A theoretical model is developed in which organizational structure is related to the type of coordination in the organization—planning or programming versus feedback or mutual adjustment. It is argued that the nature of the mechanism of coordination employed in the organization in turn affects the volume and direction of communications in the organization. Hypotheses are developed relating the variables of complexity, formalization, and centralization to communication rates. These hypotheses are tested in a 1967 study of 16 health and welfare organizations using a number of different measures of communications. In general, interdepartmental communications, both scheduled and unscheduled, are found to be affected most by these structural characteristics.

INTERNAL communications in organizations have been the subject of considerable discussion in the literature on organizations, yet empirical studies which attempt to measure various aspects of organizational communications in organizations are scarce, Landsberger’s (1961) article being a notable exception. In this paper we shall provide a framework for relating communication patterns to organizational structure and discuss some results of a test of this framework in 16 health and welfare organizations.

Usually, communications have been related to only one aspect or dimension of organizational structure. For example, Victor Thompson (1961), building upon an earlier study by Dalton (1950), showed the relationship between communication patterns and the degree of specialization within the organization. In their summary of a number of studies, Blau and Scott (1962) noted the relationship between communication patterns and status in an organization. Still other studies have related communication patterns to rules (Gross, 1953; Blau, 1955) and to power (McCleery, 1957; Smith, 1966). However attempts to weave together all these aspects of organizational structure and the process of internal communications into a single framework are largely absent. In this paper, we first suggest a set of premises and hypotheses for relating various dimensions of organizational structure—complexity (the degree of personal specialization), centralization (the distribution of power), and formalization (the emphasis on rules and regulations)—to organizational communications. Second, we present findings about the relationship between aspects of social structure and organization communication patterns.

THEORETICAL FRAMEWORK

In a few insightful pages March and Simon (1958:158–169) suggest that there are two basic ways in which organizations can be co-ordinated: feedback and plan. Co-ordination is here defined as the degree to which there are adequate linkages among organizational parts, i.e. specific task roles as well as subunits of the organization so that organizational objectives can be accomplished. Co-ordination by plan is based on pre-established schedules, while co-ordination by feedback involves the transmission of new information. (James Thompson, 1967, distinguishes three types of co-ordination: standardization, plan, and mutual adjustment; however, the first appears to be an aspect of co-ordination through planning.) The point here is that there seem to be two major types of linkage mechanisms in organizations: linkages through pre-established rules, routines, blueprints, or schedules (co-ordination by standardization, plan, and programming) and linkages through the transmission of new

* This investigation was supported in part by a research grant from the Social and Rehabilitation Services, Vocational Rehabilitation Administration, Department of Health, Education, and Welfare, Washington, D.C. We wish to express our appreciation to Harry Sharp and the Wisconsin Survey Laboratory who conducted most of the interviews for this study and to The Graduate School of the University of Wisconsin for computer funds. We wish to acknowledge the helpful comments of Robert Dewar.
information (coordination by feedback or mutual adjustment). The basic question with which each type of coordination is concerned is how these task roles and/or organizational subunits are articulated into a coherent whole so that organizational objectives can be accomplished.

In a different context, Parsons (1951) has noted that social control over individuals can be maintained either by socialization or by sanctions. In the application of these ideas to professional organizations, Blau and Scott (1962) noted that professionals conform to organizational norms either because of peer pressures or because of certain rewards and punishments. Social control, however, is not the same as coordination; the first refers to the adequacy of achieving conformity with expectations of behavior and standards of work, while the latter refers to the method by which task roles are articulated together to accomplish a given set of tasks. At the same time, there does seem to be some consistency between these ideas; i.e., coordination through planning or programming is more likely to imply use of sanctions to achieve social control; coordination through feedback is more likely to rely on socialization. Of course, we do not want to suggest that there is an identity here since there are many other mechanisms of social control such as performance records, reliance on hierarchy, or recruitment practices that are also used to insure predictability of performance in organizations.

Both feedback and programming involve the articulation of a variety of task jobs and their occupants in a division of labor in which each fulfills his respective tasks. Both mechanisms are intended to achieve the same result—the integration of the task roles, but the question remains as to how this is accomplished. Implicit in all of these writings is the premise that all organizations need coordination. This becomes our first assumption in our theory of organizational structure and communications. (See Chart 1.)

