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The flow of crisis information
as a probe
of work relations*

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Abstract. Data on the diffusion of information following a disaster were used to examine the structure of urban interpersonal relations. The disaster, the explosion of a downtown office building, occurred during a workday. The news spread rapidly, largely through communication between people who normally interacted on workdays; thus, tracing these communications provides a useful probe into work-related interaction patterns. It was found that occupational status was the best predictor of how, when, and where the news was heard. People in the formal work world tended to communicate with other workers, especially those of similar status. Moreover, as workers' status increased, so too did the number and "quality" of contacts, while reliance on the media declined. Housewives were the group most reliant on the media and family contacts. Students were found to interact primarily with peers and family members and appeared to be more similar to workers than housewives in terms of their linkage structures.

Résumé. On s'est servi de données établies à partir d'une information diffusée à la suite d'un désastre pour examiner la structure des rapports entre individus vivant en milieu urbain.

Le désastre en question, à savoir l'explosion d'un édifice à bureaux situé au centre-ville, s'est déroulé pendant un jour ouvrable.

Les nouvelles à ce sujet se sont répandues rapidement, principalement par le biais des communications qui existent normalement entre des gens qui se côtoient au travail; ainsi en retraçant le fil de ces communications, il est possible de reconstituer des modèles utiles de réciprocité sur les lieux de travail.

On a pu établir que le statut relié à une profession donnée était le meilleur prophète pour savoir comment, où et quand les nouvelles seraient entendues. Les gens qui se trouvent dans le monde ordinaire du travail ont tendance à communiquer avec d'autres travailleurs, spécialement avec ceux qui jouissent d'un rang semblable. En outre, plus le statut d'un employé augmente, plus le nombre et la qualité des contacts augmentent aussi, tandis que la confiance dans la presse (écrite et parlée) diminue.

Les maîtresses de maison appartiennent au groupe qui se fie le plus à cette presse et aux contacts familiaux. Les étudiants ont tendance à communiquer en premier avec leurs semblables et avec les membres de leur famille; ainsi ils se rapprochent bien plus des travailleurs que des maîtresses de maison dans leur comportement, jugé en fonction de la structure de leurs rapports personnels.

Introduction

This paper will report an exploration of work-based relationships that has been derived from data tracing the flow of information about a disaster. The disaster was an explosion that occurred at about 3:30 p.m. on a working day in the centre of North Bay, Ontario. Such events can be studied usefully in their own right, and indeed, the data used here were collected as part of a policy-oriented series of studies of disasters and effectiveness of responses to them (see Scanlon and Taylor, 1975). However, the present secondary analysis takes advantage of the fact that the nature and timing of this particular disaster makes it possible to use the flow of disaster information through the community as a tracer of the community's work-day structure.

Work relationships and the flow of communication through them have long been recognized as central topics in the sociology of organizations (Guetzkow, 1965; Rogers and Agarwala-Rogers, 1976). Relational and communication patterns have important effects on organizational functioning (Guetzkow, 1965) and on the behaviour of individuals in organizations (Rice and Mitchell, 1973) and even on individual job mobility (Granovetter, 1974). More broadly, Stinchcombe (1965) has argued that the overall organizational structure of a modern community is critical for its social integration. The organizational literature provides several important hypotheses about the structure of work ties and information flow, though few of these hypotheses have been tested extensively. For our purposes, the most important hypotheses link work networks to work status. In general it is expected that people at work interact most frequently with others of similar status; that those of higher status have a greater number of relationships more strategically located for access to information, that most people prefer to direct information upward if they can; and, as an overall result, that lower-status people are much less well informed by word-of-mouth communication than higher-status people.

A recent sociometric study of a school of nursing (Rice and Mitchell, 1973) serves as an illustration of the strengths and weaknesses of the research tradition relevant to these hypotheses. The eighty-eight people studied were asked with whom they most frequently consulted. Then, several measures of structural position were examined. For example, it was found that respondents of higher status could reach more fellow workers through a single intermediary (they had more consultants' consultants) and they could also be reached by more people via one intermediary, suggesting a wider potential range of communication channels. A person's status was strongly related to that of people he consulted, but only weakly to that of his consultants' consultants. Thus high-status people would not be limited to information from others of high status. These are useful and plausible results. But, like most studies of relationships or communications at work, there are some weaknesses. For example, the results are based on a small number of respondents from one part of one organization, with the data obtained in an obtrusive, potentially reactive manner. Moreover, like virtually all sociometric studies on the topic, results were obtained only for strong ties (the five or so *most frequent* consultants) while various researchers have shown that weak ties are generally the critical ones for widespread flow of information (Granovetter, 1973). Respondents were asked only about communication explicitly tied to work, a restriction that is frequently found (Rogers and Agarwala-Rogers, 1976:138). Finally, no

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behavioral data were obtained; in particular, no actual flows of communication were traced.

