.1. Dyad level analysis

Fig. 3 provides a graphical description of the bivariate relationship between dyadic status difference and gift exchange reciprocity excluding other covariates. The horizontal axis represents the difference in online status between pairs of individuals in gift exchange, measured by the log-transformed absolute difference in their page views. The vertical axis shows the probability of a dyad being reciprocal at its corresponding level of status difference. The size of each bubble is proportional to the total number of exchange dyads in the corresponding level of status difference and the curve shows the best fit of the bivariate relationship.[15] Even without controlling for other factors, the simple bivariate relationship shows that the probability of a reciprocal dyad is concave in page view difference.

The intraclass correlation coefficient (ICC) for the two-level model is 0.31, indicating that 31% of the total variance in the probability of a gift exchange tie being reciprocal is attributable to differences in characteristics among the 1st order gift exchange partners, justifying our use of multilevel models.

Table 1 shows the summary estimates for the random intercept logistic regression model on the imputed data.[16] The predicted curvilinear effect of status difference is tested using the logarithmic difference in the number of page views between two exchange partners and its quadratic term, controlling for other covariates (See Model 2 in Table 1). As predicted in Hypothesis 1A, reciprocity follows a concave trajectory as the difference in page views increases. The inflection point of the trajectory occurs at a difference of 9824 page views ($\exp(1.25/(2 \times 0.07)) = 9824$). This result, particularly the lower probability of reciprocity when page view difference is small, supports our conjecture that status ambiguity increases dominance motivations that are expressed through non-reciprocation.

Model 3 adds quadratic two-way interaction terms to test Hypothesis 2A. Although marginally significant at the .05 level, the interaction of the page view difference quadratic term and club joint affiliation ($B = 0.044$) is positive (i.e. the second derivative with respect to page view difference is positive).[17] This means that the concave relationship between reciprocity and status difference attenuates and the peak of the curve becomes less sharp as the number of common club affiliations for two exchange partners increases. We interpret this to mean that the significance of page views as a status signal decreases for gift exchange partners who have more status-relevant knowledge about each other through higher levels of interaction across multiple foci of interaction.

[14] See Appendix B for more details on the two-level multilevel model, along with a discussion of an alternative three-level multilevel model.

[15] The horizontal axis was divided into 75 equidistant bins.

[16] See Table C1 in Appendix C for summary statistics of the dyad level variables.

[17] The relatively large standard error is mainly due to insufficient data points for dyads with more than two overlapping groups. When we used a dichotomous version of the jointly affiliated club variable to ensure sufficient cases in each category, the estimate was significant.

Table 1
Random intercept logistic model of reciprocity (10 imputations).

	Model 1		Model 2		Model 3	
	B	S.E.	*B*	S.E.	*B*	S.E.
Intercept	−9.3***	2.251	−7.718***	2.208	−9.229***	2.701
Dyad includes second order friend			0.214	1.168	0.172	1.182
Dyad is friends			0.153	0.361	0.095	0.357
Friendship degree difference			0.002	0.003	0.002	0.003
Age difference[a]			−0.027	0.019	−0.025	0.019
Registration time difference (in days)			−0.001	0.000	−0.001	0.000
Log (absolute wish box difference)			0.109	0.068	0.103	0.067
Log (absolute photo difference)			−0.009	0.102	−0.007	0.101
Male dyad			−1.048**	0.387	−1.032**	0.386
Female dyad			−0.125	0.278	−0.132	0.277
Same region			0.160	0.261	0.173	0.262
Number of jointly affiliated clubs			0.259*	0.130	4.013	2.410
Log (absolute page view difference)	1.575**	0.475	1.249**	0.472	1.604**	0.587
Log (absolute page view difference) squared	−0.083**	0.025	−0.069**	0.026	−0.089**	0.032
Log (absolute page view difference) × number of jointly affiliated clubs					−0.836	0.501
Log (absolute page view difference) squared × number of jointly affiliated clubs					0.044	0.025
Random effect (τ_{00})	1.233**	0.407	1.168**	0.433	1.112**	0.430
−2 Log likelihood[b]	649.1		551.1		611.12	

Note: $N = 1156$ for tie-level variables (level-1); $N = 181$ for the first order gift exchange partners (level-2).
[a] 53 cases missing in age were imputed based on their friends' average age.
[b] Average −2 log likelihood over 10 imputations.
* $P < .05$ (two-tailed test).
** $P < .01$ (two-tailed test).
*** $P < .001$ (two-tailed test).

