DOCUMENT RESUME

ED 097 776 EA 006 479

AUTHOR Nemiroff, Paul M.
TITLE Group Decision-Making Performance as Influenced by Consensus and Self-Orientation. Paper No. 426.
INSTITUTION Purdue Univ., Lafayette, Ind. Herman C. Krannert Graduate School of Industrial Administration.
PUB DATE Oct 73
NOTE 45p.
AVAILABLE FROM Secretary of the Institute Paper and Reprint Series, Krannert Graduate School of Industrial Administration, Purdue University, West Lafayette, Indiana 47907 (free)

EDRS PRICE MF-$0.75 HC-$1.85 PLUS POSTAGE
DESCRIPTORS Bibliographies; Convergent Thinking; *Decision Making; Decision Making Skills; *Group Dynamics; Individualism; Intervention; Performance; *Problem Solving; Research; *Self Concept; Tables (Data)
IDENTIFIERS Consensus; *Self Orientation

ABSTRACT

The study attempts to specify and verify the decisionmaking processes utilized by groups when faced with a multistage rating task. It is also designed to upgrade group efficacy by introducing some procedural guidelines which group members are asked to follow in resolving differences. This "structured" intervention encourages members to seek out differences of opinion and dissuades them from using "conflict-reducing" techniques such as majority vote or trading. In addition the study examines aspects of interpersonal styles on group functioning, in particular self-oriented, individualistic behavior which is apparently dysfunctional to group processes. The major implication of the study, is that it is indeed possible to improve group performance, even in groups with potentially "poor" members, via a simple structures intervention. (Author/WM)

GROUP DECISION-MAKING PERFORMANCE AS INFLUENCED BY CONSENSUS AND SELF-ORIENTATION

by

Paul M. Nemiroff

Paper No. 426 - October 1973

Institute for Research in the
BEHAVIORAL, ECONOMIC, and
MANAGEMENT SCIENCES

KRANNERT GRADUATE SCHOOL OF
INDUSTRIAL ADMINISTRATION

Purdue University
West Lafayette, Indiana

GROUP DECISION-MAKING PERFORMANCE

AS INFLUENCED BY

CONSENSUS AND SELF-ORIENTATION

by

PAUL M. NEMIROFF[1]

PURDUE UNIVERSITY

[1]The author is especially grateful to Professor Donald C. King for his suggestions regarding format, and for his encouragement throughout the course of this investigation.

Within the last decade the use of groups in decision-making and problem-solving situations has grown extensively. While the existent literature is replete with studies which enumerate conditions under which groups operate most efficiently, few articles have dealt with the modification or facilitation of group decision-making processes. Notable exceptions are the studies by Maier and Solem (1952), Maier and Hoffman (1960), Hall and Williams (1970), and Hall and Watson (1971). If the full potential of decision-making groups is to be realized, concentrated efforts are needed to further delineate these facilitative processes. Further, such efforts should be directed toward translating theoretical findings into practical applications.

Recently, Hall and Williams (1970) undertook such an investigation. They utilized group dynamics training as a technique for modifying group decision-making processes. They noted that trained groups consistently performed more effectively than untrained groups on measures of decision quality, utilization of best resources and creativity. Two procedural factors seemed to differentiate the functioning of control groups from the performance of trained groups. The first factor, a "strain toward convergence" phenomenon was the tendency of untrained groups to coalesce rapidly so that they could reach a decision and discharge the responsibility with which they were charged. Convergence seemed to be valued as a precondition to decision-making. Presumably, it introduced a sense of urgency in groups which, in turn, affected the decision techniques employed and the manner in which opinion differences were handled. The second factor, which is directly related to the first, concerned the resolution of conflicts. Untrained groups apparently handled conflict via quick

compromises and employed decision-techniques such as majority rule. Trained groups, on the other hand, actively sought out points of disagreement and thus promoted conflicts, which they presumably treated as symptomatic of incomplete sharing of information among members. For trained groups, convergence became less of a concern than the manner in which it was to be achieved. It is important to note, however, that both of the aforementioned factors were based on inferred dynamics of statistical comparisins of the data. No attempts were made to verify such inferences via the opserver report method, nor was any post-discussion data collected from the untrained subjects.