Other studies cope with these problems at the cost of creating other weaknesses. For example, Zajonc and Wolfe (1963) examine the relationship of weak ties to status, but their study is based on a very small sample (N = 42) in just a single organization and once again the study makes no use of behavioural measures. Lundberg (1975) used communication chains generated by a "small world" approach in two organizations to study the effects of status, bureaucratization, and staff-line differences on communication; but, the "small world" method is clearly obtrusive and generates potential communication channels whose relationship to actual channels is unknown. Finally, Davis (1953a, 1953b) used several genuine pieces of news to trace directly the "grapevine" for sixty-seven management personnel in a manufacturing organization. Davis used "natural" events like someone resigning or having a child to permit the construction of complete diffusion chains, finding that most of the communication took place at work, and that status was positively related to frequency of communication as well as knowledge of the relevant events of the company. Sadly, while this study has been frequently praised and cited, there have been few follow-ups.

All these studies suggest the importance of status for communication networks in organizations, although the details of effects of status vary from study to study. Some variance is not surprising in light of Tichy's hypotheses (1973) specifying different relationships between formal and informal structure for different kinds of organization. However, varying results could stem from varying methods as easily as from varying organizational characteristics, since it is rare for the same procedures to be applied to more than one organization. This study offers data from a cross-section of an entire community, helping us to see how general the effects of status may be. The study also uses behavioural data, based on the tracing of actual communication chains; and the tracing was relatively nonreactive. Thus, this study of disaster in North Bay, Ontario permits us to examine the extent to which the prior results generalize beyond studies of selected organizations with a limited array of techniques. The North Bay data do not permit detailed analysis of particular organizations or organizational types. Rather, the focus here is work status and its general effects on relationships and communication patterns. Our data also go beyond the conventional organizational literature in the sense that all North Bay residents, including people not formally employed, were sampled. Thus, it is possible to sketch some contrasts between work ties for those with formal jobs and analogous ties for housewives and students, as well as to examine the patterns of communication between all these categories.

The study also provides a small addition to the limited research literature on the housewife, probably desirable given the vigorous calls for research on this topic recently (cf. Eichler, 1975). Limited prior research suggests that a housewife's work tends to isolate her, as much of her typical working day is spent alone or with small children (e.g., Deckard, 1975:56-57). This isolation makes the housewife more dependent on the mass media for news during working hours, and more dependent on family members otherwise. For example, in one of the classic diffusion studies, women often learned of a leaflet drop when small children gave them leaflets; women were much less likely than men to be told the news by an adult (De Fleur and Larsen, 1958:171-173). We

will not draw on the extensive literature concerning high school students, since student behaviour in this study is a little unusual given that the disaster happened while students were on their way home rather than while they were at school.

Finally, this study could be seen as contributing to the literature on mass communication. In a major recent review article, Rogers argues that most researchers agree communication often starts from other than media sources and flows along chains which may have many links (Rogers, 1973:296); yet, very little research directly examines a general multi-step flow of communication (Rogers, 1973:305-306). Rogers calls for far more relational analysis, especially on the both important and disputed role of homophily or communication between similar people (Rogers, 1973:307). This study has direct relevance to these suggestions, as can be seen from the description of the research procedure.

