Task Dependency of Organizational Centrality: Its Behavioral Consequences

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This experiment aims at demonstrating the task dependency of organizational structure and the intervening nature of organizational variables between task and structure. Two types of tasks are used. Task A is routine and deductive and Task B is nonroutine and has some inferential components. Each group is given a series of both tasks. Half of the groups start with Task A and half start with Task B. The measured variables are shown to be different for the two tasks and to be not dependent upon the order in which the tasks are performed. The nature of the task, in this experiment, dominates the behavior of the groups. The results support the conclusion that organization structure is a dependent variable intervening between task and behavior.

A substantial number of experimental studies have attempted to explore the relations among group organization, task, and performance. Following the works of Bavelas (1950) and Leavitt (1951), a number of experiments have manipulated the communication network given to the group and measured their relative efficiency and satisfaction with various tasks. However, results from these studies are not always easy to interpret. For instance, Leavitt (1951), Guetzkow and Simon (1955), and Cohen, Bennis, and Walkon (1961) find that, for a simple task like the

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2 The experiments were conducted while C. Faucheux was Visiting Professor at CIT during the Fall semester 1964-1965.
common-symbol task, a highly centralized communication structure (a wheel) is more conducive to high group performance than a less centralized network. On the other hand, Shaw (1954a, 1954b) and Shaw and Blum (1965) report that for a more complex task a less centralized network (a circle) seems to be more efficient. However, Guetzkow and Dill (1957) and Guetzkow and Simon (1955) argue that one reason why different networks vary in efficiency is the influence exerted by the network’s restrictions on the ability of the groups to develop adequate organizations. He shows that when intertrial free discussion is allowed, groups quickly develop an organization capable of coping with the networks and perform equally well in all of them. Along a similar line, Mulder (1960) argues that only the decision structure is important and demonstrates that a centralized decision structure leads to better results than a less centralized one, even for Shaw’s so-called “complex” task. He shows that circles have superior performance to wheels in the beginning trials, but that this difference tends to decrease and reverse itself in the final trials of a longer series.

One cannot be surprised, therefore, by the pessimistic conclusions of Glanzer and Glaser’s (1961) survey of the literature, namely, that at the present time there is no simple answer as to the effect of the structure of a group on its efficiency. Some of the difficulties lie in the interference between the imposed network and organizational development. In this sense, the manipulation of the communication network does no more than manipulate the organizational constraints on the group attempting to solve a given problem. The organization structure per se is neither manipulated nor controlled adequately, since in an all-channel many different organization structures can develop. For example, an all-channel can develop into a wheel. And we know that a wheel network is not necessarily the most conducive environment for a centralized organization, which often develops faster in an all-channel. One way to overcome these difficulties is to treat the organization as a dependent variable.

But in treating the organization as a dependent variable one is immediately faced with another difficulty, which lies in the definition of the nature of the task. We have seen how the simplicity-complexity dimension can be deceiving. Some attempts have been made to understand and control the nature of the task, the most remarkable being by Roby and Lanzetta (1958). But as Zajonc (1965, p. 71) pointed out:

... however up to now their classification appears not to have had a pronounced theoretical influence, probably because the vast majority of tasks used in small group research simply defy a parametric analysis in terms proposed by Roby and Lanzetta and possibly in any other terms as well.
Flament's (1963, 1965) work can be interpreted as an attempt to overcome the difficulty pointed out by Zajonc (1965) by describing the task requirement in terms of graph theory, and to predict performance according to the degree of isomorphism between task and structure. Another approach in specification of the dimension of tasks is the work of Shaw (1963), using Thurstone and Chave attitude-scaling techniques with graduate students in psychology as the judges.

