

Attitudes toward
New Organizational
Technology: Network
Proximity As a
Mechanism for Social
Information Processing

Ronald E. Rice
Rutgers University
Carolyn Aydin
Cedars-Sinai Medical Center

This study explicates and tests three network-based mechanisms whereby individuals' attitudes toward an integrated health information system may be influenced by the attitudes of proximate sources of social information. Estimates of the attitudes of generalized others are not convincingly associated with the actual attitudes of specified others. Overall, specific others' actual attitudes have only a small effect on one's attitude. Social information operates positively through communication and work-unit mechanisms (especially when weighted by importance), and negatively through the mean attitude of one's structurally equivalent position, but not through overall organizational proximity or spatial proximity. Differences in attitudes among occupational groups may have been due to implementation policies.*

INTRODUCTION

Research on the adoption and implementation of organizational information systems is fairly consistent on at least one point: user attitudes toward the innovation are crucial factors in the success of such systems (Lucas, 1981). Hence, understanding how these attitudes develop should be a central concern in innovation and implementation research.

One factor that has received recent attention is the extent to which these attitudes are influenced by others' attitudes. Strong claims have been made for the importance of social information processing in understanding the use and evaluation of new organizational media (Fulk et al., 1987). However, prior empirical tests of the influence of social information processing on attitudes toward new technologies provide contradictory results. Svenning (1982) found slight evidence of the influence of perceived referent-group attitudes on intentions to use a proposed videoconferencing system. A study of a census of 46 employees in a government office found that the similarity of perceptions of electronic mail was related to organizational culture and norms (Nosek, 1989). However, Davis, Bagozzi, and Warshaw (1989) found that MBA students' attitudes toward a software package were not influenced by subjective peer norms, and Pease (1988) found no influence of perceived referent-group attitudes on individuals' actual use of the same videoconferencing system studied by Svenning. Considerably stronger results have been found in studies that used network measures to identify groups of similar users or to operationalize the influence process. Examples include studies of the use and effects of a health information system (Anderson and Jay, 1985; Williams, Rice, and Rogers, 1988: chap. 11), a voice messaging system (Rice and Shook, 1990a), and electronic mail systems (Rice et al., 1990; Schmitz and Fulk, 1991).

The present research reviews several fundamental components of and several persistent problems with social influence models, making specific reference to social information processing theory. It then applies network analysis constructs to ask three fundamental questions: (1) Are respondents' estimates of others' attitudes a valid indicator of those others' actual attitudes, and thus social information?

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- (2) Are one's attitudes influenced by the attitudes of those who are relationally, positionally, or spatially proximate? and
 (3) Are one's attitudes influenced by the attitudes of all other individuals according to their proximity or by the simple mean of some bounded subset of others?

Social Information Processing in Organizations

According to traditional studies of organizational information systems, individual perceptions of an information system are likely to be somewhat influenced by objective characteristics of the system, individual differences such as one's past experiences with similar systems, extent of use of the system, occupational demands and procedures, and level in the organization. For example, to the extent that one actually uses the system, one is more likely to understand and have experience with the system and therefore have stronger attitudes toward the system; for successful systems this implies more positive attitudes (Lucas, 1981). To the extent that different occupations in health organizations have different norms about the role of technology and play different parts in the implementation process, occupational membership should also influence one's attitudes (Kimberly and Evanisko, 1981; Aydin, 1989). One's level in the organization would influence one's attitudes in accordance with the information requirements and access to participation in the implementation at that level (Lucas, 1981; Rice and Shook, 1990b).

The social information processing model, developed in reaction to the failure of individual attributes or objective task measures to sufficiently explain reactions to workplace phenomena, brought theories of social influence to the organizational setting (Salancik and Pfeffer, 1978). Proponents of this theory would argue, then, that individual perceptions are also likely to be influenced by the opinions, information, and behaviors of salient others. Social information processing, as with social influence in general, is especially likely in ambiguous or indeterminate situations or for newcomers to the setting (Festinger, 1954; Moscovici, 1976: 25, 32; Thomas and Griffin, 1983; Sheppard, Hartwick, and Warshaw, 1988). However, even when not uncertain about the phenomenon, an individual may still be influenced by sources on the basis of affiliation, resources, or authority, or by individuals who are mediators to sources of information about the phenomenon (Moscovici, 1976). Normative influence may also be more likely in cooperative situations, regardless of the level of uncertainty. One review concluded that, while methodological and conceptual problems cloud the issues, both objective task characteristics and social information cues do appear to influence individuals' perceptions of their tasks (Thomas and Griffin, 1983).

Thus social information processing theory postulates that individuals may be influenced by cues from others about what to attend to, how to value the salient dimensions of workplace phenomena, and how others evaluate the same phenomena (Salancik and Pfeffer, 1978). Central to this proposition is, first, the assumption that individuals must be proximate to the attitudes, information, or behavior of others to be exposed to social information (Salancik and Pfeffer, 1978;

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Hackman, 1983: 1458-1459; Dean and Brass, 1985). *Proximity*, in this context, is defined as the extent to which one could be exposed to social information in a given social system. Second, the individual must value the source others in some way for the social information to have an effect. The "value" of the source other, however, may be embedded in or confounded with the strength of proximity.

In terms of social information influencing attitudes toward a new information system, we hypothesize:

Hypothesis 1: Social information processing influences one's attitude about a new organizational information system, over and above the traditional sources of influence such as use of the system and membership in occupational categories.

Problems with Operationalizing Social Information Processing

Social influence theories, including social information processing theory, in general fail to provide explicit guidance as to how to (1) identify and (2) weight the relevant source other, (3) operationalize different proximity mechanisms of social influence, or (4) specify different levels of analysis.

Shaw (1980: 45) postulated that "socially relevant others . . . serve to influence a worker's perceptions of and reactions to a job," yet, like Latane (1981) and others, did not specify who those relevant others might be. This theoretical vagueness has been reinforced by studies conducted in laboratories, where the specific sources of social information are a "given," often a single individual provided by the researcher in the form of a research confederate or written statements from a fictional person. Even when specific, nonconfederate others are used, they are typically an arbitrarily selected number of others with whom a respondent talks (Schmitz and Fulk, 1991). Other studies rely on a "generalized other," where the "other" does not refer to specified, named individuals in the local social context but to a general category, such as "coworker" or "best friends." The reliance on such generalized others makes it difficult to specify the exact source and mechanisms of the social information process. The use of generalized others also requires that the respondent estimate the attitude of those generalized others. Estimated attitudes have also been used in some studies using specified others, such as the five people that the respondent communicates most with, which still use the respondents' estimated attitudes of those others rather than the others' actual attitudes.

