BRINGING THE INDIVIDUAL BACK IN: A STRUCTURAL ANALYSIS OF THE INTERNAL MARKET FOR REPUTATION IN ORGANIZATIONS

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We challenge the claimed incommensurability of individualism and structuralism by showing how a cognitive theory can guide the use of structural methods. According to balance theory, there is a strain toward cognitive balance in observers' perceptions of friendship relations. Thus, we found, as predicted, that being perceived to have a prominent friend in an organization boosted an individual's reputation as a good performer, but that actually having such a friend (as assessed by conventional structural methods) had no effect. Bringing individual perceptions back into structural analysis enhances, rather than detracts from, the effectiveness of a structural approach.

At the height of his wealth and success, the financier Baron de Rothschild was petitioned for a loan by an acquaintance. Reputedly, the great man replied, "I won't give you a loan myself; but I will walk arm-in-arm with you across the floor of the Stock Exchange, and you soon shall have willing lenders to spare" (Cialdini, 1989: 45).

Purposeful action can influence perceptions of the social structure of relations in an organization, and these changed perceptions can, in turn, influence action. Baron de Rothschild signaled to the members of the London stock exchange his close link to a would-be borrower, and observers of this public demonstration of friendship no doubt upgraded their evaluation of the creditworthiness of the baron's apparent friend. Research in social psychology suggests that people in general strive to influence others' perceptions of the social networks within which they are embedded (Cialdini, 1989). Further, perceptions of the structure of even relatively small organizational networks vary considerably from one person to the next (Krackhardt, 1990). People may vary in their opportunities to perceive who is friends with whom and in their susceptibility to impression management attempts of the kind initiated by the Baron de Rothschild. To some extent, social structure is in the eye of the beholder.

Researchers concerned with social networks have tended to overlook the importance of individual cognition; exceptions are Freeman, Romney, and Freeman (1987) and Romney, Weller, and Batchelder (1986), important

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works on cognitive accuracy. A strong theme in social network research has been that students of social structure need not be concerned with individuals or individual-level variables. From a radical social structural perspective, the study of individuals is "a dead end" (Mayhew, 1980: 335) that has been superseded by the analysis of the structure of relations (see Leinhardt [1977], Wellman and Berkowitz [1988], and White [1992] for similar views). According to Mayhew, "Structuralists and individualists are asking different questions. They are attempting to explain different things. . . . no shared language and no line of communication unites them in any common discourse" (1980: 339). Structural and individual approaches, therefore, are ostensibly incommensurable.

Berkowitz, in his influential survey of social network research, summarized the claim that individualism and structuralism represent different scientific paradigms as follows: "I have argued that structural analysis . . . signals the beginning of a scientific revolution" (1982: 150). Empirical work from this perspective echoes the dismissal of the psychology of the individual. For example, in a recent study of how network ties affect organizational dynamics, McPherson, Popielarz, and Drobnic asserted: "We don't have to posit some unmeasured choice mechanism based on affinities, preferences, tastes, or some other inferred internal state to understand why our associates are similar to us; the homophily [similarity] principle can be derived from social structure rather than be attributed to human agency" (1992: 168).

The irony in the attempt by some social network advocates to represent their activity as a new paradigm quite separate from the psychology of the individual is that social network research has been heavily dependent on the very psychology it has purported to reject. We think that psychology and structuralism have much to offer each other, as evidenced by the continuing influence on network analysis of the work of such major social psychologists as Lewin (1936), Heider (1958), and Festinger (1954). Davis (1979) and Gartrell (1987) offer reviews of how social psychology has influenced social network research.

Rather than throwing psychology and the role of individuals out of social network analysis, we argue here that the individual must be brought back in to acknowledge and account for the micro-foundations of structural research. This article builds on the work of Burt (1982), Granovetter (1973, 1985), Krackhardt (1987a), Kilduff (1992), Ibarra (1993), and others who have recognized that any approach to human action must include individuals as perceiving and opportunity-seeking actors.

We sought to bring the individual back into structural analysis by investigating whether individuals' perceptions were more important than an objectively measured social structure in determining the reputations of organization members. By testing competing models of the relationship between structure and reputation, we directly confronted the claim that structural analysis need pay no attention to individuals. We hoped to ground the debate concerning the value of a psychological approach to structural analysis in the realm of theory and evidence rather than in the realm of ideology.

THEORY

The theoretical framework within which we investigated the determinants of reputation in organizational labor markets was balance theory (Heider, 1958). From this perspective, someone perceived to be the friend of a positively valued other is also likely to be perceived positively: there is a strain toward cognitive balance in the perceptions of observers. We argue that the performance reputations of people with prominent friends will tend to benefit from the public perception that they are linked to those friends.

This basking-in-reflected-glory effect has been hypothesized to involve a deliberate strategy on the part of individuals to garner positive evaluations from those who perceive their ties to prominent others: "It is our contention that people make known their noninstrumental connections with positive sources because they understand that observers to these connections tend to evaluate connected objects similarly" (Cialdini, Borden, Thorne, Walker, Freeman, & Sloan, 1976: 374). Despite its apparent relevance to issues such as performance rating, previous researchers have not investigated the basking-in-reflected-glory effect in a performance context.[1]

Building from this psychological base in balance theory, we propose to extend the study of the basking phenomenon to all the actors in a social system. The structural approach suggests looking at performance reputations in terms of the structure of relations in an entire organization. Structuralists are familiar with the use of the metaphor of the market to describe any competitive situation in which people jockey for valuable outcomes, such as a reputation as a good performer (cf. White, 1970). In looking at an organization as a market for reputation, one's focus is implicitly on the process of exchange. An organization is a forum in which influence, control, and power are traded (Pfeffer & Salancik, 1978: 24–27). The higher an individual's reputation, the more valuable he or she becomes in the internal labor market.

