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March, 1973

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ABSTRACT

Group structure is one of the important mediators between individual input and group output. The present study examines the effect of group structure on the following dependent variables: (1) change in the group member's evaluation of items evaluated before group interaction, as a consequence of group interaction, (2) change in his subjective evaluation model as a consequence of group interaction, (3) group (collective) evaluations, and (4) group efficiency measured in terms of the amount of time required to complete the group task. The results of the study corroborate previous findings of the positive performance effects of decentralized group structures on complex tasks.

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THE EFFECTS OF STRUCTURE ON GROUP EFFICIENCY AND INTERJUDGE AGREEMENT FOLLOWING GROUP DISCUSSIONS

INTRODUCTION

The present study was designed to assess the effects of subgroup structure on the behavioral and performance outcomes of groups involved in decision making tasks. In particular, the study had as a primary goal the development of an understanding of how the interaction patterns of the group affect group decision making.

The pattern of interpersonal relations is called group structure. One strategy for the study of group structure under controlled conditions, and the one employed in the present study, is to impose a structure upon a small group. Structure is thus treated as an independent variable, and the consequences of a particular structure may be observed on dependent variables such as group performance, interpersonal responses, and the personal reactions of the group members (Davis, 1969).

One purpose of many of the studies of the decision processes in small groups and in formal organizations has been to determine which individuals, or organizational units, actually take part in the decision process and how influence is distributed among them. In small group research, this influence is often expressed in terms of the "power" exercised by the individual members (Cartwright, 1965). Similarly, in the study of formal organizations, interest has been focused upon the levels within the organization at which the decisions are assigned and/or actually made (Blau & Scott, 1962). While the present study is not specifically concerned with "power" or formal organizational levels, the amount of influence exercised within the group and the members' perceptions of these influence attempts are relevant issues for the study.

REVIEW AND HYPOTHESES

In an early small group study on communication networks, Goldberg (1955) introduced a new task, the unstructured group decision task, and a new dependent variable, influence (or more precisely, influencability). He put forth the hypothesis that central positions in a decision network would not be influenced as much as peripheral positions in a decision making tasks. He measured influence by determining the amount that a subject changed his initial estimate during the experimental session. Goldberg's

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finding was that influencability was negatively related to the centrality of the position only for the Y network; this relationship did not hold for wheel and chain networks. Shaw, et.al. (1957) also employed the use of an unstructured decision task. The results of their study indicated that in general the amount of change that a subject was willing to make was more a function of the amount of support and opposition he faced rather than any position characteristics of the decision network.

The degree of agreement among members of decision-making groups has not been extensively examined in the literature. One notable exception is the study by Goldberg (1966) in which he found rather high consensus among evaluations made by individual members following group discussions of the alternatives. A study by Winkler (1968) also suggests that subjects tend to make their re-evaluations of the alternatives following group discussions closer to the group assessment than to their original evaluations.

In addition, in earlier research dealing with network groups, it has been demonstrated that groups in centralized networks (wheel networks) solve problems faster and with fewer answer changes and incorrect answers than groups working in other, particularly decentralized, networks (Cohen, 1961). Groups in the all-channel network have been shown to be significantly slower than groups in the wheel network in time required to solve the group task (Cohen, 1962; Guetzkow and Simon, 1955). On other performance indices, the wheel network usually proves superior (Shaw, 1964). On the other hand, contrary to Leavitt's (1951) original generalization, in a number of studies the highly centralized structures are less efficient than other structures (Shaw, 1958; Shaw, et.al. 1957; Cohen, et.al. 1969). It appears that there is no simple answer to the question of the effects of group strucure upon group efficiency. In addition, the effect of group structure has been shown to depend in part on the requirements of the task (Heise and Miller, 1951; Malder, 1960; Shaw, 1954).

These findings will be compared and contrasted to the results obtained for the hypotheses presented in Table 1 below. It follows from the studies cited above that group structure is one of the important mediators between individual input and group output. In the present study we examined the effect of group structure on the following dependent variables: (1) change in the group member's evaluation of items evaluated before group interaction as a consequence of group interaction, (2) change in his subjective evaluation model (Huber, Sahney, and Ford, 1969) as a consequence of group interaction, (3) group (collective) evaluations, and (4) group efficiency measured in terms of time to complete the group task.

Insert Table 1 here

METHOD

The study was conducted in a laboratory setting. Group structure was defined in terms of the number and kinds of communication channels existing between the members of the group. Two types of decision network groups were used. One type was such that the group members could communicate only with their group leader and not directly with each other (centralized network). The other type of decision network was such that all members could communicate directly with each other (decentralized network).[1] All communication channels were two-way channels.