Research procedure

A cross-section of work relationships was probed by tracing the flow of information regarding a disastrous explosion which happened in downtown North Bay during a weekday. The day after the explosion, a team of interviewers arrived in North Bay armed with an interview schedule constructed in advance to be applicable to a variety of disasters, with the interviewing being completed a few days later. A sample of 168 households was randomly selected from the city directory with one member of each household being selected, again randomly.[1] Data gathered include routine "facesheet" information, as well as where, when, and how the news was heard. If the respondent reported hearing the news from another person, that person was interviewed; if he, in turn, heard from another person, that person was interviewed as well, and so on back to the chain source or stratum; someone who had either first heard from the mass media or had been an eye-witness. Nearly all chains were traced back to source in this way. The tracing added another 157 communicators to the 168 people forming the basis for most of the tables given here. Chains might also have been traced in the other direction, from the initially sampled respondent to people he told and so on, but for various pragmatic reasons this was not done, although respondents were asked how many other people they were first to inform. Cooperation was excellent; for example, 160 of the 168 chains sampled were fully traced to source. Even where informants were strangers, they were ultimately tracked down and interviewed. (See Scanlon and Taylor, 1975, for an interesting description of the detective work used.) Since the survey was fielded very quickly, with all interviewing completed just days after the explosion, and since the event was vivid and memorable, there was good recall on the important questions about hearing the news.

The sampling procedure might have raised a special problem of representativeness, but it turned out not to arise. The potential problem was that sampling *individuals* (a pragmatic necessity) may not yield a representative

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1. This sampling procedure does not necessarily yield an unbiased sample of individuals, and a set of correction weights was developed. However, the presence or absence of weights makes little or no difference to the tables.

Table 1. Observed and estimated chain distributions by length (chains traced to source only)

Chain length	Observed proportion	Estimated population proportion
1	.463	.431
2	.300	.314
3	.138	.148
4	.056	.060
5	.025	.026
6	.013	.013
7	.006	.008

If F_k = the observed proportion of chains of length K and b is the mean number informed by those who informed anyone, then the estimated population proportions are:

$$\frac{\frac{F_k - F_{k+1}}{b}}{F_1 + (F_2 + \ldots + F_j)(1 - \frac{1}{b})}$$

j = length of longest chain(s).

b = 2.2

sample of information *chains*, and it is the chains that are most useful as a probe of networks of relationships. Especially important for later analyses is the distribution of chains by length. The length of the traced segments of chains could be misleadingly short since they were traced only back to source and not onward through the people told by the respondent; or alternatively, long chains might have been overrepresented since longer chains include more people and are thus more likely to be picked up through a sample of individuals; or, we may be lucky and find that the conflicting biases cancel out. This problem was pursued further in Erickson (1979) and estimates of the true distribution of chain lengths were obtained. Table 1 reports the estimated as well as the observed distributions; conveniently, these are very similar: the differences rarely exceeded 7 percent. We have avoided the use of significance-tests in this paper, because it is often unclear how the network data relate to the population, or indeed, which population, consequently such tests would be of doubtful applicability. This issue is discussed further in Erickson (1979). However, for those who are prepared to assume the appropriateness of such tests (mainly Chi²), the tables reported in the text are generally significant at beyond $\alpha = .05$.

The diffusion of disaster information will serve as our probe of work relationships, which we expect to be affected by work status. All respondents were asked to describe their occupations. For those with formally defined occupations (those other than housewives or students) the occupations were classified as high, medium, or low in status: levels 6 and above, level 5, and levels 4 and below, respectively, on the Blishen (1958) scale. Occupational data were not collected in sufficient detail to permit any finer breakdown than this. Low levels of occupational specification seem not to be atypical of the research on organizations (see for example, Lundberg, 1975, and Rice and Mitchell, 1973).

The more serious problems with the quality of this data set typically had to do with missing data. For example, for approximately 10 percent of the network sample, status could not be coded from the job description, but an examination of this subset of the data suggests that the uncodables are not too

dissimilar from the remainder of the sample. Missing or uncodable data are not restricted to the status variable, though the problem was most marked for this variable. On the other hand, the questions relevant to disaster information were collected with great completeness. Overall, this is probably as good a set of data as one might expect given that it was collected with an all-purpose schedule, utilizing interviewers who were in the field before they could be adequately briefed, and given that the data were collected originally for purposes other than ours.

The rare and the routine:
Did disaster communication flow through regular workday networks?
We have asserted that the flow of information about the explosion serves as a tracer of work relationships, an assertion which may not at first seem very reasonable. After all, disasters are rare events which would be expected to evoke unusual behaviour. People may converge at the disaster scene, or form temporary working groups to help out, or discuss the event with strangers. Thus, abnormal patterns of relationships and communications seem probable. However, the extent of their occurrence depends on how important the disaster is, how directly it affects people in general. In the North Bay explosion, relatively few people were affected personally, though all were interested in the event, and normal channels of communication appeared to have been used far more than unusual ones.