In a later study, Hall and Watson (1971) attempted to encapsulate the lengthy group dynamics training employed in the 1970 study by Hall and Williams into a set of "normative" instructions which, essentially, were designed to break the convergence strain phenomenon noted among untrained groups. In addition, these instructions were designed to legitimize certain confrontive behaviors on the part of group members which, although thought to be essential for creative and productive group action, are typically viewed as deviant and disruptive acts within groups. Specifically, the instructions were designed to promote a fuller sharing of ideas and opinions via a consensual resolution of differences. The results of the Hall and Watson study indicated that groups receiving the normative instructions consistently outperformed uninstructed groups. The performance differences noted were attributed to the consensual decision techniques employed by instructed groups. It was implied that uninstructed groups performed less well because they did not use such a consensual technique, and resorted to more traditional modes

of decision-making such as majority rule.

Again, however, many of these conclusions are based on inferred dynamics of group processes via statistical comparisons of the data. Although Hall and Watson (p.306) state that, "...groups were 'polled' after completion of the task about the manner in which they had been able to work", they do not clearly specify how they were "polled", whether individually or in their group. This is an important consideration since confounding variables may enter into the situation if members are polled in the presence of each other (e.g. conformity issues). In addition, it has been pointed out elsewhere (Mangham and Cooper, 1969), that others may be better or more accurate sources of one's behavior in a group situation than the person is himself. Furthermore, self-reports as such should be considered as dependent measures, rather than as a check on one's independent manipulation. Patently, total reliance on self-reports or inferences drawn from statistical analyses of the data lead to speculation as to the actual processes employed by groups in resolving decisions. If, however, self-reports are used in conjunction with other techniques, in particular observer reports, a more accurate and realistic measure of the group processes and procedural factors actually employed should be obtained.

The present study combines, adapts and extends earlier techniques. It attempts to specify and verify the decision-making processes utilized by groups when faced with a multi-stage rating task. More importantly, the present study is designed to up-grade group efficacy by introducing some procedural guidelines which group members are asked to follow in resolving differences. The rationales behind the instructions are based,

in large part, on the theories posited by McGregor (1960; 1967) in distinguishing between "successful" and "unsuccessful" groups, and on the findings and suppositions of Hall and Williams (1970) and Hall and Watson (1971). The instructions are adapted from the Hall and Watson study and are designed to promote consensual approaches to decision-making which, presumably, are not generally employed by procedurally "unsophisticated" groups. By encouraging members to seek out differences of opinion, and by dissuading them from using "conflict-reducing" techniques such as majority vote or trading, it is expected that group efficacy, among "instructed" groups, will be up-graded.

In addition to investigating the facilitation of group functioning via a "structured intervention" (i.e., the instructions), the present study examines aspects of interpersonal styles on group functioning. Collins and Guetzkow (1964), suggest that certain aspects of personality in a decision-making group can represent a potential area of trouble because they may increase or introduce additional "interpersonal obstacles" into the situation. Successfully coping with interpersonal obstacles can contribute as much toward group productivity as mastering the problems posed by task-environmental obstacles. Because group members often have a tendency to ignore the interpersonal issues, Collins and Guetzkow believe that interpersonal obstacles are the major barrier to task effectiveness in many groups. Therefore, it is reasonable to assume that certain personality characteristics can generate increased interpersonal demands, and in turn, can hinder effective group functioning. Identifying members who possess such characteristics in advance would prove to be a valuable predictive tool.

One specific personality characteristic which appears to be dysfunctional

to group processes is self-oriented, individualistic behavior. In a two-way communication system, Kanfer and Bass (1963) reported that "self-oriented" subjects (as measured by Bass' Orientation Inventory), "turned off" disagreeing partners and permitted agreeing ones to talk more. If this type of behavior were to occur in a group decision-making situation, one might reasonably expect that it would impair group performance due to a limitation in the number of ideas expressed. When fewer solutions are discussed, a group is less likely "to hit" upon the correct solution. While later studies by Bass (1967) continue to define the self-oriented group member pejoratively and suggest that such a personality type is dysfunctional to group processes, no clear evidence was presented concerning the functioning of such individuals in a decision-making situation.