Subjects. The subjects were 72 volunteer undergraduate and graduate students in industrial engineering and business at a large midwestern university. They were randomly assigned to two subsamples, 36 subjects in each subsample. Subsamples 1 and 2 corresponded to subjects who worked in centralized and decentralized decision networks, respectively, at level 1 of the laboratory organizations, as further explained below. The subjects were run nine at a time, with three subjects being randomly assigned to each of three subgroups. A group leader or representative for each group had been previously designated by the experimenter (randomly determined). This person's job was to serve as the representative of his group for the level 2 orgnaizational task. The subgroups were formed into two-level laboratory "organizations" representative of overlapping groups or committees (c.f. Likert's (1961, 1967) "linking pin" concept). Figure 1 illustrates this approach. First, level 1 groups made their decisions (recommendations), and then their leaders brought these recommendations as inputs to the decision making task at level 2 of the organization. At level 2 the leaders of each subgroup met as a task force and acted upon the recommendations from the subgroups. The final organizational decision was the output of the level 2 task activity.[2] All communication within the subgroups was via an intercom system. A schematic wiring diagram of this intercom system is shown in Figure 2.

Insert Figures 1 and 2 here

After subjects had been randomly assigned to experimental conditions, written and verbal instructions about the subgroup and total organizational tasks were given along with a description of the post-interaction procedures. Those persons who were to occupy the leader or group representative position within subgroups were identified and their roles in relation to the subgroup and organizational tasks explained.

Experimental Task. The task required of each subgroup was to evaluate fifteen hypothetical teaching professors described in terms of five qualitative factors. The descriptions were not those of any actual professors and the subjects knew this. Members of the subgroups had previously rated the same hypothetical professors privately as individuals. Within the subgroups the members were to (1) discuss their individual evaluations, (2) develop, as a group, overall evaluations of the 15 professors and (3) identify, so as to recommend for award, the five most outstanding professors in the set of descriptions under consideration. Each level 1 subgroup had a different set of descriptions to consider. An example description is given below.

> He has an excellent mastery of the subject and possesses a wide fund of knowledge in other fields. Usually he is adequately prepared, but frequently seems disorganized. He asks the best work from the students but is sometimes satisfied with average workmanship. He expresses himself clearly and enthusiastically; his diction is very good. He generally will listen to all viewpoints but at times appears to be disturbed and impatient when students oppose his views.

Prior to the group discussions the procedure described in detail by Ford (1972), and originally developed by Hoepfl and Huber (1970), was followed. Very briefly, each subject was asked to evaluate each of the described professors on a 1-100 scale which recorded his "level of satisfaction" with the professor described. This overall rating is noted as U. Secondly, each subject was asked to indicate, on a 1-100 scale, the rating, x_{nl}, that he would give to a professor who was described solely in terms of the l^{th} level of the n^{th} factor. The order of appearance of

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the factors within descriptions and of the levels within factors was randomly determined. An example of a completed recording instrument is shown in Figure 3. This "graphical" scaling procedure has been shown to produce reliable ratings of factor levels (Hoepfl and Huber, 1970).

Insert Figure 3 here

Having completed these evaluations (prior ratings) the subjects then met and discussed their evaluations in the different three-man subgroups to which they had been assigned. No decision rule for final evaluations of the professors by the subgroups was specified. Rather, the members decided among themselves how their final decisions and the selection of the "chosen" subset of five most outstanding professors were to be determined.

Following the group discussions at level 1, the group members then completed a post-discussion questionnaire which (1) solicited measures of their attitudes and feelings with respect to various aspects of their group experiences, and (2) also asked the subjects privately to reevaluate (post ratings) the professors they had previously rated and also to evaluate (revised ratings) a different set of 15 professors. The purpose of these post-discussion ratings was to determine what modifications, if any, occurred in the subjects' decision models as a result of their group interaction.

The primary analyses using the rating data consisted of several procedures: (1) computing Pearson product-moment correlations between prediscussion and post-discussion ratings of the group members, (2) comparing the group ratings with these prior and post ratings of the group members, (3) using multiple regression procedures to estimate the parameters of the five mathematical models shown in Table 2[3] below and computing R, the multiple correlation coefficient, for each subject for each of the five models, and (4) performing an analysis of variance on the R's associated with the five models. The ANOVA was actually performed on Fisher's Z transformations of these R's (c.f. Du Bois, 1965).

Insert Table 2 here

RESULTS

The results for the hypotheses that were tested are presented in Table 1. In that the hypotheses were all stated in the alternative form rather than in the usual null form, if the associated null hypothesis was rejected, this indicated that the hypothesis as stated was supported by the data. Additional data relevant to the analyses associated with testing several of the hypotheses in Table 1 are presented in Tables 3 and 4.[4]

Insert Tables 3 and 4 here

Hypothesis 1 was supported. The total time required to complete the task was significantly less ($p. < .01$) for organizations using decentralized networks than that required for those organizations using centralized networks. Hypothesis 2 was also supported. Wheel subgroups took a significantly greater amount of time ($p. < .025$) to complete the task than did all-channel subgroups. Although supergroups (task force groups) at level 2 of both types of organizations were all-channel groups, it was hypothesized that there would be significant differences in performance of these groups because of the major differences in overall organization form. Hypothesis 3 was not supported.