Despite the difficulties in determining the dimensions or procedures to differentiate tasks along a continuum, it is possible to distinguish between a routine deductive task and a nonroutine inferential task. Therefore, it should be possible to establish the existence of the impact of organizational task on organizational structure and performance by examining the behavior under the impact of two series of tasks: a series of simple routine tasks and a series of complex problem-solving tasks. In order to do this, as Lorge et al. (1958) point out, the group must be given sufficient time to emerge from an ad hoc group to a functioning organization with relatively stable, differentiated roles. But the fact that it usually takes time for groups to emerge implies that the organizational structure is changing. One of the co-authors (Mackenzie, 1964 and Mackenzie and Huysmans, 1965) has worked on studies where such change is the rule rather than the exception. If the structure is changing as the group emerges, then it is not clear that organizational structure can be an independent variable unless the proper restrictions are imposed. It makes more sense to treat organization structure as a dependent rather than as an independent variable.

In an earlier experiment one of the authors (Faucheux and Moscovici, 1960) considered the group organization as a variable dependent on the nature of the task and as an intervening variable between task and performance. Two types of task were used. One was of a "deductive" nature: the solution required only the strict application of a set of rules and a correct sequence of deductions. The other task was of an "inferential" nature since it required the generation of all possible combinations of a set of elements, combinations which could not be deduced and had to be inferred. The members were absolutely free to communicate to each other and the communications were entirely tape-recorded. From the communication matrices it was possible to decide whether or not the group was "centralized." Twelve groups of four members had to perform both tasks: half of them the deductive task first, the other half the inferential task first. The results show that the groups tended to develop a centralized organization in the deductive task and a noncentralized one in the inferential task. The few groups who failed to centralize in the
deductive task performed less well than those who centralized, and similar-ly the groups who centralized in the inferential task performed less well than those who did not. These latter groups developed an identical organization of three differentiated roles.

The experiment reported in the present paper is similar to the French experiment in that the task was manipulated as the independent variable and the organization treated as a dependent one; however, it differs on several points. First, an index of centrality, developed by one of the authors (Mackenzie, 1966), provides a precise measure of centrality which allows a better analysis of the organizational development over time and trial by trial. Second, a method for a more detailed content analysis of the communications, which provides a better understanding of the different activities in which the members engage themselves, was developed by one of the authors (Mackenzie, 1964, Mackenzie and Huysmans, 1965, and Mackenzie and Frazier, 1966). Third, the tasks were different. The inferential type of task was not purely inferential and required some coordination, but it had the advantage over the French experiment of permitting repeated performances of similar tasks. The inferential task was developed from the mathematical results of a paper by one of the authors (Mackenzie, 1967), and will be discussed in the next section. Fourth, only written communications were allowed. Fifth, in the French experiment the task could be performed by individuals; whereas in the CIT experiment, the information was distributed among the members, which made interactions necessary in order to solve the problem.

In this paper we want primarily to demonstrate (a) the task dependence of organizational centrality and (b) how the organization structure and behavior act as an intervening variable between task and performance. In addition, we hope to suggest the potentialities of a new approach to organizational psychology.

METHOD

Subjects were taken from the undergraduate population at Carnegie Institute of Technology. There were fourteen groups of five members each. Each group had to perform two series of tasks. Task A, the minimum-list-of-symbols task, was primarily deductive in nature. Task B, the network decomposition task, mainly required inferences.

Half of the groups performed a series of eight A tasks, followed by a series of four B tasks. The other groups were first given four B tasks, followed by eight A tasks. The average group spent 80 minutes on the series of A tasks and 142 minutes on the series of B tasks.

The subjects were told that the average group needed 4 hours for the entire experiment and that they would be paid for 4 hours regardless of how long they took to complete the experiment. Four groups exceeded the 4 hours, and three groups
were not able to complete all eight of the A tasks because one or more of the members had to leave.

After receiving their instructions for the first series of tasks, the subjects were assigned to five different booths which isolated them visually. All communications were written on colored paper forms. Each subject had a different color. The subjects were provided carbon paper for copies to be sent to other members. There were no restrictions placed on the content of the messages. The experimenters delivered all messages after stamping the time and message number.