The "pricing" of individuals in this market is a cognitive process that unfolds within a social context. An individual's performance is often difficult to assess, so people look for signals of quality (Spence, 1973). Does the person hold a high position in the organization? Is the person a friend of a prominent leader? In this cognitive assessment process, both individual attributes and social ties may contribute to the determination of performance reputation.

To recapitulate, we are predicting that an observer's perception of an individual's performance will be significantly influenced by the degree to which the observer perceives that individual to have a prominent friend. The basis for this prediction at the psychological level is the strain toward cognitive balance in the mind of observers. Within the internal labor market of an organization, people are assumed to be jockeying to increase their

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[1] See Balzer and Sulsky (1992) and Bretz, Milkovich, and Read (1992) for reviews of performance appraisal research.

reputations as high performers by publicizing links to prominent others. This assumption is supported by research on basking in reflected glory (see Cialdini [1989] for a review) showing that people actively seek to enhance their public images by proclaiming bonds to successful others: "It is as if strains toward cognitive balance are at some level of consciousness understood to exist by observers and action is taken to exploit the consequences of the balance process" (Cialdini & Richardson, 1980: 414).

We assume that each individual is especially active in drawing attention to his or her most prominent friend because this friend offers the individual the most opportunity for basking in reflected glory. Organization members may also be alerting others to such relevant factors as their position in the organizational hierarchy and their organizational accomplishments. Further, members of the internal labor market are assumed to be searching for signals of the underlying performance quality of colleagues and competitors (cf. Spence, 1973) in an ongoing social comparison process (cf. Festinger, 1954).

Formally stated, our first hypothesis is

> *Hypothesis 1: The prominence of an individual's most prominent friend will influence the individual's performance reputation in an organization, controlling for the individual's formal status and job performance.*

However, this proposition can be further refined in accordance with balance theory to distinguish between perceived and actual friendship links.

From a balance theory perspective (Heider, 1958), it is an individual's perception of social relations, rather than the actual structure of social relations, that affects individual attitudes. What matters are the friends a person is perceived to have, not actual friendships. Balance theory suggests, therefore, that mental representations of patterns of relations will be more important determinants of attitudes than the actual patterns of relations within which individuals are located. From this perspective, perceptual measures of network relations should be more predictive of attitudes than objective measures.

Social network links can be derived either from each observer's cognitive map of how he or she perceives the connections between organizational actors or from an aggregate map built up from the agreement of each party to each link. We follow Weick and Bougon (1986: 105–106) in using the term "cognitive map" to refer to an individual's mental representation of relations within a system of connections. An individual's cognitive map of a friendship network, for example, consists of the individual's picture of who is friends with whom in a particular social system. Individuals are assumed to use these maps to negotiate their journeys through their social worlds.

An alternative to deriving a separate set of network links from each observer's cognitive map is to use a map of the actual network assembled in a conventional structural fashion from the agreement of each party to each link. The network map in this case is not idiosyncratic to any one individual. The aggregate network map represents reality because it is compiled from

the observations of all relevant observers rather than from the observations of just one observer (Krackhardt, 1987a).

> *Hypothesis 2: Measures of perceived network relations will lead to better predictions of performance reputation than will measures of actual network relations.*

METHODS

Site

Silicon Systems (a pseudonym), the organization selected as the research site, was a small entrepreneurial firm located on the west coast of the United States in an area known for its many small start-up companies. Silicon Systems specialized in the sale, installation, and maintenance of state-of-the-art information systems for clients such as local banks, schools, manufacturing firms, and R&D labs. Not long before this research began, giant competitors, such as the International Business Machines Corporation (IBM) and the American Telephone and Telegraph Company (AT&T), had begun to focus attention on Silicon Systems' market because of its perceived growth potential. According to the top managers of Silicon Systems, the small firm's competitive edge remained its ability to respond more efficiently than its giant competitors to idiosyncratic customer demands.

Silicon Systems was wholly owned by its three top managers, each of whom owned an equal share. All employees worked in the company's single-floored building. The employees saw each other regularly and were familiar with each others' work practices. The firm had grown from 3 to 36 people in 15 years, with much of the growth occurring in the 5 years prior to this study. During those years, the firm had been generally profitable, and the owners anticipated no downward trend in their business.

Of the 36 people in the company (28 men and 8 women), 33 people, or 92 percent, accepted $3 each from us to complete a lengthy questionnaire. We described the research as a study of the effects of networks in organizations. All respondents were promised and given individual reports showing their cognitive maps of the networks and how those perceived networks compared to the actual networks.

Measures

Network indexes: Friendship and advice networks. To capture respondents' cognitive maps of the friendship and advice relations in this organization, we asked each person about his or her perceptions concerning every other person's network links. For friendship, each person responded to the following question about every other person in the organization: "Who would this person consider to be a personal friend? Please place a check next to all the names of those people who that person would consider to be a friend of theirs." For advice relations, the corresponding question was: "Who would this person go to for help or advice at work?" Thus, for the

friendship network, John Meredith was asked a series of 36 questions of the form: "Who would Jane Asch consider to be a personal friend?" "Who would Jerry Bonavue consider to be a personal friend?" Each question was followed by the list of 35 employees' names. John Meredith then checked the names that indicated, for example, his perceptions concerning who Jane Asch considered to be her personal friends.

Each respondent, then, gave us a complete cognitive map of his or her perceptions concerning who was friends with whom in the organization. In order to measure perceived friendship links we used the following procedure: A friendship tie as perceived by person k existed between person i and person j only if k responded on the questionnaire that i considered j a friend.