Due to the greater opportunity for discussion by all members of the decentralized subgroups, it was hypothesized that post-discussion agreement would be higher for these group members than for members of centralized subgroups. Although hypothesis 4 was not supported, the difference was in the predicted direction. The results for this analysis are summarized in Table 4 which presents the mean product-moment correlation coefficients averaged across all groups within a particular sample. Member 1 represents the group leader and members 2 and 3 represent the other members of the group. For the total 24 groups (72 members) the mean post-discussion correlations ($\hat{r} = .69$) were higher than the mean pre-discussion correlations ($\hat{r} = .66$). This may suggest that some consensus in the ratings occurred as a function of group discussions. The difference between mean pre-discussion and post-discussion correlations was larger for sample 1 than for sample 2, indicating that greater convergence toward consensus occurred in the wheel groups than in the all-channel groups. However, neither of these differences in mean pre-and post-discussion correlations for either sample was statistically significant.

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An analysis of variance conducted in conjunction with hypothesis 7, using Scheffe's (1959, pp. 362-363) approximation on the Fisher's Z-transformed multiple correlation coefficients, showed a significant effect due to structure on the subjects' revised ratings, as well as several two-factor interaction effects for structure with academic degree level and structure with sex. For the post ratings analysis, position in network showed a significant effect but not the overall structural variable. Thus, the results did lend mild support for hypothesis 7.

As shown in testing hypothesis 4, group discussion served to slightly but not significantly increase the consensus of the group members regarding the alternatives under consideration. The group convergence toward consensus, it was thought, would be reflected in the post discussion ratings being closer to the group ratings than would be the case for the pre-discussion ratings. Hypothesis 5 was partially supported, with the group and post discussion ratings being significantly more alike than the group and pre-discussion ratings for the all channel groups. Although the hypothesized difference was not significant for wheel subgroups, the difference was in the predicted direction.

Since members of wheel groups had no opportunity to talk to anyone except their group leader, it was felt that the leader would be able to have more influence on his group members than would be the case for all channel groups. The results for hypothesis 6 marginally supported this contention.[5]

DISCUSSION

Subgroup Performance and Effectiveness

With respect to effeciency and task performance, the decentralized organization and subgroups took significantly less time to complete the task than did the centralized organization and subgroups. This is in keeping with the findings of many earlier studies involving complex tasks. This finding in earlier studies and in the present study could possibly be due to the presence of a task complexity-group efficiency interaction. The common finding that centralized networks are superior to decentralized networks in time taken to complete the task applies primarily to studies involving simple tasks (e.g., symbol-letter-, number-, and color-identification tasks). On the other hand, it has been shown in other studies (Shaw, 1958; Shaw, et.al., 1957) that with complex tasks (e.g., word arrangement, discussion, arithmetic, and sentence construction) the decentralized groups will be superior. Shaw (1964)

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tabulated the results of 18 different experiments and compared the results for simple and complex tasks. The results definitely indicated a task complexity-group performance interaction.

The present study involved a task that must be classified as complex: (1) it involved multi-criteria decisions, (2) it involved cognitive complexity in that information had to be combined, and (3) it involved perception by subjects of two problems -- the subgroup rating of the professorial alternatives and the requirement for success at the upper level of the organization. Therefore, we feel our results corroborate previous findings of the positive performance effects of decentralized structures on complex tasks.

Effects of Structure on Consensus Convergence. The results for the effects of group structure on between-member agreement following group discussion is only mildly supportive of the hypotheses examined. If we can interpret the difference between the group rating of the designated chosen alternatives and the members' post discussion rating of these same alternatives as the experienced disagreement of the individual as suggested by Delbecq, et.al. (1968), then an examination of the mean differences for wheel and all-channel groups indicated that the mean difference was less for all-channel groups, but the difference for the two kinds of groups was not significant. That is, members of the wheel groups experienced greater disagreement with the group evaluations of the alternatives even though their reassessments were closer to the group ratings than were their prior ratings. Miller (1971, p. 347) reviews an experiment on jury panels with a similar finding. It seems as though the group decisions in that study were arrived at by explicitly making rough averages of individual estimates of the members. Individual members did not always agree with the group decision but supported it because the jury had to have a unanimous decision if it was to be implemented and if a hung jury was to be avoided. Although a unanimous decision was not explicitly required of the groups in the present study, it does seem that a similar process may have taken place in the wheel subgroups in order for them to make a decision, since communication channels between members other than the leader were unavailable.

Inter-Position Influence. Our finding that subgroup members of wheel groups were more influenced by the leader than was the case in all-channel groups can be partially explained by some of the above arguments in support of other findings already mentioned.

