

HOW TELEPHONE NETWORKS CONNECT SOCIAL NETWORKS

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REACH OUT AND TOUCH SOME BODIES¹

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TELEPHONES AS PERVASIVE, IMPORTANT AND UNSTUDIED

Communities as Personal Networks

Western governments are investing megadollars to study the effects of computer-mediated communication (see, for example, Galegher, Kraut and Egido 1990; Buxton 1991; Mantei, et al. 1991). To be sure, they are responding to widespread interest by capital, labor and the state about how the proliferation of computer networks could restructure relations of production. But lurking just beneath the surface there has also been a Buck Rogers fascination with sparkling new science toys.² Meanwhile, the telephone keeps ringing. Unobtrusively, it

of this research and Bev Wellman for her continuing advice. This paper is dedicated to Marshall McLuhan.

²One of us co-authored "The Network City" (Craven and Wellman) in 1973, taking up Melvin Webber's argument (1963, 1964, 1980) that the telephone, automobile and the airplane had made possible "communities without propinquity" (Webber's

keeps being used more than computers for real-time communication between people -- at work or at play. At a time when most North Americans do not use electronic mail, almost every North American has at least one telephone available at home. Not only is the telephone an important communication medium in its own right, the study of how it maintains social relationships can give us baseline insights into how rapidly-developing computer-mediated communication media might affect the composition, structure and contents of social relationships and social networks.

Our concern in this article is with how the widespread use of the telephone affects interpersonal relations in *personal community networks*: informal ties with friends, neighbors, relatives and workmates (Wellman and Leighton 1979; Wellman 1988a). Traditionally, communities had been thought of as groups of neighbors with densely-knit relationships. By contrast to this *spatial* definition of community, our research has been using a *social* definition:

phrase; see also Meier 1962, 1983). By 1979, Murray Turoff and S. Roxanne Hiltz had expanded this notion to *The Network Nation*, their book showing how computer-mediated communication might soon transform work and community. Indeed, even the social impact of *postal communications* and the *telegraph* have been better studied (see Pred 1973, Osborne and Pike 1982).

communities are social networks of persons actively in contact with each other, and usually exchanging companionship and social support. Thus such networks are defined without regard to living near-by. They focus on social space, not geographical space.

Personal community networks view each individual as the center of a unique social network. Instead of assuming that people belong to communities that are traditional solidary groups -- such as neighborhoods, kinship groups, or cliques of buddies -- they treat each person as the center of his/her own Ptolemaic universe. In our study, these networks are composed of the 10 to 20 relationships outside of their households with whom people are actively and significantly in contact. Such relationships could be as near as next-door neighbors or as distant as beloved siblings left behind in "the old country" across the ocean. This network approach to the study of community makes variables out of formerly-defining phenomena such as network density and social support. Thus we do not use the term *social network* in a vague metaphorical sense, but as a precise scientific term, capable of being analyzed in terms of its defining variables (Wellman 1988b; Scott 1992).

As social analysts look at community in social network terms, they realize that there is no need to proclaim the loss of community just because there are not any traditional community solidarities: densely-knit, tightly-bounded, broadly-supportive local groups of neighbors and kin. The network approach has allowed analysts to discover personal community networks in which:

- network members usually provide only specialized support;
- networks contain as many kin as non-kin (friends, neighbors, workmates);
- network members usually reside outside of the neighborhood: elsewhere in the metropolitan area or beyond;
- networks are rather sparsely-knit and segmented into several clusters of relationships (Wellman 1988a, 1990).

Telephone Networks and Personal Community Networks

Moving Out and Staying Connected: "Communication is not only necessary for the formation of human communities, it is also indispensable for sustaining them," observed Keller (1977, p. 282). In the village and urban neighborhood, communication has preeminently been face-to-face. Yet Alexander Graham Bell himself had suggested in 1877 that his invention would enable people to socialize at a distance (Aronson 1977, p. 31). As soon as network analysts removed spatial proximity from their definition of community, they realized that in the western world telephones play a key role in keeping personal community networks connected (Ball 1968; Wellman 1972; Craven and Wellman 1973; Webber 1973; Wellman and Leighton 1979; Fischer 1985). Telephone networks can keep far-flung relationships in contact, and they can complement the face-to-face contact of network members who live near-by. Thus Aronson speculated that with the spread of the telephone, "one could develop intimate social networks based on personal attraction and shared interests that transcended the boundaries of residence area" (1977, p. 161). As societal transformations create linkages across village, ethnic and regional

boundaries, the telephone is now being identified as a key to Third World development (Yang 1989).

Research to Now: Until now, scholarly assertions of the role of the telephone in personal community networks have largely been arguments without data. Some researchers have tried to generalize from social psychological knowledge about communication to telephone use (most notably Short, Williams and Christie 1976). However, their focus on dyadic (two-person) ties has limited our ability to understand how telephones connect communities and other social networks. Yet the telephone has implications for the nature of community *networks* as well as for community *ties*.

Some research has investigated the role of telephones in maintaining human communities. When parts of New York City were left without telephone service for about three weeks in 1975, residents realized how much they had taken it for granted as a necessity of daily life (Wurtzel and Turner 1977). The majority of the residents felt isolated, uneasy, and less in control. They missed most of all the ability to keep in touch with kin and friends.

While the New York study dealt with respondents highly conscious of the telephone because they were cut off from it, two other studies analyzed how people routinely use telephones to interact with community members. The first, Australian study found women to be especially active in telephoning friends and relatives, living both near and far (Moyal 1989). The second study found that residents of London (Ontario), Canada used telephones most frequently for

personal and social reasons (Singer 1981). Rather than replacing face-to-face contact, telephone calls complemented it: There was a positive association between the frequency of telephone contact and face-to-face contact. Telephone calls sustained existing ties; by contrast, people used only face-to-face contact to get to know strangers. Most calls (61%) were to persons living within 10 miles. However, kin were regularly contacted, regardless of whether they lived near or far.³ The Canadians, routinely going about their affairs, do not perceive the telephone to be as much of a necessity as did the abruptly-disconnected New Yorkers: 30% of the Canadians did not believe that there would be drastic

³ As in all studies, there are some limitations to Singer's (1981) findings. The study reports "regular contact" between kin without specifying what regular means. By asking the respondents, "Whom did you call during the past day," the study found that friends rather than kin were most often contacted (1981). The measurement of only one specific day causes problems because "people do not make calls randomly with the passage of the day; the network is most heavily used on certain days, Mother's Day being the most notorious, and during certain parts of the day" (Mayer 1977, p. 243).

changes in their lifestyle "if your phone were removed tomorrow" (1981). It takes true, not hypothetical, absence to make the call grow fonder.