To measure actual friendship links, we determined the locally aggregated structure (LAS, Krackhardt, 1987a) as follows: A friendship tie existed between persons i and j only if person i claimed that person j was a friend and person j claimed that person i was a friend. Thus, the friendship link was defined as existing when both parties agreed that it existed. This measure of the actual network is direct and has obvious face validity.

Figure 1 presents an example of a respondent's cognitive map of the friendship network. The striking aspect of this particular map is the relatively few number of connections this individual perceived. Comparing this individual's cognitive map with the actual structure of friendship relations that emerged from the reports of all respondents (Figure 2) shows that perceptions concerning friendship links can be considerably discrepant from actuality (Krackhardt, 1990). In this case, the discrepancy is the result of the individual not perceiving many friendship links that actually existed. In other cases, the discrepancy occurs because an individual perceives friendship relations where none exist.

To measure a perceived advice link, we followed the following procedure: A person was considered to go to another person for advice if the respondent's cognitive map showed that person as going to the other for advice. That is, for respondent k, a perceived advice link existed between persons i and j only if respondent k perceived that person i went to person j for advice.

To measure an actual advice link, we did this: A person was considered to go to another for advice only if that person claimed that he or she went to the other for advice. That is, person i was considered to actually go to j for advice only if i's cognitive map showed i going to j for advice. This definition of an actual advice link is known as the row-dominated locally aggregated structure (Krackhardt, 1987a) and follows the standard procedure in network analysis in that it relies on the self-report of the individual concerned. This measurement preserves the asymmetry inherent in the relation, an asymmetry that is critical to our prominence argument, as discussed below.

Independent variable: Friend's prominence matrix. We hypothesized that each person's performance reputation would be influenced by the extent to which each person had a prominent friend in the organization. We

FIGURE 1
**An Employee's Cognitive Map of the Friendship Relations at
Silicon Systems[a]**

Jim

Pat

Ev

Irv ◄———► Zoe   Steve   Fred ◄———► Upton

Ivo

Chris
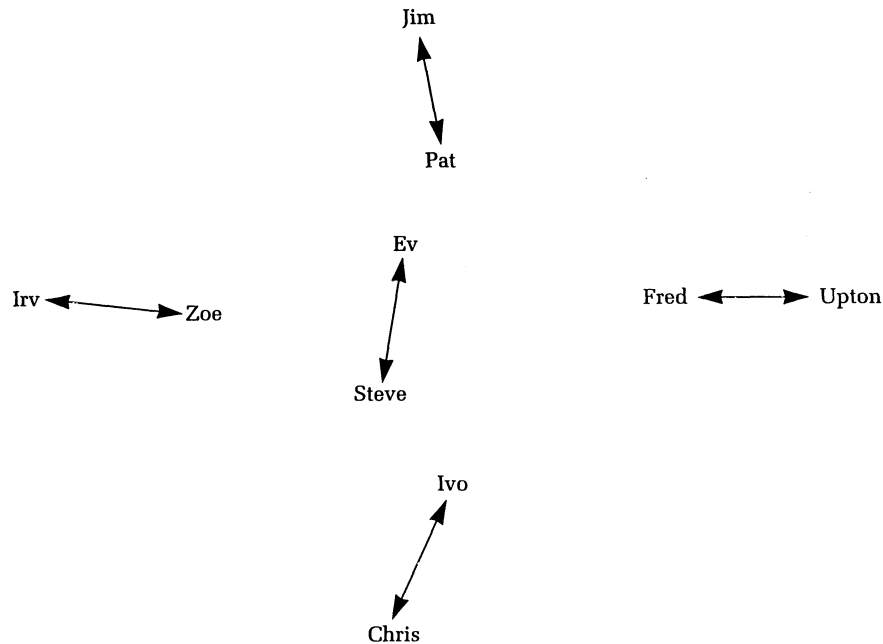
[a] The sociogram was drawn by KrackPlot (Krackhardt, Lundberg, & O'Rourke, 1993).

chose to focus on each person's most prominent friend rather than on an average of all friends' prominence ratings because of the theoretical basis of the research. An average measure would not capture an individual's ability to bask in reflected glory. With an average measure, two individuals might have the same friends' prominence score even though one person had no prominent friends whereas the other had both highly prominent and highly obscure friends.

We measured each friend's prominence in four different ways and obtained four separate matrixes. Table 1 summarizes the differences among these four measurements. To contrast the predictive validity of the perceived and externalized structures, we measured prominence using both perceived and actual network links. To check for common method variance, we measured prominence both from questionnaire responses, as indegree centrality in the advice network—that is, the total number of others who went to the friend for advice (Scott, 1991: 72)—and from the organization chart, as formal status in the organizational hierarchy. The four measures of friend's prominence were, therefore (1) the indegree centrality of the perceived