Position in the group's communication network is an important determinant of relative influence in artificially constrained networks (Miller, 1971). Also, position in a group's communication net can influence conformity and deviation. In one study of four-man groups, the person in the most central position in the wheel configuration never disagreed with the majority, or the majority never differed with him (Shaw, et.al., 1957). Central members were in a position to get their opinions accepted. Thus, the members of wheel networks may have felt more influenced by the leader than did the members of all-channel groups. In addition, it is possible that the group evaluations and decisions were strongly influenced by the group leader's evaluations. Indeed, in many of the earlier experiments, the central member of a wheel network was always the decision maker. In order to reduce cognitive overload from the other members sending their information, the group leader may have attempted to strongly influence the final decision process.

We suspect that the group members were ego-involved in their prior ratings and group discussion had little effect on their post ratings, thereby resulting in the different results for post and revised ratings associated with hypothesis 7. That is, the task of having to evaluate a second and different set of alternatives (revised ratings) removed the initial ego involvement or "inertia effect" (Pitz, 1969) and in turn caused the group discussions to have more of an effect. This is speculative, however, and further experimentation is needed to determine the exact causes of the different results for hypothesis 7.

It is, of course, possible that other explanations could be given for the results obtained here. It is clear that more research is needed to test these possible explanations as well as those that we have set forth.

FOOTNOTES

1. The centralized and decentralized network groups were given the names wheel and all-channel, respectively, in keeping with the designation of these kinds of networks in the previous literature.

2. The decision network at level 2 of the organization was always a decentralized (all-channel) network. The three decision networks at level 1 of the organization were eithere all centralized (wheel) or all decentralized networks. Therefore, only two of the eight possible organizational configurations were examined in this study, a highly centralized (C) and highly decentralized (D) organization.

3. These five mathematical models were examined in detail in Ford (1972) in order to determine which model better represented the decision making strategies of the individual subjects.

4. Please note that entries within the body of Table 4 are mean values of pre- and post-discussion correlations averaged over 36 members as appropriate. Position in group integrity has been maintained with the computations. The column and row means as well as grand means were computed as follows:

Let N = number of subsamples

r_{ij} = mean correlation between members i and j averaged over 12 groups.

σ_A = mean standard deviation of member's pre-discussion ratings.

σ_B = mean standard deviation of member's post-discussion ratings.

$I = J$ = number of members.

Then

$$r_{i.} = \sum_{j=1}^{J} r_{ij}/J, \qquad r_{.j} = \sum_{i=1}^{I} r_{ij}/I$$

$$\sigma_{i.} = \sum_{j=1}^{J} \sigma_B/J, \qquad \sigma_{.j} = \sum_{i=1}^{I} \sigma_A/I$$

$$\bar{\bar{r}} = \sum_{i=1}^{I} \bar{r}_{i.}/I, \qquad \bar{\bar{\sigma}} = \sum_{i=1}^{I} \sigma_{i.}/I \quad \text{(pre-discussion)}$$

$$\bar{\bar{r}} = \sum_{j=1}^{J} \bar{r}_{.j}/J, \qquad \sigma = \sum_{j=1}^{J} \sigma_{.j}/J \quad \text{(post-discussion)}$$

5. Since a value for α of .10 is only marginally significant, we actually conclude here that hypothesis 6 was not supported. We are using a value of .05 for α as the basis for rejecting the null hypothesis.

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TABLE 1

Research Hypotheses and Results

Research Hypothesis[a]	How Measured	Statistical Test[b]	Results
I. Hypotheses Concerning Subgroup Performance and Effectiveness			
A. Time to Complete Task			
1. The most centralized organization, (C) is the less effective organization in terms of time taken to complete the task.	Task completion times of subgroups and task force supergroup were recorded and summed to arrive at total organization times.	A t-test was used to compare the centralized (C) and decentralized (D) networks. H_0: $X_C - X_D = 0$ vs. H_1: $X_C - X_D > 0$ d.f.: $n_1 = n_2 = 4$	$t = 3.705$; reject H_0. Hypothesis 1 is supported.
2. The wheel subgroups are less effective than all-channel groups in terms of time taken to complete task.	Task completion times of the subgroups were recorded and their mean computed.	Compared mean task completion times of subgroups using t-test. H_0: $X_w - X_{ac} = 0$ vs. H_1: $X_w - X_{ac} > 0$ d.f.: $n_1 = n_2 = 12$	$t = 3.406$; reject H_0. Hypothesis 2 is supported.
3. There are significant differences between subgroups of the same type in different organizations in terms of time taken to complete task.	Task completion times of the task force supergroups were recorded and their mean computed.	A t-test was used to compare C and D networks. H_0: $X_{ac_C} - X_{ac_D} = 0$ vs. H_1: $X_{ac_C} - X_{ac_D} \neq 0$ d.f.: $n_C = 4$, $n_D = 16$	$t = -.1581$ N.S.; fail to reject H_0.
II. Hypotheses Concerning Influence of the Group and Effects of Structure			
A. Effects of Structure on Consensus Convergence			
4. There will be greater agreement among members' post discussion ratings of the alternatives for all-channel groups than for wheel groups.	The Pearson product-moment correlation coefficient between group members' post-discussion ratings was computed across groups of the same type.	A t-test of differences in mean values of the Z-transformed r values. H_0: $r_D - r_C = 0$ vs. H_1: $r_D - r_C > 0$ d.f.: $n_1 = n_2 = 12$	$t = 1.27$ N.S.; fail to reject H_0. Hypothesis 1 is not supported but difference is in predicted direction.