Estimating others' attitudes has been labelled "social projection" (Gerard and Orive, 1987). Reliance on social projection assumes that the respondent can accurately estimate an other's attitudes or behaviors. However, Rice and Mitchell (1973) found that there was no significant correlation between subjects' ratings and the ratings of the subject's coworkers of the extent of their collaboration or their social interaction. Social projection can thus lead to false consensus, the overestimation of consensus for one's own behavior (Mullin et al., 1985; Davis, Bagozzi, and Warshaw, 1989),

or disconfirmed projection, in which the respondent's estimates of others' attitudes are not correlated with the attitudes that the specified others themselves actually report (Gerard and Orive, 1987). Thus, we hypothesize:

Hypothesis 2: Estimated attitudes of (especially generalized) source others are "disconfirmed social projections" and thus invalid indicators of others' actual attitudes.

But simply identifying the existence and strengths of mechanisms by which an individual may be proximate to a "source other(s)," and measuring the others' actual attitudes, may be insufficient. Social information processing theory postulates that the influence of socially constructed meanings is affected by factors such as the others' credibility, status, or adoption behavior that affect the general salience or importance to the individual of the source other (Shaw, 1980). Krassa (1988) showed, using computer simulations, that the importance that individuals place on others' opinions significantly influences the rate at which public opinion changes due to diffusion through interaction. Importance might also be indicated by perceived and/or formal power, which is a property of organizational and personal attributes as well as position in the organizational structure (Brass, 1984).

The typical measure of proximity to a "source other"—simple binary presence or absence of a source other or, in some cases, the number of source others present or who communicate with the individual—is a very weak and unexplicated measure of proximity to influence. Latane (1981: 343), whose theory of social impact does postulate a structural context for social influence, noted that even his own theory "does not say when social impact will occur or detail the exact mechanisms whereby social impact is transmitted."

Finally, it is unclear whether social information should be conceptualized as some sort of average influence from all of an individual's specified source others or from within a specific, bounded subset of those others.

Network-based Proximity Mechanisms for Social Influence

Traditionally, tests of social influence explain the similarity of attitudes among a set of individuals on the basis of shared attributes, such as occupation, age, or innovativeness. However, network theorists argue, instead, that people develop shared attitudes through social networks, or patterns of relations (Wellman, 1983). One's structural context influences one's interpretations, perceptions, and behaviors. Through networks, members exchange information and develop similar perceptions and opinions, individuals can vicariously experience others' behaviors, and others legitimate changes associated with and reduce uncertainty about an event, idea, or phenomenon (Rogers and Kincaid, 1981; Hackman, 1983; Tichy, 1981). Thus, in general, networks provide the mechanisms by which individuals are proximate to, or are exposed to, others' information, influence, and behavior. But what are the bases of these proximity mechanisms? "It is one thing to say that networks have an effect on social evaluation processes and quite another to say precisely what the effects

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are, how they are produced, and more generally, what networks add to the explanation of social evaluation phenomena" (Gartrell, 1987: 59). Three proximity mechanisms are discussed here—relational, positional, and spatial (see Rice, 1992, for a more detailed review).

Prior researchers have noted important distinctions between relational and positional mechanisms for interaction and influence. Distinctions between these two conceptions of social structure include, among others, expertise embedded in informal relations versus formal structure (Blau, 1954), interaction structure versus dimension structure (Rice and Mitchell, 1973), informal versus formal communication (Allen, 1977), structure as regular interactions versus formal roles and procedures (Ranson, Hinings, and Greenwood, 1980), cohesion versus position (Burt, 1980), and coactivational versus configurational conceptions of organizational structure (Dow, 1988).

Relational proximity. In the relational view, an organization is a communication network in which actors or subunits repeatedly interact as they process resources and information (Dow, 1988: 56), constructing purposes, goals, and attitudes. Thus, the influence mechanism from the relational view is communication proximity, or the extent to which individuals interact directly and indirectly (Rogers and Kincaid, 1981). A relational model of social influence is based on the proposition that "people are most likely to compare with and come to agree with others to whom they are more strongly tied" (Erickson, 1988: 115). This approach presumes that it is not just the specific others with whom one communicates that must be taken into account (for example, Schmitz and Fulk, 1991 used the mean attitude of the respondent's five most frequent communicants), but also the strength of that communication (for example, Rice et al., 1991, used the mean of the product of the respondent's interaction strength with each communicant multiplied by that other's attitude).

Positional proximity. In the positional network view, individuals occupy the same position, or are structurally proximate, to the extent that they occupy the same roles and thus sets of obligations, status, and expectations (Burt, 1980). These roles are defined by the pattern of relationships, both present and absent, among all members of a social system. Two kinds of underlying relationships can be conceptualized in an organizational context: structural equivalence and organizational proximity.

Adherents of the structural equivalence approach to proximity argue that two individuals may have similar attitudes, not necessarily because they are linked with each other (as with relational proximity) but because they are linked to similar others (from whom they both develop similar attitudes and with whom they both share similar attributes), have experienced similar socialization (such as through training or professional membership), and are similarly unlinked to the remaining sets of others (Burt, 1980). As Hartman and Johnson (1989: 525) expressed it, "Individuals may be the focus of similar information, requests and demands from members of their role set, creating an information field in which they are embedded, which, when internalized, creates even more powerful pressures to conform than discussions

with similar alters." Thus, structural equivalence studies can use the same raw data on interactions as does the relational approach, but the data are conceptualized and analyzed differently.

We can also conceptualize positional proximity as organizational proximity. From an organizational structure perspective, a position can be conceptualized as the configuration of horizontally and vertically differentiated job positions, which represent patterns of instrumental relations among the positions (Dow, 1988). Such organizational structures provide the channels for information and control among functionally interdependent tasks created by the division of labor (Lincoln and Miller, 1979). For example, Adams, Laker, and Hulin (1977) showed that there were significant differences in employee attitudes about job characteristics across vertical structures (job levels) and horizontal structures (functional specialties). Theoretically, these formal structures represent organizational proximities, and not necessarily communication interactions, because organizations attempt to minimize the complexity of these channels in two ways. First, bureaucracies "unbundle" social relationships by "stripping relations of all content but that which is strictly applicable to the attainment of organizational ends" (Lincoln, 1982: 21). Second, "subtasks are coordinated by placing related activities under the supervision of a single manager" so that subordinate relations are mediated through superiors (Dow, 1988: 56). For example, different supervisors' norms for acceptable communication behaviors explained differences in how subordinates handled clients in two otherwise similar agency units (Blau, 1955). More generally, organizational structure mediates the purpose and direction of information and influence, such as in influencing employee reactions to their jobs (Oldham and Hackman, 1981: 78) and employee perceptions of their communication relationships (Corman, 1990).