FIGURE 2
The Actual Structure of Friendship Relations at Silicon Systems[a]
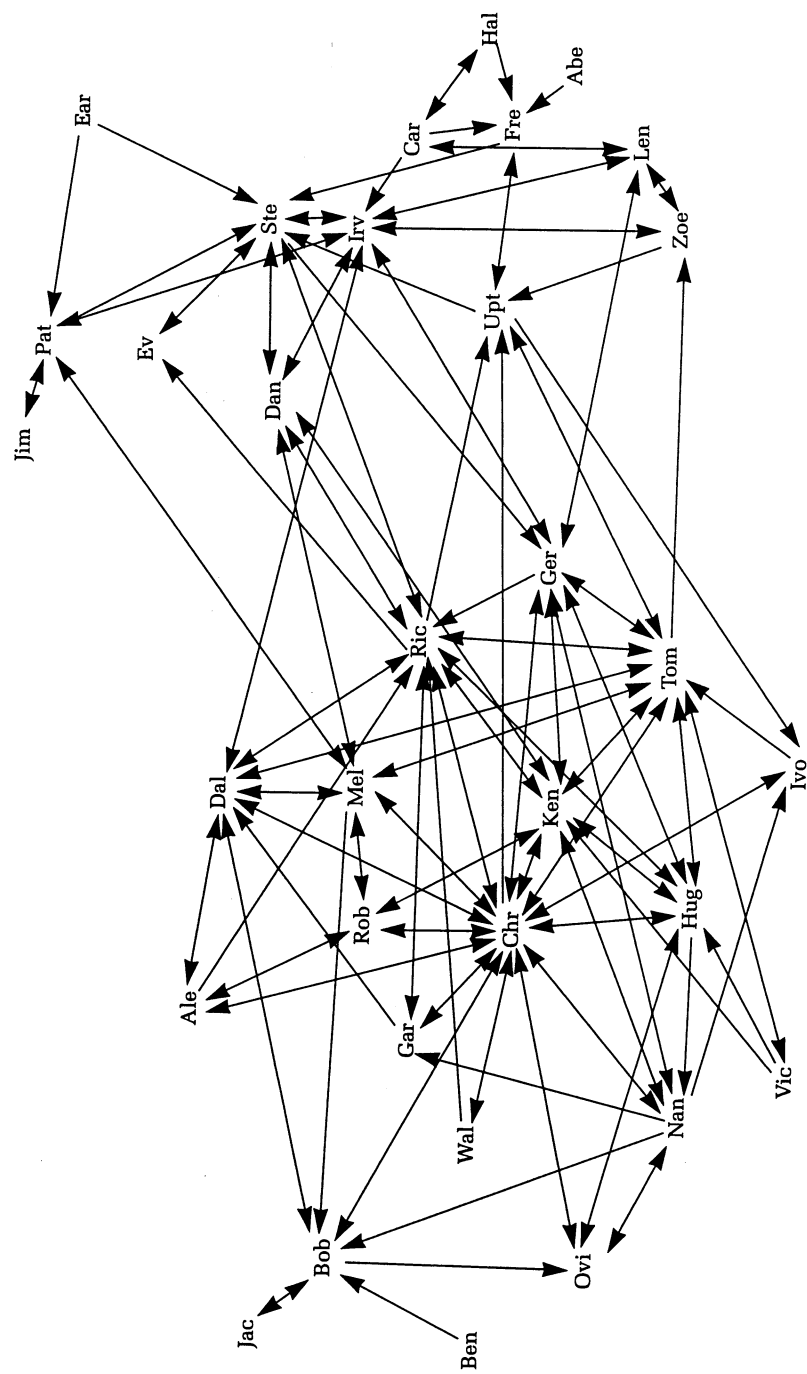
[a] The sociogram was drawn by KrackPlot (Krackhardt, Lundberg, & O'Rourke, 1993).

TABLE 1
Summary of Research Variables

Variable	Definition of Each Cell in Matrix
Dependent	
Performance reputation matrix	Respondent i's perception of the job performance of person j, rated on a seven-point scale, for all j's not supervised by i
Independent	
Perceived friend's indegree centrality matrix	Advice indegree centrality of person j's most central friend, based on friendship and advice networks perceived by i
Actual friend's indegree centrality matrix	Advice indegree centrality of person j's most central friend, based on aggregate (LAS) friendship and advice networks
Perceived friend's formal status matrix	Level in organizational hierarchy occupied by person j's highest-level friend, based on friendship network perceived by i
Actual friend's formal status matrix	Level in organizational hierarchy occupied by j's highest-level friend, based on aggregate (LAS) friendship network
Control	
Job performance matrix	Supervisor's evaluation of the job performance of person j on a seven-point scale
Formal status matrix	Level in the organizational hierarchy occupied by person j

friend, (2) the indegree centrality of the actual friend, (3) the formal status of the perceived friend, and (4) the formal status of the actual friend.

The indegree centrality measure of prominence was derived from the advice network of relations. In social network research, "Prominent leaders are the objects of extensive relations from followers, while the latter are the objects of few relations" (Knoke & Burt, 1983: 199). To capture this kind of prominence, therefore, an asymmetric measure was needed, one that counted nonreciprocated ties. Further, our theoretical assumption was that individuals publicize the existence of friendship links to prominent others and that perceivers scan an organization for clues as to who the prominent actors are. We needed, then, a measure of visible prominence, one that emphasized direct ties rather than indirect ties. We wanted to capture the kind of prominence represented by someone whose desk is often surrounded by people seeking help and advice rather than the kind of prominence represented by someone with relatively invisible influence based on indirect links. Because of our concern with asymmetry and visibility, we chose to measure informal prominence in terms of indegree centrality in the advice network, which refers to the extent to which others seek help or advice about work-related matters from a focal person. Technically, indegree centrality can be defined as the number of other people who go to an actor for advice

(Freeman, 1979). Indegree centrality has been widely used in organizational research when direct, asymmetric ties are being measured (e.g., Burkhardt & Brass, 1990), although measures that include indirect ties may be more appropriate in other situations (cf. Ibarra, 1992, 1993).

In the current research, we measured indegree centrality for both the perceived and actual networks. For the perceived measure, we looked at each respondent's cognitive map of perceived relations. Within each cognitive map, we identified, for each person, the friend with the highest indegree centrality rating. This rating was then recorded as the first measurement of the independent variable.