How Telephones Might Affect Community: We are not arguing technological determinism: The telephone, the automobile and the airplane facilitate the existence of spatially-dispersed networks, but they do not determine the existence of such networks. We must also consider how people fit into large-scale divisions of productive and reproductive labor, and the extent to which their survival and success relies on market purchases and institutional distributions -- as well as on assistance from community networks. Yet in a continent rapidly taking up fax, it is obvious that the telephone is a well-used tool. It is ubiquitous, easy to use, and low in cost.

An AT&T advertising campaign urges Americans to "reach out and touch some one". In the images reflected -- and propagated -- by such ads for the telephone, the dominant vision has been of Sunday calls to granny across the continent. This builds upon the obvious facility of the telephone network to transcend spatial barriers. By showing the household gathered around the telephone at each end, it emphasizes the maintenance of domesticity and community. In reality, telephone conversations are usually private, one-to-one exchanges.⁴ They stand in marked contrast to the more collective possibilities

⁴Telephone calls work best when there is only two persons connected, one at each end of the line. Conference calls have been

for community interactions -- for example, on street corners, in pubs, parties or out shopping (Wellman 1992).

Little systematic information is publicly available about who contacts whom and to what effect.⁵ Until now, we have not known -- outside of ad-land - - which relationships are actually sustained by the telephone nor what kinds of

too difficult to arrange, and listeners' confusions in distinguishing among speakers disturb calls with multiple parties -- using either extensions or speaker phones. Thus a telephone call directly maintains a relationship, not a social network.

⁵ Our computerized literature search on *Sociofile* found next to nothing. But see the preliminary studies in Pool (1977) and Singer (1981), and the collection of speculations in Pool (1983). See also Claude Fischer's social history of early telephone development (1987, 1988; Fischer and Carroll 1988) which notes that -- as with computer-mediated communication -- most attention was initially paid to business uses. The telephone companies may possibly have proprietary, unpublished information.

things people do by telephone. Does the telephone play an important role in its own right in maintaining relationships and community, or is it an adjunct of face-to-face communication? What is the extent and intensity of communication between community members that the telephone can sustain? Can long-distance relationships operate solely, principally, or partially through telephone contact? Does the dyadic nature of the telephone conversation work to disconnect communities into a series of separate duets?

STUDYING TELEPHONE USE

The East York Study

East York is a densely-settled residential area with a population of about 100,000, a half-hour trip (by car, subway or streetcar) from the center of downtown Toronto. At the time of our interviews, most residents were British-Canadian, married (with children), and held regular blue-, pink-, and white-collar jobs. The men held jobs such as electrician, laboratory technician and truck driver, while the women held jobs such as secretary, waitress and insurance claims examiner. The somewhat homogeneous class and ethnic composition of the sample may restrict its general applicability.

Our information comes from interviews (lasting 10 to 15 hours) conducted in 1977-1978 with a sub-sample of 29 of the 845 adults originally randomly-sampled for the first East York study. Whereas the first study had been a large, closed-end survey of 845 respondents, we drew a subsample for this second study to obtain more details through in-depth interviews. The

interviewed respondents told us about their important relationships with kith and kin stretching beyond their households. These ties comprise of the *active* networks of the East Yorkers -- egocentrically defined, with the respondents at their centers.⁶

Units of Analysis

Most surveys look at one unit of analysis: the respondent. However, egocentric (personal) network data makes our analytic lives richer and more complicated by providing several units of analysis. In this study, we take the following into account:

Respondents: We look at 29 respondents: the Egos at the centers of their Ptolemaic network universes.

⁶The 1978 interviews are more fully described in Wellman (1982, 1985, 1990, 1992), Wellman, Carrington and Hall (1988), and Wellman and Wortley (1989a, 1990). The 1968 survey is described in Wellman (1979) and Wellman *et al.* (1973). The findings of the latter intensive study are largely congruent with those from the earlier large survey.

Network Members: We have nearly complete information for the purposes of this study on 344 network members.⁷

Relationships: By definition, we have information about the relationships of these 344 network members to the particular respondents to whom they are connected. (No network member is actively connected to more than one respondent.)

Networks: By definition, the 334 network members are part of 29 networks. We have information about these networks' *composition* (e.g., percent immediate kin; average residential distance) and their *structure* (e.g., density of ties among network members).

This information is available in several ways:

Quantitative Analysis: Separate *SAS* and *SPSS-X* files for (a) Respondent/Network Structure data and (b) Network Member/Relationship data. The Network Member/Relationship file can be aggregated to provide information on network composition. All files can be linked (Wellman and Baker 1985).

Qualitative Analysis: All interviews were tape-recorded and transcribed into typescript. The typescripts have been scanned into ASCII files. This textbase was then indexed by *Nota Bene* (total file = 9.2 megabytes).

⁷ N is less than 344 for several tables because of missing data for tie strength.