Spatial proximity. Spatial proximity is the third potential mechanism for social information processing. Spatial proximity may be intentional, such as when office landscaping and physical structures are used to place individuals with similar tasks together, or may result from less conscious factors, such as common obstacles, accessible stairwells, floorspace, or client flow. Simply living or working close to one another increases the likelihood of interaction and thus exposure to social information and others' attitudes (Festinger, Schacter, and Back, 1950). Face-to-face dyadic communication is heavily influenced by physical proximity and drops off rapidly at distances beyond 75–100 feet. Further, organizational designs often locate similar or interdependent activities or roles close to one another (Conrath, 1973; Allen, 1977).

Spatial proximity may also affect social information processing not directly through communication interaction but through exposure to or inaccessibility of other individuals, organizational subclimates and events, task materials, private spheres of activity, and aspects of the workplace (Hackman, 1983). Davis (1984) proposed three main elements of the physical office environment: physical structure, physical stimuli, and symbolic artifacts. Archea (1977) has developed a detailed theoretical model of physical and spatial forces affecting one's exposure to and disclosure of organizational

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information, other individuals, acceptable behaviors, strategically revealed identities, and evaluations of status and social influence.

Relative influence of the three proximity mechanisms. To the extent that making sense of ambiguous new aspects such as an information system requires conscious, proactive construction of meaning with relevant others, there should be increasing effects of social information processing as the mechanisms represent greater focus on interactions among individuals. For example, Hartman and Johnson (1989) found that organizational commitment was better predicted by relational proximity than by positional proximity because its increased likelihood of involving direct contact meant increased variety and repetition of information. Van Maanen (1978) argued that relational proximity may lead to less discrepant social information processing than would positional proximity because there are more directly linked and common perceptions. However, positional mechanisms are likely more influential in situations in which status, power, and role behavior are more important than individual relations and in organizations with more mechanistic climates (Brass, 1984). Further, Burt (1980) argued that the relational approach is a special, weaker, and less diverse case of the positional approach.

Spatial proximity by itself may be a weak mechanism for social information processing because ambient stimuli are rarely consciously noticed, the diversity of ambient stimuli declines over time, and private inferences about such ambient stimuli are not examined publicly (Hackman, 1983). However, attitudes toward organizational changes that are spatial in nature—such as changing to an open-landscape office design (Zalesny and Farace, 1986)—may be partially explained by spatial influence mechanisms.

Hypothesis 3: Effects of social information processing should be stronger as proximity changes from spatial to positional to relational mechanisms.

Finally, any or all of the three proximity mechanisms described above may theoretically provide social information from all specified individual source others according to one's proximity to those others, or simply from the mean social information of some subset identified as a bounded group.

Relative effects of levels of influence. One may conceptualize social information as the result of a wide variety of social information (Shaw, 1980), culminating in an average influence or "impact vector" (Latane, 1981) from all relevant specified individuals. Relevant specified others may, of course, also mean a particularly salient or theoretically identified individual (such as one's supervisor specified on the basis of organizational proximity).

Alternately, reference group theory postulates that groups provide a standard against which the individual evaluates him- or herself and others (Hackman, 1983). Groups, especially in ongoing social structures such as an organizational unit, represent strong influences on information, values, perceptions, norms, and behaviors in general. This influence occurs because "groups control many of the stimuli to

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which an individual is exposed in the course of his [sic] organizational activities" (Hackman, 1983: 1456). Groups also provide approval, reward, and negative sanctions. Friedkin and Cook's (1990: 122) experimental results "provide theoretical [and empirical] foundation for the convention of measuring interpersonal effects with the mean opinion of an individual's set of peers. . . . [However] whether or not there is a group norm, the mean of peers' opinions must be viewed strictly as an analytical construction that may be employed to estimate the magnitude of pressures toward uniformity in a peer group." They further qualify their results by warning that the group's mean is more likely to be a valid and significant influence when the group is small and homogeneous and when opinions have stabilized.

Because each specified individual provides social information relative to their proximity to the respondent, and because the respondent may attribute different importance to different classes of individuals, the average aggregated individual influence incorporates more aspects of the full social information processing model than does the simple "peer effect" model, as the Appendix shows.

Hypothesis 4: Average overall social information from specified proximate individuals should be a stronger influence on one's attitude than the simple mean of an individual's bounded group.

The hypotheses were tested in a network study of a student health service approximately two years after a new health information system was implemented there.

METHOD

Data Collection and Sample

Site. This study focused on the implementation of an integrated health information system at the Student Health Service (SHS) of a large urban university. The SHS employs approximately 100 full-time employees and a changing number of part-time and student workers and treats upwards of 600 patients per day. SHS's boundaries—both organizational and spatial—are quite explicit. Most employee interactions occur entirely within these boundaries and focus on the provision of health care as well as the internal administration of the SHS.

There are many motivations for implementing medical information systems, including increased sophistication of research, need to analyze patient data, requirements for documentation of medical records, need to coordinate technological services, and accountability of personal, technical, and medical resources. General impacts include improved timeliness of health care, improved format of reports to physicians and administrators, increased access to multisource data bases to improve the quality of the health care process, and the introduction of management controls to contain health care costs (Lincoln and Korpman, 1980).

System planners at the SHS designed its new computerized system to approximate the paper-and-pencil system previously used in each SHS clinic and administrative office. The hardware consists of a mini-computer with terminals distributed within SHS. At the time of our study, approximately

two years after the first system module was implemented, many system functions were operating, including (1) scheduling appointments, (2) generating an "encounter form" for each visit or appointment, (3) keeping track of services, diagnoses, and tests performed, and (4) generating reports. As students showed up for their appointments or were admitted for on-the-spot treatment, they were given an encounter form generated by the system, which they carried with them throughout their visit to the clinic. This form was used to consolidate information about test requests and clinic activities and was used as the basis for entering data into the system and eventual corroboration with departmental entries for billing and analysis.

Data. The system trainer, who was also head of SHS's medical records, was our primary organizational contact. She provided a detailed personnel roster, a formal organizational reporting chart, and SHS's floorplan. Other data were collected by questionnaires distributed at staff meetings. Employees sealed and mailed the completed questionnaires to a university department outside of the medical center. Researchers followed up nonrespondents by letters or personal telephone calls after the initial distribution of the questionnaires. The usable questionnaire sample size from all departments was 104, resulting in a response rate of 87 percent (we did not include summer workers or student assistants, who raised the total to 142). Responses from members of departments that had not yet implemented any component of the system were not included in the analyses. Individuals for whom we did not have relevant proximity data or who did not answer sufficient questions were also not included in the relevant analyses. These criteria limited the usable sample size to between 96 (those locatable on the formal organizational chart) and 62 (those responding to the network roster and the relevant questionnaire items and belonging to the implementing departments).