Chart 1 Premises and Hypotheses about Organizational Control

Premises

I. All organizations need coordination.
II. There are two basic mechanisms for achieving coordination: programming with emphasis on sanctions and feedback with emphasis on socialization.

III. The greater the diversity of organizational structure, the greater the emphasis on coordination through feedback.
IV. The greater the differences in status and power in an organization, the greater the emphasis on coordination through planning.

Derived Hypotheses

1. The greater the degree of complexity, the greater the rate of task communications.
2. The greater the degree of complexity, the greater the proportion of horizontal task communication.
3. The greater the degree of formalization, the less the rate of task communications.
4. The greater the degree of formalization, the higher the proportion of vertical task communication.
5. The greater the degree of centralization, the less the rate of task communication.
6. The greater the degree of centralization, the higher the proportion of vertical task communication.

Our second assumption, following March and Simon (1958) and James Thompson (1967), is that coordination can be achieved in two basic ways. (1) The activities of each job occupant can be programmed and then a system of rewards and punishments can be utilized to insure conformity to the basic organizational scheme. A clear blueprint of action would make departures from the plan immediately obvious, and a system of rewards would provide the force behind the basic plan. Standards would leave little ambiguity about whom to punish and whom to reward. (2) Organizations can rely more upon continuous flows of information (feedback or mutual adjustment) as a method for coordinating the organization. Under this system, errors, when detected, are often seen as a problem of improper socialization or training; one method of correcting this situation is through the provision of new information. Also implied in this approach is that pressure comes not so much from formal sanctions, in the strict sense of the term, but more from peer pressures and inner standards of quality developed through socialization. The first approach relies upon external control, whereas the latter is more concerned with internal control, or what is called self-control.

Thus, two basic processes to achieve coordination can be distinguished: feedback and programming. In practice, most organi-
organizations would use some mixture of the two mechanisms. For us, the most interesting as well as most important question is the specification of the organizational circumstances under which one or the other of these two mechanisms will be emphasized. March and Simon (1958) provide no suggestions about the structural concomitants of these mechanisms of coordination, although they do suggest that the uncertainty of the task may affect the choice. However, Thompson (1967) does suggest some structural concomitants of various types of interdependencies and coordination. The internal structure of an organization should have an important relationship to the form of coordination that is most dominant, and hence, to the way in which communications are designed.

We assume that there are two major structural factors that affect the patterns of internal verbal communication: diversity and the distribution of power and status. These are basic axes of organization structure that Victor Thompson (1961) and others have noted. As the diversity of an organization increases, it becomes more difficult to plan a successful blueprint for the organization. As the variety of tasks in an organization increases, the number of potential connections among parts increases even more rapidly, and the articulation of organizational parts by a set of predetermined rules becomes more complicated. Moreover, the application of sanctions becomes more difficult because each of the jobs may require a different set of standards. The decision-makers in such organizations are likely to be forced to rely more upon feedback mechanisms than upon rigidly programmed mechanisms of communication. This whole process is further intensified if the nature of most jobs in the structure is complex and involves a variety of activities (often the case with professionals). Here, we are suggesting that the variety of tasks, as well as the degree of uncertainty, is an important determinant of the degree of communications (March and Simon, 1958; James Thompson, 1967; Perrow, 1967; Hage and Aiken, 1969).

In addition, differences in power and status among job occupants in an organization are likely to inhibit the rate of feedback communications. As social distance between organizational levels increases, the free flow of information is reduced (Barnard, 1964). Similarly, the threat of sanctions from the top discourages the frank discussion of problems and, therefore, organizational decision-makers are unlikely to learn of problems until a crisis has developed, as Blau and Scott (1962) have suggested and as Barnard (1964) explicitly argued.

The degree of organizational diversity propels the organization toward attempts to coordinate through information feedback while status and power differences propel the organization toward attempts to coordinate through programming. Together they influence the probabilities of the adoption of either programming or feedback, or more precisely the particular combination, since each of these factors can be operative at the same time. We assume that organizational elites attempt to program some interaction in the form of regular reports. Even where they have made a conscious decision to rely only upon a feedback mechanism of coordination, there will always be some feeble attempts to rationalize parts of the organization. What is critical here is the differential emphasis on coordination through feedback and coordination through planning or blueprints.