Our general procedure is to use quantitative analysis first -- variations on OLS regression -- to get a preliminary sense of which relational and network characteristics are related to telephone use. Then *Nota Bene* textbase searches using Boolean logic easily allow us to find, for example, all places in interviews where respondents discuss telephone conversations with their mothers (see Figure 1). The Univariate and Print procedures in *SAS* help to identify specific cases where people talked a good deal on the telephone with their mothers or gave them much emotional support. A small addition to the *Nota Bene* search criteria allows us to focus on those cases (for full details, see Wellman and Sim 1990). For example, Figure 1 shows a search of only the transcript of Respondent #068.⁸

> Figure 1 about here <

INTIMATES AND SIGNIFICANTS

The respondents' 344 *active* relationships are with 137 socially-close *intimates* and with 207 somewhat less-intimate *significant* persons with whom they also are actively in contact. The median active network has 4 intimate ties

⁸In addition, we use quotations from interviews with respondents where appropriate and available. All names and personal identifiers are pseudonyms. Quotations from the interviews have been edited lightly for syntax and length.

and 7 significant ties. Although the active members of a network usually include most living kin through first cousins (Wellman and Wortley 1989a, 1990, Wellman 1990), they include only a small fraction of the respondents' friends, neighbors and workmates.⁹

⁹*Intimate* network members are those whom respondents "feel are closest to you outside your home". *Significant* network members are those non-intimates whom respondents "are in touch with in your daily life and who are significant in your life". Intimate and significant network members jointly comprise the respondents' sets of *active* network members. Other studies' estimates of the total number of informal ties -- not just active ties -- range from 250 to 1,500 (Boissevain 1974; Pool and Kochen 1978; Bernard, Killworth, Johnsen, Shelley, McCarty and Robinson. 1990).

As in our other papers, we count as one tie a relationship between a respondent and a married couple unless the respondent

told us that there were two distinct ties. (The median size of the networks rises to 15 persons if ties to a married couple are counted as two relationships instead of one.) We assume that such joint ties essentially have the characteristics (gender, etc.) of the primary person in the relationship. This procedure reduces the number of active ties from 429 to 344, with such joint ties comprising 25% of the final sample of ties. Although joint ties do provide two bodies for the price of one relationship, they are not significantly more likely than single ties to have provided social support (Wellman and Wortley 1989a).

Our dependence on respondents' reports about their network members is similar to the many surveys which have asked respondents about their behavior and attitudes. When applied to network relations, this data-gathering approach appears to "represent enduring patterns of interaction more accurately than individual instances of behavior" (Krackhardt 1987, p. 110; see

also Antonucci and Israel 1986; Barrera, et al. 1985; Hammer 1980; Bernard, Killworth and Sailer 1981; Romney and Weller 1984; Milardo 1989). Fortunately, we are interested in such enduring patterns. Moreover, interviewing respondents about their networks is much more economical, convenient and feasible than interviewing a dozen members of each network. Only Shulman (1976) has actually interviewed the network members originally named by respondents, and only Erickson, Radkewycz and Nosanchuk (1988) have studied supportive exchanges among a large (albeit circumscribed) population.

All egocentric network studies provide a kind of cluster sample: information about sets of respondents' relationships. Members of the same network are more likely than a random sample to have similar characteristics (Feld 1982; Marsden 1988). If this leads to appreciable intra-cluster correlation, there is some danger of finding apparent associations between variables where

Thus our interviews provide information about the moderately to very strong ties that supply Canadians with most of their social support and companionship (Erickson, Radkewycz and Nosanchuk 1988). It excludes information about less active ties that have been supportive in the past or might be supportive in the future. It ignores the many weaker ties that are important for obtaining information and integrating social systems (Granovetter 1973; Pescosolido and Georgianna 1989).

The intimate ties of these respondents differ somewhat from weaker, but still significant, relationships. Intimates are usually friends and immediate kin (parents, adult children, and siblings) whom the respondents meet voluntarily and in several contexts. The somewhat weaker significant ties are often neighbors, coworkers and extended kin who are in less-voluntary and more specialized contact. However, they are still much stronger ties than most of the 1,500 or so persons whom these respondents may know (Wellman 1990).

Friends and Relatives

none truly exist. However, Sudman (1976) suggests that this problem is unlikely to occur in cases such as ours where the variables involved are not directly related to the cluster's purpose.

Most networks contain a mixture of friends and relatives. Nearly half of the active ties are with kinfolk, principally with *immediate kin* -- parents, adult children and siblings (Table 1). Immediate kin tend to have close, intimate relations. By contrast, those few *extended kin* who are active network members tend to have weaker, non-intimate relations. Similarly, *friends* tend to be intimate while active *neighbors* and *organizational ties* (including *co-workers* seen socially outside of work) tend to have non-intimate relations.

> Table 1 about here <

Access to Network Members

These networks are by no means the local residential groups traditionally celebrated by community studies (Wellman 1988a; Wellman and Leighton 1979). Only a small proportion of network members are in walking distance of the respondents' homes or jobs (Table 2). Most active network members live more than 9 miles from the respondents. Only 22% live within 1 mile. Moreover, 32% live more than 30 miles away, so that a long drive or a long-distance call is necessary to keep in touch.¹⁰

¹⁰To be sure, these data exaggerate the distances that co-workers must travel to interact -- most meet only at work and nearby after-work hangouts. Hence the *CWD* column in Table 2 treats coworkers as "living" in the same building.

> Table 2 about here <

There are no truly local communities in which most network members live within walking distance of each other. Even the four networks heavily laden with neighbors and near-by kin have a median residential distance of two miles so that most network members are beyond (normal North American) walking distance.

Network members live at a variety of distances from the respondents. This spatial diversity may help explain why networks tend to interact as dyads, couples or small groups rather than as wholes. It is difficult to get many network members together at the same time. Indeed, many barely know -- or even know of -- each other. The major exception is family gatherings which are usually arranged by a mother or sister actively involved in integrating kinfolk (see also Caplow 1982; Lüschen 1972; Rosenthal 1985). There is no widespread Toronto tradition of network members casually or routinely meeting in pubs or other public spaces (Wellman 1992).

East Yorkers are involved in *private home societies* rather than *street corner societies* (Whyte 1943). They interact privately rather than in groups (Wellman 1992). The private nature of many interactions is also reflected by the low density of most networks. Only one-third of the members of the median network have direct ties with each other, although all are indirectly linked through the respondent. Eighty-eight percent of network members meet inside each other's homes -- by far, the most prevalent meeting place (except among

co-workers and other organizationally-focused ties). Telephones provide the second most widely used context for network interaction: 85% of all network members talk on the telephone. By contrast, only a minority of network members interact on street corners, organizational venues, or centers of informal activity such as pubs or hockey arenas. For example, a maintenance man we interviewed rarely goes out socially with his close friends:

We usually have an evening where they will come out here or we will go in there. As far as going to someplace like the O'Keefe Centre or that, I think that's the first time we have gone out as a foursome for dinner and a show. [Leonard Dobson, 38, married]

Home get-togethers has been aided by the metropolitan-wide, flat-rate, telephone calling area; low-cost, direct long-distance dialling throughout Canada and the United States; excellent public transportation; a good road network; and the proximity of Canada's principal international airport. Respondents use face-to-face encounters somewhat more frequently than telephone contact. They are in touch with the median network member about once every two weeks (Table 3). The median respondent is in touch with three active ties in an average day -- including one or two intimates.