The second measurement of the independent variable—the actual friend's indegree centrality—was based on the actual friendship and advice networks aggregated from the responses of all respondents. As described above, the existence of a friendship link in the actual network meant that the two people involved both agreed the friendship link existed. Similarly, the existence of an advice link from, say, John to Bill, meant that John had indicated on his questionnaire that he went to Bill for advice. For each person, therefore, we identified the actual friend with the highest indegree centrality rating and recorded that value.

The third and fourth measurements of the independent variable were based on the friend's formal status rather than on the friend's indegree centrality. Because of potential common method variance, it was necessary to demonstrate that the critical variables in the study were not correlated simply because they were derived from the same source. The obvious remedy for common method variance is to use different sources for the independent and dependent variables, if doing so is consistent with the conceptual framework of a study (Sackett & Larson, 1990: 474).

Following this strategy, we derived prominence ratings from the organizational chart recorded in company records. In many organizations, those higher up in the hierarchy are also more prominent because many others go to them for help and advice about work-related matters. Formal status has been shown to be predictive of organizational power (Brass & Burkhardt, 1993; Krackhardt, 1990) and to correlate highly with network centrality (Ibarra, 1992; Krackhardt, 1990). Formal status, then, provides an alternative to perceived measures of prominence in organizations.

We were therefore able to test our hypotheses with the independent variable ratings derived from company records and our dependent variable ratings derived from questionnaire responses. In this way, we avoided the problem of common method variance. Also, we were able to assess the convergent validity of the independent variable by seeing whether different definitions of the same variable produced the same results (cf. Campbell & Fiske, 1959).

At Silicon Systems there were three levels of formal authority. The three owner-managers occupied the top level. Even though each owner-manager had different responsibilities and titles, all three were equal partners, and

they made all major company decisions as a team. The next level consisted of five managers, each of whom had supervisory responsibility over certain operational features in the organization. The remaining 28 employees had no formal supervisory titles or authority. Formal status, then, was rated as follows: we gave each of the three owners a status rating of 3, each of the five managers a rating of 2, and each of the remaining 28 employees a rating of 1.

We assigned formal status to both perceived friends and actual friends. For the perceived measure, we looked at each respondent's cognitive map of perceived relations. Within each cognitive map, we identified, for each person, the friend with the highest formal status. This status rating was recorded as the third measurement of the independent variable. The measure of the actual friend's formal status was based on the real friendship network aggregated from the responses of all respondents. For each person, we identified the friend with the highest status rating and recorded the rating as the fourth measurement of the independent variable.

In summary, we measured each friend's prominence in four ways, pitting perceived and actual network measures against each other and pitting a network measure of prominence against an organizational chart measure of prominence. For each of the four measures, we created a 36-by-36 matrix, with cell entries representing the prominence ratings of friends. For example, for the matrix of perceived friends' indegree centrality ratings a "9" in a cell formed by the intersection of row 12 and column 25 meant that, among all the friendships person 12 perceived person 25 to be involved in, 9 was the highest indegree centrality rating that any of person 25's friends achieved.

Dependent variable: Performance reputation matrix. Each respondent provided his or her perception of the job performance of every person in the organization by circling numbers on a seven-point scale next to people's names. We collected these performance reputation ratings in a 36-by-36 matrix. Each row in the dependent variable matrix represented the impressions in the mind of one respondent concerning the performance of those others not actually under the respondent's supervision. Similarly, each column in the matrix represented the impressions of one individual held by all those respondents not actually supervising that individual. The performance reputation matrix contained the actual raw ratings the respondents provided. Social network analysts typically retain raw ratings in matrix form rather than seeking to perform analyses on average scores (see Scott [1991] for an excellent introduction to social network analysis). We elicited the raw ratings with the following instructions: "If you think the person is performing their job extremely well, you might circle the '7' next to their name. If you think the person is performing their job reasonably well, you might circle the '4' next to their name. If you think they are not performing their job at all well, you might circle the '1' next to their name." Each cell in the performance reputation matrix contained the rating provided by one respondent concerning one other person. For example, if person 12 rated person 25

as performing extremely well on the job, then a "7" would appear in the cell formed by the intersection of row 12 and column 25.

Our reliance on a one-item measure of performance increases the possibility of random error and makes significant results harder to find. Our tests, therefore, are likely to be conservative assessments of the hypothesized basking-in-reflected-glory effect.

First control variable: Job performance matrix. Supervisors' ratings of subordinates' performance were excluded from the dependent variable matrix described above because these supervisory ratings constituted the measurement of job performance. Supervisors therefore used the same seven-point scale that was used for the performance reputation measure. The job performance of people in organizations is typically difficult to ascertain, especially for work with many different aspects. However, one conventional measure of job performance in many companies is the supervisory rating: "The vast majority of performance ratings come directly from the immediate manager" (Bretz et al., 1992: 331). Previous research has shown that performance ratings obtained for research purposes are more reliable and valid than those obtained for administrative purposes (Wherry & Bartlett, 1982), perhaps because issues other than ratee performance bias official performance ratings (Longenecker, Sims, & Gioia, 1987; Tsui & O'Reilly, 1989: 410).

The reporting relations between supervisors and subordinates were obtained from company records. The three owners of the company in the present research had nobody above them in the organizational chart to provide a supervisory rating. For each owner, therefore, we used the mean rating given by the other two owners as the supervisory rating. The owners' ratings of each other did not differ in any case by more than two points on the seven-point scale.

The supervisory ratings were collected in a column vector 36 cells long containing values from 1 through 7, indicating the job performance of each person in the company. Thus, each cell (i,j) in this matrix contained j's supervisor's rating of j's performance. The vector was repeated 36 times to create a matrix of the same size (36 by 36) as the other matrixes in the analyses.