Individual-Level Measures

Computer use was measured as 0 if respondents used neither the terminals nor any information from the system, 1 if they provided or received system information but did not use the terminals, 2 if they used the terminals once a week, 3 if once a day, 4 if several times a day, and 5 if most of the day.

Occupational membership was determined from personnel records. The categories included physicians, registered nurses, other medical personnel (such as lab assistants, radiologists), administrators, and office and clerical staff. Prior research on medical information systems shows that differences in tasks and social norms in health occupations, and especially medical versus nonmedical social worlds, play a powerful role in acceptance and outcomes of such systems (Kimberly and Evanisko, 1981; Aydin and Rice, 1991). Thus the first three occupations were also dummy-coded into a medical occupational category (= 1) and the second two into a nonmedical occupational category (= 0).

Organizational level was measured as the number of reporting steps down from the organization's director, ranging from 1 to 5, based on the formal organizational chart. This

measure was used, along with system use, to briefly characterize the different groups identified by network analysis.

Attitudes toward a computer system—especially those concerning worth, utility, ease of use, satisfaction and success—are a central focus of information-system implementation research (Schultz and Slevin, 1975; Lucas, 1981; Ives, Olson, and Baroudi, 1983). An individual's attitude toward the system was computed as the mean of three questionnaire items: (1) "The new computer system is worth the time and effort required to use it," measured from 1 = strongly disagree to 7 = strongly agree; (2) the extent to which the system had changed "the ease of performing the department's work," measured from 1 = significantly increased to 7 = significantly decreased, and (3) the extent to which the system had changed "the quality of the department's work," measured from 1 = significantly increased to 7 = significantly decreased. The values for the latter two items were reversed in the analyses to maintain consistent direction. The mean of the three items was then computed if the respondent answered at least two of the items. These three items formed a single principal component, with loadings of .81, .92, and .92, respectively, representing 78 percent of the variance, and the scale had a Cronbach's alpha of .85.

It is not practical to ask respondents to estimate multiple items for various others, so for the analyses involving estimates of others' attitudes, respondents were asked "To what extent do you agree that [your coworkers] [your supervisor] think that the new computer system is worth the time and effort required to use it?" measured from 1 = strongly disagree to 7 = strongly agree.

Importance of source other. The importance to the respondent of two specified organizational classes of others as sources of social information was measured by asking "How important are the opinions of [your supervisor] [your coworkers] in influencing how you think about the new system?" measured from 1 = very important to 4 = not important at all, and reversed for the analyses in order to maintain consistent direction. Ideally, the importance to the respondent of the opinion of each specific other would be measured by asking the same question alongside the network roster discussed below, but this study was not able to obtain this measure of specific individuals' importance. We are pursuing this approach in a new study.

Network-based Measures

Relational proximity. On the questionnaire, a roster listed each individual working at the organization at that time or in the recent past. Respondents were asked to circle a number in response to "How frequently, on the average, do you have significant discussions with other [organizational] personnel about how you accomplish your work?" using a scale of 0 = not once in the last year, 1 = once a month or so, 2 = several times a month, 3 = every week, 4 = several times a week, 5 = every day, or 6 = several times a day. The cell values of this matrix were then squared, to roughly approximate the number of times per month i inter-

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acted with j (e.g., "every day" is approximately 25 days per month, and $5^2 = 25$). Because not every one who was listed responded to the questionnaire or was still employed at SHS, these responses represent an asymmetric, rectangular matrix. Further, some of these respondents did not answer at least two of the attitude items. So the final usable relational matrix was 62×72 or, for analyses requiring square matrices, 62×62 . For analyses utilizing the different network matrices, this common sample of 62 was used. These values represent overall relational proximity.

Relational groups. The relational network model conceptualizes a group as those who interact more with each other than with others, forming highly cohesive subsets. The NEGOPY program was used to detect relationally based groups (Richards and Rice, 1981; Rogers and Kincaid, 1981). NEGOPY groups together individuals who have at least 50 percent of their total interaction (strength of linkage) within a group, who are all connected through at least one path of linkages within the group, and no more than 10 percent of whom could be removed without disconnecting the group. It is based on graph-theoretic principles but is capable of analyzing large-valued asymmetric networks. For two reasons, a cutoff value of 16 or greater (4^2 , or "once a week") was used to drop weak relational links. First, because groups in the organization were small and interdependent, either a single or two large groups resulted from lower cutoffs in the relational data. Second, it is unlikely that social information processing about a specific organizational phenomenon (the information system) can be very powerful through infrequent contacts. To create a symmetric matrix, when the (i,j) value differed from the (j,i) value, the mean was used, as there was no basis to assume that either respondent was more accurate. The results identified relational group membership.

Structural equivalence proximity. The squared relational matrix was used as the raw data to calculate euclidean distances between each pair, a common continuous measure of overall structural equivalence (Burt, 1980; Rice and Richards, 1985; Borgatti, 1987). The resulting symmetric matrix was then reversed to maintain consistent direction and was used as the measure of overall structural equivalence.

Structural equivalence positions. The positional model conceptualizes a group as a cluster of individuals who are more proximate to each other relative to all others in the social system, regardless of the extent of interaction within the position. Johnson's (1967) hierarchical clustering (diameter method) was applied to the unreversed structural equivalence matrix to identify overall structural equivalence positions.

Organizational proximity. Because "the key channels in an organization are those which link positions differing in rank or function" (Lincoln and Miller, 1979: 183), organizational proximity may be formally represented by the similarity of individuals with respect to their direct and indirect relations between job positions as portrayed by the organizational chart (Tichy, 1981). Our organizational contact indicated 96 of

the formal reporting relationships on an organizational chart. From this chart, two forms of organizational proximity were constructed: unit organizational proximity and overall organizational proximity.

Unit organizational proximity. The work unit's positional supervisor was considered the source of (downward vertical) organizationally proximate social influence. All positional coworkers who reported to the same supervisor were considered sources of (horizontal) organizationally proximate social influence. A respondent's unit organizational proximity to both the supervisor and the coworkers is thus one, while the proximity to all other organizational members is zero.

Overall organizational proximity. A symmetric organizational proximity matrix was constructed, where a 1 indicates that i and j have a formal reporting relation, and a 0 indicates no reporting relationship. The geodesic, or the shortest path distance between two nodes in a network, is a standard index for measuring raw binary structural relations. Geodesic distances between each i and j were computed from the reporting matrix. The resulting geodesic matrix was then converted into euclidean distances among all pairs of individuals. For use with the attitude and importance measures, the matrix was reversed to maintain consistent direction with the other measures.

Organizational positions. As with the structural equivalence data, Johnson's (1967) hierarchical clustering (diameter method) was applied to the unreversed organizational proximity matrix to identify overall organizational positions.