5.2. Individual level analysis

We argued that delaying reciprocation is a strategy that actors may employ to subtly express and consolidate their status superiority over their exchange partners if they are similar in status. We provide evidence for this conjecture at the individual level of analysis by modeling the hazard of reciprocation after one receives a gift from her exchange partner. The specific objective here is to see if the proportional hazard of reciprocation is a concave function of the status difference between two exchange partners.[18] When the status difference is small, the actor who receives a gift will tend to delay reciprocation, resulting in a low hazard. When the status difference is moderate, actors should experience a lower level of status threat, resulting in a higher hazard of reciprocation. Finally, when status difference is substantial, the hazard of reciprocation will be low, due not to status threat, but to the difference in the status values attached to the gift they receive. Consequently, the hazard of reciprocation should peak at an intermediate level of status difference.[19] Model 5 in Table 2 confirms this main conjecture (Hypothesis 1B); the main effect of page view difference is positive while its quadratic term is negative and both terms are significant at the 0.05 level. This curvilinear effect is robust across different model specifications presented in Models 6 and 7.

Model 6 adds quadratic two-way interaction terms between page view difference and number of overlapping clubs to test whether more accurate information about the exchange partner moderates the effect of status ambiguity (Hypothesis 2B). To reiterate, Hypothesis 2B predicts a positive quadratic two-way interaction effect, which indicates that the concavity of the relationship between the hazard of reciprocation and page view difference will attenuate for dyads overlapping in multiple club affiliations. As predicted, the interaction between clubs and the quadratic term of page view difference is positive and significant at the 0.05 level ($B = 0.045$). The addition of the two terms in Model 6 yields a significantly improved overall fit over Model 5 ($\chi^2 = 6.98$; $df = 2$). To illustrate this result, we plot the predicted proportional hazard of reciprocation by page view difference over different levels of club overlap (Fig. 4) with the estimates from model 6 and holding other variables constant at their means. The curvilinearity is most pronounced for dyads that have no club overlap and attenuates with increasing overlap. At two overlapping clubs, the hazard monotonically decreases with page view difference. These results offer visual confirmation that people with more knowledge about their exchange partners are less affected by the ambiguities of the page views as a status measure. On the other hand, people who have less knowledge about their exchange partners are more affected by the ambiguities stemming from similar page views because the salience of page views in their perceptions of relative status increases.

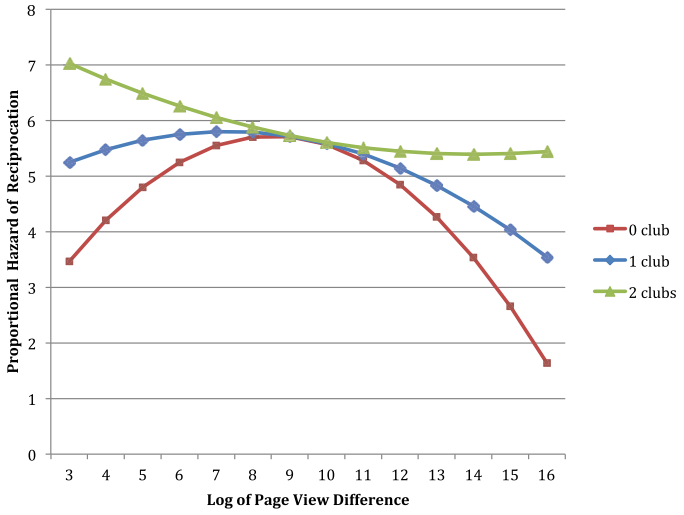

Fig. 4. Proportional hazard by status difference by number of clubs.

[18] A U-shape relationship in reciprocation time and status difference outlined in Hypothesis 1B is equivalent to an inverted U-shape relationship between reciprocation hazard and status difference.
[19] See Table C2 in Appendix C for descriptive statistics of the individual level variables.

Table 2
Cox regression estimates of reciprocation after last gift received (10 imputations).