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TABLE 1

(continued)

Research Hypothesis	How Measured	Statistical Test	Results
5. Members of both kinds of groups will tend to make their reassessments of the alternatives (post ratings) closer to the group assessments than to their original assessments (prior ratings).	Groups' recommendations were rated on 0-100 scale. Two indices were computed for each alternative: D_1 = Prior rating - group rating; D_2 = Post rating - group rating. These differences were summed across subjects and means values computed.	use t-test. H_0: $D_2 - D_1 = 0$ vs. H_1: $D_2 - D_1 < 0$; d.f.: $n_2 = 68$, $n_1 = 68$ (w groups); $n_2 = 66$, $n_1 = 70$ (ac groups)	For ac groups: $t = -2.48$; reject H_0 at $\alpha = .01$ level. For w groups: $t = -1.06$ N.S., but in predicted direction. Hypothesis 8 is partially supported.
B. Inter-position Influence			
6. Subgroup members of wheel groups will feel influenced more by the leader of their group than will members of completely connected groups.	Perceived influence was measured on a 7-point semantic-differential scale where 4.00 represented a neutral position or attitude.	A t-test was used to compare w and ac groups. H_0: $\bar{X}_w - \bar{X}_{ac} = 0$ vs. H_1: $\bar{X}_w - \bar{X}_{ac} > 0$; d.f.: $n_w = 22$, $n_{ac} = 24$	$t = 1.451$, marginally significant at $\alpha = .10$ level. Reject H_0. Hypothesis is partially supported.
7. Subjects' prior decision models are affected by the interaction of structural and demographic variables.	Group members sex, degree level, position in network, and type of network were recorded as variables along with multiple correlation coefficients associated with subjects' post and revised ratings.	An analysis of variance was conducted on Z-transformed R's of post and revised utility models of subjects. Factors were structure, sex, degree level, position in network, and type of decision model. H_0: $\beta_{12} = 0$ vs. H_1: $\beta_{12} \neq 0$	There was a significant effect due to structure for the revised rating ($F = 6.71$, $p < .01$). Other factors which were significant were sex ($F = 22.18$, $p < .01$), structure x sex ($F = 10.34$, $p < .01$) and structure x degree level ($F = 5.78$, $p < .05$) for revised ratings. For the post ratings there was no significant effect due to structure ($F = 2.06$), but there was a significant effect due to position in network ($F = 8.76$, $p < .01$), structure x degree level ($F = 19.59$ $p < .01$) and sex x position in network ($F = 19.40$, $p < .01$). It thus appears that the hypothesis is supported. Reject H_0.

a/ Note: The names all-channel net and completely connected net are synonymous and are used interchangeably here.

b/ The degrees of freedom indicated may be less than the maximum possible, in some cases, given the total number of subjects and subgroups. This lower number of degrees of freedom is due to incomplete or unanswered items on the post-discussion questionnaires which were not discovered until after the experiments were completed.

TABLE 2

Summary of the Five Mathematical Models

Name	Conceptual Formula	Computing Formula
LINEAR	$U = U_0 + \sum_{n=1}^{N} u_n x_{n1}$	$U = U_0 + \sum_{n=1}^{N} u_n x_{n1}$
CONJUNCTIVE (CONJ)	$U = \prod_{n=1}^{N} U_0 x_{n1}^{u_n}$	$\text{Log } U = \text{Log } U_0 + \sum_{n=1}^{N} u_n \text{Log } x_{n1}$
DISJUNCTIVE (DISJ)	$U = \prod_{n=1}^{N} U_0 \left(\frac{1}{a_n - x_{n1}}\right)^{u_n}$	$\text{Log } U = \text{Log } U_0 - \sum_{n=1}^{N} u_n \text{Log}(a_n - x_{n1})$
LOGARITHMIC (LOG)	$U = U_0 + \sum_{n=1}^{N} u_n \text{ Log } x_{n1}$	$U = U_0 + \sum_{n=1}^{N} u_n \text{ Log } x_{n1}$
EXPONENTIAL (EXP)	$U = \prod_{n=1}^{N} U_0 \, e^{u_n x_{n1}}$	$\text{Log } U = \text{Log } U_0 + \sum_{n=1}^{N} u_n x_{n1}$