> Table 3 about here <

Intimates keep in touch by telephone somewhat more frequently than significant, but non-intimate, network members -- a median of nearly once per week. Intimates use telephone contact as much as face-to-face contact. Nevertheless, frequency of contact varies enormously for both intimates and

significants: from thrice-daily visits with invalid mothers, socially and spatially close neighbors, and workmates to less-than-yearly contact with friends who have moved overseas, extended kin who have moved to Florida, and brothers left behind by intercontinental immigrants.

STUDYING TELEPHONE CONTACT

There are two principal variables at the relationship level of analysis, with three corresponding variables at the network compositional level of analysis.

Frequency of Telephone Contact ("Frequency")

We asked the respondents how frequently they talked with each network member by telephone (and face-to-face). We turned these into *days per year* measures. However, the distributions of both frequency of contact measures are skewed. Many network members talk between daily and weekly -- by telephone or face-to-face -- while the number of infrequent contacts straggles down to once-per-year or less. To normalize these distributions, we logged them (to the base 10).

This log transformation also makes theoretical sense. If the variable was unlogged, then a difference in contact between 1 and 11 days per year would count the same statistically as a difference between 101 and 111 days per year. Yet the former difference is an appreciable distinction between yearly and monthly contact, while the latter difference still amounts to twice-weekly contact. Logging does the proper theoretical thing, by making smaller

differences count for more. Added proof is in the correlations and regressions: they are higher for logged variables.

Proportional Use of Telephone Mode for the Relationship ("Proportion")

Relationships which have frequent telephone contact may also have frequent face-to-face contact. To see which relationships and networks especially rely on telephone contact, we developed a proportional measure. This takes the (unlogged) frequency of telephone contact as the numerator. Its denominator is the sum of the frequency of telephone, face-to-face and (the much rarer) written and CB radio contact.

Average Frequency of Telephone Contact with a Network Member ("Network Frequency")

This measure indicates the amount of contact (per year) each respondent has with the average member. It is calculated by taking the mean of the (logged) days per year of the network members.

Proportional Use of Telephone Mode for the Network ("Network Proportion")

To what extent are network relations overall dependent on the telephone? Analogous to the proportional telephone mode measure for

relationships, this measure divides the overall frequency of telephone contact with network members by the sum for each network of all modes of contact.¹¹

Calling Areas

We categorized all ties into one of three calling areas:

Local: The respondent and network member both live in the same local calling area, so that each telephone call between them is free. (N = 212 relationships).

¹¹The denominator includes the sum of the frequencies of contact by letter, card and CB radio, as well as face-to-face and telephone. We caution that all of these measures are derived from respondent recollections. Bernard, Killworth and Sailer's (1981) study of electronic mail suggests that respondents may not get their contact estimates right. Yet, except for engineering purposes, an accurate measure is less important than a consistency of recall (many > few), and internal evidence from the interviews suggests that our respondents know well with whom they have important contacts and how often. Studies in which respondents recall their use of alcohol encounter similar situations but also find the data valid. See also Hammer's comments (1980).

North America: The network member lives elsewhere in North America, so that a call can be made at relatively low-cost, within comparable time-periods, and easily dialled. (N = 110 relationships.)

Europe: The network member lives in Europe, so that a call is expensive, involves coordinating different times of days, and may involve complex ways of making connections. (N = 22 relationships).

In addition to analyzing the entire sample, we perform separate analyses for local and North American relationships to see if ease of calling affects the impact of the telephone on network relations. (Analyses of the small European sample were unreliable and are not reported separately.)

THE PERVASIVENESS OF THE TELEPHONE

Respondent Characteristics

All types of respondents use the telephone to an equal (and heavy) extent. We found no difference between types of respondents in either their frequency of telephone contact with network members or their proportional use of the telephone as a means of communication with network members. There are no differences according to age, gender, employment status (doing paid

work outside of the home or only doing domestic house work), occupational status¹², or marital status.

To be sure, none of our respondents are shut-ins or frail. All have telephones in their homes and access to automobiles. Yet our findings -- despite the small sample size -- suggest that the extent to which people use telephones is relatively constant for broad sections of the North American population. However, as we shall see, there are important differences in who people call.

Social Support

We asked the respondents about 18 types of *social support* that they might get from network members. Subsequent factor analysis showed that these 18 types grouped into 6 dimensions of support: *Emotional Aid*, *Small Services*, *Large Services*, *Financial Aid*, *Companionship*, and *Job/Housing Information* (Wellman and Wortley 1989b).

Network members specialize in the kinds of help they reportedly give to the respondents. Most provide between one and three dimensions of support (out of a maximum of six). Support is more likely to come from intimates than from significant, but non-intimate, active ties (Table 4). However, parents and adult children exchange much support -- although little companionship -- even

¹²We used the Blishen scale (Blishen and McRoberts 1976), a Canadian equivalent to the American Duncan (1961) scale for ranking job status.

when they are not intimate. Intimate friends and siblings provide the bulk of companionship and a good deal of other kinds of support. Physically-accessible network members -- neighbors and others seen frequently -- provide most small services. Women specialize in providing emotional aid -- to men (especially immediate kin) as well as to women friends and relatives (Wellman and Wortley 1989a, 1990; Wellman 1990, 1992; Wellman and Wellman 1992).