	Model 4		Model 5		Model 6		Model 7	
			B	S.E.	*B*	S.E.	*B*	S.E.
Dyad includes second-order friend			0.01	0.257	−0.01	0.261	0.014	0.256
Dyad is friends			0.918***	0.277	0.765**	0.284	0.831**	0.277
Friendship degree difference[a]			0.002	0.003	0.002	0.003	0.002	0.003
Age difference			−0.038*	0.017	−0.038*	0.017	−0.036*	0.017
Registration date difference (in days)[a]			−0.001*	0.000	−0.001	0.000	−0.001*	0.000
Log (wish box difference)			0.144	0.056	0.142*	0.056	0.141*	0.056
Log (photo difference)			−0.003	0.073	0.010	0.074	−0.014	0.074
Male dyad			−0.707*	0.320	−0.665*	0.32	−0.670*	0.321
Female dyad			0.006	0.210	−0.024	0.213	0.005	0.209
Same region			0.285	0.217	0.342	0.222	0.267	0.216
Reciprocator has more page views			−0.033	0.194	−0.011	0.195	−2.860*	1.249
Monetary value of gifts reciprocator received			0.015***	0.003	0.014***	0.003	0.014***	0.003
Number of jointly affiliated clubs			0.215*	0.087	3.993	2.094	0.205*	0.087
Log (absolute page view difference)	0.936**	0.360	0.828*	0.343	1.240**	0.481	0.921**	0.354
Log (absolute page view difference) squared	−0.058**	0.019	−0.046**	0.018	−0.071**	0.027	−0.060**	0.020
Log (absolute page view difference) × number of jointly affiliated clubs					−0.847*	0.432		
Log (absolute page view difference) squared × number of jointly affiliated clubs					0.045*	0.021		
Log (absolute page view difference) × reciprocator has more page views							0.319*	0.139
−2 Log likelihood	1260.55		1191.40		1184.42		1185.68	

Note: $N = 1156$.
[a] Coefficient and S.E. multiplied by 1000.
* $P < .05$ (two-tailed test).
** $P < .01$ (two-tailed test).
*** $P < .001$ (two-tailed test).

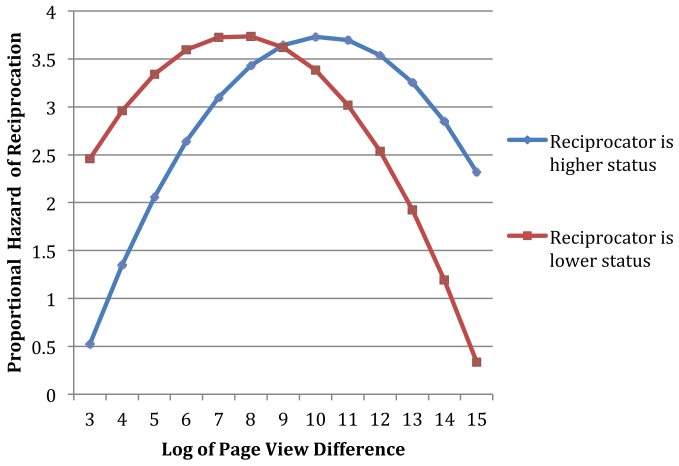

Fig. 5. Proportional hazard of reciprocation by status difference, by reciprocator's status (page views).

Model 7 adds to Model 5 the interaction term between status difference and the dummy variable indicating whether the reciprocator has more page views than her exchange partner. The coefficient is positive and significant. To facilitate interpretation, we present the predicted hazard of reciprocation in Fig. 5. The basic curvilinear relationship holds for both higher and lower status reciprocators, but the curve for the higher status reciprocators is shifted horizontally to the right.[20] That is, the hazard of the more loss-averse higher status reciprocator is lower than the hazard of their lower status counterpart when page view difference is small (Hypothesis 3).

Finally, although gender and age effects with respect to gift reciprocation fall outside the scope of the current study, we note some interesting patterns in passing. Regarding gender, male dyads have a strong negative effect on the probability of reciprocity while female dyads do not; based on Model 2, the male dyads are 64.9% less likely to be reciprocal ($1 - \exp(-1.048) = .649$) than different-gender dyads. This finding is consistent with reported gender differences in status competition among friends (Fisk, 2011; Singleton and Vacca, 2007). A similar pattern is observed in the reciprocation models where the hazard of reciprocation for male–male exchange dyads is approximately half the hazard for different-gender dyads ($\exp(-0.707) = .49$) according to Model 5.[21] Second, larger absolute age difference correlates with lower hazards of reciprocation (Models 5–7). Age is a prominent diffuse status characteristic in the South Korean Confucian cultural context on which generalized exchange in everyday interactions operates. The older person is expected to show benevolence to her younger counterpart (even if the age difference is as small as one year) by, for example, shouldering a larger portion of costs in joint activities (e.g. paying for lunch). Given this cultural expectation of paying "downward" from the older to the younger and the norm against being indebted to someone younger than oneself, we expect a more timely reciprocation from the older gift exchange partner and that hazard should increase with age difference. Indeed, we find confirmation for the above prediction from the data. In a variant of Model 5 (available upon request) where the absolute age difference is replaced with the signed age difference between the reciprocator and the initial gift giver, the hazard of reciprocation

[20] In another model specification not reported here, we added a quadratic two-way interaction term including (a) a quadratic term for the page view difference, (b) an interaction term of page view difference and the dummy variable indicating whether the reciprocator has more page views than her exchange partner, and (c) an interaction term of the quadratic term for page view difference and the dummy variable. Model fit did not improve significantly compared to Model 7 and all point estimates were not significant.