Second control variable: Formal status matrix. This variable controlled for the effects of formal status on the performance reputation of each focal person. In this small, organic organization, there was little apparent status differentiation based on educational differences or functional specialization. From our visits to the company, we concluded that the major status difference was between those who owned the company and those who only worked for it. Therefore, we defined formal status as the level in the organizational hierarchy each person occupied (3 = owner-manager, 2 = manager, 1 = nonmanager).

The formal status scores were collected in a column vector 36 cells long containing the numbers 1 through 3. Thus, each cell (i,j) in this matrix

contained j's formal status. The vector was repeated 36 times to create a matrix of the same size (36 by 36) as the other matrixes in the analysis.

ANALYSIS

Social network data are often not amenable to standard statistical tests because the observations cannot be assumed to be independent. For example, in the current research, the matrix of friend's indegree centrality ratings includes 36 ratings from each person in the study. Each of the 36 ratings within a row of this matrix derives from the same source—the cognitive map of the respondent—and therefore exhibits systematic interdependence. Indeed, in some of the matrixes, the cell values are repeated across rows. Krackhardt (1988) showed that such row or column interdependence can bias ordinary-least-squares (OLS) tests of significance. The size of this bias is substantial: results based on samples drawn from a population for which the null hypothesis is true (that is, there is no relationship between the independent and dependent variables) have a 70 percent chance of appearing significant under standard parametric methods.

To deal with this problem of bias, we used the Multiple Regression Quadratic Assignment Procedure (MRQAP) suggested by Krackhardt (1993). The procedure builds on earlier bivariate work done by Hubert and others (Baker & Hubert, 1981; Hubert, 1987; Hubert & Schultz, 1976) and extended to the multiple regression case by Krackhardt (1987b, 1988).[2]

The method is straightforward. First, OLS estimates of regression coefficients are calculated in the usual manner. Then the rows and columns of the dependent variable matrix are permuted to give a new, mixed up matrix. The OLS regression calculation is then repeated with the new dependent variable. This new regression produces different beta coefficients and overall R^2 values that are stored away. Another permutation of the dependent variable is then drawn, another regression is performed, and these new values are also stored.

This permutation-regression process is repeated an arbitrarily large number of times (in our case, 1,000). The distribution of the stored betas and R^2's for each of the independent variables under the set of permuted regressions becomes the reference distribution against which the observed original values are compared. If fewer than 5 percent of the betas derived from the permuted regressions are larger than the observed beta, the beta is considered significant at the .05 level (one-tailed test). If fewer than 1 percent of the betas are larger than the observed beta, it is considered significant at the .01 level.

The advantage of this simple procedure is that it is robust against varying and unknowable amounts of row and column autocorrelation in the dyadic data. That is, if a sample is drawn from an autocorrelated population

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[2] See Krackhardt (1988) for an introduction to the procedure, and see Kilduff (1990) for an empirical example of its use.

in which the null hypothesis is true, the probability that the results will appear significant by this MRQAP test is .05 (where alpha equals .05). This remarkable feature of the MRQAP occurs because the test is a conditional nonparametric test. That is, each permutation of the dependent variable retains the structure of the original dyadic data and therefore preserves all the autocorrelation in each permuted regression; the test is conditioned on the degree of autocorrelation that exists in the data.

The permutation version of MRQAP (Krackhardt, 1993) differs from the earlier analytic version (Krackhardt, 1988). The analytic solution to the multiple regression problem was based on Mantel's formula (Mantel, 1967) for the first two moments of the distribution of all permutations. The current version has several demonstrated advantages. First, it permits an unbiased test of the overall R^2. Second, it is relatively powerful in the face of missing data. Finally, whereas the analytic test necessarily contains the assumption that the reference distribution of betas based on the permutations is normally distributed, the permutation-based sampling procedure used here does not have such a requirement. Permutation MRQAP is now available in user-friendly form in the UCINET IV social network analysis package (Borgatti, Everett, & Freeman, 1992).

One of the advantages of the permutation version of MRQAP is that it can handle missing values with much more statistical efficiency than the prior version. In the current research, several of the variables had values missing, either because there were three nonrespondents or because we assigned cells in a matrix missing value status when defining the variable. For example, in the case of the dependent variable, performance reputation was only considered in (i,j) pairs in which i was not j's direct supervisor, and a missing value was inserted when i was the direct supervisor of j.

RESULTS

The descriptive statistics shown in Table 2 indicate a reasonably high level of performance at Silicon Systems, with both performance reputation and actual performance averaging around 4.9 on a seven-point scale.

The zero-order correlations in Table 2 show that the two measures of perceived friend's prominence, perceived friend's indegree centrality and perceived friend's formal status, were highly correlated ($r = .68$, $p < .01$), as were the two measures of actual friend's prominence ($r = .83$, $p < .01$). Further, these correlations suggest that the actual friends of high-status individuals tended to also be of high status ($r = .65$, $p < .01$) and indegree centrality ($r = .54$, $p < .01$).

Table 2 also shows that the dependent variable, performance reputation, was significantly correlated (at $p < .01$) with all four measurements of the independent variable, friend's prominence, as well as with both control variables (job performance and formal status). To answer the question of whether these significant correlations would remain significant when other variables were controlled for, we conducted a multiple regression analysis.