The indirect evidence for this view is fairly compelling. For example, almost 80 percent of all respondents who reported passing the news on told someone with whom it was usual for them to interact at that time of day, with 93 percent telling a person they regularly spoke to at least once a week, and only 1 percent telling strangers. Respondents were also asked if they had overheard the news; only 3.7 percent had done so. Thus, it seems that news of the disaster was important enough to pass on in routine social encounters, without being sufficiently compelling for most of the residents to interrupt routine behaviour and move into emergent modes and patterns. If our view is correct, this could be due to a low level of direct personal involvement. When asked how they felt on hearing the news, only 10 percent of the respondents reported extreme emotions like panic or fear. Similarly, about 20 percent had a personal reason for direct concern because they knew one of the victims or were afraid for relatives or friends who worked near the explosion site.

Moreover, the time and location of the explosion had the result that the routine channels of communication available for use were mostly relationships at work. The explosion occurred in the North Bay business district during a working day, and information about it was passed so rapidly that more than three-fourths of the sample were informed before the working day was over. Table 2 reports the proportion of the initial sample that had heard of the disaster by various times.

Indeed, the news transmission was so rapid that by the time of earliest media coverage, a radio "flash" at 3:49 p.m. (Scanlon and Taylor, 1975), nearly half of the initial sample had already heard. It is no wonder, then, that about 57 percent of those interviewed heard about the explosion while at work (if we take the housewives' place of work as the home; see Table 3). Not all did; we will see that *not* hearing at work is itself explicable in terms of earlier arguments about work networks. Rosengren (1973), after reanalyzing previous studies of

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Table 2. The speed of information acquisition

Time (day of explosion)	Percent of initial sample who had heard by that time*
3:30 (explosion occurs)	19.6
3:40	33.3
3:49 time of first media report (radio bulletin)	46.4 (by interpolation)
4:00	64.3
4:30	75.0
6:30	93.5
Midnight	96.4
$\underline{N} = 168$	

*Respondents could not always give exact times, but vague times were coded conservatively, so this table may actually underestimate the speed with which the news was heard. For example, someone who claimed to have heard "between 3 and 6" would be counted above as "heard by 6:30" even though he probably heard much earlier.

news diffusion, concludes that the importance of news is related both to the speed of its spread and the extent to which it is spread by interpersonal channels. The North Bay explosion was of some importance to the bulk of the residents, which, along with the workday timing, probably accounts for the very rapid spread of the news by largely word-of-mouth transmission.

Thus, our contention that the pattern of news spread should serve as a natural probe of the workday structure of North Bay appears to be a reasonable one. Information appeared to diffuse primarily through routine channels working at higher than usual capacity. Consequently, by analyzing the chains and the individual data, light should be shed on the nature of workday social relationships. The chain data come from recent vivid experience about which respondents were eager to talk and the data collection was relatively non-reactive. Actual communication was traced in field settings; many work sites and kinds of relationship were involved. Thus, these data have strengths where many previous studies are weak. On the other hand, as we have noted, the present study has weaknesses also. However, the data set *is* opposite and supplements previous studies usefully, especially in the area of seniority-utilitarian or moderately large, high-mobility utilitarian organizations (Tichy, 1973:200). Consequently, it permits validation of previous results by enriching methodological triangulation on the topic of work networks.

In the next section we begin reporting of results with a description of the effects of occupational status on where and how the news was heard. In concluding this section, we note that occupational status was clearly the strongest influence on hearing the news. Other "face sheet" variables (age, sex, education, marital status, religion, and mother tongue) were examined; they had virtually no effect when occupational status was controlled.

Occupational status and hearing the news

Table 3 shows where the respondent heard about the explosion by the respondent's occupational status.