[21] To explore possible differences in reciprocation from males to females and females to males, we also examined a variant of Model 5 where the cross-gender dyad term was replaced with male → female dyad and female → male dyad terms in addition to the male → male dyad term as before. In this case, the female → female dyad was the omitted reference category. The hazard of reciprocation for female to male dyads was lower compared to the female to female baseline ($B = -0.22$, $p = 0.36$) while the hazard for male to female dyads was higher than female to female ($B = 0.24$, $p = 0.33$). However, these effects were not significant at the 0.05 level. The hazard for male to male dyads remained at a similar level as in model 5. While this is a potentially interesting dynamic worth probing deeper, we leave it for future investigation as gendered reciprocation processes diverges from the focus of the current study.

increases by 2.9% ($B = 0.028$, $p = 0.02$, $\exp(0.028) = 1.029$) with a one-year increase in the reciprocator's age relative to the initial giver. The plausible dynamic of generalized exchange with respect to age, however, seems independent of the status ambiguity effect that we have focused on so far as the effect size and statistical significance of page views (and its quadratic term) does not change.

6. Discussion and conclusion

In this paper, we developed and tested a model of reciprocation that takes status ambiguity into account. Contrary to typical experimental settings in social exchange studies, a wide range of interaction domains in the "wild" involve ambiguities in relative status. These ambiguities can stem either from incoherent alignments of diffuse status dimensions (e.g. race, gender) or from unconsolidated status characteristics – usually specific to a particular domain. The domain of interaction in the current study, Cyworld, provided an ideal setting for observing such an unconsolidated status characteristic. Relatively new social spaces within online social media platforms including Cyworld have created possibilities for domain-specific status differentiation that are partly decoupled from pre-existing status hierarchies.[22] These spaces provided fertile grounds for the users to negotiate underdetermined role relations and their pertinent lack of status differentiation (Leifer, 1988).

Page views in Cyworld are a noisy status dimension for calibrating relative status in an already under-structured domain of social interaction. When actors rely on page views in perceiving relative status, competition for dominance is more likely especially for those who stand close to each other on that noisy status dimension. We applied this reasoning to gift exchange and argued that those ambiguities can lead individuals to delay or withhold reciprocation as an implicit gesture for dominance.[23]

Two sets of statistical models, one at the dyadic and the other at the individual level, lent empirical support for this conjecture. In particular, we showed that the probability of two-way exchange dyads (Hypothesis 1A) and the hazard of reciprocation (Hypothesis 1B) are curvilinear with respect to status difference. The curvilinear effect of page view difference was weaker for exchange dyads with potentially richer status-relevant information about their exchange partners, as measured by club overlap (Hypotheses 2A and 2B). We interpret the attenuated curvilinearity as a result of exchange partners placing less weight on page views in perceiving relative status. Lastly, individuals with slightly larger page views than their exchange partners showed the tendency to delay reciprocation longer than those who had slightly fewer page views than their exchange partners (H3). We interpreted this last finding as evidence for the presence of status anxiety expressed through loss-aversion; a person with more page views than her exchange partner is more loss-averse than a person with less page views than her partner.

An intriguing implication of our argument is in when popularity reversal occurs over time within a dyad. That is, how do A's and B's timing of reciprocation change when A has slightly lower page views than B at a certain point in time, but gains slightly higher page views subsequently, either as a result of genuine changes in popularity or by random chance (i.e. noise)?[24] Based on our argument and model results, one would predict that as A approaches B's page views from below, that is, as status ambiguity increases, A's hazard of reciprocation will monotonically decrease towards 2 (far left of the red line in Fig. 5). However, once A's page views exceeds B's, A's hazard is predicted to drop discontinuously to 0.5 (blue line in Fig. 5) and start to increase as page view difference increases in favor of A. On the other hand, B might show a decreasing hazard of reciprocation as A catches up to B in page views, but once A exceeds B, the hazard would dramatically increase. We caution this mechanical application of our theory as additional considerations may dictate the relational dynamic during this transitional period. For example, A might try to appease B's potential disgruntlement by closely attending to interactions with B while B might express denial and feigned disinterest by delaying reciprocation even longer. Alternatively, both A and B might be prone to egocentric biases of self-superiority (Zuckerman and Jost, 2001). Then, A might see the reversal in page views as corroborating signs of her superiority over B while B might discount this reversal, leading to no change in her hazard of reciprocation. In short, additional assumptions are required in order to predict the effects of longitudinal changes and reversals in status on reciprocation behaviors. We suggest these interesting extensions for future research.