TABLE 2
Means, Standard Deviations, and Correlations[a]

Variables	Means	s.d.	1	2a	2b	2c	2d	3
1. Performance reputation	4.93	1.39						
2. Friend's prominence								
a. Perceived friend's indegree centrality	6.70	8.86	.23					
b. Actual friend's indegree centrality	7.87	7.00	.26	.22				
c. Perceived friend's status	1.46	0.73	.28	.68	.30			
d. Actual friend's status	1.55	0.83	.28	.15*	.83	.30		
3. Job performance	4.91	1.15	.33	.14*	.31*	.28	.49	
4. Formal status	1.31	0.62	.30	.17	.54	.38	.65	.47

[a] All correlations are significant at $p < .01$, except for those with an asterisk.
* $p < .05$

Results of the first model, shown in Table 3, suggest that high performance on the job in this organization helped people achieve reputations as high performers ($p < .01$) but that formal status did not significantly affect performance reputations. The two control variables explained 14 percent of the variance in performance reputation. The question of interest, then, is whether the measures of the independent variable significantly increased explained variance above that already explained by the control variables. Did the existence of a friendship link to a prominent person boost individuals' performance reputations in this organization, as Hypothesis 1 predicts?

TABLE 3
Results of Multiple Regression Analysis[a]

Variables	1	Status Models			Centrality Models		
		2	3	4	5	6	7
Friend's prominence							
Perceived friend's indegree centrality						.028**	.026**
Actual friend's indegree centrality					.024		.018
Perceived friend's status			.319**	.315**			
Actual friend's status		.109		.090			
Job performance	.296**	.277*	.273*	.258*	.286*	.284*	.277*
Formal status	.407	.326	.281	.217	.263	.350	.245
Intercept	2.934**	2.961**	2.739**	2.764**	2.985**	2.879**	2.920**
R^2	.136	.139	.161	.162	.146	.166	.171

[a] Beta coefficients are unstandardized. Their significance was determined by the Multiple Regression Quadratic Assignment Procedure (MRQAP, Krackhardt, 1993).
* $p < .05$, one-tailed test
** $p < .01$, one-tailed test

Table 3 shows that friendship with prominent others did boost individuals' performance reputations, but this effect depended on how the friendship links were assessed. Recall that Hypothesis 2 predicts that perceived friendship links will lead to better predictions of performance reputation than actual links. The results shown in Table 3 support this prediction.

Models 2, 3, and 4 in Table 3 employed two different definitions of the status of the highest-status friend to measure the independent variable. Model 2 shows that entering the status of the actual friend into the regression equation together with the control variables resulted in no significant increase in the variance explained. Model 3 shows that the introduction of the status of the perceived friend did increase explained variance significantly $(p < .01)$, from 14 to 16 percent. Entering both measurements of friend's status simultaneously (model 4) confirmed that only the perceived measure had a significant effect on performance reputation $(p < .01)$.

In support of Hypothesis 2, then, these models show that, with individuals' job performance and organizational status controlled, only the perceived measure of friend's status had an effect on individuals' performance reputations. Being perceived to have a friend at a high level in the organization helped boost an individual's reputation as a high performer, whereas actually having such a friend had no significant effect on performance reputation.

Models 5, 6, and 7 in Table 3 repeat the analyses already performed in models 2, 3, and 4, with a measure of the friend's indegree centrality in the informal advice network substituting for a measure of the friend's formal status. The results for models 5, 6, and 7 repeat the pattern seen in models 2, 3, and 4, indicating that the results favoring perceived friendship over actual friendship were not artifacts of the way prominence was measured.

Model 5 shows that entering the indegree centrality of the actual friend in the regression equation did not significantly increase explained variance. Model 6 indicates that the introduction of the indegree centrality of the perceived friend did increase explained variance significantly $(p < .01)$, from 14 to 17 percent. Finally, model 7 confirms that when both the actual and the perceived measures of friend's indegree centrality were entered together, only the perceived measure had a significant effect on performance reputation $(p < .01)$.

Paralleling the results from the status models, the results from the centrality models show that, with individuals' job performance and organizational status controlled, only the perceived measure of friend's indegree centrality had an effect on individuals' performance reputations. In other words, being perceived to have a friend to whom many others go for help and advice helped boost an individual's reputation as a high performer, whereas actually having such a friend had no significant effect on performance reputation.

In summary, Table 3 shows that the status models (2, 3, and 4) and the centrality models (5, 6, and 7) are similar both in terms of the superiority of perceived measures of friend's prominence over actual measures and in

terms of the variance explained by each set of models. These consistent results support the convergent validity of our measures of perceived and actual prominence. The results show that it doesn't matter whether the prominence ratings derive from the friend's position in the organizational hierarchy or from questionnaire items concerning who goes to whom for advice at work. The robustness of the results across measures derived from two different sources supports the conclusion that the significant correlations are not artifacts of common method variance.

One other concern, however, is that the effect of actual prominence might have been suppressed as a result of the correlational structure of the data. Table 2 shows that, relative to measures of perceived prominence, measures of actual prominence were more highly correlated with the control variable (job performance) that contributed significantly to explained variance in all the models of Table 3. To check whether the high correlations between measures of actual prominence and the control variable distorted the results, we conducted the analyses again without controlling for job performance and found the same pattern of results (albeit with less explained variance): only the perceived measures of friend's prominence significantly predicted performance reputation. The measures of actual friend's prominence continued to be nonsignificant in all models.

DISCUSSION

In support of the hypothesized basking-in-reflected-glory effect, the results show that performance reputation is partly a function of an individual's job performance and partly a function of the individual's having a prominent friend. Perhaps the most intriguing aspect of the results is the finding that the actual existence of friendship links, recognized by both parties to the links, had no significant effect on performance reputation. Rather, it was the perceptions in the minds of organization members that mattered. To explain outcomes such as performance reputation in organizations, it may be necessary to explore the perceived networks that influence the attitudes of organization members. Structure, as it exists in the minds of individuals, may be more predictive of important outcomes than has been recognized. Bringing the individual back into structural analysis, therefore, may enhance rather than detract from the effectiveness of a structural approach.