> Table 4 about here <

The data show that all dimensions of support are provided through the medium of the telephone as well as through face-to-face contact. The frequency of telephone contact (although not the proportion of all contact that is by telephone) is positively correlated with several dimensions of support. Network members who frequently talk on the telephone tend to provide more: Small Services ($r = .11$), Large Services ($r = .11$), Emotional Support ($r = .13$), and Companionship ($r = .16$). Yet most of these significant -- albeit modest -- relationships disappear in multiple regressions when we simultaneously control for the effects on support of other relational characteristics, notably the strength of the relationship, frequency of contact, residential distance, and the role type (sibling, friend, etc.).¹³ An exception to this is the relationship between phone

¹³These findings are not congruent with the first East York study which found a significant association between the frequency of telephone contact and the provision of support. We believe that

use and major emotional support (Table 5).¹⁴ When respondents need emotional support during a major crisis or long-lasting problem, they are especially likely to receive it over the phone from network members. Both the frequency of phone use, and the proportion of times that the phone is used as the mode of communication between network members is higher with those network members who provide high levels of emotional support. Moreover, this happens both when the network members live in the local (metropolitan) calling area or further away in North America.

several differences in the study account for this discrepancy (Wellman 1979). First, the first study looked only at strong, intimate ties. Second, the first study asked only two crude, global questions about the general readiness of network members to provide support where the second study inquired in more detail about many specific kinds of support. Third, the inclusion of more variables in the second study's regression model -- such as voluntarism and multiplexity -- may control for some of the relationship between frequent telephone contact and support.

¹⁴This variable is one of three items which comprise the support dimension of emotional aid noted above.

>Table 5 about here<

Frequent telephone contact is less a cause of social support and more of a facilitating backcloth for supportive ties. Those ties which tend to be supportive -- strong,¹⁵ immediate kin, in frequent contact -- tend to have more frequent telephone contact. Hence, when these network variables are entered into the regression model with the social support variables, the latter appear to have no effect on telephone use. The statistics are misleading, though, because such network members use the telephone extensively to *arrange* and *convey* social support.

Services, Large and Small: Telephone calls rarely deliver services themselves -- except for information. But they are used frequently to convey information and make necessary arrangements for help to be provided. Indeed, the telephone is most often used to make routine arrangements for small services. It has largely replaced face-to-face contact when the purpose of the contact is to convey a small amount of specific information. As Wendy Sherwin

¹⁵ Strong ties, as defined in our study, have at least two of the following characteristics: intimacy, voluntariness, and interaction in multiple contexts. These three variables are highly correlated and predict well to many types of social support (Wellman and Wortley 1990).

says of her intimate, near-by friend (and fellow carpooler), "It got to the point you have to phone each other every morning to find out who's driving."

Network members also use the telephone to request help with problems that are out of the ordinary.

Aunt Beatrice knew we were moving. She phoned, and we said we needed help. She came over and stayed the day. [Maureen O'Sullivan].

She [a friend] wanted some information that could help her lawyer with her separation and would I be home tonight. I said no I have to teach but I'd call her when I got home. [Diane Cressey, separated homemaker, 34]

An ambiguous aspect of telephonic requests for help is that they are easier to turn down than face-to-face requests. The telephone provides a more narrow band of communication than does face-to-face contact (with its accompanying body language, voice tone, etc.), and it is usually easier to terminate telephone calls than visits. This easier deniability may even at times be a comfort to the person requesting help. Some respondents report that they avoid burdening network members. They fear that because some ties may not be willing or able to provide certain kinds of support, persistent requests for help would permanently damage the relationship. It is easier to be tentative about such matters on the telephone.

Yet in many relationships, the telephone serves as a quick and relatively secure link to request help in emergencies. Jane Hazlett [married homemaker, 59] feels comforted by its presence: "I'd only have to pick up the

telephone and she [her best friend] would be there for me. I know she feels the same way."

Another respondent, Grace Creston [widowed purchasing clerk, 61] has relied heavily on a neighboring couple for large and small services since she suffered a chronic hip injury:

She does my heavy shopping for me every week, and he changes light bulbs and things like that. I remember once I was in terrible pain. I just phoned and asked Pat if she would take me to the doctor. I couldn't get there myself, I was in too much pain. But I knew I could count on her.

Often, people initiate calls to see if their services are needed at a given moment -- when they know the network member is in continuing difficulty. For example, Patricia Fairgray's brother-in-law routinely helps her, although he lives in another part of Toronto. His help combines face-to-face and telephone contact:

There is hardly a week that goes by that he doesn't pop in here at some time, and he phones three or four times a week to see if everything is okay. If there is something wrong with the tap or the washing machine or anything, he will always come over and do his best.

Emotional Aid: Respondents frequently and easily use the telephone to give (and receive) emotional aid. Because the telephone is easily accessible, comfortably used, and requires minimal time to make contact, its use has developed as a routine way of providing emotional support to the majority of network members who do not live or work near-by. Its convenience and informality even make it a preferred alternative for handling some cases of

minor or chronic distress. For example, Maureen O'Sullivan talks to her elderly aunt

quite a bit because she gets depressed. She's blind and she gets frustrated. So I call her and try to cheer her up a bit. She phones me every day if I don't phone her.

When no one else is in earshot, telephone talk can be compelling and private. Yet the situation changes when others are at home. Patricia Fairgray often gives emotional support to her chronically depressed friend and neighbor, but

we never talk personally on the phone. There is nobody here and I can say what I like, but she has a son and daughter there. If she wanted to say anything about life, she wouldn't say it on the telephone because the relationships are there.

Companionship: Like Emotional Aid, companionship itself can be delivered over the telephone. It helps strengthen relationships by keeping network members aware of each other and by reducing loneliness. When Wendy Sherwin first moved to the suburbs, she was too busy taking care of her son to make local friends. "I wasn't desperately in need of meeting friends at that point because I had telephone contact at least with the people I had known previously."

Indeed, respondents often use the telephone deliberately as a means to keep in touch because it is easier to limit the extent and the intensity of the contact. As Wendy Sherwin relates: "I just ask Jessie [her sister-in-law] how she is doing, and she tells me if anything interesting has happened in her young life: what's happening at work and such."

In addition to being a direct conveyor of companionship, the telephone is used at least as often to arrange get-togethers -- between individuals, couples and groups. Patricia Fairgray supplied one (of many) examples:

Margaret [her sister-in-law] phoned Monday. She said, "If you're not doing anything Wednesday, come on down." So it ended up that Margaret, [Margaret's friend] and I were all down there. We just had a chit-chat and a cup of tea.