Spatial proximity. Our organizational contact located each of the possible 142 employees on a floorplan. Spatial proximity was measured by the physical walking distance (i.e., not strict coordinate distance) between each room or working location. For example, the greatest distance between two people was 50 units (grid marks on a tracing sheet), and the shortest distance was 0 (when they shared the same office). In order to create proximity values that were in the same direction as the relational measures, the distances were reversed. Studies of geographic diffusion patterns (Hagerstrand, 1965), organizational communication (Conrath, 1973), and innovation diffusion (Rogers, 1983) have found that interaction and diffusion over distances decreases rapidly, often as the square of distance, so the values were then squared. The organizational and spatial 62×62 sub-matrices were used when necessary for comparisons with the relational matrix.

Spatial clusters. The spatial model conceptualizes a cluster as consisting of all those physically close to each other and distant from other individuals. Johnson's (1967) hierarchical clustering was also used to detect spatially proximate clusters of individuals, using the symmetric squared distance matrix.

Combining Measures

For the analyses of the influence of estimated attitudes, the respondent's estimates of the supervisor's and the generalized coworker's system worth item were used. For the

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Table 1

Variable Definitions and Descriptive Statistics					
Variable	M	S.D.	Min.	Max.	N
Individual's response:					
System worth time/effort	5.21	1.63	1	7	101
Improved ease of dept. work	4.60	1.69	1	7	94
Improved quality of dept. work	4.79	1.49	1	7	93
Mean attitude	4.85	1.43	1	7	96
Reversed importance of					
Coworkers' opinion	2.35	1.04	1	4	100
Supervisor's opinion	2.65	1.18	1	4	100
Organizational level	3.56	.79	1	5	142
System use	1.60	1.92	0	5	140
Relational:					
Mean relational others' system worth					
Unweighted	5.42	.40	4.40	6.67	62
Weighted	12.67	6.19	4.40	25	62
Mean system worth by proximity	38.54	25.36	3.50	153.74	62
Group mean system worth	5.26	.44	4.36	6.75	62
Number of relational links	24.81	18.13	1	61	62
Attitude by proximity					
Unweighted	12.96	4.79	4.67	27.71	62
Weighted by importance	30.93	21.24	4.67	110.84	62
Mean group attitude	4.93	.55	3.33	5.52	62
Structural equivalence:					
Mean system worth by proximity	580.80	119.61	116.91	709.57	62
Position mean system worth	5.17	.27	5	6.33	62
Mean attitude by proximity					
Unweighted	537.55	111.42	107.29	649.98	62
Weighted	1218.79	618.57	354.06	2584.96	60
Position mean attitude	4.85	.32	3.56	6.08	62
Work-unit coworkers:					
Mean system worth—unweighted	5.14	.89	3	7	57
Mean system worth—weighted	11.81	5.77	3	25	56
Mean attitude—unweighted	4.76	.83	1.62	7	131
Mean attitude—weighted	11.57	5.52	3.75	22.92	65
Work-unit supervisor:					
Worth—unweighted	6.18	.74	4	7	61
Worth—weighted	16.57	7.87	5	28	58
Attitude—unweighted	5.61	.69	4	6.67	138
Attitude—weighted	15.10	7.54	4.33	26.68	68
Overall organizational proximity:					
Mean system worth by proximity	101.27	15.46	64.16	121.57	62
Position mean system worth	5.17	.70	3.67	6.75	62
Mean attitude by proximity					
Unweighted	95.65	15.10	62.23	115.36	62
Weighted	220.90	111.27	64.60	445.72	62
Position mean attitude	4.95	.73	3.42	6.27	62
Spatial proximity:					
Mean system worth by proximity	13105.16	1304.76	9806.39	15049.90	62
Cluster mean system worth	5.27	.45	4.40	6.50	59
Mean attitude by proximity					
Unweighted	12281.02	1231.78	9214.84	14168.77	62
Weighted	28914.60	14351.11	10117.67	55045.36	60
Cluster mean attitude	4.78	.56	3.67	5.95	59
Occupational category:					
Category mean system worth	5.26	.26	5	6.20	59
Category mean attitude	4.93	.54	3.67	6.07	62

individual-level analyses involving others' actual attitudes, each other's attitude score was multiplied by the appropriate importance (supervisor or coworker) and proximity scores, averaged, and added to each respondent's record (see the Appendix).

The relational analyses thus include only those with whom the respondent communicated from the 62 network respon-

dents. In the structural equivalence analyses, all 62 individuals were used regardless of level of communication. In the unit organizational proximity analyses, the respondent's supervisor and the unit coworkers were treated as two separate influence classes (regardless of whether the respondent indicated communicating with them or not), and the respondent's supervisor's attitude and the mean of the respondent's coworkers' attitudes were added to the respondent's record. For the overall organizational proximity and spatial analyses, all individuals were used regardless of level of communication.

The resulting group or position or cluster memberships were coded into each individual's case record. The mean of the attitudes of the others in a respondent's group or position or cluster or occupation was also added to each respondent's record.

Separate analyses were conducted that either included the importance weights (scalar-multiplied by the proximity matrices before being matrix-multiplied by the attitude vector) or did not include them. For the analyses involving estimates of social information, these weights were, or were not, applied to the projected estimates of the generalized classes of "supervisor" and "coworkers." Table 1 describes the various measures.

Of course, the three proximity mechanisms are not necessarily distinct in practice. For example, Bienenstock, Bonachich, and Oliver (1990) showed that members grouped in certain social categories (such as by sex, race, education, and religiosity) who were more densely connected with others in the same social categories (relationally and positionally proximate) were more likely to have homogenous attitudes. Hartman and Johnson (1989) also concluded that relational and positional proximity are not mutually exclusive, but complementary and contingent. However, the three proximity mechanisms are conceptually distinct and assume quite different bases for influence, quite different raw data, and quite different network analysis algorithms (Rice and Richards, 1985). Thus, there can be no completely comparable one-to-one critical test of the relative influence of these three network mechanisms.