The results, then, support the utility of combining variables derived from individuals' cognitive maps with more conventional structural variables. The thesis that psychological and structural approaches represent incommensurable paradigms militates against the kind of cross-level approaches that appear well adapted to the complex realities of organizations (Weaver & Gioia, in press). We introduced the Multiple Regression Quadratic Assignment Procedure (MRQAP) as one way to combine levels of analysis. The MRQAP is still a relatively new addition to the research arsenal. This study demonstrates the use of the procedure as a flexible tool for combining multiple observations from each individual's cognitive map with single measures on each individual within the same analysis.

The theoretical basis for the current research is balance theory (Heider, 1958), which has a long history of use within social network analysis; Davis (1979) reviewed the relevant research. Much of this previous work modeled relations in social rather than cognitive space, following the influential mathematical extension of Heider's ideas from the concept of cognitive balance to that of interpersonal balance (Cartwright & Harary, 1956).[3] Social network analysts continue to develop sophisticated mathematical approaches to social structure (e.g., Boyd, 1991), but Blau's warning remains pertinent: "There is a danger that the refined methods that network analysis . . . has developed will lead to sterile descriptive studies" (1982: 279). In examining Heider's predictions concerning the strain toward cognitive balance, we have sought to return social network analysis to a theory-driven mode rather than a purely method-driven mode.

The research presented here is both an example of how structural methods can incorporate individuals' cognitive maps and a contribution to the literature on performance reputation. We have interpreted the results as supporting the idea that observers' perceptions of individuals' friendship links to prominent others positively influence the observers' evaluations of the individuals concerned. This interpretation is compatible with balance theory in general and with research on the basking-in-reflected-glory effect in particular,

However, the data are cross-sectional and can support other causal arguments. For example, it is possible that individuals perceived by their colleagues to be high performers are assumed to have prominent friends. Without more detailed observations on the process by which perceptions concerning performance and friendship links are formed, the present results must remain suggestive rather than conclusive. Future research could investigate how reputations change over time in response to impression management techniques (cf. Tsui & Barry, 1986), and possible personality differences between individuals in their impression management strategies. For example, high self-monitors—individuals who are highly sensitive to social cues—may actively gather and use information concerning who is friends with whom; whereas low self-monitors—those who rely on their own attitudes and feelings for guidance—may be averse to trying to influence perceptions of their social relations (cf. Kilduff, 1992).

A second limitation of the current research concerns the small size of the organization studied and the correspondingly high degree of interaction among its employees. Silicon Systems may be untypical because all the employees were at least weakly tied to each other, if Granovetter's (1973) definition of interacting more than once a year is used. The question of whether the results generalize to large organizations will be difficult to answer given the methodological limitations of social network research. Typically, social networkers attempt to include the complete network of people

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[3] Crockett (1982) reviewed cognitive balance theory research.

in a social setting. For research concerning people's cognitive maps of entire networks of relations, data collection and analysis constraints dictate an upper bound of about 50 people (Krackhardt, 1987a).

However, in large organizations, where people may not know each other as well as did the people in our study and where, therefore, specific information about others may be scarce, performance reputations may be even more reflective of perceptions and impressions. Research has shown that when decision makers lack information about an employee, they rely on prevailing cognitions, such as stereotypes (Drazin & Auster, 1987), and that halo errors are more likely to occur when raters are evaluating people with whom they are unfamiliar (Kozlowski & Kirsch, 1987). Thus, we would expect individuals' perceptions to be even more important in determining others' reputations in large organizations than they were in this small organization.

We assumed throughout this research that individuals act strategically to emphasize friendship links to prominent others. This assumption is compatible with the basking-in-reflected-glory effect and with evidence of wide variation with respect to how accurately people perceive network relations (Krackhardt, 1990). The relative opaqueness of friendship relations may provide opportunities for the strategic management of impressions.

Research on impression management suggests that individuals perceived to be linked to prominent others may be credited with the ability to form powerful coalitions and the ability to influence higher-status persons (Tedeschi & Melburg, 1984). In other words, individuals perceived to have prominent friends may gain important advantages in the market for power and influence in an organization. Research on these phenomena in organizational settings is lacking, although anecdotes abound. For example, in the struggle for the control of the Lehman Brothers investment banking house, Louis Glucksman gained a crucial advantage by convincing his rival Pete Petersen that he, Petersen, had lost friendships with board members that Glucksman had retained. Neither Petersen nor Glucksman ever checked with the board members to see if those impressions were accurate (Auletta, 1986). More empirical research on the impression management of friendship ties in organizations would be useful.

The declared aim of structural analysis has been to reveal the structural form beneath the apparent content of social relations. According to structuralists, the unit of analysis is "the social network, never the individual" (Mayhew, 1980: 349). Structuralists have tended to "shun the 'person' construct as polluting" (White, 1992: 3). In this article, we have challenged the notion that structure can be understood apart from the cognitions of individuals. Our argument is compatible with the critique of structuralist claims by poststructuralists (see Agger [1991] for a general introduction). In particular, by including each individual's cognitive map in the analysis, we follow poststructuralist writers in rejecting the privileged status of any one particular interpretation of structure. We have also challenged the claimed incommensurability of individualism and structuralism by pointing to the influ-

ence on structural analysis of the psychology it has purported to reject and by providing an explicit demonstration of how a cognitive theory can guide the use of structural methods.

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