Table 3. Where the respondent first heard of the explosion by occupational category

| Occupation | Location | | | | | | |
| | work or | | | social at the | | | |
	home	school	travelling	event	scene	total	N
housewives	82.7	—	(4)	9.6	—	100%	52
students	38.7	19.4	29.0	(2)	(2)	100%	31
low status workers	34.2	40.5	12.7	11.4	(1)	100%	79
medium status workers	17.1	68.4	10.5	(1)	(2)	100%	76
high status workers	(4)	67.6	20.6	—	—	100%	34
							272

Table 4. How non-eyewitnesses heard of the explosion

Occupation	Mass media	Person	Overheard	Total	N
Housewives	41.8	51.1	(3)	100%	43
Students	40.0	60.0	—	100%	15
Low status workers	37.7	51.0	11.3	100%	53
Medium status workers	27.3	68.2	(2)	100%	44
High status workers	20.0	80.0	—	100%	25

As noted above, Table 3 indicates that most of the sample heard the news at work. Examined in more detail, the table suggests the chances of hearing at work are related to status: low-status workers heard at work much less often than middle-or higher-status workers, which is just what one would expect if lower status implies less extensive work networks. Students heard at "work" (i.e., at school) least because many of them were already on their way home when the explosion occurred; and because of their mobility many became eyewitnesses. Housewives heard at work (at home) most; but this does not suggest rich work networks for them, since they tended to hear from the mass media or late in the day from family members coming home, although "co-workers" (other housewives) were also an important news source, as will be seen in later tables.

Occupation also had an effect on how the news was heard, as shown in Table 4. Eyewitnesses are excluded from this table, since becoming an eyewitness was a fortuitous matter unrelated to the nature of work networks: for example, many students became eyewitnesses because the explosion occurred as they were going home from school, and people working near the explosion were more able to witness it. More relevant to the character of networks is the distinction between those who heard from the mass media and those who heard from another person. As seen in Table 2, the mass media were slow in their coverage, so having to rely on the mass media to hear the news is probably a good indicator of isolation from the rapid flow of interpersonal communication. Viewed in this way, the people with the fewest available contacts during the workday were the housewives and the students. Perhaps the students were cut off from their peers if they were walking home alone, while the housewives who were alone at home were not able to make effective use of

the quickly overloaded telephone lines. Alternatively, the housewives simply may not have very extensive workday contacts in general. Among the employed workers, the higher the status, the lower the reliance on mass media, again this is consistent with the hypothesis that higher-status workers have more extensive networks. Although the numbers are modest, it is interesting that 80 percent of the non-witness, high-status workers were personally informed of the disaster.

The results for where and how the news was heard are consistent with findings from previously cited studies that higher status carried with it more work contacts and better access to the flow of news at work. On the other hand, the role of housewife seems to imply relative isolation from interpersonal communication, with the media, especially the radio, taking on the information function, but the evidence is very indirect. Let us move on to an examination of the interpersonal flows traced out in the North Bay study as chains were tracked to their sources.

Links in the communication chains

To analyze relationships more directly the communication chains were broken up into their component links between pairs of individuals and organized as a standard "who-to-whom" matrix. The matrix of flows among occupational status groups can be percentaged across, as in Table 5, to show who members of a given group tend to tell; or the data can be percentaged down, as in Table 6, to show who members of a given group tend to hear from. Both versions are given here.

Tables 5 and 6 tell much the same story but from different viewpoints. Members of each occupational category are most likely to get the news from, and pass the news to members of the same category, probably the people they most often meet during routine work activity. There is one interesting exception to this pattern: those in the highest status occupations are more often informed by those of medium status than by others of high status. This exception may be due just to sampling error arising from the small subcategory N, or it may be a consequence of the small "field of eligibles," few high-status people widely dispersed so that many would of necessity be informed by others of different status. Or, it may suggest that high-status persons are likely to have not only more numerous but also more wide ranging contacts — to know, and receive information from many people in many positions, as argued earlier.

The next notable feature of Tables 5 and 6 is the effect of having a formal job (work other than that of a student or housewife). Workers of any status are more likely to hear the news from, or tell the news to, workers of different status than housewives or students. Again this probably reflects the fact that workers have more workday contact with other workers, even workers in different jobs, than with their families. Flows among formally defined workers show status effects like those suggested in the literature. First, the two groups most different in status (low and high) are the least likely to communicate directly. Second, status is related to a worker's chances of communicating with anyone at work. The lower the status, the more likely that a respondent heard the news from or told it to a housewife or student. This suggests that lower-status people were less likely to hear the news before going home than those of higher status and if they did hear it at work they did not hear it in time to pass it on to many workmates.