Although it is plausible that internal structure affects the type of coordination, one may logically ask what factors affect or determine internal structure. A number of recent writings have suggested that technology or task structure is a major determinant of variations in internal structure (March and Simon, 1958; James Thompson, 1967; Perrow, 1967). A recent study by Hage and Aiken (1969) did find that routine technology was highly related to the centralization of decision-making. Environmental characteristics such as stability, homogeneity, and certainty have also been suggested as important determinants of internal structural variation (James Thompson, 1967; Lawrence and Lorsch, 1967b). Blau and Schoenherr (1971) have argued that size has pervasive effects on internal structural arrangements. Pugh et al. (1969) show that a combination of technology and size are important predictors of the structure of organizations, although Hall et al. (1967) report some negative findings regarding size. Others have suggested the importance of ecological pattern
Indeed mechanisms notion communications. Traditionally, complicated ship understanding frequency of communications. That is, more complex, that is, more professional, one can say that the organizational structure is more diverse. This leads to the following hypotheses:

1. The greater the degree of complexity, the greater the rate of task communications.
2. The greater the degree of complexity, the greater the proportion of horizontal task communications.
3. The greater the degree of formalization, the greater the rate of task communications.
4. The greater the degree of formalization, the higher the proportion of vertical task communication.
5. The greater the degree of centralization, the less the rate of task communication.
6. The greater the degree of centralization, the higher the proportion of vertical task communication.

One could also logically derive hypotheses regarding the relationship between frequency of communication and the degree of stratification, but since we did not measure this variable, we do not include such hypotheses here.

METHODOLOGY

Research Design

The data upon which this study is based were gathered in 16 social welfare and rehabilitation organizations located in a large...
Midwest metropolis in 1967. These agencies were all the larger welfare organizations that provide psychiatric and rehabilitation services as defined by the directory of the Community Chest. There are three mental hospitals, three residential treatment homes, three rehabilitation centers, six case-work agencies, and a department of special education in the public schools. Ten of these organizations are private, and six are publicly supported.

Respondents within each organization were selected by the following criteria: (a) All executive directors and department heads; (b) in departments of less than ten members, one-half of the staff was selected randomly; (c) in departments of ten or more members, one-third of the staff was selected randomly.

Nonsupervisory administrative and maintenance personnel were not interviewed. The procedures used in aggregating individual data in order to develop measures of organizational characteristics have been described elsewhere (Aiken and Hage, 1968; Hage and Aiken, 1969).

Measurement of Communications

The measures of organizational communications in this analysis are limited to verbal interactions about tasks, that is, to interactions that are most immediately involved in the achievement of organizational goals. We do not include written communications nor have we measured the content of these communications, although we make reference to their probable content. We phrased our questions so that respondents would exclude all purely expressive communications, such as camaraderie among friends or the exchange of gossip. Of course, this distinction may seem somewhat artificial since effective task communications usually involve some expressive elements like jokes or pleasantries. We asked respondents to exclude only those communications that were completely expressive and which were in no way related to the accomplishment of some work objective.

We have separated task communications into two major types. The first includes the more routinized, usually planned communications such as staff or committee meetings; the second includes less routine, often unplanned communications, such as informal, impromptu conferences between two staff members about a client’s situation or the consultation between colleagues about a newly instituted organizational activity. We refer to the former as scheduled and the latter as unscheduled communications.

There is a variety of scheduled task communications in an organization. We found it helpful to distinguish between organizational committees, which involve members from different departments and occupational groups and are usually concerned with specific problems (such as personnel, finance, social, etc.) from departmental or unit meetings, which involve members from the same department. The former is an example of horizontal communication, and the latter is an illustration of vertical communication. Both allow for feedback. In contrast, staff meetings and treatment meetings are less likely to have this characteristic. Staff meetings are used primarily to make announcements and were infrequently held in these organizations. Treatment meetings or production meetings are frequently held, but their content has little to do with the problems of organizational coordination.