The subjects received a coffee break between the two series of tasks. During the coffee break discussion of the experiment was forbidden. After the coffee break, the subjects were instructed in their second series of tasks.

At the end of the experiment, the subjects completed a questionnaire.

**Description of the Tasks**

**Task A—Minimum List of Symbols**

The group had to find the smallest complete set of different symbols (minimum list) distributed among them. The group had a correct solution only if all members sent the experimenter a correct list in the same order.

Four types of symbols were used: digits, letters, colors, or simple geometric symbols. The type of symbol varied from trial to trial and all four were used, but each subject received the same type on a given trial.

The minimum-list-of-symbols task required that the subjects share their information, compiling a minimum list of symbols, and checking to see that all had the same list.

**Task B—Network Decomposition Task**

Each of the subjects was given a list of arcs from a five-point graph. The first step was to construct the network from the arcs; to do this the subjects had to share their information and infer the correct total graph which integrated all the information distributed among the members. The second step was to decompose the total graph into two subgraphs which had to be wheels, circles, or all-channels. In this experiment there were up to three possible correct decompositions, and the subjects did not know how many correct solutions existed. The subjects had to check the total graph and generate, check, and share the subgraphs. The subgraphs had to be compiled for the total solution and shared. The decomposition of the graph was very difficult and required inferences by the group. The average group spent 35 minutes per B task. Tasks A and B are illustrated in Fig. 1.

**Dependent Measures**

**Index of Centrality**

An index of centrality developed by one of the authors (Mackenzie, 1966b) was used to compute the individual centralities and group centrality for each trial. The centrality index is based on the group's communications incidence matrix, where each entry is the fraction of the total number of the group's messages sent by one participant to another. The index is so constructed that it is zero for the homogeneous all-channel and unity for the homogeneous wheel. A graph is homogeneous if all nonzero entries in the matrix are equal. The centrality index, then, is based on
**Sample Tasks for Faucheux-Mackenzie Experiment**

<table>
<thead>
<tr>
<th>INFORMATION</th>
<th>SYMBOLS</th>
<th>ARCS OF A NETWORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td>2, 7</td>
<td>(1→2, 2→3)</td>
</tr>
<tr>
<td>GOLD</td>
<td>1, 3</td>
<td>(3→4, 4→5)</td>
</tr>
<tr>
<td>BLUE</td>
<td>3, 4</td>
<td>(5→1, 1→3)</td>
</tr>
<tr>
<td>PINK</td>
<td>5, 7</td>
<td>(2→4, 4→1)</td>
</tr>
<tr>
<td>GREEN</td>
<td>2, 4</td>
<td>(2→5, 5→3)</td>
</tr>
</tbody>
</table>

**Task A**

- **Minimum List of Symbols:** 4
- **Possible Unique Solutions:** Two 5-point circles

**Task B**

- **Total Network:**

**Inference**

- None required

**Note:**

Fig. 1.

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actual communication patterns rather than upon the mere availability of communication channels. The centrality index allowed us to monitor the actual communications structure from trial to trial.

**Performance**

The primary measure of performance was the mean number of errors per trial. The error rate reflected the accuracy of the group's performance. We also computed the mean number of messages per trial and the mean time to reach the correct solution for each trial. The mean number of messages and mean time per trial were used to compare within task performances but not to compare performances between tasks, since the two types of tasks were different and required a different amount of time and number of messages per trial. We also calculated the mean number of messages per minute, which was used as an estimate of the efficiency of communication.
The lower the number of messages per minute, the greater the economy in communication or the lower the redundancy.

Subjective Evaluations

At the end of the experiment the subjects completed a questionnaire in which they were asked to evaluate on a nine-point scale such things as the group performance, their own performances, their relative liking of each task, and to what extent the group members took appropriate roles needed by the group.