Table 5. Who people told: news flow between occupational categories

From	To						
	Housewives	Students	Workers (status)				
Occupation			low	medium	high	Total	N
Housewives	20.8	(2)	26.9	26.9	(2)	100%	26
Students	(3)	(4)	(3)	(1)	—		11
Low status workers	19.2	(2)	38.5	23.1	(3)	100%	26
Medium status workers	17.1	(2)	19.5	43.5	17.1	100%	41
High status workers	(4)	—	25.0	25.0	30.0	100%	20
							124

Note: based on the chain data, omitting those persons whose occupation could not be classified (the news was received from 18 unclassified people and sent to 27 unclassified people).

Table 6. Who people heard from: news flow by occupational categories

From	To				
	Housewives	Students	Workers (status)		
Occupation			low	medium	high
Housewives	29.6	(2)	21.2	19.4	(2)
Students	(3)	(4)	(3)	(1)	—
Low status workers	18.5	(2)	30.3	16.7	(3)
Medium status workers	25.9	(2)	24.2	47.2	38.9
High status workers	(4)	—	15.2	13.9	33.3
Total	100%	100%	100%	100%	100%
N	27	10	33	36	18

(Same data as Table 5 percentaged down)

The last point is further supported by the related data in Table 7. Each respondent was asked who he had told of the event who had not already heard. Table 7 records the percent of all people reportedly told who were classified as friends, fellow workers, etc., of the respondent. The data are not fully comparable to Table 5 as they are based on self-reports instead of traced links, and respondents reported varying numbers of information transmissions. Nevertheless, a similar pattern emerges: the lower the status, the more likely a worker told a family member rather than a co-worker. Students and housewives also tell family members frequently.

One could sum up the flow data in terms of orientation: students are peer oriented, housewives and low-status workers are family oriented, and higher-status workers are work oriented. This interpretation is consistent with conventional wisdom concerning the values of each of these groups. However, some of the data are not fully consistent with such a view; for example, telephoning family members rather than waiting to tell them at home might be seen as a sign of family orientation, but medium-status workers more often informed family members by telephone (rather than in person) than low-status workers did. Of course, medium-status persons are mainly white-collar workers and this group typically has readier access to telephones in the workplace.

Table 7. Occupation by relationships of people reportedly informed

			Relationships of the informed			
Respondent's occupation	Family	Friend	Co-worker	Stranger/ know visually	Total	N
Housewife	58	42	—	—	100%	19
Student	41	50	—	(2)	100%	22
Low status workers	50	15	20	15	100%	34
Medium status workers	37	(3)	43	13	100%	46
High status workers	35	(3)	52	—	100%	23

Another possible integrating theme is sheer opportunity. In this view, people told whomever they could easily tell, which implies that Tables 5 and 6 reflect proximity relationships more than social relationships. To check this possibility, a further variant on "who you told" can be used. Respondents were asked who they *first* told, and how long that was after the respondent heard himself. In general, strangers or people known visually plus fellow workers were told immediately or within half an hour (perhaps because co-workers are accessible, and there is little motivation to tell strangers when the news is stale). The time lag for telling friends or family was more spread out, anywhere from "immediately" to many hours later. This general pattern, and its breakdown by occupation, is consistent with the variable of proximity. Housewives told friends (whom they could telephone) faster than they told family members; students told friends (with whom they were getting out of school) faster than they told family members. Workers (whatever their status) told fellow workers faster than they told family members.

But, those persons who are readily accessible are exactly those the respondent is likely to know well; that is, proximity relationships and social relationships are usually much the same thing. Thus, we feel that interpretation in terms of orientations or proximity are made more feasible when viewed in terms of workday networks.

Status and communication opportunities

If the richness of networks structures communication opportunities, then higher-status people will have more such opportunities. Table 5 to 7 show the pattern of opportunities rather than showing the number directly. Another aspect of the self-report data bears more clearly on this question: each respondent was asked how *many* people he was the first to inform. The mean number told was 1.0 for housewives, 2.4 for students, 1.5 for low-status workers, 2.5 for medium-status workers, and 2.9 for high-status workers. Again, higher status seems to go with a greater number of contacts; housewives by this index too appear relatively isolated while the student network measured this way appears surprisingly dense, likely due to their high incidence of witnessing the event. Those who informed an unusually large number of people, 5 or more (up to 18!) are especially interesting as they are likely to be central in their networks. As Table 8 indicates, students and high- and medium-status workers are more central than others. For students, the large number of

Table 8. Effect of occupational status on number of people informed

Occupation	Number of people informed			
	0-4	5-18	Percent	N
Housewives	91.4	8.6	100	58
Students	80.7	19.4	100.1	31
Low status workers	88.0	12.1	100.1	83
Medium status workers	80.0	20.0	100	85
High status workers	74.3	25.7	100	35

people told is easily explained. Many students found out about the disaster early by going to the scene, and told their fellow students near there, likely returning home before the first news broadcast. But high-status workers, though lacking these advantages, were able to tell even more people.