This paper extends Thye's status value theory in exchange by examining different scope conditions. Thye's theory has been applied to (1) negotiated exchanges (i.e. bilateral exchange) where (2) individuals were clearly differentiated by nominal status characteristics and (3) were aware of the status characteristics of each potential exchange partner (Thye, 2000). In contrast, the current exchange context is non-bargaining and unilateral in form, but more importantly, the status signal which actors are attuned to is noisy and continuous. The noise in the status measure leads to a variation in perceived status ambiguity, offering us the opportunity to examine the exchange outcomes when Thye's scope condition of perfect status information is relaxed. We focused on the competitive aspect linked to this scope condition, but other drivers of exchange operating under ambiguity may also be conceivable. Another scope condition that we identify, which does not come to the fore in Thye's theory is that individuals do not have full information of the exchanges occurring in other exchange dyads. This condition holds particularly true in the online context that we analyze, but it also reveals the importance of third-party monitoring for understanding the dynamics of exchange and the form of dominance competition that we argue to be crucial for those dynamics. Gift exchange in anthropological studies takes place mostly in group contexts where third-party observers legitimate status hierarchies (Mauss, 1950; Sahlins, 1963). Other strands of research on status and legitimacy (Podolny, 2005; Martin, 2009) also emphasize the importance of third-party audiences in the emergence and maintenance of status hierarchies. In these studies, the presence of an audience leads not only the giver to give more in order to gain recognition and status but also the reciprocator to match what she has been given in order to preserve status and reputation. Hence, non-giving or delaying reciprocation, as in the case of Cyworld, would not be a viable strategy for asserting higher status if gift giving is readily observable by third party others who collectively form and legitimate status orders (Martin, 2009). Finally, the objects of exchange in the current context heavily embody symbolic and expressive value, a condition that is difficult to forge in experimental settings where participants typically exchange with strangers and are motivated by monetary compensation. Although the expressive value emphasized in this setting may be seen as a limiting condition, we maintain that it in fact offers the opportunity to explore alternative, non-instrumental motivations of exchange that have been so difficult to study after the experimental turn of social exchange research.

[22] Research on emergent online social spaces are trying to understand the formation of new role relations (Welser et al., 2008, 2011) and how they compare to the familiar offline relations that we know of (boyd, 2006).

[23] Leifer (1988) uses the term "local actions" to describe these uncommitted, "nonrole-specific" actions that enable and constrain future courses of action that may eventually lead to consolidated status differentiation.

[24] We thank the anonymous reviewer who encouraged us to consider the implications of the discontinuity in reciprocation in the model.

On the other hand, the online observational data used in this study leave several issues unresolved. First, we recognize that individuals' motivations for dominance over their exchange partners were not directly measured. Future experimental research could fill this gap by manipulating status ambiguity and measuring dominance motivations in the lab. We anticipate, however, that experimentally manipulating dominance motivations will be a challenge, since they occur more readily in ongoing, real-life role relationships. An alternative approach may be to gather publicly available text content of interpersonal communication within the limits of respecting user privacy (e.g. public @mention tweets in Twitter) and measuring the extent of interpersonal dominance motives gleaned from it (Pennebaker, 2013). Second, it is difficult to ascertain whether the page views variable that measures status in Cyworld simply reflects unobserved offline characteristics such as demographics, socio-economic status and/or the size of one's offline network. We believe that page views are a reasonable measure of status for several reasons. First, the ethnography on Cyworld users generally suggests that the primary motivation is communicative and attention-seeking, which naturally ties in with the users' drive to seek popularity and use indicators of it to gauge relative status. Second, recent psychological research on the uses and engagement in social media reveals dispositional factors (e.g. self-monitoring) independent of SES (Gosling et al., 2011; Seidman, 2012). Since engagement on the site is a necessary condition for gaining popularity, one may argue that dispositional factors partly determine online popularity. Third, to the extent that SES is correlated with page views, we believe the correlation can be addressed by controlling for Cyworld activity level (see footnote 10 for details). Despite these reasons that lend credibility to page views as a measure of online status, at the end of the day, we cannot observe the broader offline characteristics of the users, which could otherwise allow us to rule out the possible endogeneity problem. We encourage future research to operationalize online status in more rigorous and creative ways.