Information about scheduled communications was obtained by asking each respondent the following question:

“Now we would like to find out something about the committee and staff meetings in (organization name). Please list all staff committees or meetings in (organization name) of which you are a member.”

For each committee or meeting reported, the following two questions were then asked:

“How many times per month does (name of committee or meeting) meet?”

“On the average, how many hours per month do you spend in meetings of (name of committee or meeting)’?”

To aid in the classification of each response, we obtained a list of all the permanent committees and departments of the organization from the head of each organization and compared this list with the answers of respondents. In this way, we were able to classify responses into the fourfold classification of staff, organization-wide committee, departmental, and treatment (or production) meetings.
From these responses, several measures were constructed. The most important measure is the average frequency of attendance in both committee meetings and department meetings since this taps the sheer rate of scheduled task communication and standardizes it for the varying number of respondents in each organization. We also constructed a measure of the average number of hours spent in these two kinds of meetings, but since the pattern of findings is the same, we do not report those results here. By distinguishing between organization-wide committees and department meetings, we can see if horizontal or vertical scheduled communications are most likely to be emphasized in organizations with given structural characteristics.

Unlike scheduled communication, unscheduled task communication is categorized by the level and department to which they are directed. (See Table 1.) In this way we can determine the degree to which communications flow in both horizontal and vertical directions.

Information about these more spontaneous and informal communications was obtained by asking each respondent the following questions:

"In every position, it is sometimes necessary in fulfilling one's job to confer with other people. How many times in a typical week do you confer with people here in the organization other than at committee meetings?"

"What are the names of these people?"

"What are their job titles?"

"How many times in a typical week do you confer with each of these persons?"

Two types of information were obtained from these questions: (1) the number of different persons in the organization with whom communications occur and, (2) the frequency of these contacts. To simplify the presentation of the data, we only include here the latter which is a measure of the intensity of information flow among members of the organization.

In order to determine whether a communication was intradepartmental or interdepartmental, we obtained a complete membership list of each department of each organization. We were thus able to locate the departmental


Table 1. Means, Standard Deviations, and Ranges of the Intensity and Proportion Measures of Scheduled and Unscheduled Organizational Communications.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Organization-wide Committees</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Average number of committee meetings per month</td>
<td>.96</td>
<td>.53</td>
<td>0.0</td>
<td>1.91</td>
</tr>
<tr>
<td>2. Proportion of all staff members who participate in committee meetings per month</td>
<td>34%</td>
<td>6%</td>
<td>0%</td>
<td>60%</td>
</tr>
<tr>
<td><strong>B. Departmental Meetings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Average number of departmental meetings per month</td>
<td>1.41</td>
<td>1.10</td>
<td>.18</td>
<td>4.00</td>
</tr>
<tr>
<td>2. Proportion of all staff members who participate in departmental meetings per month</td>
<td>41%</td>
<td>24%</td>
<td>6%</td>
<td>80%</td>
</tr>
<tr>
<td><strong>C. Frequency of Unscheduled Communications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Interdepartmental, higher level</td>
<td>3.74</td>
<td>2.83</td>
<td>.24</td>
<td>9.24</td>
</tr>
<tr>
<td>2. Interdepartmental, same level</td>
<td>4.96</td>
<td>3.70</td>
<td>.14</td>
<td>11.24</td>
</tr>
<tr>
<td>3. Interdepartmental, lower level</td>
<td>5.98</td>
<td>5.37</td>
<td>.00</td>
<td>17.14</td>
</tr>
<tr>
<td>4. Intradepartmental, higher level</td>
<td>6.38</td>
<td>4.25</td>
<td>.80</td>
<td>14.00</td>
</tr>
<tr>
<td>5. Intradepartmental, same level</td>
<td>7.05</td>
<td>4.17</td>
<td>.76</td>
<td>15.73</td>
</tr>
<tr>
<td>6. Intradepartmental, lower level</td>
<td>15.86</td>
<td>10.60</td>
<td>1.90</td>
<td>50.53</td>
</tr>
<tr>
<td>7. All unscheduled communications</td>
<td>26.84</td>
<td>13.91</td>
<td>6.50</td>
<td>61.79</td>
</tr>
</tbody>
</table>
affiliation of each person mentioned. The level within a department was determined by asking a series of questions at the outset of each interview about a respondent's job title, his major activity, names and titles of persons in the organization reporting to him, and names and titles of persons in the organization to whom he reported. Since we had included most supervisors in our study, we were able to construct an "operative" organizational chart, which proved to be more useful than the formal organizational chart, which, if one existed, was often either outdated or inaccurate, or both. Thus, we were able to classify each unscheduled communication mentioned in one of the following categories: (1) Interdepartmental, higher status level or upward communication; (2) Interdepartmental, same status level or horizontal communication; (3) Interdepartmental, lower status level or downward communication; (4) Intradepartmental, higher status level or upward communication; (5) Intradepartmental, same status level or horizontal communication; (6) Intradepartmental, lower status level or downward communication; (7) All unscheduled communications, a summary of all informal communication.