RESULTS

Estimated Attitudes

Table 2 shows that a respondent's perceived worth of the system (the extent to which the system is worth the time and effort to use it) is predicted by the respondent's estimates of one's coworkers' and supervisor's perceived worth of the system. The unweighted estimates explain 38 percent of the variance, and the weighted estimates explain 27 percent. However, it is difficult to trust these associations because of the common-method bias and the likely social projection of one's own attitude onto generalized others (Gerard and Orive, 1987). In fact, results show that the unweighted and weighted actual perceived system worth of a respondent's specified coworkers were not significantly associated with the attitudes estimated by the respondent for

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Table 2

Predicting Respondent's System Worth from Estimates of Generalized Other's System Worth (Values Are Beta Coefficients)

Independent variables	Equation	
	1	2
Unweighted system worth:		
Estimated coworkers'	.49***	
Estimated supervisor's	.23*	
Weighted system worth:		
Estimated coworkers'		.26**
Estimated supervisor's		.35***
Adjusted R ²	.38	.27
d.f.	2,93	2,91
F-ratio	29.9***	18.4***

*p < .05; **p < .01; ***p < .001.

generalized coworkers. This is true regardless of whether the actual reported worth of the system was represented as the mean attitude (weighted or unweighted) of (1) all one's unit coworkers or (2) all those with whom the respondent communicated, or (3) the mean of the overall relational, structural equivalence, organizational, or spatial proximity matrices multiplied by the system worth attitude vector, or (4) the various group means, including that of one's occupational category. No combination of these variables produced a significant regression equation.

Table 3 shows that a respondent's estimate of the supervisor's actual system worth is significantly associated only with (1) the weighted supervisor's actual system worth, (2)

Table 3

Regressions of Estimates of Supervisor's System Worth Item on Different Combinations of Possible Sources of Others' Actual System Worth (Values Are Beta Coefficients)

Independent variables	Equation				
	1	2	3	4	5
Mean system worth:					
Respondent's:					
Relational group				-.34**	-.22**
S.E. position				.04	
Overall organizational position				.15	
Spatial cluster				-.05	
Occupational category				.18	
Unit supervisor:					
Unweighted	.18				
Weighted		.52***			.49**
Multiplied by overall:					
Relational proximity				.46*	
Structural equivalence				.38	
Organizational proximity				-.20	
Spatial proximity				-.04	
Adjusted R ²	.01	.25	.04	.03	.29
d.f.	1,56	1,56	4,53	5,50	2,55
F-ratio	1.90	20.5***	1.60	1.40	12.7***

*p < .05; **p < .01; ***p < .001.

the mean system worth of all those with whom the respondent communicated (only one of whom could potentially be the supervisor), and (3) negatively, with the mean system worth of all the other members of the respondent's relational group. The overall variance explained in the regression equations including the last two sources were not statistically significant. The single best regression predicts 29 percent of the estimated supervisor's system worth, with statistically significant coefficients for (negatively) the mean attitude of one's relational group, and the weighted supervisor's actual attitude. However, the unweighted supervisor's actual attitude is not statistically significant, and one's estimate of one's supervisor's attitude was correlated with the importance of one's supervisor at $r = .50, p < .001$. Thus it is hard to place much confidence in these sources for justifying the use of estimated social information. These results are examples of disconfirmed social projections and demonstrate the danger of using social projections as the basis for tests of social information processing.

Groupings and Differences across Groupings

Four relational groups resulted, ranging in size from 5 to 22, along with 12 isolates. The adequacy of the groups identified by NEGOPY was confirmed in two ways. First, the *F*-ratio for apportioning the variance in the relational matrix to the four groups and the set of isolates was highly significant. Second, according to the Quadratic Assignment Procedure (Hubert and Schultz, 1976), the dissimilarity matrix of group membership was strongly and significantly associated with the relational matrix. Concerning overall matrix comparisons, the relational matrix was weakly but significantly associated with all the other matrices ($r^2 = .02$ to $.04$); the structural equivalence matrix was weakly associated with the organizational proximity matrix ($r^2 = .01$) but not with the spatial matrix; and the organizational proximity matrix was not associated with the spatial matrix.

Table 4 shows that there was an overall significant difference among the attitude means of the four groups. The group with the most positive attitude toward the system (group 3) consisted of individuals midway in the organizational hierarchy with (nonsignificantly) lower levels of usage and had the lowest within-group link density (63 percent). This group consisted primarily of cashier, billing, and upper-level administrative personnel. The least positive group (group 2) consisted of individuals higher in the organization with the (nonsignificantly) highest level of use and had the second-highest within-group link density (75 percent). This group consisted primarily of finance and personnel employees and some administrators. The two relational groups with the lowest and highest attitudes toward the system (groups 2 and 3) were located next to each other, so spatial proximity cannot be playing a large role in similarity of attitudes. The two spatial clusters (see below) with the highest (cluster 6) and lowest (cluster 8) attitudes toward the system were also located next to each other. However, the more numerous spatial clusters do seem to be subsets of the relational groupings.

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Table 4

Differences in Attitude toward System, Organizational Level, and Usage of System, by Groups, Positions, and Clusters*

Groupings	#	N	Attitude	Level	Use
Relational groups	1	5	4.07	3.80	2.80
	2	6	3.72	2.67	3.00
	3	17	5.43	3.29	2.63
	4	22	4.97	3.73	2.45
<i>F</i> -ratio			3.2*	3.5*	.2
Structural equivalence positions	1	47	4.94	3.47	2.49
	2	4	4.09	2.50	3.00
	3	5	5.33	4.00	2.80
	4	6	5.11	3.00	1.50
<i>F</i> -ratio			.6	3.5*	.7
Organizational proximity positions	1	11	4.32	4.00	1.13
	2	7	5.33	3.92	1.77
	3	9	4.63	3.00	1.13
	4	8	4.96	2.44	1.56
	5	8	5.08	4.91	2.80
	6	7	5.91	3.00	2.86
	7	21	4.41	3.00	1.34
	8	9	4.56	4.56	.69
	9	10	5.03	3.23	1.83
<i>F</i> -ratio			1.1	91.3***	1.9
Spatial clusters	1	6	5.05	3.50	1.30
	2	5	5.33	3.80	2.20
	3	15	4.66	3.40	2.00
	4	9	5.11	3.11	2.13
	5	14	4.81	3.93	1.36
	6	17	5.41	3.29	2.71
	7	16	4.85	4.13	3.60
	8	14	3.95	3.07	3.00
<i>F</i> -ratio			1.6	4.4**	2.3*
Occupational membership					
Physicians	1	9	3.74	3.06	.50
Nurses	2	13	4.46	3.43	1.65
Other medical Admin	3	6	6.00	2.67	2.17
Administrative other Medical	4	30	4.70	3.77	1.22
Other Office / Clerical	5	38	5.18	3.68	2.38
<i>F</i> -ratio			3.5*	5.6***	4.2**

* Group sizes are given based on number of respondents providing attitude scores. Group sizes are generally larger for the organizational level and usage scores.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Cutoffs were also used on the final results from the positional and spatial clusterings, on the basis of the clustering dendograms, factor analysis, and understanding of the organizational site because, by definition, no cutoff results in one overall position or cluster.

The clustering algorithm identified four structurally equivalent positions whose attitude means and usage levels were not statistically different. While there is a significant difference in organizational level, it is hard to characterize differences among these positions because so many of the respondents occupied the first position.