Finally, the link-tracing method we used for sampling exchange and friendship ties resulted in a small portion of missing values at the individual level. Because the variables constructed for analyses were tie level attributes that had to be calculated from individual level variables (e.g. difference in the number of friends), the data contained a non-negligible portion of missing values regarding friendship ties and friendship degree. Although we addressed this issue through multiple imputation in addition to adding dummy controls, the significant proportion of missing cases at the dyad level cautions us from drawing strong, definitive conclusions.

Through this study, we contribute to exchange theory by highlighting the possible Machiavellian dominance motivations behind a quintessentially pro-social behavior, gift exchange. That is, under particular circumstances, dominance-seeking actors delay their giving, which is contrary to the dominant view in the literature that giving enhances one's status. We also offer one way to theoretically combine exchange as cause and as consequence of status, pointing to new extensions of existing experimental research on the interplay of status and exchange.

This paper holds implications for the increasing amount of research that uses online-based interaction data to construct social networks where a "social tie" in an interaction network (e.g. gift exchange, phone calls, text messages) is treated interchangeably with a tie representing sentiments, role relationships, or opportunity structures (Kitts, 2014). This study, on the other hand, suggests a plurality of sentiments and role relations in the observed interaction (i.e. gift exchange), which may be consequential for scaling our understanding from dyadic interactions to the larger network structure. We join Kitts (2014) in arguing that a richer and more accurate understanding of the structure of a given network can be obtained by leveraging fine-grained online interaction data to disentangle the intertwined conceptual constructs constituting our notion of a "social tie."

Lastly, the paper points to future research opportunities for micro-sociologists to observe, theorize, and test the emergence of hierarchies in newly created online domains of interaction with unprecedented detail. Recognizing these opportunities in social media have clear policy implications for the long-term preservation of user data from endangered or already extinct early social network services around the world (e.g. Friendster, Hyves, Orkut, hi5, Bebo). We urge the research and policy communities to carefully weigh these benefits against the real and potential risks to user privacy.

Appendix A. Multiple imputation procedure for missing values

To impute the missing variables, we first used Markov Chain Monte Carlo (MCMC) method implemented in the PROC MI procedure in SAS 9.1 to produce 10 imputed datasets in order to change the missing pattern into monotone. The MCMC method consists of two steps; the imputation step and the posterior step. In the imputation step, values are drawn for the missing variables in each separate case 1 from an initial conditional distribution for the missing values, given other observed values of case 1. The complete sample thus obtained was used to recalculate the population mean vector and covariance matrix. Then, the mean vector and covariance matrix were again used in the imputation step to draw adjusted values for the missing cases. The MCMC simulation repeated the two steps until the mean vector and covariance matrix converged. As for the covariates that were used in this process, we included all of the independent and control variables in Table C1 and another variable, namely, the average age of each individual's friends. The resulting monotone missing data with 10 imputations was then submitted to the regression imputation procedure in PROC MI. The means and standard deviations for age before and after imputation were identical whereas the mean and standard deviation for the number of friends in the imputed data were each 44% and 20% smaller, respectively than the observed data. The biased mean number of friends did not change much even when a full MCMC method was used instead of combining the MCMC method and the regression imputation method.

Appendix B. Rationale for employing a two-level multilevel model

The structure of the Cyworld data is more complex than that of the traditional egocentric network data because the Cyworld data extends another step out from the seeds' immediate gift exchange partners. For this reason, proper treatment would require, in principle, a three level multilevel modeling approach to fully account for the three-wave nested data structure. Specifically, each tie in a seed's "two-step" egocentric network is nested within the common first order exchange partners. Those first order exchange partners are, in turn, nested within the common seeds. Therefore, the logical extension of the traditional two-level model to account for the three-wave nested data structure would be to treat the seeds as the third level unit, the ties between the first order exchange partners and the seeds as the second level unit, and, finally, the ties between the second order exchange partners and the first order exchange partners as the first level unit. This three-level model would, in principle, fully account for the complex nested structure of the data. However, we employ a two level model for practical concerns of model convergence.

We extensively tested different model specifications under the three level model using alternative convergence criteria and

Table C1
Summary statistics for dyad level variables.