Since organizations varied in size of staff, we standardized organizational scores by calculating the average frequency of unscheduled communications for each person in these organizations for each of the above categories. This was done by dividing the total frequency of communications in each category by the number of persons in the organizations for whom that type of communication was possible. It was logically impossible for some individuals to have particular types of communications. For example, those at the bottom of the chain of command could hardly communicate with someone lower down. The number of respondents used in the denominator therefore varied by category. Further, the information flow between the executive director and his subordinates was excluded in calculating organizational scores because such communications could not be classified as being in the same or a different department. Persons were given missing data scores for illogical types of communications, and final computations of organizational scores were based only on available data. In calculating the measure of "overall unscheduled communications," there were no missing data since all respondents could logically have some kind of communications. This measure was constructed by dividing the total frequency of all unscheduled communications by the total number of respondents in each organization (excluding the organization head). These precautions hopefully allowed us to compute accurate rates of communication per organizational member, eliminating the biases created by different distributions of people among departments and status levels. As shown in Table 1, there is considerable variation among our organizations for these measurements.

One might ask if scheduled and unscheduled communication scores are highly related to one another. In general, they are not. However, the greater the average frequency of committee meetings, the greater the horizontal unscheduled communications between departments. Thus, scheduled horizontal communication tends to be associated with unscheduled horizontal communication. On the other hand, the higher the proportion of people involved in departmental meetings, the less there are unscheduled intradepartmental communications. In other words, there seem to be alternative mechanisms for departments to achieve coordination.

**Complexity and Communication Findings**

Two measures of organizational complexity are used—the number of occupational specialties and the degree of professional activity. (See the Appendix for a description of measurement procedures for each variable.) The first is simply the number of specific occupational specialties that exist in each organization. The second reflects the degree to which staff members are active in professional activities outside the organization. The first two empirical hypotheses are (1) that the intensity of communications will vary directly with the number of occupational specialties and the degree of professional activity, and (2) that these factors are most likely to be associated with communications in a horizontal direction.

Looking just at the relationships between occupational diversity and the intensity of
communication, we note that the more diversified the occupational structure of an organization, the higher the intensity of overall unscheduled communications \( r = .51 \) and the greater the involvement in organization-wide committees \( r = .66 \) as shown in Panels C7 and A1 of Table 2. The relationship between the diversity of the occupational structure and the frequency of attending departmental meetings is in the predicted direction, but quite weak as shown in Panel B1 \( r = .20 \), indicating that while complexity is positively associated with the overall rate of scheduled communications it is more strongly associated with horizontal communications—i.e., organization-wide committee meetings—than with vertical communications, i.e., departmental meetings.

Professionalism was measured by the degree to which staff members were involved in professional associations, including number of associations, frequency of attendance, number of offices held, and number of papers given. This measure has weak relationships with most of the intensity of communication measures, although each is in the predicted direction; in the case of the intensity of overall unscheduled communications, the relationship is quite high as shown in Panel C7 of Table 2 \( r = .42 \).

### Table 2. Pearsonian Correlation Coefficients between Indicators of Complexity, Formalization, and Decentralization, and Measures of Scheduled and Unscheduled Communications.