After reviewing literature on personality variables and small group performance, Bouchard (1969) has suggested that future research should concentrate on predicting the "constituents of interpersonal effectiveness" since they accounted for the majority of differences noted among groups.

The present study, using Bass' Orientation Inventory (1962), will examine some of these "constituents" by composing groups which are homogeneous with respect to their measured level of self-orientation. In line with the above discussion, and based on previous research, one could reasonably assume that "high" levels of such a trait will engender increased interpersonal demands in the groups, thereby decreasing group performance on a decision task. Conversely, groups who have "low" levels of such a trait should be able to perform more effectively.

Thus, two general hypotheses are posed in the present study:

H1: Groups composed of individuals receiving the "structured intervention" (instructed groups), will perform more effectively than groups composed of members not receiving the "intervention". (i.e., uninstructed groups).

H2: Regardless of whether or not they receive the "intervention", groups composed of members who are all "high" on a measure of self-orientation will perform less effectively than groups composed of members who are all "low" on the measure.

EXPERIMENTAL DESIGN

Setting and Subjects

The study was conducted in connection with a portion of the curriculum of an Administrative Science course for undergraduates at Purdue University during the 1972-73 academic year. In essence, the study employs a 2X2 design, with instructions and self-orientation constituting the two factors of interest. In all, 216 students from six class sections completed Bass' Orientation Inventory. On the basis of college norms (Bass, 1962), students were dichotomized into "high" and "low" levels of self-orientation. Those scoring above the 55th percentile were classified as "high self-oriented" while those scoring below the 45th percentile were classified as "low self-oriented". Of the original 216 students, 144 scored in the "high" or "low" categories and were formed into 36 four-man groups, 18 of which were comprised of "low" self-oriented members while the other 18 groups consisted of students who had all scored "high" on the measure of self-orientation. Students scoring between the 45/55th percentile levels served as group observers.

Class sections of the course were randomly assigned to experimental (instructed) and control (uninstructed) conditions. Thus, a four-way classification of the 36 groups existed: instructed high self-oriented; instructed low self-oriented; uninstructed high self-oriented; uninstructed low self-oriented.

Prior to the experimental period, class members had been exposed to various presentations of individual motivation, organizational theory and the like and had spent several hours in the presence of one another. Therefore, the groups should be thought of as "quasi-ad hoc" rather than

strictly as ad hoc entities since the latter term implies little or no previous member familiarization. However, the groups employed cannot be considered "established" entities since the amount of member familiarization or interaction prior to the experiment was minimal.

The Self-Orientation Measure

Bass' Orientation Inventory (ORI) is a self-administering questionnaire which consists of 27 triads of questions about personal preferences, values and projections. The instrument generates three scores which have shown promising relationships to various criteria (Bass, 1967). Only the "self-orientation" score is of concern here, as this was the basis by which subjects were categorized as "high" or "low" self-oriented. In describing self-orientation, Bass (1962; p 3) states:

> "Self-orientation reflects the extent a person describes himself as expecting direct rewards to himself regardless of the job he is doing or the effects of what he does upon others working with him. For him, a group is literally a theatre in which certain generalized needs can be satisfied. The other members are both the remainder of the cast as well as an audience for which the self-oriented member can air his personal difficulties, gain esteem or status, agress or dominate. A person with a high score in self-orientation is more likely to be rejected by others, to be introspective, to be dominating and to be unresponsive to the needs of others around him. He is concerned mainly with himself, not co-workers' needs or the job to be done."

The Decision Task

The decision task employed was the NASA Moon Survival Problem (Hall and Watson, 1971). The problem concerns the predicament faced by a space crew which has crash-landed on the moon. Fifteen items of equipment are left in working condition after landing and participants are to rank these items in order of their relative value and utility for survival. The

rationale for the use of the task has been described in detail elsewhere (Hall and Watson, 1971). The task demands of the problem are generally considered to be representative of multi-stage decision-making situations.

Procedure

Early in the semester, class members completed the Orientation Inventory and were told that they would receive feedback about the instrument later in the semester. On the day of the experiment, students were asked to engage in a decision-making exercise for purposes of "demonstration and future class discussion". All subjects in the study received identical presentations of background information and task objectives. Each student received two copies of the NASA Task and was asked to complete his answers in duplicate. Students were told to complete the task individually without discussing their answers with others. After all subjects completed both copies of their ranking, one copy was collected by the experimenter and the other copy was kept by each student to be used in the next part of the "exercise".