Content Analysis of the Communications

The centrality indices reflected only the communication patterns in terms of the numbers of messages sent and received. By using the method of one of the authors (Mackenzie, 1964), based on set theory, a detailed content analysis was made on the written messages. All messages were coded into 288 task-oriented categories, consisting of 32 activities with 9 subcategories (called "elements") for the type of statement made about each activity. There were also 63 nontask-oriented categories consisting of 7 activities with 9 social subcategories. We also coded time, message numbers, identification of sender and receiver, trial numbers, group numbers, and the symbol or arc content of each message. The activities ranged from a "communication about one arc or symbol" to "communications concerning the goal of minimizing the number of messages." Examples of subcategories (elements) are decisions, requests, suggestions, or instructions. Each message was first broken down into its activities and then these into elements. The nontask-oriented communications ranged from a "nontask-oriented communication about the experiment staff" to "jabberwocky" in which nonsense communications were coded. Examples of nontask-oriented subcategories include "shows solidarity," "shows antagonism," "agreement or approval."

RESULTS

Centrality

As expected, we found sharp differences in centrality between tasks (Table 1). We found a tendency for the groups to centralize on the eight A tasks, but there was no noticeable upward or downward trend over the four B trials.

TABLE 1

<table>
<thead>
<tr>
<th>Task</th>
<th>Task performed first</th>
<th>Task performed second</th>
<th>Mean for all trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task A</td>
<td>.665*</td>
<td>.617</td>
<td>.645</td>
</tr>
<tr>
<td>Task B</td>
<td>.298*</td>
<td>.395</td>
<td>.340</td>
</tr>
</tbody>
</table>

* The differences between means for all three columns are significant at the 0.001 level.
* The difference between means for the first two columns (the order in which a series of tasks was performed) is nonsignificant for the A tasks ($t = 0.74$) but significant for the B tasks ($t = 2.18$, $p < .05$).
Using standard regression techniques, we performed the following calculations:

(i) For the groups performing the A tasks first, we regressed the centrality of the groups against trial number and total elapsed time for both the A tasks and the B tasks. This gave us four regressions.

(ii) For the groups performing the B tasks first, we regressed the centrality of the groups against trial number and total elapsed time for both the A tasks and the B tasks. This gave us four regressions.

We found (Table 1) that for the A tasks the mean centrality was not affected by the order of performance, and that there was a slight but significant difference for the B tasks ($t = 2.18, p < .05$). The result for the B tasks raised the question of the effect on the centrality of the second series of tasks due to the first series of tasks. In order to test for such an effect, we computed the amount of variance in the second series of tasks about the regression line for the first series of tasks for both trial number and total elapsed time. We found the following:

(i) By using the trial-number regressions, the B tasks accounted for only 25% of the variance in the A tasks and the A tasks accounted for none of the variance in the B tasks (in fact, the variance actually increased).

(ii) By using the total elapsed time regressions, the B tasks accounted for none of the variance in the A tasks and the A tasks accounted for none of the variance in the B (in fact the variance actually increased in both cases).

We conclude, therefore, that the organization structure depends upon the nature of the task, and the organization structures for the two tasks are different and independent.

Among the fourteen groups performing the A tasks only three did not centralize completely in a wheel structure, while the other eleven centralized on the average between the fourth and fifth trials. The mean trial number for centrality was 4.4 when A's were performed first and 4.5 when A's were performed second. By examining the graph of trial numbers versus centrality for each group of A tasks, ten of the eleven groups exhibited the same pattern. One can see a regular increase over the first few trials and then a sudden jump in centrality to 1.0 (that of a wheel), followed by a plateau reflecting the stabilization in a wheel structure. Only two groups manifested a slight decrease in centrality on the eighth trial.

Among the seven groups performing A first, six centralized in a wheel, and when confronted with B tasks all decentralized immediately on the
first B task (mean decrease in centrality was 0.623). Among the seven groups performing A last, three did not complete all eight tasks because, having already exceeded the 4 hours, one of their members had to leave to meet other obligations. One of these three groups centralized and the other two did not.