<table>
<thead>
<tr>
<th>Complexity</th>
<th>Formalization</th>
<th>Occ. Prof.</th>
<th>Spe-</th>
<th>Ac-</th>
<th>Presence Index</th>
<th>Decen-</th>
<th>tival-</th>
<th>Job</th>
<th>Job</th>
<th>tative ty</th>
<th>Descrip. Specif. tion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>.66*** .32</td>
<td>-.30</td>
<td>-.31</td>
<td>.60**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>.31</td>
<td>.20</td>
<td>-.10</td>
<td>.61**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>.20</td>
<td>.25</td>
<td>-.09</td>
<td>.57**</td>
<td>.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>.13</td>
<td>.30</td>
<td>-.06</td>
<td>.30</td>
<td>.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>.54</td>
<td>.52*</td>
<td>.41</td>
<td>.08</td>
<td>.51*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>.67** .62**</td>
<td>-.61**</td>
<td>-.20</td>
<td>.53**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>.40</td>
<td>.19</td>
<td>-.45*</td>
<td>.42</td>
<td>.42</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>.29</td>
<td>.26</td>
<td>-.15</td>
<td>.28</td>
<td>.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>-.04</td>
<td>-.36</td>
<td>.15</td>
<td>-.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>.19</td>
<td>-.31</td>
<td>-.52*</td>
<td>.33</td>
<td>.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C7</td>
<td>.51*</td>
<td>.42</td>
<td>-.50*</td>
<td>-.12</td>
<td>.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* \( p < .10 \) ** \( p < .05 \) *** \( p < .01 \)

\( \text{See Table 1 for meaning of symbols.} \)

\( \text{See the Appendix for a description of the construction of measures.} \)

To the extent that organization-wide committee meetings provide opportunities for horizontal communications, the second hypothesis above is supported. However, it requires some interpretation. Horizontal communications, as suggested earlier, can mean at least two things. (1) It can simply mean communications across departmental boundaries. But (2) it can mean communications with someone at the same status level, regardless of whether the communication is in the same or a different department. If we ask, however, whether such interdepartmental interactions are with someone at the same level, at a higher level, or at a lower level, we find that the frequency of such interdepartmental communications is greatest with others at the same status level for both the number of occupational levels \( r = .67 \) and for the degree of professional activity \( r = .62 \), although there is some suggestion that it can also be upward \( r = .34 \) and \(.52 \) respectively in other departments as well.

The conclusion we reach is that complexity—as measured both by the number of occupational specialties and professional activism—tends to be positively associated with the intensity of organizational communications, both organization-wide committees as well as all unscheduled communications. Looking more closely at this latter relationship, however, we find that it is the flow of communications with people on the same status level in different departments that is most highly associated with these two measures of complexity. Horizontal relationships with people in the same department are actually inversely related to the two measures of complexity. Thus, the word horizontal in our hypothesis should be modified to mean interdepartmental communications with persons on the same status level. However, this is exactly the intent of our original premise regarding the meaning of feedback. In particular, communication between departments is more likely to be of this kind. Regardless of this interpretation, it is clear that the volume of communications is higher in more complex organizations; and this is especially true of communications between departments, both scheduled and unscheduled.
Formalization and Communication

The measure of formalization included here are (1) the degree to which—as reported by respondents—there is a complete job description for their job, and (2) the degree of job specificity. The latter measure was an index which included a number of additional items reflecting the programming of jobs, such as the existence of specific procedures for various contingencies, written records of job performance, and well-defined communication channels. The hypothesis here is that the greater the degree of formalization, the lower the rate of communications; and the direction is likely to be upward and downward within the same department, not between departments.