TELEPHONE CONNECTIONS

Contact and Distance

Although most people call and most kinds of things are either done or arranged on the telephone, there are important differences in which kinds of relationships use the telephone extensively.

Contact Breeds Contact: Since telephone contact is more of a complement to face-to-face contact than a substitute for it, a relationship's (logged) frequency of face-to-face contact is the strongest correlate of its (logged) frequency of telephone contact (Table 6). The significance of this association is true for network members living in the local calling area (which may be up to 30 miles away), elsewhere in North America, or in Europe. When we hold constant the strength of the tie, the residential distance, and the role type, we find that people often see those they call often but rarely call those they rarely see. Thus 23% of the network members talk both by telephone and face-to-face at least once every two weeks, while 22% talk with each other less than once per month (Table 7).

> Tables 6 and 7 about here <

Distance Complexly Affects Contact: Frequent contact interacts complexly with the residential distance that separates the network members from the respondents (see also Cox 1969). For the sample as a whole, there is no relationship between (logged) residential distance and telephone contact when other variables are statistically controlled in multiple regressions (Table 6). However, the frequency of face-to-face contact does decrease with increasing distance, just as it does in scientific communities (Kraut, Egido and Gelegher 1990).

Yet within local calling areas, the greater the distance separating the two parties, the higher their proportional reliance on the telephone for contact. They are more apt to drop in on those living near-by but are more likely to call those living at the other side of the metropolitan area. For instance, Chris Armstrong [31, married firefighter] drops in on near-by friends without preliminary arrangements, "We'll go out for a walk or something and just go knock on their door. That's typical." Conversely, Tom Robinson's [30, married, printer] friend finds it necessary to "phone just to make sure" he's in before making any visits.

The situation is reversed for long-distance calls. The significant negative signs for the regression coefficients show that the respondents are more likely to make long distance calls to those living relatively near-by than to those living far away. To be sure, calls over longer distances cost more money, although they only consume a small fraction of a household's income. However,

the interviews suggest that long distance calls are made more frequently to network members living closer to the respondents, because it is easier and cheaper to get together with such network members. Often, as is the case for Tom Robinson and his friend in cottage country, it is a question of an automobile drive rather than an airplane trip:

If I want to talk to him now I'll just phone him. I don't care if it's long-distance. I'll just pick up the phone and call him just to say how are ya?, we'll be up Friday or Thursday night.

Because the respondents can -- and do -- see such people often, their telephone contact serves as a complement to their face-to-face contact. They use the phone frequently to make arrangements for visits and the delivery of supportive resources.¹⁶

By contrast, some infrequent calls to distant relations are substitutes for face-to-face contact. Helen Troy [53, single, bank clerk], the last living connection to her relatives in Scotland, may rarely visit her kin, yet she keeps in touch as often as she can: "[I call] probably once a year. I do it from the office.

¹⁶Studies of the use of electronic mail systems whose costs do not vary by distance may resolve the question of whether it is the cost of the communication or the difficulty of complementary face-to-face contact over long distances that retards electronic communication (see Mantei, et al. 1991).

We're really not supposed to make the call, but I don't abuse the privilege. I just make this one."

Other calls are to arrange major trips in which there is a good deal of concentrated face-to-face contact. For example, a mother might visit her adult son for two weeks every year. Hence, face-to-face contact predominates on a days per year basis, although telephone contact maintains the relationship between visits. Despite direct dialling, long distance remains a barrier to frequent telephone contact. The attitude that may predominate is reflected in one electronic technician's comment, "We got on long distance once in a while, but not too often. It's too expensive." [Doug Freedman, 47, married]

Isaac Asimov once wrote a science-fiction novel (1957) in which an entire planet never interacted face-to-face. All contact was by holographic telephone. Our data suggest that this situation goes against the human condition. Only when it is easy for people to get together often, do they speak often by telephone. To be sure, the telephone has helped transcend the constraints of spatial separation but only in conjunction with the automobile. It has enabled the dimensions of community to expand from the neighborhood to the metropolitan area and outlying areas reachable by car trips. Indeed, our research (Wellman and Wortley 1990) suggests that this is true for the delivery of support as well as it is for the frequency of telephone (and face-to-face) contact.

The Strength of Relationships

Rumor has it that telephone companies have invested vast resources to make the ring of telephones irritating and compelling. Except for those disciplined and anti-social enough to remain hidden behind their home answering machines, *answering* a telephone call is still largely an involuntary act.

By contrast, *making* telephone calls to network members is often a more voluntary act than initiating face-to-face contacts. Face-to-face meetings often take place under institutional auspices (e.g., at work or parents' night at school), unplanned encounters (e.g., in front yards with neighbors or while out shopping), or at get-togethers arranged by friends or relatives. Hence, whatever the unwantedness of the calls we receive (from telemarketers and disliked network members), it is more likely that we make calls to people we want to contact more often than we encounter people we want to meet. We call the people we want to talk with.

Such reasoning is in accord with our finding that strong ties have much more telephone contact than weaker, significant (albeit still active) ties. The strength of a relationship is positively associated with both the frequency and the proportional use of telephone contact (Table 6 above). Strong ties talk on the telephone 64 times per year as compared with 28 times per year for those network members who have significant, but weaker, ties (Table 8). Forty-two

percent of their contacts are by telephone as compared to 30% of the contacts for the weaker ties (Table 8).¹⁷

¹⁷ Our strength variable is a linear combination of the extent to which respondents perceive network members as socially-close *intimates*, persons with whom they interact *voluntarily* (rather than because they are jointly embedded in the same institution or network), and with whom they interact in *more than two contexts*. In Table 6, a *strong* tie is one with a score of 2 or 3 on the strength variable (i.e., having at least two of the characteristics of intimacy, voluntariness and multiplexity). A *significant* tie is one with a score of 0 or 1 on the strength variable.

Previous research has shown that the three constituents of the strength are highly correlated and load highly (and almost equally) on a single factor of relational characteristics (Wellman and Wortley 1989b). However, as a check to see if our construction of a single strength measure unwarrantedly

> Table 8 about here <

Role Type

misrepresented the association of intimacy, voluntariness and multiplexity with telephone use, we ran additional analyses including all three separately. All are positively associated with telephone use. The findings using these separate variables were consistent with those using the combined *strength* variable.