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TABLE 3

Task Completion Times of the Different Subgroups (Minutes)

SUB-GROUP	Wheel Groups				Completely Connected Groups			
	REP 1	REP 2	REP 3	REP 4	REP 1	REP 2	REP 3	REP 4
S1	25	45	35	66	40	35	50	40
S2	43	56	57	32	45	33	44	33
S3	83	68	72	41	42	25	46	28
S4	30	18	54	39	15	26	32	45

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TABLE 4

Mean Agreement Among Members of the Decision Making Group Before and After Group Discussion[a]

Group Member		Group Member 1	Group Member 2	Group Member 3	Pre-Discussion $\bar{\sigma}$	Pre-Discussion $\bar{r}$	Grand Means
Sample 1							
1		.868	.605	.735	22.82	.669	$\bar{\bar{\sigma}} = 22.61$
2		.726	.873	.532	21.89	.568	
3		.626	.602	.878	23.11	.633	$\bar{\bar{r}} = .623$
Post-Discussion	$\bar{\sigma}$	22.40	22.68	24.86			
Post-Discussion	$\bar{r}$	.686	.666	.615			
Grand Means		$\bar{\bar{\sigma}} = 23.38$	$\bar{\bar{r}} = .656$				
Sample 2							
1		.846	.709	.706	23.91	.707	$\bar{\bar{\sigma}} = 23.02$
2		.670	.809	.695	22.63	.702	
3		.740	.765	.815	22.51	.700	$\bar{\bar{r}} = .703$
Post-Discussion	$\bar{\sigma}$	24.08	23.01	23.87			
Post-Discussion	$\bar{r}$	.705	.718	.753			
Grand Means		$\bar{\bar{\sigma}} = 23.66$	$\bar{\bar{r}} = .725$				

Pre-Discussion (Combined Samples)

$$\hat{\sigma} = \sum_{n=1}^{N} \bar{\bar{\sigma}}/N = 22.82$$

$$\hat{r} = \sum_{n=1}^{N} \bar{\bar{r}}/N = .66$$

Post-Discussion (Combined Samples)

$$\hat{\sigma} = \sum_{n=1}^{N} \bar{\bar{\sigma}}/N = 23.52$$

$$\hat{r} = \sum_{n=1}^{N} \bar{\bar{r}}/N = .69$$

[a] Mean correlations between the ratings of different members prior to group discussion are presented above the diagonal of the matrix; mean correlations after group discussion are presented below the diagonal. Diagonal entries present the mean of the pre-versus post-discussion correlations for individual group members.