In general, we find that the correlations between formalization and measures of both the scheduled and unscheduled communications are not as strong as those between measures of complexity and communication rates. The existence of job descriptions tends to be negatively associated with the average frequency of participation in organization committees \( r = -0.30 \), as shown in Panels A1 and A2 of Table 2, middle column. However, the existence of job descriptions has no relationship with the intensity of participation in departmental meetings. Job specificity also has weak negative relationships with these same measures of communications. On the other hand, job specificity has a strong negative relationship with the frequency of attending departmental meetings; i.e., the greater the degree to which jobs are programmed, the less frequently staff members attend departmental meetings, which also reflects in part that there are fewer departmental meetings in such organizations. The greater the degree to which there are job descriptions in an organization, the fewer the overall unscheduled interactions \( r = -0.50 \), although there is no relationship between job specificity and this measure of communication \( r = -0.12 \). The small size of these correlations, especially between the measures of formalization and scheduled communication, may reflect that we have poor measures of the degree of planning of the work flow. Both of our measures are specific to individual tasks, and neither reflects the degree of programming or coordination. This may explain why our measures work better with unscheduled communication than scheduled communication, since unscheduled communications are more likely to reflect discussions about particular jobs than organization-wide co-ordination.

Looking more closely at the categories of unscheduled communication, we see that the presence of job descriptions is negatively related to the frequency of interaction in each category with the exception of communications on the same status level within the same department. The presence of job descriptions is especially strongly related (in a negative direction) in the case of communications between individuals at the same status level in different departments \( r = -0.61 \). Similarly, job specificity tends to affect the frequency of communications, although there are positive relationships between intradepartmental communications with superiors and colleagues on the same status level.

Centralization and Communication

The measure of centralization utilized here is the Index of Participation in Decision-Making. It reflects the degree to which organizational members report their participation in (1) decisions about the hiring of personnel, (2) the promotion of personnel, (3) the adoption of new organizational policies, and (4) the adoption of new programs or services. A high score on this measure reflects the degree to which strategic organizational decisions, in contrast to decisions about work assignments and the like, are decentralized. Conversely, a low score on this measure means that there is a high degree of centralization in such organizations. Our hypotheses are that participation in decision-making is positively related to the intensity of communications and that there are more horizontal communications in such organizations.

The degree of participation in these strategic organizational decisions was found to have strong positive relationships with the frequency of communications (see Table 2, last column). There is a strong positive relationship between the degree of participation in these strategic organization decisions and the frequency of attending both com-
mittee meetings (r = .60) and departmental meetings (r = .45). The relationship between participation in these decisions and the frequency of unscheduled interactions is in the predicted direction (r = .36), but not strong.

Looking more closely at the relationship between the index of participation in decision-making and each category of unscheduled interaction, we note first that organizations with wide participation in decision-making have a higher degree of interdepartmental communication. This is true for information flows upward, on the same level, and downward (r = .51, .53, and .42, respectively). In decentralized organizations, there is greater interdepartmental communications in all directions—i.e., at a higher level, the same level, and at a lower level in the chain of command, and this is generally true for staff members on all organizational levels. In decentralized organizations, there are fewer intradepartmental communications on the same level and downward.

Other Measures of Unscheduled Communication Volume and Direction

Although we have explored a number of measures of both scheduled and unscheduled communications, there are still others that one might consider. One could—and indeed we did—compute a proportional measure for unscheduled communications, that is, what percent of the flow is between departments at each relative status level and what percent is within departments at each relative level. The advantage of this measure is that it provides the most stringent test regarding communication direction. In general, the pattern of findings are changed very little except to reduce the size of the correlations somewhat. In other words, complexity and decentralization not only positively affect the total volume of unscheduled communications but they increase the proportion and the frequency between departments per organizational members as well. Similarly, formalization reduces the proportion between departments as well as the volume. However, this effect is not as strong.

Still another way of computing unscheduled communications is to be concerned with level-specific communication rates as opposed to our measures which are not computed by level. For example, one can compute the frequency with which department heads confer with other department heads. However, preliminary analysis indicates that the same basic pattern of findings emerges when level-specific rates are substituted. Similarly, the level-specific rates indicate that it is not only the department heads and intermediate supervisors that are conferring between departments but other levels as well, suggesting again a pattern of coordination.