Kinship: If telephone contact were entirely a voluntary relationship, then we would expect friends to talk on the telephone more than kinfolk. One (largely) chooses friends, but one (largely) is born into or marries into kinfolk. (Unlike pre-Industrial societies, few North Americans marry to acquire a specific set of kin.) Indeed, our respondents maintain active network ties with almost all of their immediate kin and many of their extended kin through first cousins (Wellman and Wortley 1989a; Wellman 1990). Yet Tables 6 and 8 show that kin use the telephone more than friends to keep in contact. (Friendship is the dummy criterion variable for the regressions in Table 6.) For the entire sample of network members, this is true both for immediate kin -- parents, adult children and siblings -- and for extended kin. Thus immediate kin tend to speak on the telephone a little more than once per week (an average of 60 times per year) while friends tend to speak about every other week (an average of 27 times per year). Such comparisons hold up when we analyze only strong -- or significant -- relationships.

The substantial differences between immediate kin and extended kin in their use of the telephone use are consistent with the greater social support that immediate kin provide (Wellman and Wortley 1989a). Immediate kin have much more contact than extended kin -- by telephone as well as face-to-face (Table 8). While Betty Lancaster [a 35 year old housewife] may trivialize her weekly telephone contact with her mother as "just very short and sweet", the fact remains that they also see one another at least three times in that same week.

The nature of less frequent contact with extended kin is illustrated by Diane Cressey's confession, "I would *make an effort* to call her [her sister-in-law] once every other month." The contrast is even greater for face-to-face contact than it is for telephone contact.¹⁸

A more complex picture arises when we compare local (metropolitan Toronto) relationships with relationships to immediate and extended kin living elsewhere in North America (Table 8). When kin live within the metropolitan Toronto calling area, immediate kin are most often seen face-to-face with the telephone serving as a secondary, but important, adjunct. For example, Lisa Foster [a 38 year old married waitress] whose sister lives right next door recalls:

She would call me more or less to see what I was doing: if I were going shopping, or something like that, I would call and say, "Are you ready? I'll meet you outside".

By contrast, extended kin who live locally are telephoned more than they are seen. Although the telephone is the major means of communication between such extended kin, nevertheless, they are telephoned less frequently than local immediate kin and they are seen much less frequently. As we only

¹⁸The very high frequency of telephone contact for strongly-tied extended kin is an anomalous effect of a small set of elderly network members (N=9) who have come to function as treasured immediate kin.

have information about the small proportion of respondents' ties with extended kin that are *active*, it is probable that the many less-active ties are contacted even less frequently.

Contact patterns are different when kinfolk do not live in the metropolitan Toronto local calling area but elsewhere in North America. Immediate kin as well as extended kin are telephoned more frequently than they are seen face-to-face. Especially for immediate kin, telephone communication is more of an independent means of staying in contact than an adjunct to face-to-face meetings. As is the case for local relationships, such immediate kin have more frequent telephone contact than do similarly far-flung extended kin. Indeed, immediate kin speak long-distance more frequently than extended kin make no-cost local telephone calls.

The few active extended kin who live elsewhere in North America are only seen on rare occasions and -- by contrast to immediate kin -- hardly ever called. If such kin are in touch, it is likely to be face-to-face contact by means of infrequent visits or at family get-togethers. For example, Maureen O'Sullivan only calls her cousin "when it's about something specific, say, making arrangements to use his cottage."

Anthropologists note that humans are the only primate species to maintain ties with offspring that disperse (Rodseth, Wrangham, Harrigan and Smuts 1991). The telephone has now become a key means of doing that. There is a hierarchy of kinship contact. Immediate kin are seen frequently if they live

locally; if they live far away, they are called frequently. Extended kin are called less frequently than immediate kin if they live locally and they are seen even less frequently. Extended kin living far away are rarely telephoned and have most contact in gatherings for special occasions.

Neighbors and Organizational Ties: Physical accessibility means that both neighbors and organizational ties (workmates, fellow members of church groups, etc.) deal with each other face-to-face much more than by telephone (Tables 6 and 8). Yet neighbors differ from organizational ties by having a much higher frequency of telephone contact (Table 8).

This occurs because the role of neighbors and organizational ties differ significantly in these networks. The respondents use their personal community networks for social *reproduction* -- keeping their households going -- and not for *production*. They rarely rely on network members for help in earning a living, and they usually limit their social contact with workmates to casual conversation at breaks or right after work. By contrast, neighbors are important suppliers of domestic services. They talk frequently on the telephone to keep in touch and arrange to do things for each other (Wellman 1985; Wellman and Wortley 1989a). Indeed, Betty Lancaster's neighbor is an indispensable source of companionship:

If it's raining, we phone to make sure the other one's home before we run across. But likely, once a day, we'll pick up the phone to see if the other one's there and say, "Have you got time for coffee?"

Network Characteristics

The relationship of *network composition* to telephone use mirrors that found at the relationship level although our small sample size of 29 networks makes the achievement of statistical significance difficult. Indeed, our method of statistical aggregation would make it surprising if the network-level results were markedly different from those found at the relational level. Networks with more face-to-face contact, a higher proportion of strong ties, and a higher percentage of women tend to have more frequent telephone conversations. Networks with a higher percentage of strong ties and a higher percentage of kin tend to have a higher proportion of their contact by telephone (Table 9). However, spatially-dispersed networks do not use the telephone more than more compact ones.

> Table 9 about here <

We analyzed a separate set regressions to see if *network structure* was associated with telephone use. Network analysts have suggested that the telephone facilitates the maintenance of more sparsely-knit, less solidary networks (Webber 1973; Wellman and Leighton 1979). However, we did not find any relationship between network density and the frequency of telephone use (Table 10). To be sure, more sparsely-knit networks may use telephones for a greater proportion of their contact -- the regression coefficient is suggestive but not significant. Finally, despite the ease of maintaining dyadic contact by telephone, networks with high telephone use do not have larger numbers of strong or significant ties.

