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Dynamics of Friendship Reciprocity Among Professional Adults

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Friendship is generally a reciprocal relation, yet many enduring ties are not symmetrical. Sometimes, only one member of a dyad considers the other a friend, or may see their relation as a close friendship while the other does not. Existing theories imply that personal and social attributes may influence the likelihood of reciprocity in friendship. In this longitudinal study, we found that demographic and educational attributes had little effect, but relative gregariousness and popularity consistently influenced development and persistence of unequally reciprocated friendships in 2 cohorts of executive MBA students. Additionally, higher gatekeeping power predicted greater tendency to befriend members of different age categories. Although gatekeeping power correlated directly with unequal reciprocity, the effect was mediated by gregariousness and popularity.

Friendship, although it may vary in meaning or intensity for different people, occurs among people in all cultures and societies. Its personal, social, and organizational benefits have been highlighted in psychology (e.g., Chan & Cheng, 2004; Furman, 2001), sociology (e.g., Ingram & Roberts, 2000), and organizational research (e.g., Krackhardt, 1992; Mehra, Kilduff, & Brass, 1998). People who work together often become friends (Gibson, 2005), producing a variety of group and organizational consequences. For example, friendship ties have been empirically linked to enhanced team performance (Kratzer, Leenders, & van Engelen, 2005) and greater information sharing between a CEO and the board of directors (Carpenter & Westphal, 2001). Friendship can increase venture capital investment in an entrepreneur's company, while decreasing contractual restrictions (Batjargal & Liu, 2004). Further, the composition of a friendship

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network can affect the success of organizational change efforts (McGrath & Krackhardt, 2003).

Throughout the wide range of theoretical and empirical research on friendship, there is a tendency to expect that friendship is mutual. If Alice sees Bob as a friend, people tend to believe that Bob sees Alice as a friend, even when this reciprocity does not exist (Freeman, 1992). Further, it is difficult to remember asymmetries (i.e., unequal reciprocation) in relationships (DeSoto, 1960).

Several theories support the notion that friendship tends to be reciprocal. Homophily, which is defined as liking others who are perceived to be similar to oneself, often produces friendship as a result of shared gender, ethnicity, or socially constructed attributes that cause people to identify with each other (McPherson, Smith-Lovin, & Cook, 2001). Assuming that similarity between two persons is mutual, they should both be influenced by homophily to accept each other as friends.

Balance theory also predicts friendship reciprocity. Because people feel uncomfortable with imbalances in their own relations and in relations among their friends, they tend to reciprocate proffered friendships, relinquish friendship attempts that are not reciprocated, and intervene to create mutual connections among people they like (Heider, 1958). Even studies that acknowledge early imbalance between “would-be” friends (e.g., Lydon, Jamieson & Holmes, 1997) have suggested that the pair will eventually settle into a mutual relationship or no relationship at all.

Despite theoretical and popular support for friendship reciprocity, a few researchers have noted that asymmetries often occur. For example, Mollica, Gray, and Trevino (2003) reported that over one third of the friendship ties they measured initially and over one half of the ties a few months later were unreciprocated. Explanations for friendship imbalances call attention to knowledge distribution (Carley & Krackhardt, 1996) or discrepant popularity (Hallinan, 1978) within a social system. Attribute similarity and social position influence transitivity in networks (Hallinan & Kubitschek, 1988), so these factors may also affect reciprocity. Friendship can be fragile (Wiseman, 1986). Unreciprocated friendships tend to include lower levels of positive feelings than are found in mutual friendships (Mendelson & Kay, 2003), so they may be particularly fragile.

To advance our understanding of nonsymmetrical friendship, we theorize about the effects of attribute similarity and social activity on friendship reciprocity over time. Because friendship is dynamic (Gibbons & Olk, 2003; Miller, Notaro, & Zimmerman, 2002; Weinstock & Bond, 2000), we must assume that levels of reciprocity can also be dynamic. Why do unequally reciprocated friendship relations occur among adults? What causes these structural imbalances to persist? Can we identify factors that draw nonsymmetrical friendships into balance?
In this article, we argue that friendship reciprocity among adults cannot be adequately understood as a strictly dyadic process. Rather, profering and reciprocation of friendship depends on population characteristics and relations with others, as well as objective similarity between members of the dyad. We draw from two complementary perspectives: The first considers interpersonal preferences, and the second considers social activity.

Theoretical Background and Hypotheses

Asymmetrical ties may result from differences in interpersonal preferences or socializing tendencies. Interpersonal preferences lead people to establish relationships with particular others whose attributes they see as desirable. They are particularly likely to choose others whose similarities to themselves are salient or who hold prestige in the social setting. We will examine the effects of interpersonal preferences on friendship asymmetry by considering relative similarity and gatekeeping power within the network.

Socializing tendencies include a general willingness to give friendship and the ability to attract it. They may create dyadic asymmetries through differences in thresholds for friendship or through differences in general popularity. We will examine the effects of socializing tendencies on friendship asymmetry by considering out-degree (i.e., number of people chosen by the participant as friends) and in-degree (i.e., number of people choosing the participant as a friend).

Relative Similarity and Gatekeeping Power as Predictors of Unequally Reciprocated Friendship

Relative similarity. Homophily may lead similar people to build reciprocal relations, but if participants’ perceptions of similarity differ, the result may be an unequally reciprocated relationship. Because people choose friends whose salient attributes are similar to their own, we may assume that homophily tends to build reciprocated relations between people whose similarities are noticeable to both parties. In contrast, when perceptions of similarity differ, the same mechanism (homophily) may lead to unequally reciprocated friendships. Differing perceptions of similarity could result from differing priorities or from social comparisons with a variety of others. When most others seem very different from Alice along dimensions that matter to her, she may be more likely to notice how Bob is similar to her. In contrast, if many others within Alice’s social setting seem similar to her, she may be less likely to view Bob as a similar other.
Carley (1995) argued that people choose friends who have knowledge that is similar to their own, but their judgments of similarity depend on the availability of others who hold similar knowledge. Thus, the judgment of similarity between two people may be relative to each person’s unique perception of similarity with others in the social environment. Given a complex distribution of attributes and knowledge among their existing and potential friends, the relative similarity of Alice to Bob does not necessarily equal the relative similarity of Bob to Alice. Investigating the effects of relative knowledge similarity on friendship development, Carley and Krackhardt (1996) found that the proportion of each person’s knowledge that was shared in a dyad, compared with the amount of knowledge that was shared with available others, predicted nonreciprocation in friendships. Homophily research implies that this outcome is at least partially mediated by affective preference for relatively similar others.