The clustering algorithm identified nine overall organizationally proximate positions. There was no overall statistically significant difference among the positions in attitude about the system, though the administrative personnel making up positions 5 and 6 had among the highest attitude and usage

lab, pharmacy + radiology

levels. These two positions consisted of the supervisors of many of the service departments and all of the medical records personnel. Position 1, including the purchasing and billing personnel, had the lowest attitude level. Nor was there any statistically significant difference in usage levels, while the clinical assistants position had the lowest usage level. As would be expected, because reporting relations were used as the basis for determining positional proximity and positional clusters, there was a highly significant difference in organizational level. The positions generally correspond to small, meaningful clusters of the organizational structure.

The clustering algorithm identified eight clusters of individuals who were spatially proximate. There was no overall difference in average attitude about the system across these clusters, though there was an overall difference in organizational level and system usage. However, though the spatial clusters are near-perfect subsets of the relational groups and the two proximity matrices are statistically associated, the results lead to different conclusions about differences in usage and attitudes. Whereas the highest usage occurred in the relational group 2 and the lowest in group 4, the spatial clusters show that the lowest usage occurred in the subset consisting of radiology (cluster 1), which was not part of relational group 2 or 4, while the highest usage occurred in the cluster of medical records personnel (cluster 7), who were part of the relational group showing the lowest overall usage.

Predicting Respondent's Attitude

Table 5 portrays the four regressions that included the only statistically significant predictors from each of the categories

Table 5

Regressions of Attitude on Different Combinations of Potential Sources of Social Information (Values Are Beta Coefficients)

Independent variables	Equation			
	1	2	3	4
Others' attitudes				
Positional mean (S.E. position)			-.35**	
Multiplied by overall relational proximity				
Unweighted	.28*		.39**	-.27*
Weighted		.49**		
Unit coworkers (weighted)		-.38		
Unit supervisors				
Unweighted	.24			
Weighted		.44*		.45***
Individual differences				
Occupation				
Nonmedical (0)/Medical (1)	-.22	-.23	-.23	-.28*
System use	.09	-.10	-.06	-.12
Adjusted R ²	.17	.28	.22	.28
d.f.	4,53	5,46	4,50	4,50
F-ratio	2.75*	5.06***	4.9***	6.2**

*p < .05; **p < .01; ***p < .001.

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of social influence variables (overall proximity by attitude, which had no significant predictors; group or positional or cluster means; unweighted relational or organizational unit others; and weighted relational or organizational unit others) and always included the dichotomized respondent's nonmedical or medical social world and the respondent's system use.

One's attitude toward the new organizational information system is, to a small degree, predicted by social information. The unweighted, relational proximity multiplied by specified others' attitudes is a statistically significant influence, which, along with the nonsignificant nonmedical/medical social world membership and use of the system, explains 17 percent of the variance. This influence actually strengthens when the mean of the respondent's structural equivalence position is included, which has a negative influence, jointly explaining 22 percent of the variance. The weighted relational and supervisor's attitudes were statistically significant influences in the third regression, which explained 28 percent of the variance. The weighted supervisor's attitude also maintained its predictive value in the fourth regression, which explained 28 percent of the variance, and included the significant influences of the structural equivalence position's mean and social world membership.

The most parsimonious equation is the third, because it does not have to rely on the importance weightings. It is possible that communication about work-related matters with specified coworkers is sufficiently weighted by the strength of communication that the importance weightings are unnecessary. However, the regression indicates that one's attitude is also negatively influenced by the mean of those specified others who are structurally equivalent. The negative peer effect of structurally equivalent others is plausible for the same reason that the relational influence is positive: Direct interactions seem to influence convergent attitudes, while positional proximity does not require direct, and thus convergent, attitudes. In one sense, in accord with Burt (1980), this means that the structural equivalence peer effect is more general than the relational influence because it here allows for both positive and negative influences. However, the relevant literature generally presumes a positive effect of social information.

Occupation As Position

Table 3 showed an overall statistically significant difference among the five occupations for average attitude, organizational level, and usage. Administrators had the most positive attitude toward the system, were on average higher in the organization, and had the second-highest level of usage. Physicians had the most negative attitude, were somewhat lower in the organization, and had the lowest level of usage.

Occupational membership, however, does not necessarily provide a relational or positional mechanism for organizational proximity through which social information flows and does not specify whether the mechanism is relational, positional, or spatial. Rather, as noted early on, an additional, nonnetwork mechanism may be the different professional

norms and concerns that divide the medical and administrative social worlds in hospital settings (Kimberly and Evanisko, 1981). A brief review of the implementation process reveals some of these differences.

At the SHS the information system was initially intended to, and in the long run will, provide useful clinical and patient information to both the medical staff and to SHS administrators. The encounter form, described above, provided a variety of reporting and control benefits, such as improving legibility of prescriptions and lab tests, providing information about diagnoses, preventing "walk-outs" (where students avoided payment by leaving the clinic without turning in their bill), and providing billing data that could be verified. Indeed, the level of data entry errors (called "follow-ups" to avoid any sense of blame or incompetence in using the new computer system) steadily declined during the period of study. Initially, however, SHS administrators decided to emphasize system capabilities and data-collection procedures that would improve administrative effectiveness.

Because the initial emphasis was on administrative applications of the system, medical personnel had experienced few benefits by the time of our study. In fact, the nursing department eventually hired an additional staff member specifically to use the system and enter data so that nurses would not be distracted from providing patient care. Further, some personnel were irritated at having the financial office provide them with follow-up reports.

Simple cross-tabulations of the five occupations show, in general, that members of the occupations are generally distributed throughout the groups, positions, and clusters. No occupation had more than 54 percent (the nurses) in one cluster. Additional network analyses (reported in Aydin and Rice, 1991) show that occupational membership cannot be adequately represented as a network mechanism. Thus, usage and attitudes were understandably lower for members of the medical social world than for members of the administrative social world, partially explained by the different levels of participation and outcomes that occupational members experienced rather than by social influence through membership in occupational positions or by strong overlaps between occupation membership and network mechanism.

DISCUSSION

The results support hypothesis 1, that social information processing influences one's attitudes toward a new organizational information system, over and above traditional sources such as use of the system and occupational membership. Membership in different medical or nonmedical social worlds may play a small role in influencing one's attitude, but due to different implementation strategies, policy choices, and applications of the information system rather than due to social information. In this study, usage of the system, by itself, does not apparently influence one's attitude toward the system. Further, the results support hypothesis 2, finding greater influence from relational and positional sources than from spatial sources. There is weak evidence of the influence of social information through both the relational and

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unit organizational proximity mechanisms but not for the overall structural equivalence, overall organizational proximity, or spatial mechanisms. The two primary sources of social information are those with whom one communicates frequently and one's supervisor. Weighting of the other's attitude by how important the respondent feels the other's opinion is seems necessary in the case of unit-organizationally proximate coworkers and supervisor, though at the cost of possible multicollinearity, but not for relationally proximate others, perhaps because of the inherent weighting effect of interaction frequency.