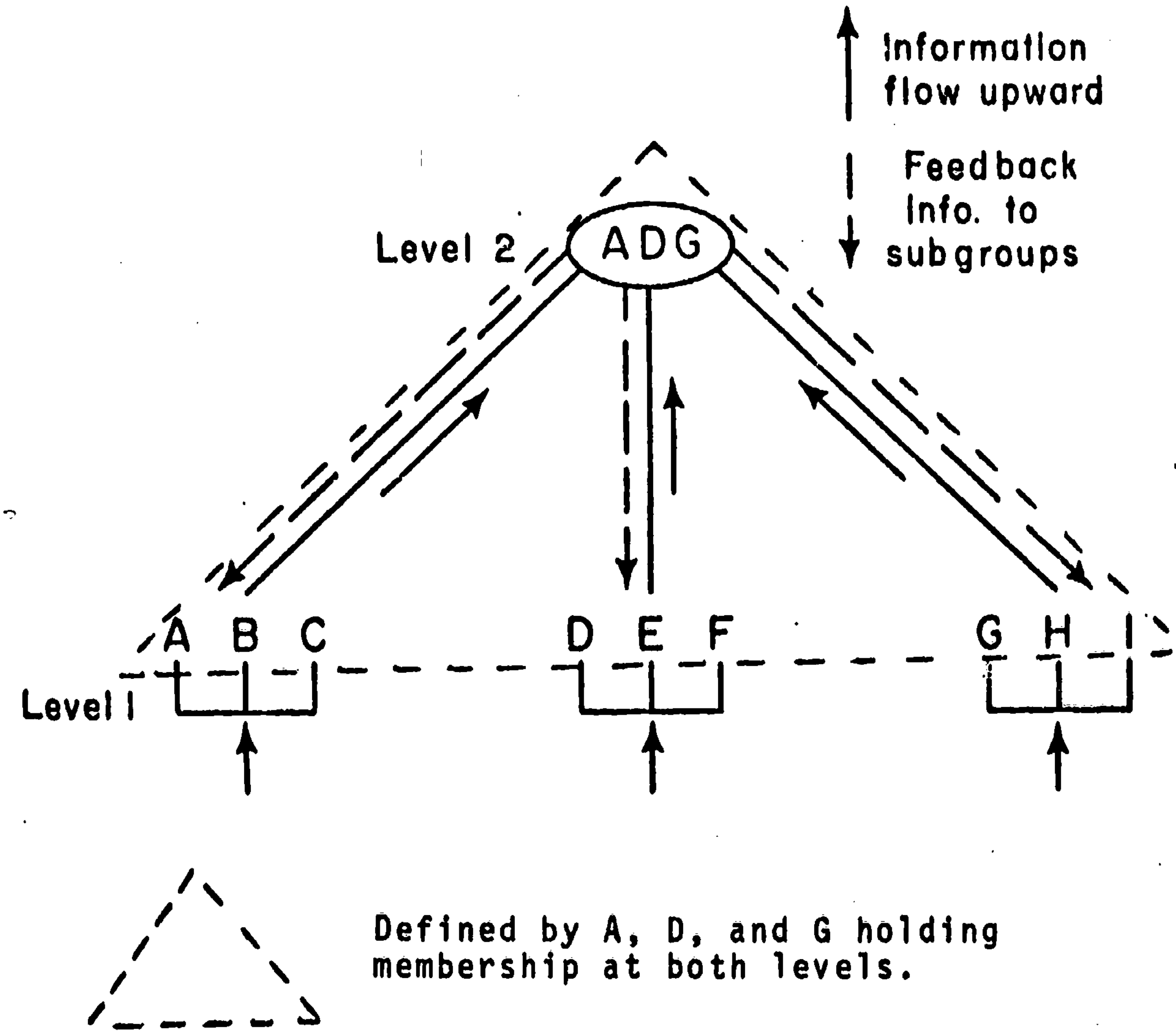
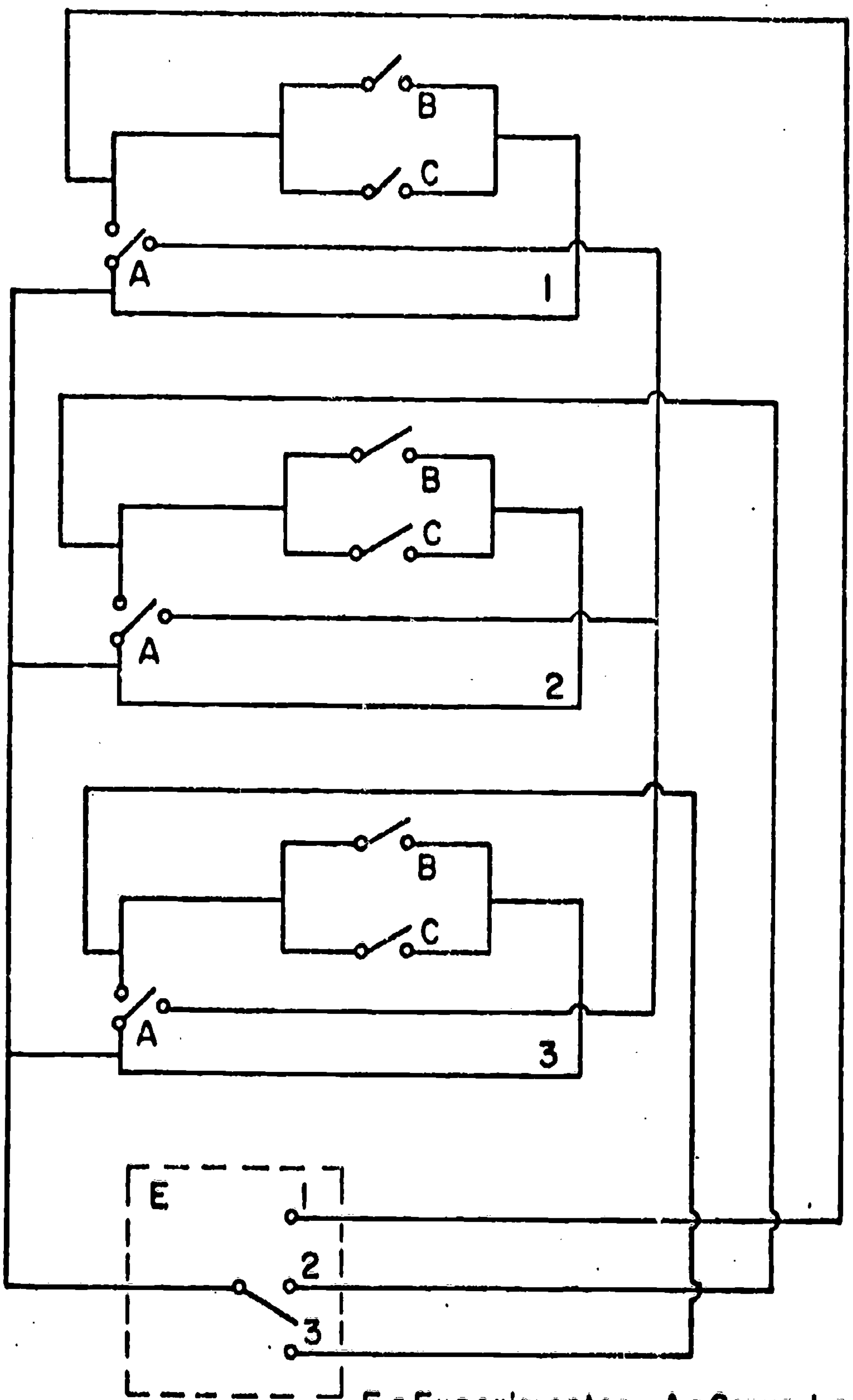