> Table 10 about here <

HOW TELEPHONE NETWORKS KEEP SOCIAL NETWORKS CONNECTED

1. People talk on the telephone with their network members about as many days per year as they see them face-to-face. Of course, some people are mainly called and some are mainly seen.

2. People with all social characteristics use the telephone about the same amount. We only looked at people who were not shut in, and who had good access to phones and cars.

3. Frequent use of the telephone is correlated with the provision of emotional aid, companionship, and large and small services.

4. However, most of these associations disappear when multiple regressions take into account the strength of a relationship and the frequency of face-to-face contact.

5. Strong ties -- intimate, voluntary, and multiplex -- use the telephone more than weaker ties.

6. The more people see each other face-to-face, the more they talk with each other on the telephone.

7. Kin use the telephone more than non-kin (friends, neighbors, organizational ties). Immediate kin use it more than extended kin.

8. People usually have face-to-face contact with their immediate kin who live in a local calling area, but they usually telephone their extended kin

who live in their local calling area. People usually telephone immediate kin who live at a long distance but have predominantly rare, but face-to-face contact, at special occasions with their active extended kin who live at a long distance.

9. Residential distance is not related to the use of the telephone. The telephone has not totally conquered space. People do tend to call more frequently those who live in a distant part of their metropolitan local calling area. By contrast, they tend to make more long-distance calls to those who live comparatively close to their own metropolitan area. Such calls are lower in cost and in the same time zone.

10. Despite their residential proximity, neighbors use the telephone more than friends or organizational ties. Neighbors telephone principally to arrange get-togethers or exchange services.

11. Networks with high telephone use are not more sparsely-knit than others.

These data show that telephones are not simple means of maintaining dispersed, unbounded communities. They help keep kin connected even more than friends and neighbors. But the personal community networks in which these kin fit are not the traditional densely-knit solidarities of neighbors. The telephone has allowed kin -- and friends -- to be strongly connected even when living apart. It has allowed them to select which kin with whom they will maintain ties -- principally immediate kin. Hence the dispersed, often-dyadic nature of telephone-based relationships has given people maneuvering room to

deal with their relationships -- even when they chose to continue dealing with traditional ties to kin and neighbors.

Telephone Networks and Social Networks in the Global Village

Are contemporary communities the densely-knit, Rousseau-esque social networks of all-embracing ties that traditionally thought of as communities. Or are they the more sparsely-knit, wide-ranging networks of specialized ties of which the *infomatique* generation dreams? Rather than fitting one of these alternative models, most personal community networks fit both. One segment of a network is composed of immediate kin whose relations are densely knit and broadly supportive while other segments contain friends, neighbors, and workmates whose relations are sparsely-knit, companionate, specialized in support, and connected with diverse other social circles. This combination supplies both stable support from ascribed ties with immediate kin and adaptive support from achieved ties with friends, neighbors, workmates, and other organizational relations. It is the quality of the tie that matters the most for supportive community relations. Most relationships are based on the mutual exchange of intangible or mundane resources, and differences in socioeconomic resources do not play a significant part in their supportiveness. The egalitarian nature of these ties -- and the scarcity of patron-client relationships -- reflects the Western world's material affluence and dependence on large institutions for material well-being.

These networks support reproduction, not production. They center primarily on the household, secondarily on the community, and rarely on earning a living. Just as few personal community ties are with co-workers, few co-workers are seen or phone after work. The networks are important to the routine operations of households, crucial to the management of crises, and sometimes instrumental in helping the Torontonians to change their situations. Many provide bandages; routine emotional aid and small services that help the respondents cope with the stresses and strains of their situations. A sizable minority provide safety nets that lessen the effects of acute crises and chronic difficulties. Several provide social capital to change situations (houses, jobs, spouses) or to change the world (local politics, stopping smoking in the workplace).

Although the diverse networks provide diversified support, the networks' segmentation and moderate density hinder the widespread communication of needs and mobilization of activity. Community members do not gather at cafes; they must be contacted individually -- usually by telephone (Wellman 1992). Reflecting modern trends in marketing and community, these Canadians shop for support at specialized interpersonal boutiques rather than at department stores. Not only different relationships, but different types of relationships, provide companionship, emotional aid, services and financial aid.

The congruence of our findings with other North American and Western studies (Wellman 1988a) suggests that our conclusions may apply

beyond Toronto and Canada. However, we believe that supportive relations in comfortable First World milieus differ substantially from those in other circumstances. The low importance of the economic and political aspects of social support among these Canadians distinguishes their networks from those First, Second and Third World social systems that are less economically or politically secure.

Do our findings portray the "global village" forecast by Marshall McLuhan (1965), a Torontonian himself? Do Torontonians -- with their telephone networks, computer networks, TV networks and airplane networks -- truly live in a global village? To the extent to which there is awareness of things happening elsewhere, this is true to some extent although such occurrences are almost always reported as isolated events without any attempt to explain historical or social contexts. To the extent that Torontonians have active ties elsewhere, Toronto's immigrant population and trading enterprises sustain many personal and business ties across the Atlantic, Pacific and Indian oceans. Such relations may well have tightened the global connectivity more than the five-link pathways that Milgram (1967) suggested were sufficient to connect any two persons in the world.

Yet the Toronto findings reported here both affirm and modify the idea. Our respondents certainly maintain ties globally. However, although little of their community ties are in their neighborhoods, most of their ties are in or near metropolitan Toronto. It is at a distance of about 50 kilometers where active

community ties start conveying less social support, and not at 0.5, 5, 500 or 5,000 kilometers. At longer distances, only primordial bonds remain strong: between parent and adult child, between brother and sister. The telephone -- along with the airplane and the automobile -- plays an important role in strongly maintaining these longstanding, densely-knit ties. But the telephone only weakly maintains ties with other, extended kin barely alive; such ties rarely are strong. The one-to-one nature of phone conversations does not maintain many ties with extended kin because their vibrancy depends on kinship groups gathering in-person to generate collective solidarity. Friendships, too, have become isolated relations between individuals or married couples; the Torontonians have difficulty in keeping them going over long distances (Wellman 1992).

"Think globally, act locally," said René Dubos (1990). Our community now sometimes leap across regions and continents. But on a day-to-daily basis, Torontonians mostly act metropolitanly.

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