The centrality for the B tasks was significantly lower than for the A tasks and no trend was noticeable over the four trials. The inferential component in the task inhibited a greater centralization. This supports our hypothesis that the degree of centralization of a group is determined by the nature of the task. As we shall see later, though the low variance in centrality within the B tasks does not permit any conclusion about the relation between centrality and performance, there are some significant relationships between centrality and the subjective evaluation of performance.

Performance

A Tasks. Before considering the performance in the A tasks, let us remember that three groups (Groups 14, 9, and 10) were not able to complete the eight trials: these groups were performing the A tasks, and when they had exceeded the 4 hours some of their members had to leave to meet external obligations. Table 2 contains the performance measures of these three groups, plus another (Group 19) which completed all eight trials but failed to centralize. We can see that the performances of Groups 9 and 10 were relatively poor compared to those of Group 14, which centralized on the sixth and last trial, and Group 19. Let us compare the performance of the three groups that did not centralize with the performance of the eleven others before their centralization (Table 3): the former sent more messages per trial ($t = 1.95, p < .05$), their communication efficiency (in terms of messages per minute) was lower ($t = 2.85, p < .005$), and the number of errors per trial was greater ($t = 1.41, p < .10$). If we look at the groups who did centralize and compare their performances before and after centralization, we find again the same trends: after centralization the number of messages, the time and the number of errors per trial fell significantly. Clearly performance increased in the A tasks when the groups centralized.

B Tasks. In the A tasks there was a clear distinction between the groups that did not centralize and those that did. For the groups that centralized, it was very simple to distinguish between prejump and postjump trials. There were no such clear distinctions for the B trials. We could not discriminate performance differences according to the centrality index, partly because of the low mean and variance for the B tasks and partly because of the difficulty in interpreting the meaning of
TABLE 2
Performance Means for Those Groups Not Completing All Eight
A Tasks or Who Did Not Centralize

<table>
<thead>
<tr>
<th>Group designation</th>
<th>Mean No. of messages per trial</th>
<th>Mean time per trial</th>
<th>Mean No. of messages per minute</th>
<th>Mean No. of errors per trial</th>
<th>Mean centrality in A trials</th>
<th>No. of completed trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>20.0</td>
<td>5.67</td>
<td>3.65</td>
<td>0.18</td>
<td>0.466</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>45.5</td>
<td>7.40</td>
<td>6.12</td>
<td>1.00</td>
<td>0.315</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>56.0</td>
<td>9.75</td>
<td>5.73</td>
<td>1.75</td>
<td>0.147</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>37.0</td>
<td>11.00</td>
<td>3.36</td>
<td>0.13</td>
<td>0.441</td>
<td>8</td>
</tr>
</tbody>
</table>

* Groups 14, 9, 10, started with task B and Group 19 started with task A. Group 14 centralized on trial 6. The other three groups did not centralize.

b The mean number of messages per trial, mean number of messages per minute, and mean number of errors per trial were higher ($p < .05$) for groups 9 and 10 than for 14 and 19. In addition the mean centrality was significantly lower for Groups 9 and 10.

low centrality. The interpretation problem is discussed in the summary and discussion section. However, for all four performance measures (Table 3) there exist significant differences between the A and B tasks.

It is clear that for the most part the Task A data are not directly comparable in any meaningful sense with Task B data because the tasks are different. The one possible exception is the number of messages per

TABLE 3
Performance Means for Both Tasks According to Centrality

<table>
<thead>
<tr>
<th>Experimental situation</th>
<th>Mean No. of messages per trial</th>
<th>Mean time per trial</th>
<th>Mean No. of messages per minute</th>
<th>Mean No. of errors per trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups that never centralized on A tasks (9, 10, 19)</td>
<td>43.9</td>
<td>9.60**</td>
<td>5.22</td>
<td>.76*.***</td>
</tr>
<tr>
<td>Precentralization data for groups that eventually centralized on A tasks</td>
<td>32.6</td>
<td>10.50**</td>
<td>3.11</td>
<td>.32*</td>
</tr>
<tr>
<td>Postcentralization data on A tasks</td>
<td>10.4</td>
<td>4.00</td>
<td>2.07</td>
<td>.13</td>
</tr>
<tr>
<td>All B tasks</td>
<td>81.2</td>
<td>35.5</td>
<td>2.45</td>
<td>.66**</td>
</tr>
</tbody>
</table>