FIGURE 1

Organizational Structure



E = Experimenter , A = Group Leaders

FIGURE 2

Schematic Wiring Diagram of Communication Networks Within Experimental Groups

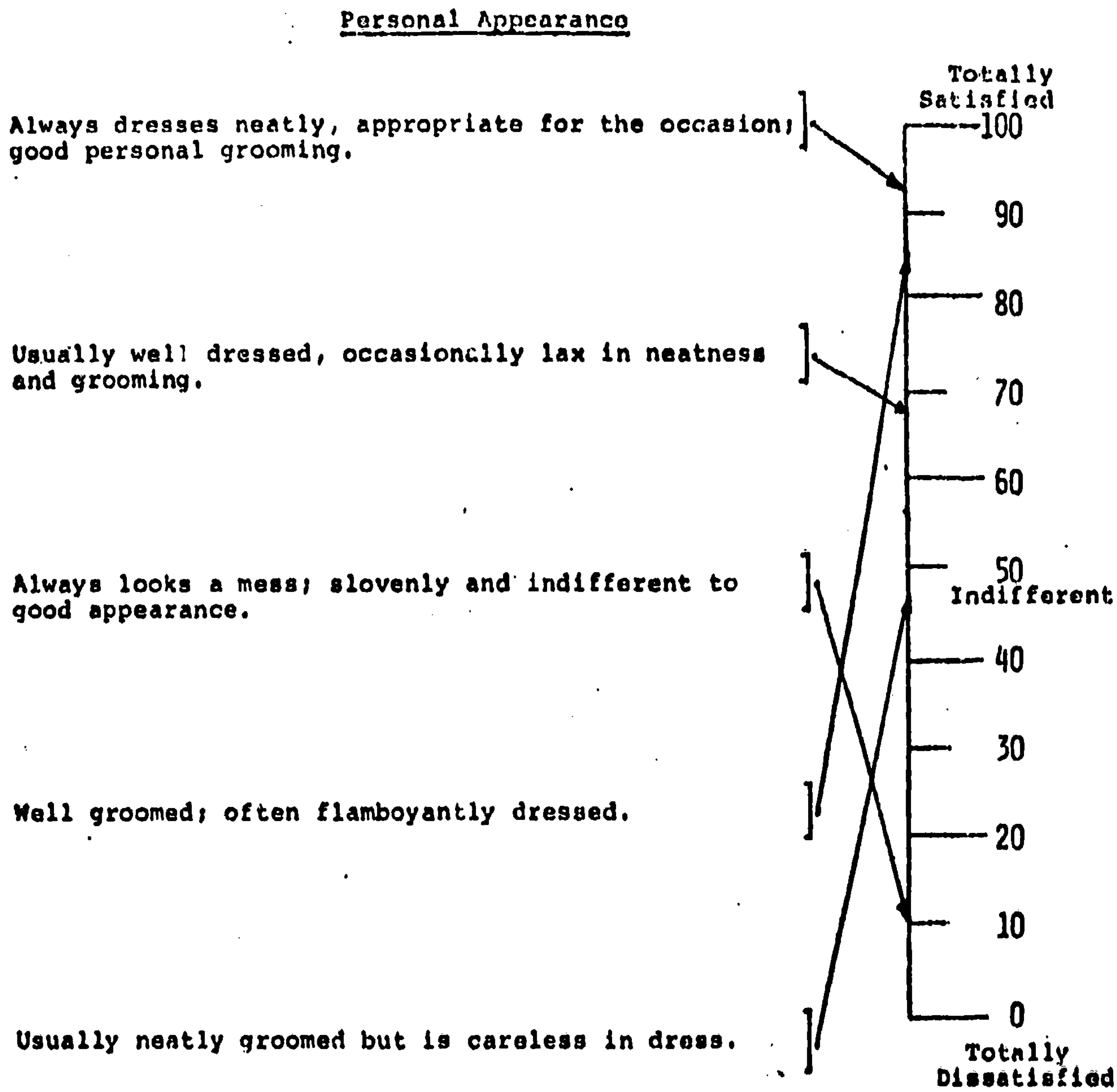


FIGURE 3

Example of a Completed Recording Instrument
for the Factor "Personal Appearance"

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