Continuous variables with no missing values	*N*	Mean	S.D.
Log (wish box diff.)	1156	2.1	2.2
Jointly affiliated clubs		0.2	0.7
Log (visit diff.)		10.3	3.3

Continuous variables with missing values	Before imputation			After imputation		
	N	Mean	S.D.	*N*	Mean	S.D.
Friendship degree difference	585	76.9	53.7	1156	100.9	60.2
Age difference	695	4.7	7.8		5.4	7.7
Registration time difference	1149	488.9	435		488.3	435
Log (photo diff.)	1155	5.8	1.5		5.8	1.5

Categorical variables	*N*	Frequency	%
Reciprocal gift exchange	1156	114	9.9
Unilateral gift exchange		1042	90.1
Dyad includes 2nd order friend		377	32.6
No 2nd order friend		779	67.4
Friendship dyad		573	49.6
Non-friend dyad		583	50.4
Male dyad		229	19.8
Female dyad		373	32.3
Heterosexual dyad		554	47.9
Same region		487	42.1
Different region		669	57.9

Note: The imputed statistics are averages over 10 imputations.

options for approximation. The estimation method for multilevel logistic regression models is more complicated than ordinary multilevel linear models. In SAS 9.1 which we used for all statistical analyses, there are two solutions for approximation. The first option is to approximate the model using pseudo-likelihood estimators. This method is implemented in the "PROC GLIMMIX" procedure which adopts the first-order Taylor expansion of the logit link function to obtain the linear approximation. The second option is to approximate the integral using quadrature-based methods. Adaptive quadrature numerically approximates the integral in the likelihood function by a series of either fixed or flexible discrete points. This method is implemented in the "PROC NLMIXED" procedure in SAS 9.1. Approximating the model usually converges faster and fits complex models relatively easily. However the variance estimates for random effects tend to be negatively biased (smaller variance). On the other hand, approximating the integral yields unbiased standard error estimates but requires fairly accurate discrete points for the adaptive quadrature and cannot be used for models involving more than two levels. The main trade-off between the two procedures, then, is between accounting for higher level clustering at the seed level with a known negative bias (PROC GLIMMIX) vs. obtaining less biased estimates at the cost of not properly accounting for higher level clustering (PROC NLMIXED).

Eventually, we choose to use the more conservative NLMIXED procedure for the following reason. Consider a three level multilevel model where i is a gift exchange dyad, j is the first order gift exchange partner, and k is the seed. Dyad i is nested within j and j is nested within k. We denote $\eta_{ij} = \beta_{ojk} + r_{ijk}$, where η_{ij} is the probability that dyad i is reciprocal, β_{ojk} is the level-2 and r_{ijk} is the level-1 residual. At level-2, $\beta_{ojk} = \beta_{ook} + u_{ojk}$ where u_{ojk} is the level-2 residual normally distributed with mean 0 and standard deviation $\tau^{(2)}_{00}$($u_{ojk} \sim N(0, \tau^{(2)}_{00})$). In turn, $\beta_{ook} = \gamma_{000} + u_{ook}$ where u_{ook} is the residual at level 3, normally distributed with mean 0 and standard deviation $\tau^{(3)}_{00}$($u_{ook} \sim N(0, \tau^{(3)}_{00})$). Then, $\beta_{ojk} = \gamma_{000} + u_{ook} + u_{ojk}$ is the mean of η_{ij} for dyads including j. The correlation of the mean level of reciprocity (β_{ojk}) for any two first order gift exchange partner with the same seed is $\mathrm{ICC}_{\beta_0} = \tau^{(3)}_{00}/(\tau^{(3)}_{00} + \tau^{(2)}_{00})$. The ICC_{β_0} for our reciprocity data is $\mathrm{ICC}_{\beta_0} = 0.096$ which means that 9.6% of the variance in the mean reciprocity level between any two gift exchange *dyads* with different first order gift exchange partners is due to the fact that they share the same seed. Practically speaking, ignoring a 9.6% ICC by specifying a two-level model using the NLMIXED procedure seems to be a lighter trade-off than ignoring the negative bias which is entailed by specifying a three-level model using the GLIMMIX procedure.

Appendix C. Summary statistics for dyad and individual level variables

See Tables C1 and C2.