* The differences between all six pairs of means in each column are significant at .05, except the pairs marked by asterisks where * means $p < .10$ and ** means $p > .10$. Thus 21 out of a possible 24 pairs of means are significantly different at .05.

b This number has two asterisks since the pair (.76, .32) is significantly different at 0.10, but the pair (.76, .66) is not significantly different at 0.10.
minute, which is a measure of communication efficiency. For the B tasks the number of messages per minute was significantly higher than for the postcentralization A trials ($t = 10.8, p < .005$), but significantly lower than for the precentralization A trials ($t = 5.07, p < .005$) and the noncentralized groups on A trials ($t = 8.20, p < .005$). It is therefore possible to conclude that, in terms of communication efficiency, the B groups performed less well than the centralized A groups and better than the precentralized and noncentralized groups.

Subjective evaluations. The final questionnaire permitted us to obtain data on the subjective evaluation by the subjects of their relative liking of each task, and to what extent they thought the members in their group took the roles they felt were required.

Group-performance evaluation. Since the A tasks required centralization for greater efficiency, we expected that the greater the centralization of a group, the higher would be the evaluation of its performance by the members. Inversely, since the B tasks required more participation from all the members (therefore less centralization) in order to generate all possible solutions, we expected that the lower the centralization, the higher would be the group-performance evaluation. These expectations were supported by the data: we found a significant positive correlation ($r = .817, p < .05$) between average centrality (mean of the postjump trials, or the mean of all trials if the group did not centralize) and the mean group-performance evaluation for the A tasks, and a negative correlation ($r = -.365, p > .05$) for the B tasks. Although this last correlation did not reach a satisfactory level of significance, the difference between the two coefficients was highly significant.

Personal-performance evaluation. By the same reasoning, there should be a positive correlation for the B tasks between the evaluation of one’s own performance and one’s evaluation of group performance, and a negative correlation for the A tasks. The A tasks required very little personal performance unless the subject was in the most centralized position, but the B tasks required a high performance level by each subject. The correlation was significantly positive for the B tasks ($r = .687, p < .05$) and negative for the A tasks ($r = -.419, p < .05$). Again, the difference between these two coefficients was significant.

Liking of the tasks. Since average individual participation was inversely related to centralization, and the B tasks presented more of an intellectual challenge, one would expect a greater liking for the B tasks than for the A tasks. This assumption was supported by the findings ($t = 2.61, p < .02$).

Role-fulfillment evaluation. Another interesting finding was that for both tasks there was a significant and positive correlation between the
group-performance evaluation and the extent to which members felt that the appropriate roles had been taken in the group (r = .702 for A tasks and .687 for B tasks, both p < .05). However, only for the A tasks did we find a positive correlation between this evaluation of role-fulfillment and group centrality (r = .852, p < .05); there was no significant correlation for B (r = .076). This demonstrates that different roles were expected in the two different tasks.

Content Analysis

As mentioned earlier, the number of messages sent and received (upon which the centrality index is based) does not tell the complete story. It is also necessary to analyze the content of the messages. The size of our data does not permit, in this paper, a thorough content analysis; therefore, we shall analyze a subset of the data dealing directly with organizational centrality. In our content analysis we had one activity dealing with a concern for organizing for greater efficiency and two activities for the group's discussion about the designation of one or more coordinators (Table 4).