The present research aims to extend this line of reasoning to the general role of homophily in friendship development. Because level of similarity is not necessarily equally perceived by both parties to a relationship, one person may feel more similar to another than the other feels in return. Further, and perhaps more importantly, one person may feel less similar to another than the other feels in return.

In a very homogeneous environment, in which we are outwardly similar to everyone else, homophily may play a small or nonexistent role in determining which pairs become friends. In this case, proximity may largely shape friendship, as argued by Davis (1968). In a more heterogeneous environment, in which personal and social differences become salient, proximity may not be enough to foster friendship. People in this setting become aware of their differences, and they feel drawn to others who share their salient attributes. When people feel quite different from others in the social setting, homophily may lead them to seek similar others actively and to minimize relations with those whom they perceive to be dissimilar.

As an example, imagine an informal group, lacking other aspects of hierarchy, in which there are 12 men and 2 women. Homophily, as usually interpreted, would lead the women to draw together and the men to draw together, each in reciprocal relationships with similar others. The concept of relative homophily makes a different prediction. In general, members of a salient majority are less likely to focus on the shared characteristic in forming friendship ties than are members of the minority (Mehra et al., 1998). In our imaginary setting, the men could be less concerned than the women about gender similarity. If relative perceived similarity drives friendship choice, the women may draw together in a reciprocal relation, but the men will not limit their friendships because of gender. This scenario would lead to more unre- ciprocated relations from the men toward the women than the reverse.
The same argument applies to ethnic or age-related classifications. Given no external hierarchy or societal constraint on interaction, we would expect to find more unreciprocated friendships initially proffered from majority members toward minority members than the reverse. This majority–minority effect may result from population characteristics that make differences generally salient to minority members. It may also result from composition of the local social system that brings particular differences to the attention of participants.

Although homophily effects may follow comparison of any salient personal attributes, three readily observable attributes are common to all persons: gender, ethnicity, and age cohort. Relative similarity in any of these attributes may influence friendship reciprocity.

**Hypothesis 1.** Unequally reciprocated friendship will flow from a person whose salient characteristics are shared by the majority toward a person whose salient characteristics are in the minority, rather than the reverse. This effect could be based on gender, ethnicity, or age cohort.

**Gatekeeping power.** Central positions within a network equate to power and status, and as Hallinan and Kubitschek (1988) argued, persons of higher social status may receive friendship from others without returning it. In particular, we propose that gatekeepers—that is, people whose social positions afford access and control over information traveling through the local grapevine—may be less prone to initiate relations with less central others. Because higher gatekeeping power yields more benefits from the social system, people who are more central along this dimension have less practical need to invest their attention and emotions in less central—and, therefore, less powerful—people than the reverse. For example, Bowler and Brass (2006) found friendship asymmetry associated with a higher status individual not reciprocating interpersonal citizenship behaviors. This suggests that higher status individuals are likely to receive stronger friendship from less central others than they reciprocate.

**Hypothesis 2.** Unequally reciprocated friendship will flow from a person with lower gatekeeping power toward a person with higher gatekeeping power, rather than the reverse.

**Differences in Social Activity as Predictors of Unequally Reciprocated Friendship**

Disparate aspects of social activity, apart from salient demographic features, may create asymmetries in friendship. These asymmetries probably
reflect several concurrent social processes. One process could involve differences in gregariousness between two people that might lead some to have lower thresholds for friendship than do others. Another would result from discrepancies in overall popularity, such that each dyadic relationship may be more important to the less popular person than to the more popular person.

**Personal gregariousness.** Personal gregariousness, or the tendency to seek and accept others as friends, could easily lead to disparate feelings of friendship between two persons. A gregarious person seeks others’ company, enjoys being with others, and is generally sociable. It is easy for a gregarious person to like someone else. Less gregarious people may be slower to recognize others as friends, and may tend to see relationships as less close than do their gregarious counterparts. Gregarious people may interpret daily greetings and discussion of the local news as signs of friendship, while less gregarious people may see these as courtesies or pastimes that do not indicate genuine friendship. For example, one of the authors witnessed a discussion in which one person called another a *friend*. The speaker was rebuked because, in the second person’s upbringing, one becomes a *friend* only after a long period of interaction. Their relation was not considered by this person to be friendship.

Along these lines, Lydon et al. (1997) argued that some pairs of individuals are in an *acquaintanceship* or *pre-friend* stage from which they might become friends, as opposed to other pairs who are clearly in a *non-friend* or a friend stage. For friendship to develop between acquaintances, one individual must reach out to the other as a friend. During this transition period, friendship asymmetry can occur. Over time, the friendship may become reciprocal, but empirical observation of long-term imbalances suggests that some people are more willing to “be friends” than are others. People who have a lower threshold for friendship will tend to name more people as their friends than will people who have a higher threshold for friendship. When gregarious people who have a low friendship threshold interact with less gregarious people who have a higher threshold, unequal reciprocation may occur.

*Hypothesis 3.* Unequally reciprocated friendship will flow from a person who is more gregarious toward a person who is less gregarious, rather than the reverse.