Appendix D. Age difference of gift exchange dyads by gender combination and friendship status of seeds

Despite the rarity of gift exchange dyads that are not Cyworld friends, friends of friends, or belonging to the same group, the nature of those non-friend gift exchange ties remains a puzzle. Although a fully developed qualitative analysis, which falls out of the scope of the current study, is warranted to comprehensively address this question, we do find some suggestive evidence that is consistent with two alternative, non-competing hypotheses. First, the non-friend exchange dyads may be pre-romantic courting relationships developing online (Rosenfeld and Thomas, 2012). Accordingly, Cyworld gift exchange could be a way to initiate interaction that might develop into a romantic relationship. If this conjecture is correct, the age difference in the different gender, non-friend gift exchanging ties should mirror the age difference of heterosexual romantic couples in the South Korean population (i.e. two to three years).[25] As shown in Table D1, while the mean

[25] While reliable statistics on the age gap of Korean romantic partners are difficult to obtain, the Korean census statistics tracks the age gap of first-time married (heterosexual) couples. In 2006, the grooms were between one and five years older than the bride in over 54% of the first-time married couples. The mean first-time marriage age was 30.9 years for males and 27.8 years for females in 2006 (Statistics Korea, 2007). The mean male–female age gap of gift exchanging non-friends (2.8 years) falls squarely within the age gap distribution among first-time married couples.

Table C2
Summary statistics for individual level variables.

Continuous variables with no missing values	*N*	Mean	S.D.	Min	Max
Receive frequency	1160	1.8	5.5	0	158
Give frequency		1.8	8.1	0	229
Affiliated clubs		7.5	32.2	0	907
Total visits to minihome		33,574.4	609,782.6	0	20,481,727
Wish box		32.9	117.6	0	2380

Continuous variables with missing values	Before imputation					After imputation				
	N	Mean	S.D.	Min	Max	*N*	Mean	S.D.	Min	Max
Number of friends	618	34.6	50.1	1	252	1160	19.4	40.02	0	252
Age	1108	23.6	7.9	5	65		23.6	7.92	5	65
Days since registration	1159	802.1	403.5	122	2572		802.3	403.6	122	2572
Photos	1159	658.2	1101.6	0	17,912		657.8	1101.2	0	17,912

Categorical variables	*N*	Frequency	%
Gift exchange seed	1160	44[a]	3.8
1st order gift exchange partner		181	15.6
2nd order gift exchange partner		935	80.6
Friendship seed		43	3.7
1st order friend		222	19.1
2nd order friend		353	30.4
Non-friend		542	46.7
Male		467	40.3
Female		693	59.7

Note: The imputed statistics are averages over 10 imputations.
[a] The number of gift exchange seeds is larger than the number of friendship seeds because one gift exchange seed did not have any friends.

Table D1
Mean and standard deviation of age differences between gift exchange partners by gender composition and friendship status.

	Friend	Non-friend
Male age – female age	0.17 (9.37)	2.82 (8.77)
Abs (male age – female age)	4.78 (8.06)	5.05 (7.68)
Abs (female age difference)	4.823 (7.70)	13.36 (15.58)
Abs (male age difference)	2.15 (4.32)	6.69 (7.50)

male-to-female age difference for gift exchanging friends is 0.17 years, that mean for non-friend exchange ties is 2.8 years. Random processes of exchange tie formation cannot account for this difference as the age distributions of males and of females in the entire gift exchange sample are exactly the same (mean = 22.8, S.D. = 8.1).

Second, media reports document the wide substitution of Cyworld gifts for traditional gift giving occasions. Older family members would give New Years gift money (**Sebe-don**) to children and young adults (Maeil Business Newspaper, 2006) while some employees preferred Cyworld gift vouchers as New Years bonus (Cameron, 2005). As with Facebook and other more recent social media services, younger Cyworld users were reluctant to establish Cyworld friendships with their parents and older relatives due to privacy concerns. If younger Cyworld users avoid "friending" their relatives and parents, but receive Cyworld gifts from them, the non-friend gift exchange dyads in our data should exhibit a larger age difference on average. Indeed, the mean age difference of non-friend exchange ties (6.96 years) is significantly larger ($t = -2.81$, $p < 0.01$) than that of the exchange ties among friends (4.17 years). In addition, consistent with the parent–child hypothesis, the absolute age difference for the two same-gender, non-friend gift exchange dyads (last two rows in Table D1) are approximately three times larger than the corresponding gift exchange dyads among friends.

In sum, we find evidence that the non-friend gift exchange ties may over-represent inter-generational kin relationships or pre-romantic courting relationships compared to the friendship exchange ties. Despite these differences, non-friend gift exchange ties constitute a small proportion of all exchange ties (12.9%), minimally affecting the results of the main analysis. Even if the courting relationships had constituted a larger portion of our sample, the subtle and stylized dominance competitions often observed in courting relationships probably would have strengthened our core hypotheses regarding status competition and delayed reciprocation (Hypotheses 1A and 1B).

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