It appears that people at work do tend to communicate with others of similar status; they tend to communicate with others at similar work sites; and they also tend to direct communication upward in status. Those of higher status not only are more likely to hear the news at work, as seen earlier, but also are more likely to pass it on; higher-status people inform more people and more of those they tell are co-workers rather than family members or friends. Again, the evidence supports the view that higher status is associated with a greater number of work contacts and better access to the flow of information at work.

Time of hearing by chain position:
An index of density?

So far the data have been used to examine aspects of individual positions in networks, primarily on individual degrees (number of people interacted with) and/or individual relationships (who talks to whom). Using the chain rather than the individual as the unit of analysis should provide some feeling for the nature of networks built up from individuals and their pair-wise relationships. Although we can only speculate rather indirectly about one gross feature of networks (their density) such speculations are important in light of the possibly important effects of density. For example, dense-work networks may be one precondition for the emergence of working class consciousness (e.g., Simmel, 1955) and network density may have crucial importance for rumour transmission (Buckner, 1965).

At a network level, what effects might status have on density and what aspects of our data might shed light on this? Those of higher status are expected to be located in denser parts of work networks, as well as having more contacts on an individual basis.

The wider variety of contacts of high-status people implies that some high-status person will probably hear any interesting news; if the links among high-status people are dense, it implies that the news will spread rapidly to the other high-status people. Once the news reaches anyone in a dense part of a network, it very soon reaches everyone or nearly everyone in that part, for everyone has a multiplicity of possible routes of information access. In a less dense part of the network, the news is likely to move more slowly, with more people not hearing

Table 9.

Occupation	N	Percentage of group hearing in first hour	Percentage of group found in first two strata	Difference: column I minus column II
Housewives	58	81.04	84.48	-3.44
Students	31	80.64	90.33	-9.69
Low status workers	83	85.55	80.73	4.82
Medium status workers	84	86.90	80.95	5.95
High status workers	35	86.71	62.85	23.86

the news; for if a person in that part of the network hears the news, he will not be able to pass it on to as many people directly or indirectly because of the relative sparsity of links.

Thus, we argue that people in denser parts of networks would be likely to hear the news more quickly, holding constant the number of steps away from an eyewitness. Note that this is not quite the same thing as simply hearing the news faster than others in general; sheer speed of hearing is in part a fortuitous matter like being an eyewitness, and indeed is largely related to being an eyewitness. Speed only indexes network structure when it refers to the time it takes for information to flow through interpersonal chains in networks. Thus, Table 9 looks at speed and chain position by occupational status. For speed, we chose to look at the percent of the group which had heard the news within an hour. (Hearing much later than that clearly reflects slow dissemination.) For length, we chose the percent of the group in the first two "strata," that is, the initiator of the chain and the first person told by that person, so the larger this number, the fewer the long chains. Seen separately, these proportions have little systematic relationship to occupation, as the first two columns of Table 9 indicate. But a meaningful pattern does emerge from the *difference* between speed and length as indicated in the third column. The greater the density of a respondent's occupational category, the more likely that he heard quickly *at several removes*. Thus, Table 9 suggests that higher-status workers are in much denser subnetworks than medium-status workers, who are in slightly denser subnetworks than low-status workers; housewives and students are in very low density networks; though for students this may be another result of their having been caught on the move rather than at school. Thus, this table supports our contentions about status and density.

Since the chains of information transmission pass through network areas of differing density, they must move at differing speeds. Thus, chain position and time of hearing may have little or no systematic relationship to each other, as Table 10 indicates. People farther along in chains are somewhat slower to hear; the ten people in fifth, sixth, or seventh position all heard after a half-hour lapse, and for any given time a greater proportion of chain starters had heard than any other group. But it is clear that speed and stratum are not very strongly related. In part, the relationship of time and stratum is weak because of the constraints set by the speed of saturation. A chain which did not move fast enough to inform five or six people in a hurry could not get to be five or six people long simply because there were few uninformed people left.