**Popularity.** In addition to each person’s tendency to befriend others, each person has some tendency to attract positive affective relations from others. These concepts are related, but they represent distinct cognitive and social processes. The first reflects a focal individual’s acceptance and emotion
toward others; while the second reflects others’ acceptance and emotion toward the focal individual.

In evolving networks, connections are not randomly distributed. Rather, those actors who are already popular (i.e., they have a relatively greater number of positive relations) tend to attract a higher percentage of new relations than do others. This process of preferential attachment can lead to a scale-free network (Barabasi & Bonabeau, 2003) in which “the rich get richer,” and these relatively few actors become hubs. Further, friendship research has shown that people tend to choose as friends those who are more popular than themselves (Feld, 1991). We build on this tendency by noting that while these actors may have greater popularity, popularity is only an antecedent to friendship and not a guarantee (Bukowski, Pizzamiglio, Newcomb, & Hoza, 1996).

The mutuality or reciprocity that is typically associated with friendship (Newcomb & Brady, 1982) may not exist. Rather, having greater popularity may result in reduced attention to any one particular relationship because of the relative amount of social attention being received. Conversely, those individuals who are less popular are likely to claim more popular individuals as friends, but not vice versa. Therefore, we anticipate that those people in our sample who receive fewer or weaker friendship relations may tend to maintain unequally reciprocated relations with more popular others.

**Hypothesis 4.** Unequally reciprocated friendship will flow from a person who is less popular toward a person who is more popular, rather than the reverse.

**Finding Balance in an Unequally Reciprocated Friendship**

Under what circumstances does initial lack of reciprocity in friendship shift to a balanced relationship? Do changes in perceived similarity or in social activity lead to balance? How do homophily and social tendencies break or balance asymmetrical relationships? We propose two processes that might lead toward balance. First, initial categorizations may be overcome by increasingly accurate information about the other person that leads to reciprocation or discontinuation of the friendship. In this case, the occurrence of homophily-based imbalances will decline over time. Second, self-fulfilling prophecy research demonstrates that, over time, individuals’ expectations can alter the behavior of others.

The *Pygmalion effect*, a special case of self-fulfilling prophecy, occurs when an individual’s beliefs about another person lead him or her to behave
in ways that foster the expected attributes in the other person (Livingston, 2003). For example, confidence in others’ ability to reach a goal can convince people that they are able to do so (Eden, 1990). The opposite effect, sometimes referred to as the Golem effect (Kierein & Gold, 2000), occurs when lower expectations lead to poorer performance. These effects have been studied largely in the realm of motivation and performance (White & Locke, 2000), but the social psychological principles may be equally important for understanding relationship development. When there is an unequally reciprocated friendship, the signals of friendship and the behaviors that accompany it may lead the receiver to respond with friendship. Alternatively, the sender may withdraw the friendship after seeing that the recipient does not act like a friend. Drawing from these two processes, we propose that some unequally reciprocated friendships will become balanced as a result of familiarity over time.

**Hypothesis 5.** Some unequally reciprocated friendships will shift toward balance over time as participants observe each other.

Ongoing contact between people enables them to learn more about each other. They may exchange ideas and observe attributes that were not obvious early in the relationship. Through this process, the sources of homophily shift from surface characteristics to more detailed understandings. As initial categorizations fade in the light of increasingly accurate information, homophily leads to attraction along more substantive dimensions. People may then respond to similarities of knowledge, values, or behaviors that take precedence over demographics or other shallow indicators of similarity or dissimilarity. Unequal reciprocation caused by demographic homophily may be rectified at this point if deeper attributes enable both people to appreciate each other. While we anticipate this for all demographic characteristics (e.g., gender, race, cohort), it is particularly likely for gender. Meta-analyses of the Pygmalion effect have found that it is most pronounced when the leader is male (Kierein & Gold, 2000; McNatt, 2000). In our majority–minority scenario, we anticipate that men (who are more prevalent in many professional settings) are initially more likely to befriend women than vice versa. In this situation, the self-fulfilling prophecy will likely lead to balance. Thus, we expect the following:

**Hypothesis 5a.** Unequal reciprocity across demographic categories will move toward reciprocity over time.

**Hypothesis 5b.** The shift toward reciprocity will be most pronounced for unequal reciprocity related to gender.

As people recognize signals from others, they may change their friendship perceptions. Proffering of friendship by a more gregarious or less popular
person may result in acceptance over time, but unreciprocated friendship may be withdrawn if the relationship is not moving toward reciprocity. Some proportion of observed imbalances reflects a stage in this process, but some will remain unequally reciprocated over a long period of time. The Pygmalion effect may cause a previously nonfriendly member of a dyad to respond with friendship to friendship behaviors and expectations proffered by the other person. If we can assume that more popular people are more likely to be approached than are less popular people, then we may apply arguments of self-fulfilling prophecy to infer that a more popular person will often respond to the expectations of a less popular instigator of the relationship.

Hypothesis 5c. Unequally reciprocated friendship from less popular people to more popular people will move toward balance over time, either by growing reciprocity or by dissolution of the relation.

The self-fulfilling prophecy effect may also apply to gregariousness. It may cause a previously nonfriendly member of a dyad to respond with friendship to friendship behaviors and expectations proffered by a more gregarious instigator of the relationship. As noted previously, the effect may also cause gregarious people who have not been treated as friends to withdraw their friendship. Whether through the positive or the negative behavioral and emotional signals, relations that are imbalanced as a result of disparity in gregariousness are likely to move toward balance over time.

Hypothesis 5d. Unreciprocated friendship by more gregarious people to less gregarious people will tend toward balance, either by growing reciprocity or by dissolution of the relation.

Method

To test the effects of relative similarity, gatekeeping position, and social activity on unequally reciprocated friendship, we asked the following questions. First, which factors predict friendship asymmetries early in the relation? Second, what causes unequally reciprocated friendships to remain imbalanced over time? Third, how do these factors influence resolution of imbalanced friendship?