The experimenter then announced the students' names in groups of four. Students not assigned to a group were asked to serve as group observers and report to another area to receive their instructions. Subjects were unaware of the fact that their specific group assignments had been previously determined on the basis of their "ORI" scores.

Participants were then asked to join their respective groups for the purpose of arriving at a group decision on the NASA Task. A "Group Ranking Sheet" was distributed to each group. Subjects were told that they had a maximum of 40 minutes in which to reach a group decision but that it was not necessary to use the full period. The groups worked in separate

conference rooms.

The previous instructions were given to all groups. Prior to their work on the experimental task, however, the "instructed" groups were presented with additional directions which represent the "structured intervention" of this study. The following comments were directed to the "instructed" groups:

> I'd like you to use a special technique in arriving at your group decisions on the NASA Task. The technique involves the decision mode referred to as "consensus". First, let me read you some remarks that Ben Franklin said when he addressed the Constitutional Convention on September 17, 1787. They concern his feelings on consensus and the reasons for his support of the proposed document. Please listen closely:
>
> Mr. President, I confess there are several parts of this Constitution which I do not at present approve, but I am not sure that I shall never approve them; For having lived long, I have experienced many instances of being obliged by better information or fuller consideration to change opinions even on important subjects, which I once thought right, but found to be otherwise. It is therefore that the older I grow, the more apt I am to doubt my own judgment, and to pay more respect to the judgment of others. Thus, I consent, Sir, to this Constitution because I expect no better, and because I am not sure that it is not the best...on the whole, Sir, I cannot help expressing a wish that every member of the Convention who may still have objections to it, would with me, on this occasion, doubt a little of his own infallibility--and to make manifest our unanimity, put his name to this instrument.

The following comments were then presented:

> The task on which you are about to begin involves group decision-making. Your group is to employ the method of Group Consensus in reaching its decision. This means that the prediction of each of the fifteen (15) ranks must be agreed upon by each group member before it becomes a part of the group decision. Consensus is difficult to reach. Therefore, not every ranking will meet with everyone's complete approval. Try, as a group, to make each ranking one with which all group members can at least partially agree. Here are some guides to use in reaching consensus:

1. Avoid arguing for your own individual judgments. Approach the task on the basis of logic.

2. Avoid changing your mind only in order to reach agreement and avoid conflict. Support only solutions with which you are able to agree somewhat at least.

3. Avoid "conflict-reducing" techniques such as majority vote, averaging or trading in reaching decisions.

4. View differences of opinion as helpful rather than as a hindrance in decision-making. Differences of opinion are natural and expected. Seek them out and try to involve everyone in the decision process.

5. Disagreements can help the group's decision because with a wide range of information and opinions, there is a greater chance that the group will hit upon more adequate solutions.

In addition, a written summary of the above remarks was given to each subject in the "instructed" condition, and subjects were requested to re-read the instructions before beginning group discussion on the NASA Task.

"Uninstructed" groups did not receive the additional information presented above and were left to their own devices in arriving at group decisions. With these exceptions, all other procedures were identical for both "instructed" and "uninstructed" conditions.

As was earlier mentioned, students not classified as "high or "low" self-oriented functioned as group observers. Two observers were assigned to each group. Each observer was given an "observer rating form" which included five, 9-point, Likert-type questions. The five questions were designed to assess; 1) the frequency with which majority vote was utilized by the group; 2) the frequency with which group members resorted to averaging of rankings in resolving differences; 3) the frequency of trading occurring in the group; 4) the extent to which one person dominated the

discussion and; 5) the extent to which all members were able to fully discuss their views when disagreements occurred. Observers were given a brief lecturette on the differences between various decision modes frequently utilized by groups faced with a decision task. Observers were asked to record their responses without collaborating with each other. In addition, observers performed the following duties: 1) at the end of 30 minutes, they informed the groups that they would have 10 more minutes to complete the task, if necessary; 2) after the group had completed the task, they handed out a 12-item Likert-type questionnaire to be completed individually by each group participant.