The results also support hypothesis 2, concerning the artifactual and misleading use of estimated social information, whether from specified or generalized others. Estimated social information (social projection) from generalized others (coworkers, and supervisor) is significantly correlated with an individual's attitude toward the new organizational information system but is not correlated with the attitude (except for the supervisor's weighted attitude) that the corresponding specified others report. Thus it represents disconfirmed social projection and should be rejected as a way of operationalizing social information processing.

Finally, the results support hypothesis 4, that proximate others provide a stronger social information influence than the simple mean of an individual's group or position or cluster. The simple peer effect is not a statistically significant source of social information, except negatively in the case of the peer effect of one's structurally equivalent others.

Qualifications

There are many possible ways to identify relevant others using network analysis. Each has embedded assumptions, strengths, and weaknesses, each may be affected by missing data in different ways; further, each identifies a group, position, or cluster differently (see Rice and Richards, 1985, for a detailed analysis of these and other differences). This is an important consideration, because the results imply that social information is primarily a local phenomenon. Social information may come from the subset of an organization's membership with whom one communicates, one's coworkers, and one's supervisor, but these sources are each considerably less than all the potentially proximate others. In general, models of social influence need to better specify the relevant local reference group, because there are often unspecified differences and because characteristics such as rank or importance are relative to proximate others (Gartrell, 1987).

Although the three mechanisms are explicitly operationalized and differentiated, other and multiple measures of each might capture more of the social information. Certainly the traditional organizational chart imperfectly captures organizational position. Many other factors determine functional positions, such as politics or temperament, and individuals, especially in complex organizations, may have multiple vertical reporting relationships. Brass (1984) analyzed a wide variety of separate network measures to identify how network position affects individuals' organizational influence. Walker (1985) combined nearly a score of measures to show how

network position predicted cognition about software development practices.

Finally, it is more than obvious that many other factors also influence the formation of attitudes about new organizational technologies. Variables such as prior experience with computing, prior attitudes about work and computers, objective measures of system performance, perceived positive or negative consequences, education, tolerance for ambiguity, and the level of uncertainty associated with the object would be included in a complete model (Gerard and Orive, 1987; Rice, 1987).

Some Implications and Extensions

Each proximity mechanism carries with it unexplored assumptions about the communication media that may facilitate or constrain opportunities for social information processing. None of the models makes explicit assumptions about the medium used, though the spatial model implies only access to influences within lines of sight or hearing. Given the ability of both traditional media (such as the telephone) and new media (such as facsimile, electronic messaging and voice mail) to overcome proximity constraints (Rice, 1987) and the different roles these media play at different spatial distances (Conrath, 1973), more specified models for social information processing would consider interactions between proximity mechanisms and communication channels. Would exposure to social information through relational proximity be less influential if the communication occurred through information-lean channels, those that could not provide the full range of social cues, nonverbal signals, and social regulations (such as electronic mail) (Daft, Lengel, and Trevino, 1987; Rice et al., 1991)?

An additional avenue for exploration would be the role of these proximity mechanisms over time. An individual's relational contacts are likely to fluctuate over time. The positional matrix is likely to be fairly stable, but there were a few promotions, transfers, new hires, and resignations during our two-year study period. Even organizational spatial proximity may exhibit regular but significant changes throughout the day (Monge et al., 1985). Moreover, it is possible that the implementation of a new information system itself changes attitudes toward technology and use of that technology, in turn leading to changes in communication patterns, organizational structure, and working location.

CONCLUSION

The literature on organizational communication and organizational information systems, as with other research areas, is rife with claims both of the all-encompassing nature of one theoretical model or another as well as of the accumulated inconsistencies and contradictions in research results. Our goals are much more modest. Without rigorous operationalizations and testing, without guidance for how a theory might be applied, and without conceptual specification of the components involved in some hypothesized process, theoretical claims cannot be challenged and results can be neither compared nor comparable. The present study has

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attempted to identify some of the problematic areas of social information processing theory in the context of explaining attitudes toward a new information system. We suggest that a network approach helps to identify and operationalize just what the mechanisms and sources of social information processing are. We also suggest that social information processing, in the complex and changing arena of ongoing organizational activities, can play no more than a small role in influencing attitudes toward ambiguous phenomena such as a new information system.

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APPENDIX: Comparison of Full Social Information Processing Model, Projected Social Information Model, and Peer-Effect Model

In the full social information processing model,

$SIP_i = ((M_{ij} \times P_{ij}) * B_j)$, where

SIP_i = a $n \times 1$ column vector of average social information influence and

M_{ij} = The $n \times n$ matrix of importance of j to i (several j 's may share the same importance value to i for their class c), and M_{ij} is undefined

P_{ij} = the $n \times n$ (relational, positional, or spatial) proximity matrix where i and j go from 1 to n , and P_{ij} is undefined, and P_{ij} is row-normalized by the number of present ij links for the relational matrix and by $n - 1$ for the positional and spatial matrices

combined through elementwise multiplication, and

B_j = the $n \times 1$ column vector of each j 's attitude, where j goes from 1 to n ,

combined through matrix multiplication.

The estimated or projected social information from a generalized other is simply $M_{ic} * B_{c^i}$ where B is estimated by i for each generalized class c comprising some unspecified number of js , and M includes the importance to i of class c of those same generalized others.

This approach is similar to, and extends, several prior models of social influence, including, among others, Woelfel and Haller's (1971) force aggregation theory; Shaw's (1980) application of Anderson's information integration theory of judgment; Latane's (1981) impact vector model; Krackhardt and Porter's (1985) operationalization of the influence of estimated satisfac-

tion of leavers and other stayers on individual stayers; and Ajzen and Fishbein's theory of reasoned action (Sheppard, Hartwick, and Warshaw, 1968).

Another measure of the relational influence of i on each j that could be used is $(I - P_{ij})^{-1}$, where P_{ij} is first row-normalized and I is the identity matrix (Friedkin and Cook, 1990). The elegance of this measure of prominence is that it takes into account the cumulative influence through all indirect paths between i and j . But the straightforward model of relational social information processing argues only for the influence of direct ties.

The peer effects influence on a respondent is simply the average of the attitudes of the other members of a respondent's group:

$$SIP_{ki} = ((\sum A_{kj}) - A_{ki}) / (n_k - 1) \text{ where}$$

$\sum A_{kj}$ = the total of the attitudes of all the other members j within a group k
 A_{ki} = the attitude of member i of group k
 $n_k - 1$ = the number of members of group k , less 1.