In a corporate setting, informal networks often reflect formal, hierarchical structures. In a neighborhood, they often reflect proximity. To examine naturally occurring influences on ties among professional adults without these constraints, we collected data on two samples ($n$s = 55 and 59,
respectively) of Master of Business Administration (MBA) students who were enrolled in executive programs at a West Coast university.

Each sample consisted of executive MBA candidates in a lock-step, cohort program. Issues of position and role prestige were minimal because each person held the same formal position within the group. All students in each sample completed the same courses concurrently. This setting is fairly stable, permitting us to examine persistence and change in friendship reciprocity over time with minimal disruptions in the network.

To determine homophily effects on imbalanced friendship, we measured three salient group categorizations. Ethnicity and gender often foster social identification and homophily effects among individuals (McPherson et al., 2001). Age categories can be less defined than gender or ethnicity, yet shared attributes and preferences have been identified among people born during the same span of time (Zemke, Raines, & Filipczak, 2000). These shared tendencies develop through common exposure to defining events, and they lead to recognizable similarities among persons from the same age cohort. In the present study, all participants were either Baby Boomers (Boomers) or Generation Xers (Xers). We used generational membership, ethnicity, and gender as potential factors in homophily-based asymmetries.

Initial data were collected by surveying students near the end of their first quarter in the program. The second sampling occurred 18 months later for Sample 1, and 30 months later for Sample 2, during the final quarter of the program for each cohort. At each time, students completed surveys measuring demographics and friendship ties with others in the sample. Students received feedback about the responses, but they were not told how the information would be used in the present analysis.

**Dependent Measures**

*Friendship.* Students evaluated their relationships with classmates using a 5-point scale ranging from 1 (*barely or do not know*) to 3 (*casual friend*) to 5 (*close friend*). This survey was based on those used by Krackhardt and Stern (1988) and by Gibbons (2004). For Sample 1, although the entire cohort was together during an offsite, weeklong orientation course and during social activities, for pedagogical reasons, the group was split in half during the first quarter. Friendship ties probably existed across the subgroups, but we initially asked each student to provide friendship evaluations only on those students in his or her respective half. Subsequently, the students were combined into one large section for most of the remaining courses. At Time 2, then, we asked the students to provide friendship evaluations on all students
in their program. In contrast, respondents in Sample 2 were together throughout the entire program.

Information from all surveys in each group was aggregated to represent the friendship network at each time period. The vector of Student \(i\)'s reported relation with each other person became a row in a matrix containing all self-reports for that time period. For Sample 1, this procedure created two \(55 \times 55\) matrices in which Cell \(ij\) represents Student \(i\)'s report regarding his or her relationship with Student \(j\) at a particular time.

Because the class was split at Time 1, data representing the relationships across classes were missing at Time 1. The Time 2 matrix included full data for 50 of the students, but 5 persons declined to answer the friendship survey. To minimize the effect of these missing data on network measures, their positions in the friendship network were represented by other students' nominations of them. This nulls out their data in our analyses, possibly reducing the power of our tests, but it enables us to retain a more accurate graph of the network than if their data were excluded. In Sample 2, this process created two complete \(59 \times 59\) matrices of the friendship ties.

Unequal reciprocation of friendship. Based on the friendship matrices, this variable reflects asymmetries in the dyadic relations at each time in each sample. It includes in every Cell \(ij\) the difference between \(i\)'s nomination of \(j\) as a friend and \(j\)'s nomination of \(i\) as a friend. This difference score is similar to that used by Bowler and Brass (2006). To accomplish this, each weighted friendship matrix was transposed, and was then subtracted from the original friendship matrix. The procedure yielded an unequal friendship (UF) matrix for Times 1 and 2 in each sample. A positive number indicates that row Student \(i\) reported stronger friendship toward column Student \(j\) than the reverse. The corresponding Cell \(ji\) contains the same integer, with the opposite sign.

Stable, imbalanced friendship. Based on the UF matrices at both time periods, a third matrix was created from each sample to represent consistent imbalances in relationships over time. This trinary matrix indicates the direction of consistent imbalances, using the values of \(-1\), 0, and 1. If Cell \(ij\) in the UF matrices contained a negative number at both time periods, the corresponding cell in the stable imbalance matrix contains a \(-1\). Similarly, if Cell \(ij\) in the UF matrices contained a positive number at both time periods, the corresponding cell in the stable imbalance matrix contains a 1. Otherwise, the cell contains a 0.

Motion toward balance. This matrix indicates changes in friendship nominations by pairs that moved from imbalance into balance over time. For each sample, Cell \(ij\) contains a signed integer representing Student \(i\)'s increase (i.e., positive number) or decrease (i.e., negative number) in reported friendship with Student \(j\). Only pairs that moved from imbalance into balance are
included in this dataset; all others are marked missing. This variable identifies the source or sources and extent of change that brought each relationship into balance.

**Independent Measures**

**Ethnicity.** Students were asked to categorize their primary racial/ethnic identities. For Sample 1, there were 38 people who identified themselves as Caucasian, 1 person as African American, 2 as Hispanic, and 9 as Asian (5 did not indicate racial/ethnic identity). For Sample 2, there were 40 people who identified themselves as Caucasian, 2 as African American, 1 as Hispanic, and 15 as Asian (1 did not indicate racial/ethnic identity).

A matrix was created for each sample to represent presence and direction of majority to minority pairings. A 1 was entered in Cell \( ij \) if Student \( i \) reported majority membership and Student \( j \) reported minority membership. In this case, Cell \( ji \) contains a \(-1\). If both students reported majority membership, or if both students reported minority membership, their cells (\( ij \) and \( ji \)) each contain a 0.

**Gender.** Each participant’s gender was coded as 0 for female and 1 for male. The population from Sample 1 consisted of 19 women and 36 men, while Sample 2 included 22 women and 37 men. For each sample, a matrix was created to represent presence and direction of male to female pairings. A 1 was entered in Cell \( ij \) if Student \( i \) was male and Student \( j \) was female. In this case, Cell \( ji \) contains a \(-1\). If both persons were of the same gender, their cells (\( ij \) and \( ji \)) each contain a 0.