Seven of the questions were designed to assess subject reactions in terms of satisfaction with their groups' decisions, satisfaction with self-performance, and perceived group effectiveness. The remaining five questions were identical to those on the observers' forms and were designed to determine the degree of congruence between self-reports and observer ratings concerning the styles of decision-making by the group.

Criteria of Measurement

The task lends itself to a number of estimates of group functioning. In addition to indices of the quality of group decisions, indices of utilization of resources and achievement of the "assembly effect bonus" can be computed.

Decision quality index. Subject responses to the NASA Task are, in essence, rank orderings of standard items. Therefore, both individual and group responses can be compared to the objectively correct orderings supplied by NASA. Decision adequacy is determined by summing the absolute deviations

between subject rankings and the solution key for each of the 15 items. This results in an "error score", the magnitude of which is inversely related to decision quality. Error scores on the NASA Task can vary from 0 to 112 points from absolute accuracy.

Utilization of average resources index. Pooled or averaged individual error scores, prior to any group interaction, are frequently used as the base line from which group decisions are evaluated (Hall and Williams, 1966). Gain or loss in quality of the final group score when compared with the average individual error score, then reflects the effects of interaction and, therefore, can serve as an index of the degree to which in-group resources have been effectively utilized in forming a group decision.

Utilization of most accurate resources. This index is similar to the utilization of average resources index, except that in this case, the most accurate member's score, prior to group interaction, is compared with the group score. The difference score obtained reflects how well each group utilizes its most skilled resource.

Assembly effect bonus. As defined by Collins and Guetzkow (1964 p. 58), this effect, "...occurs when the group is able to achieve collectively something which could not have been achieved by any member working alone or by a conbination of individual efforts". As used here, it refers to those instances when the group's decision surpasses in quality its most accurate group member's decision. Groups achieving the assembly effect bonus are assigned a value of 1, while those who do not are assigned a value of 0. Thus, cell totals can vary from 0 to 9.

Time measure. As a final measure of group functioning, the time taken to accomplish the task was recorded for each group. A maximum time limit of 40 minutes was imposed on all groups.

RESULTS

As a check on the effectiveness of the instructions, analyses of variance were computed for observer rating responses and subject questionnaire responses. For observer responses, there were significant differences between instructed and uninstructed groups on three questions: 1) the frequency with which majority vote was utilized by the group in reaching its decisions; 2) the frequency with which group members resorted to averaging of rankings in resolving differences; and 3) the frequency of trading occurring in the group. The results for these questions are presented in Table 1.

Insert Table 1 here

These results indicate that uninstructed groups resort to decision styles of majority vote, averaging and trading significantly more than do instructed groups. The AxB interaction obtained for question 2 was subjected to a Newman-Keuls Test. The results indicated that "high" self-oriented groups resorted to averaging of rankings to resolve differences significantly more than did "low" self-oriented groups in the uninstructed condition ($p < .05$). With instructed groups, however, "high" and "low" groups did not significantly differ on the extent to which averaging was used. Figure 1 illustrates this finding.

Insert Figure 1 here

Group members responded to 12 questions after completing the NASA Task. The only significant differences among all groups were obtained on the same questions which were found to be significant on the observer response analyses discussed above. The direction of the differences, including the AxB interaction for question 2 (Figure 1), were the same

as those obtained by the observers ($p < .005$). It is interesting to note that no differences were noted for subjects' reactions to questions concerning satisfaction with group decisions, satisfaction with self-performance and perceived group effectiveness.

Sole reliance on self-reports can often be misleading. When used in conjunction with observer reports, however, they can provide useful supplementary information. In the present study, self-reports of the decision techniques being employed were congruent with those made by observers. Apparently, group members were cognizant of the decision styles that they used and were able to indicate this on the "post-experimental" questionnaire.

Based on the observer response analyses, as well as the analyses of the subject questionnaire, it would appear that instructed and uninstructed groups employed distinctly different modes of decision-making. It is reasonable to assume, therefore, that these differences were promoted by the instructions. Tests of the effect of the instructions on group efficacy are now in order.

The two general hypotheses of importance are 1) that instructed groups will perform more effectively than uninstructed groups, and 2) that groups composed of members who are all "high" on a measure of self-orientation will perform less effectively than groups composed of members who are all "low" on the measure. These hypotheses were tested in terms of several performance indices.