We found a significant difference between the groups who did not centralize and the others before their centralization in the A tasks. The latter communicated more than the former about the designation of a coordinator (t = 2.35, p < .05). However, there was no significant differ-

<table>
<thead>
<tr>
<th>Experimental situation</th>
<th>No. of elements per trial concerning organizing for greater efficiency</th>
<th>No. of elements per trial concerning the designation of one or more coordinators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups that never centralized on A tasks</td>
<td>4.30*&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.40*</td>
</tr>
<tr>
<td>Precentralization data for groups that eventually centralized on A tasks</td>
<td>6.43*</td>
<td>7.42</td>
</tr>
<tr>
<td>Postcentralization data on A tasks</td>
<td>0.00</td>
<td>0.05</td>
</tr>
<tr>
<td>All B tasks</td>
<td>3.39&lt;sup&gt;†&lt;/sup&gt;</td>
<td>3.68*</td>
</tr>
</tbody>
</table>

* The number of elements is identical to the number of statements unless the statement is a compound statement, in which case the number of elements is the same as the number of parts.

<sup>b</sup> The differences between all six pairs of means in each column are significant below .05 except those pairs marked by an asterisk * or a dagger †. This number has both an asterisk and a dagger because the pairs of means (4.30, 6.43), and (4.30, 3.39) are not significantly different. In this table nine out of the twelve possible pairs of means are significantly different at .05.
ence in the average number of statements (elements) about organizing for greater efficiency. Thus the groups that centralized were more concerned with the designation of a coordinator and equally interested in efficiency. This suggests that perhaps one of the reasons some groups did not centralize was their relative lack of communication about selecting a coordinator about whom they would centralize.

After the groups centralized, the number of communications, for the A tasks, concerning organizing for greater efficiency and the designation of one or more coordinators, fell essentially to zero. The differences are significant at the .001 level. This finding is supported by the results of the questionnaire where, for the A tasks, there is a high correlation between centrality, group performance, and feelings that members took the appropriate roles. If the group had not been performing well (efficiency) or if members felt that appropriate roles had not been taken, then there should have been statements to this effect.

If we now make the same comparison between the A groups and B groups, we find significant differences between the B tasks and the pre-centralized A tasks (t = 2.08, p < .05 for efficiency and t = 2.85, p < .01 for coordinators) but no significant difference between B tasks and the noncentralizing groups in the A tasks.

SUMMARY AND DISCUSSION

Our first objective was to determine the influence of the nature of the task upon the organization of a group. Our data demonstrate clearly that the A tasks (which were of a routine deductive nature) led towards centralization while the B tasks (which were nonroutine and had some inferential components) did not lead toward centralization.

Our second objective was to determine how organization structure acts as an intervening variable between task and performance. The results clearly show how a more centralized organization was conducive to a better performance with the A tasks. However, we did not find so clear a relationship for the centrality data in the B tasks. There are at least two explanations. The first is technical: the variance in centrality for the B tasks is low (the adjusted standard error is 0.147). A second and more substantive reason is the fact that a low centrality group does not necessarily mean an organized group and certainly does not explain what kind of organization it has, if any. One can see four distinct possibilities in interpreting low centrality:

1. A stable, differentiated organization where the roles of the participants differ from each other on each trial and the role of each participant does not change over time.
(2) A flexible organization where members take appropriate roles as needed. Such an organization can be characterized by different roles among the participants on a given trial, with the role of each participant changing from trial to trial.

(3) A chaotic organization where the roles of the members are not different on a given trial and where the roles of the participants vary from trial to trial.

(4) A uniform organization where the roles of the members are not different on a given trial and where the roles of the participants do not vary from trial to trial.

Only a detailed content analysis of the messages in terms of the activities can permit us to decide which kind of organization is behind the overall centrality of the group.

Moreover, the subjective evaluations by the members of their performance and of the group activities support our reasoning concerning the task dependency of organizational centrality.

The evidence presented in this paper, in our opinion, supports strongly the idea that treating organization structure as a dependent variable is a necessary condition for further development of experimental research in organizational behavior. In order to do so we shall need more insight into the determinants of organizational behavior and a more refined methodology to measure the dependent dimensions.

REFERENCES


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