**Age cohort.** Both samples were solely composed of Boomers and Xers. In Sample 1, the age break between generations (based on birthdays at or since 1964) occurred at the 23.6\(^{th}\) percentile. In Sample 2, the age break occurred at the 57.9\(^{th}\) percentile. This created a situation in which the Boomers formed the majority in Sample 1, but the Xers formed a slight majority in Sample 2. For each sample, a matrix was created to represent the presence and direction of Boomer to Xer pairings. A 1 was entered in Cell \( ij \) if Student \( i \) was a Boomer and Student \( j \) was an Xer. In this case, Cell \( ji \) contains a \(-1\). If both persons were of the same age cohort, their cells (\( ij \) and \( ji \)) each contain a 0.

**Gatekeeping power.** At Time 1 and again at Time 2, the friendship matrix was used to determine each person’s betweenness score. Betweenness is a measure of centrality in a social network. It is known as the gatekeeping measure because it calculates the extent to which each individual stands along the shortest path between all pairs in the system. By enabling access and control over social exchanges, greater betweenness tends to increase one’s power and influence in a social setting.
To calculate betweenness, we binarized the data by coding participants’ responses of 1 and 2 to 0 and their responses of 3, 4, or 5 to 1. Direction of the relationship was retained. Then we used UCINET V to obtain betweenness measures for each person at each time in both samples. A matrix was created to represent pairwise difference in betweenness by entering in Cell $ij$ the difference between Student $i$’s betweenness score and Student $j$’s betweenness score.

**Gregariousness.** At Time 1 and again at Time 2, the friendship matrix was used to determine each person’s out-degree. This measure of gregariousness represents the extent to which each individual selects others as friends, including weightings for closeness of ties. It is calculated by summing all of the individual’s self-reports about others in the social system at each time period. Matrices were created to represent gregariousness difference by entering in Cell $ij$ the difference between Student $i$’s out-degree and Student $j$’s out-degree.

Because out-degree is based on each person’s claim about his or her friendships with others, there is a small amount of overlap between dyadic friendship imbalance and our gregariousness measure. This occurs because each person’s report about every other is included in his or her total gregariousness score. At Time 1, this produces a common-methods bias that could slightly skew the results of cross-sectional analyses in favor of our hypothesis. Over time, this problem disappears, as gregariousness (measured at Time 1) is used to predict imbalances reported 18 months and 30 months later.

**Popularity.** At Time 1 and again at Time 2, the friendship matrix was used to determine each person’s in-degree. This measure of popularity represents the extent to which others select the person as a friend, including weightings for closeness of ties. It is calculated by summing all friendship nominations of the individual by others in the social system at each time period. In-degree generally correlates positively with out-degree, but it is distinct in meaning, as it reflects only others’ feelings toward the individual. Matrices were created to represent popularity difference by entering in Cell $ij$ the difference between Student $i$’s in-degree and Student $j$’s in-degree.

Because in-degree is based on all others’ claims about each individual person, there is a small amount of overlap between dyadic friendship imbalance and our popularity measure. This occurs because all reports about each person are included in his or her popularity score. At Time 1, this produces a common-methods bias that could slightly skew the results of cross-sectional analyses against our hypothesis. Over time, this problem disappears, as popularity (measured at Time 1) is used to predict imbalances reported 18 months and 30 months later.
Control Measure

We controlled for individual versus group focus, which may have an effect on the creation and persistence of unequally reciprocated friendships. Group focus versus self-focus affects performance appraisals, communication, and decision making (Earley & Erez, 1997). Self-focused individuals make new affiliations in order to fulfill self-motives. This may lead to lower levels of friendship. However, self-focused individuals, because they do not recognize stable in-group and out-group memberships, are sometimes friendlier to strangers, thinking that they may be allies someday (Olk & Earley, 1996). To account for these potentially counteracting tendencies, we evaluated each person’s group focus using a scale developed by Earley and Erez. The scale (Cronbach’s $\alpha = .74$) includes 10 items on a 5-point scale ranging from 1 (self-focus) to 5 (group focus).

Analysis

The hypothesized relationships were tested from multiple angles. First, which initial factors predicted unequally reciprocated friendships in the cross-sectional data at Time 1? Second, which initial factors predicted friendship asymmetries many months later? Third, what caused unequally reciprocated friendships to remain imbalanced over time? Finally, what influenced the resolution of imbalanced friendships over time?

We tested the hypotheses for each sample at the dyadic level using the multiple regression quadratic assignment procedure (QAP). QAP is a non-parametric test of relationship between variables. Therefore, it is not bound by the assumptions intrinsic to OLS regression. Because social network data are, by definition, interdependent, QAP correlation and regression are preferable to other methods for hypothesis testing when using dyadic data (Krackhardt, 1987). QAP tests for structural similarity between two matrices and determines the likelihood that an existing correlation could have occurred by chance. It does this by generating a distribution of possible outcomes, given the present data. The observed correlation is then compared with the distribution of possible correlations to determine the level of statistical significance.

In the present study, the permutation-correlation process was repeated 1,000 times, and the number of times that a more extreme correlation was observed determined the significance of the observed correlation. For example, if 1% of the permutations yielded a more extreme correlation than that observed in our data, the existing relationship is considered to be significant at the .01 level. Similarly, the significance of a multiple regression...
QAP model is estimated by comparing the explanatory power of the observed variables with a distribution of possible outcomes. The $p$ value for the model indicates the proportion of chance models that produced a better fit.

Results

Correlations among variables are presented in Table 1. Because the matrices are anti-symmetric (i.e., Cell $ij$ is the inverse of Cell $ji$), the mean for all variables is 0. The results of regressions testing effects on structural imbalance are reported in Tables 2 and 3. Because self-focus versus group focus had no significant effect on any of the outcome variables, we excluded it from the regressions.