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Table 10. Stratum by when heard: cumulative percentage

Time on Wednesday when news heard	Stratum							All Strata
	1	2	3	4	5	6	7	
3:30 p.m.	40.5	15.4	12.8	6.3				27.1
3:40 p.m.	60.1	33.0	41.0	37.5				47.1
4:00 p.m.	81.5	70.3	74.4	75.0	42.9	(1)	(1)	76.0
4:30 p.m.	85.7	83.5	84.6	81.3	71.4	(1)		84.3
6:30 p.m.	95.8	95.6	94.9	93.8	100.0	(1)		95.7
Midnight	96.4	97.8	97.4	100.0	100.0			97.2
N	168	91	39	16	7	3	1	325

Table 11. Chain length by information source of initiator

How chain initiator heard	Stratum							N
	1	2	3	4	5	6	7	
Television	70%	—	—					
	(7)	(2)	(1)					10
Radio	51%	30%	11%	—	—			
	(24)	(14)	(5)	(3)	(1)			47
Eyewitness	40%	32%	16%	6%	—	—	—	
	(37)	(30)	(15)	(6)	(3)	(1)	(1)	93
								150*

*Missing: 8 chains not fully traced out and 10 for which initiator's mode of hearing is not specified

One other chain characteristic may be of some interest: length. It is often argued that chain length is related to the quality of information transmission (e.g., De Fleur, 1962). In this study, the most striking correlate of chain length was the way the chain originator heard the news, as reported in Table 11: chains traced back to eyewitnesses were longer than those traced to the radio, in turn longer than those traced to television. As already seen, this means that longer chains were started by people who heard earlier (recall the slow radio coverage and even slower television report). It also means that longer chains were started by people with better network positions (we have argued that those informed by the media were probably relatively cut off from the flow of information). Another possible reason for the longer chains started by eyewitnesses is motivation to spread the news quickly and excitedly, motivation which might well be higher for those with a more direct sense of involvement from seeing the scene of the explosion. There is not much evidence on this, but analysis of a question about whether respondents had "made a special effort" to pass the news on suggests that eyewitnesses were no more likely to do so than other groups.

We regret that the number of cases did not allow us to examine the effects of other face sheet variables on information flow with occupational status held constant. Flows among those of different education, age, and so on were examined, and the patterns were generally consistent with an underlying

occupational structure. For example, males and those with higher levels of education reported informing more people; and people tended to pass the news to those with equal or slightly higher levels of education. For lack of space, these tables are not presented here.

Summary and conclusions

The North Bay explosion set off a large number of chains of interpersonal communication which, moving very quickly, soon virtually saturated the population. The decision to view the study of chains as a "snapshot" of the routine workday relationships was based on several elements; the explosion took place during the workday in a highly visible part of the city, the news was transmitted primarily interpersonally, and the communication channels were nearly always routine ones with very few atypical interaction partners being reported.

The major findings are generally consistent with the theory and previous findings on networks in organizations. Status, not surprisingly, turns out to be the major predictive variable. News passes among workers of similar status; as status increases, the number of persons informed increases; speed of reception through several removes increases with status; and the probability of informing or being informed by family members rather than workers decreases with status.

For housewives, the results are also generally consistent with the literature, though that literature is sparse and provides little more than informed speculations. For most of the tables where status is a good predictor, housewives appear similar to, but lower than, the lowest status workgroup. For example, if hearing from the mass media is an indicator of isolation, the housewives are the most isolated. They inform the fewest others, and hear slowly when at several removes from the initial source. They are also very "family centered," hearing most often from family and passing on the news entirely to family or friends. These differences become even more striking when housewives are compared with students who look much like workers on these indices, though there are too many idiosyncrasies about this latter category to make comparison entirely meaningful.

The use of data from a disaster study appears to have been profitable, though there are several clear disadvantages in that there is a restriction on the amount of advance planning, resulting in the non-collection of much potentially useful information. On the other hand, such a study provides a useful addition to the literature on work networks utilizing data that are relatively non-reactive and behavioural and that are drawn from a community rather than just one or two organizations. Although this study does possess weaknesses, its strengths are where many other studies have tended to be weak, thus providing valuable triangulation.

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