**DISCUSSION**

Together these findings suggest that, as organizational structure becomes more diversified and, in particular, as personal specialization increases, the volume of communication increases because of the necessity of co-ordinating the diverse occupational specialists. The major direction of this increased flow of information is horizontal, especially cross-departmental communications at the same status levels. In this sense, committee meetings represent a greater emphasis on horizontal information flows than do departmental meetings because the former involve other departments. But there is also an increased horizontal flow of unscheduled task communication. Conversely, insofar as organizational leaders attempt to co-ordinate the organization via programming, as reflected in job descriptions and specified task procedures, the necessity for interaction declines. The interaction that exists is probably concerned with the interpretation of a particular regulation. Concomitantly, if power is dispersed in the organization, not only does the volume of communication increase, but the flow of communications across departmental boundaries is also increased. Similarly, organization-wide committees and departmental meetings (both scheduled mechanisms of interaction) are likely to be increased as well. As organizations have more and more of a sharp status pyramid, upward communication tends to be considerably inhibited just as it is when the power is concentrated in the hands of a small elite.

If one accepts our theoretical framework, then there are some interesting implications of our findings. These findings suggest that as organizations become more diversified,
more specialized (personal specialization, not task specialization) and more differentiated, they have to rely less on a system of programmed interactions to achieve the necessary linkages between parts of the organization and more on a system of reciprocal information flows to achieve co-ordination. We have also suggested that such organizations would more likely rely on socialization rather than use of sanctions as a key mechanism of social control.

It may well be that findings such as ours are greatly affected by the nature of the technology in the organization or characteristics of the environment. That is, we might expect that an organization with a nonroutine technology would have a more diversified, more specialized (i.e. more reliance on knowledge), and more differentiated structure, would more likely achieve co-ordination through feedback or mutual adjustment, and consequently would have a greater volume of communications (Cf., Perrow, 1967). Similarly, we might expect that the consequences of an organization’s having an environment that was unstable, heterogeneous, and characterized by uncertainty would be similar (Cf. James Thompson, 1967; Lawrence and Lorsch, 1967a). If this were true, it would suggest that the processes described here are only part of a larger system of interrelated forces. Future work might also explore the relative effectiveness of organizations using feedback as opposed to programming to achieve organizational goals, given similar structural characteristics. In these ways, the approach here might be extended and made more complete.

APPENDIX

Number of Occupational Specialties

The number of occupational specialties was based on questions with individual respondents, not on a count of number of specific titles. Each respondent was asked what he did and then this was coded according to the kind of professional specialty. This procedure was considered to be more appropriate since it permitted comparability across organizations, and since it avoided the problem of task specialization in which one activity might be divided into many specific and separate tasks (cf. Victor Thompson, 1961).

Professional Activity

The index of professional activity ranged from 0 to 3 points and was constructed as follows: (a) 1 point for belonging to one or more professional organizations; (b) 1 point for attending at least two-thirds of the previous six meetings of any professional organization; (c) 1 point for the presentation of a paper or holding any office in any professional organization.

Job Descriptions

The presence of job descriptions was determined by asking each respondent whether the following statement was definitely true, more true than false, more false than true, or definitely false: “There is a complete written job description for my job.” Replies to these questions were scored from 1 (definitely false) to 4 (definitely true), and then the organizational score was computed using the aggregation procedure previously described (Aiken and Hage, 1968). A high score means the presence of job descriptions.

Job Specificity

The index of specificity of job was based on responses to the following six statements: (1) Whatever situation arises, we have procedures to follow in dealing with it. (2) Everyone has a specific job to do. (3) Going through the proper channel is constantly stressed. (4) The organization keeps a written record of everyone’s job performance. (5) We are to follow strict operating procedures at all times. (6) Whenever we have a problem, we are supposed to go to the same person for an answer. Replies to these questions were scored and aggregated in the same way as job descriptions.

Participation in Decision-Making

The index of participation in decision-making was based on the following four questions: (1) How frequently do you usually participate in the decision to hire new staff? (2) How frequently do you usually participate in the decisions on the promotion of any of the professional staff? (3) How frequently do you participate in decisions on the adoption of new policies? (4) How frequently do you participate in the decision on the adoption of new programs? Respondents were assigned numerical scores from 1 (low participation) to 5 (high participation), depending on whether they answered “never,” “seldom,” “sometimes,” “often,” or “always,” respectively, to these questions. An average score on these questions was computed for each respondent, and then the data were aggregated into organizational scores. A high number reflects a high degree of participation in decision-making.

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