Hypothesis 1 predicted that demographic homophily would create unequal reciprocity between members of majority versus minority social groups. This idea received limited support in our data. We found no gender effect once other factors were controlled, as indicated in Table 2. The other two social categories influenced friendship imbalance across time in Sample 1. After 18 months, members of the ethnic majority reported less friendship with minority members than the reverse ($b = -.482$, $p < .01$). During the same time period among the same people, Boomers began to like Xers slightly better than the reverse ($b = .269$, $p < .10$). This is the sample in which Boomers were the majority, so our results clearly do not support the notion of majority versus minority friendship preferences. Rather, they imply a social process in which group members developed similar attitudes toward members of different groups, who correspondingly developed shared attitudes toward them. Friendship imbalances existed in Sample 2, but they did not reflect a systemwide tendency of one demographic group to perceive more or less friendship with members of the other than the reverse. Although ethnicity significantly produced stable imbalance over time in Sample 1 ($b = -.104$, $p < .05$), demographic differences did not consistently predict stable imbalance (see Table 3).

Hypothesis 2, which proposed that people with lower gatekeeping power would be more likely to report greater friendship with more central others than the reverse, was not supported. Betweenness had no significant main effect on friendship imbalance in Sample 2 or on stable imbalances in either sample.

Hypothesis 3 proposed that imbalanced friendship would be more likely to flow from a person who is more gregarious toward a person who is less gregarious than the reverse. This was strongly supported in both samples, as reported in Table 2. Cross-sectional data at Time 1 demonstrate that the
### Table 1

**Correlation Matrix for Samples 1 and 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unequal friendship, Time 1</td>
<td>—</td>
<td>.35***</td>
<td>.70***</td>
<td>.01</td>
<td>-.05</td>
<td>.07</td>
<td>.54***</td>
<td>-.05</td>
<td>.30***</td>
<td>-.11</td>
</tr>
<tr>
<td>2. Unequal friendship, Time 2</td>
<td>.26***</td>
<td>—</td>
<td>.65***</td>
<td>.02</td>
<td>-.08</td>
<td>.18*</td>
<td>.38***</td>
<td>-.17*</td>
<td>.10</td>
<td>-.12</td>
</tr>
<tr>
<td>3. Stable imbalance</td>
<td>.59***</td>
<td>.58***</td>
<td>—</td>
<td>.04</td>
<td>-.09</td>
<td>.13†</td>
<td>.48***</td>
<td>-.10</td>
<td>.22**</td>
<td>-.10</td>
</tr>
<tr>
<td>4. Gender</td>
<td>-.24**</td>
<td>-.01</td>
<td>-.13†</td>
<td>—</td>
<td>.09</td>
<td>.02</td>
<td>-.02</td>
<td>-.04</td>
<td>.09</td>
<td>-.04</td>
</tr>
<tr>
<td>5. Ethnic majority–minority</td>
<td>-.10</td>
<td>-.32**</td>
<td>-.19*</td>
<td>.07</td>
<td>—</td>
<td>.08</td>
<td>.06</td>
<td>.27*</td>
<td>.13</td>
<td>-.17</td>
</tr>
<tr>
<td>6. Baby Boomer–Generation Xer</td>
<td>-.10</td>
<td>.14†</td>
<td>.03</td>
<td>.15</td>
<td>-.02</td>
<td>—</td>
<td>.09</td>
<td>-.03</td>
<td>-.05</td>
<td>.26*</td>
</tr>
<tr>
<td>7. Gregariousness difference, Time 1</td>
<td>.61***</td>
<td>.26**</td>
<td>.40***</td>
<td>-.29*</td>
<td>-.08</td>
<td>-.17†</td>
<td>—</td>
<td>.39**</td>
<td>.75***</td>
<td>-.27*</td>
</tr>
<tr>
<td>8. Popularity difference, Time 1</td>
<td>.06</td>
<td>.04</td>
<td>.07</td>
<td>-.04</td>
<td>.02</td>
<td>-.08</td>
<td>.59***</td>
<td>—</td>
<td>.62***</td>
<td>-.19†</td>
</tr>
<tr>
<td>9. Betweenness difference, Time 1</td>
<td>.32***</td>
<td>.00</td>
<td>.16*</td>
<td>-.29*</td>
<td>.12</td>
<td>-.38*</td>
<td>.60***</td>
<td>.42***</td>
<td>—</td>
<td>-.30*</td>
</tr>
<tr>
<td>10. Group orientation difference</td>
<td>.06</td>
<td>.02</td>
<td>.04</td>
<td>-.11</td>
<td>-.25*</td>
<td>-.08</td>
<td>.10</td>
<td>.04</td>
<td>-.15</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note.* Sample 1 correlations are reported below the diagonal. Sample 2 correlations are reported above the diagonal. Because each of the variables is anti-symmetric (i.e., Cell $ij$ is the inverse of Cell $ji$), the mean for each variable is 0.  
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. 

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**DYNAMICS OF FRIENDSHIP RECIPROCITY**

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difference in gregariousness between two persons predicted the direction of imbalance in their friendship relation (Sample 1, $b = .036$, $p < .001$; Sample 2, $b = .017$, $p < .001$). Over time, the effect of initial gregariousness on subsequent imbalance remained consistent with the hypothesis (Sample 1, $b = .028$, $p < .01$; Sample 2, $b = .017$, $p < .001$).

Hypothesis 4 proposed that imbalanced friendship would be more likely to flow from a person who is less popular toward a person who is more popular than the reverse. This was supported at Time 1 in Sample 1 and consistently in Sample 2. Cross-sectional data in Sample 1 at Time 1 demonstrate that the less popular person in a dyad tended to report greater friendship than did the more popular person ($b = -.036$, $p < .001$). This effect

Table 2

<table>
<thead>
<tr>
<th>Dyadic variable</th>
<th>Unequal friendship, Time 1</th>
<th>Unequal friendship, Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample 1</td>
<td>Sample 2</td>
</tr>
<tr>
<td>Gender</td>
<td>-.04</td>
<td>.01</td>
</tr>
<tr>
<td>Ethnic majority–minority</td>
<td>-.04</td>
<td>-.00</td>
</tr>
<tr>
<td>Baby Boomer–Generation Xer</td>
<td>.01</td>
<td>-.01</td>
</tr>
<tr>
<td>Betweenness centrality difference, Time 1</td>
<td>.00</td>
<td>-.00</td>
</tr>
<tr>
<td>Gregariousness difference, Time 1</td>
<td>.04***</td>
<td>.02***</td>
</tr>
<tr>
<td>Popularity difference, Time 1</td>
<td>-.04***</td>
<td>-.02**</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.47***</td>
<td>.35***</td>
</tr>
<tr>
<td>$p$ value</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. 

...
disappeared over time \((b = -.012, \text{ ns})\). In Sample 2, popularity had the expected effect at both times (Time 1, \(b = -.017, p < .01\); Time 2, \(b = -.017, p < .01\)).

In support of Hypotheses 3 and 4, both gregariousness and popularity had the expected effects on stable imbalance over time (see Table 3). In Sample 1, gregariousness \((b = .010, p < .001)\) and popularity \((b = -.007, p < .05)\) influenced long-term friendship imbalance in the expected direction. In Sample 2, gregariousness \((b = .009, p < .001)\) and popularity \((b = -.008, p < .01)\) also influenced stable friendship imbalance in the expected direction.

Hypothesis 5 proposed that some unequally reciprocated friendships would shift toward balance over time, as participants observed each other. This was clearly supported by our results. To test the causes of the shifts, we ran regressions predicting motion toward balance in friendships over time (see Table 4). The data included only pairs that moved from imbalance into balance over time. The dependent variable represents a shift in friendship appraisals by each person in a pair whose appraisals of the relation became equal.

We found support for specific aspects of Hypothesis 5. There was no balancing effect from majority–minority categorizations in general or of male–female in particular, providing no support for Hypotheses 5a and 5b. However, expectations regarding popular (Hypothesis 5c) and gregarious (Hypothesis 5d) people were supported. The change from unequally reciprocated to reciprocated friendship resulted from more popular people

### Table 3

**Regression Results Predicting Stable Friendship Imbalances Over Time**

<table>
<thead>
<tr>
<th>Dyadic variable</th>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.01</td>
<td>.03</td>
</tr>
<tr>
<td>Ethnic majority–minority</td>
<td>(-.10^*)</td>
<td>(-.03)</td>
</tr>
<tr>
<td>Baby Boomer–Generation Xer</td>
<td>.06</td>
<td>.04</td>
</tr>
<tr>
<td>Betweenness centrality difference, Time 1</td>
<td>(-.00)</td>
<td>(-.00)</td>
</tr>
<tr>
<td>Gregariousness difference, Time 1</td>
<td>(.01^{***})</td>
<td>(.01^{***})</td>
</tr>
<tr>
<td>Popularity difference, Time 1</td>
<td>(-.01^*)</td>
<td>(-.01^{**})</td>
</tr>
<tr>
<td>(R^2)</td>
<td>(.24^{***})</td>
<td>(.33^{***})</td>
</tr>
<tr>
<td>(p) value</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

*Note.* Trinary outcome variable indicates direction of imbalance that was evident, in the same direction, at both time periods.

\(^{*}p < .05. \^{**}p < .01. \^{***}p < .001.\)
increasing their liking of less popular persons than the reverse (Sample 1, $b = .025, p < .05$; Sample 2, $b = .012, p < .01$). People who were more gregarious withdrew some of their friendship, while less gregarious people increased their friendship (Sample 1, $b = -.026, p < .001$; Sample 2, $b = -.014, p < .001$).

Supplemental Tests of Interactions Among Variables

Post hoc analyses of interactions among variables reveal limited consistent effects, primarily between gatekeeping power and demographic variables. Gatekeeping power negatively predicted the direction of stable imbalances between ethnic majority and minority persons, such that the person with higher gatekeeping tended to report lower friendship at both time periods than did the person with lower gatekeeping ($b = -.001, p < .10$). In contrast, gatekeeping power positively predicted the direction of stable imbalances between persons from different generations, such that the person with higher gatekeeping tended to report greater friendship at both time periods than did the person with lower gatekeeping ($b = .001, p < .01$).

Discussion

Asymmetrical ties are expected to occur between individuals in hierarchical situations (e.g., employee and boss), but friendship relations are often
assumed to be reciprocal. The present study diverged from prior research by focusing on imbalances in friendship relations among professional adults outside the hierarchical setting of their jobs. Based on prior research, we identified relative homophily, gatekeeping power, and social activity as possible sources of unequal friendship reciprocity. The results provide strong evidence that asymmetrical friendship occurs and persists in response to the broader social activity of the actors.

In support of Hypotheses 3 and 4, we found that gregariousness (i.e., the tendency to befriend other people) and popularity (i.e., the tendency to elicit friendship from others) were related to asymmetrical ties in the expected directions. The more gregarious person in a pair is likely to perceive greater friendship than is the less gregarious person. Pairs that came into balance over time often did so through a reversal of this gregariousness effect (Hypothesis 5d), but it continued to predict imbalance throughout the 18-month and 30-month samples. The gregariousness effect predicted stable imbalances in both samples.

Popularity also had a significant impact on the formation and retention of unequal friendship relations over time. This relationship was more complicated and somewhat less consistent than the gregariousness effect. In general, the more popular person in a dyad is more likely to receive greater friendship from the less popular person than the reverse; and the balancing process is more likely to reflect a positive response from the more popular person than a withdrawal by the less popular person.

Our study did not find consistent support for interpersonal preference perspectives on unequal reciprocity. In only a few instances did measures of relative homophily (Hypothesis 1) predict friendship asymmetry, and differences in gatekeeping power did not foster friendship imbalances (Hypothesis 2). Different ethnic group membership correlated significantly with unequal friendship at Time 2, and majority members nominated minority members less than the reverse in Sample 1. This finding is consistent with evidence that individuals in the minority seek majority individuals who can meet their needs, while majority members may be reluctant to form minority ties (Zeggelink, 1995).

Unequally reciprocated relationships did not result from minority–majority status in gender or age. Although differences in relative knowledge similarity can foster asymmetrical ties (Carley & Krackhardt, 1996), relative similarity in gender and age does not seem to be a reliable cause of unequal reciprocity. These findings indicate that while homophily may be important for the emergence of friendship ties (Mollica et al., 2003), relative similarity does not have a consistent effect on reciprocity. When heterophilic ties develop, they are nearly as likely to be reciprocal as ties between demographically similar people.
Gatekeeping effects on friendship asymmetry appear to be mediated by social activity and moderated by demographics. Difference in network access to information does not create asymmetrical ties directly. The high correlations of the gatekeeping power measure of betweenness with both unequal friendship ties at Time 1 and with stable imbalance for each sample (reported in Table 1) are consistent with other research (Bowler & Brass, 2006). Difference in betweenness is also strongly related to difference in gregariousness and popularity. Inclusion of all these variables in the regression equations yielded significant results only for gregariousness and popularity. This suggests that social activity, which is related to social power, is a mechanism that causes asymmetrical ties. Joint effects of betweenness and demographics indicate that gatekeepers are especially likely to reach across age categories.

The present study sheds light on a prevalent but understudied relationship and aids in the development of more processual theories of relationships. It is not, however, without limitations. By parsing each person’s characteristics and social choices into many categories, we reduced our statistical power proportionately. It seemed necessary to address this set of characteristics because they are universally recognized as indicators of social identity. Ethnicity, gender, and age create identities and influence group-to-group interactions across cultures. Yet, this approach ignores personal levels of ethnocentrism and the social characteristics that foster it. Clearer, more accurate predictions could probably be achieved by asking people how they identify themselves, and then using this social identity variable to model homophily effects on friendship reciprocity. This would enable targeted study of the processes occurring among people who hold distinct categorical views of self and others. The results of the current study imply that social context and selective identities probably influence which categorical memberships, if any, create friendship imbalances.

Another area for future research is examining the relationship between asymmetrical friendship ties and other types of ties. It is likely that advice-giving and other helping relations affect the development and stability of friendship ties. In our sample, the adults were part of a cohort, taking classes together and being placed into study groups for the purpose of studying together and conducting group projects. In the context of graduate school, friendship ties may overlap heavily with advice and information sharing.3

Prior research has demonstrated that these relations overlap frequently in organizations (Ibarra, 1992), but the extent of the overlap seems to vary. For example, a study of networks among teachers in four public schools (Gibbons, 2004) revealed significant correlations between the weighted friendship and advice networks in all of the organizations at two time periods

3We thank an anonymous reviewer for this insight.
(correlations ranged from .37 to .55). Centrality in friendship and advice networks may also be related, but the relationship seems to be dependent on context. For example, centralities in advice and friendship networks were significantly correlated among employees of an advertising firm (Ibarra & Andrews, 1993), but they were not significantly related in an organization that specialized in information-systems sales and maintenance (Krackhardt, 1990). These disparate findings indicate a potentially complex relationship between advice giving and friendship development that deserves ongoing investigation. Specifically, researchers might investigate whether asymmetries in corporate relations (e.g., advice or communication ties) offset friendship asymmetries (Lazega & Pattison, 2001).

This research could be extended by collecting data in non-American contexts or in organizations in which hierarchical relationships exist jointly with the informal relationships. The individuals in our samples represent a reasonable range of demographic variables for the United States, and our measure of group focus had no relationship with asymmetrical friendship. However, extending this work beyond the United States could provide more insight into the unequal aspects of the relation. How do friendship imbalances develop and resolve in cultural contexts in which friendship thresholds may be higher or lower, and meanings of the relationship may vary from North American norms? What happens during intercultural friendship development?

The current study has practical as well as research implications. Many studies have related friendship ties to individual and organizational outcomes, such as personal satisfaction, communication patterns, information sharing, workplace performance, innovation, and profits (e.g., Bouty, 2000; Ingram & Roberts, 2000; Lincoln & Miller, 1979; Mehra, Kilduff, & Brass, 2001). While the present study did not examine these outcomes, our findings about persistence of asymmetrical ties have implications for professional settings.

Friendship, which is important within and across organizations (Labianca, Brass, & Gray, 1998; Morrison, 2002), brings trust into professional relations (Krackhardt, 1992). It forms a central component of one’s social capital, which is the set of resources—tangible or virtual—that accrue to an actor through the actor’s social relationships and that facilitate the attainment of goals (Leenders & Gabbay, 1999). Social capital, in turn, affects one’s career development (e.g., Eby, 2001; Forret & Dougherty, 2001; Metz & Tharenou, 2001).

People generally assume that friendship given equals friendship received (Bell, 1981), which could lead to unwise behaviors if the assumption fails to prove true. Conditions that foster unequally reciprocated relations could place people at risk in circumstances in which they assume that they can trust
and communicate freely with others whom they consider to be friends. Individuals who are highly gregarious, especially if they are not popular, may find themselves to be at such risk. They may assume that they have many strong ties—and, therefore, greater social capital—while others in the network do not support this perception. This may lead individuals to overestimate their access to resources and their ability to trust others in their network. Future research that extends our findings to evaluate these implications will continue to enhance understanding of the theory and the practice of friendship ties in adult networks.

References