Group Decision's Quality

In order to assess decision quality, "Error Scores", defined previously, were computed for all individuals and groups. Table 2 presents

this data in summary form.

Insert Table 2 here

With respect to group decision quality, it would be expected that 1) instructed groups would produce decisions which are qualitatively superior to those produced by uninstructed groups and further; 2) groups composed of members who are all "high" in self-orientation would produce decisions which would be inferior to those produced by groups composed of "low" self-oriented members. Implicit in these hypotheses was the assumption that pre-discussion resources available to all groups would be of comparable quality. Inspection of Table 2 indicates that, before group discussion, mean error scores for the various groups differed somewhat: Instructed (A1)=41.79; Uninstructed (A2)=39.09; High Ori.=39.68; Low Ori.=41.20. While these differences are not great, it was thought that the hypotheses could be tested more objectively by the use of covariance procedures thereby controlling any possible pre-discussion "advantages" among groups.

Two separate factorial analyses of covariance were performed. First, mean pre-discussion resources, taken as a baseline competence level for all groups were compared with final group decision scores. Reference to Table 3 indicates that an F or 4.62(df=1/31) was obtained when instructed and uninstructed groups were compared ($p < .05$).

Insert Table 3 here

In the second analysis, the most accurate resources before group discussion functioned as the covariates and were compared to final group

decisions. Here again, significant differences were obtained between instructed and uninstructed conditions ($F=9.30$, $df=1/31$, $p<.01$). In both analyses, the quality of the decisions produced by instructed groups were found to be significantly superior to those produced by uninstructed groups when adjusted for pre-discussion resources.

The F ratios from these analyses also indicated that "high" and "low" self-oriented groups did not significantly differ in the quality of their final decisions ($F=.66$ and 2.16).

Thus, it may be concluded that instructed groups produced better decisions on the NASA Task than uninstructed groups. This supports hypothesis 1. High and low groups, however, did not function as hypothesized as no significant differences on decision quality were noted for these groups. Therefore, hypothesis 2 is not supported.

Quality gains of group decisions over average resources

As discussed by Collins and Guetzkow (1964), an advantage of group decision-making over individual decision-making is that a wider range of information is available in the group situation. This results in a greater likelihood that group members will select more adequate solutions. While it is difficult to directly measure the degree to which group members capitalize on this available information, one index of procedural effectiveness can be derived by comparing the quality increments of a group's decisions over its existent average resources. Since the judgements of all group members were collected prior to group discussion on the experimental task, it was possible to compare the pre-discussion member data with the final group decision. Thus, the gain or loss scores were used as an indirect criterion of the effectiveness of a group's decision-making process.

It was assumed that 1) instructed groups, having employed a consensual decision style, by definition, would be better able to utilize their average resources than uninstructed groups, and 2) that "high" self-oriented groups, due to their potential for increased interpersonal obstacles, would be less likely than "low" self-oriented groups to capitalize on their available resources. Reference to the analysis of gain-loss scores summarized in Table 3 shows that instructed groups differed significantly from uninstructed groups in gains over mean resources. A comparison of the mean improvement in quality of 15.43 points which was experienced by instructed groups with the mean increase of 8.76 points produced by uninstructed groups yielded an F of 6.17 (df=1/32) which is significant beyond the .05 level.

"High" self-oriented groups experienced a mean increase in quality over their average resources of 11.30 points, while "low" self-oriented groups produced a mean increase in quality of 12.90 points. This difference is not significant (F<1).

Utilization of most accurate resources

The gain-loss scores over the group's most accurate member reflect how well the group utilizes its most skilled resource. It is believed that the extent to which a group is able to approach the performance of its most proficient member has implications not only for decision quality, but for continued member commitment as well (McGregor, 1967; Hall and Williams, 1970).

A comparison of instructed and uninstructed groups indicate that the former groups improved +4.50 points over their most accurate group members while uninstructed groups decreased an average of -2.94 points (Table 2, column 5). This difference is significant beyond the .01 level (F=9.40, df of 1/32).

"High" self-oriented groups produced a mean loss in quality over their best resources of -0.89 points, while "low" self-oriented groups experienced a gain of +2.44 points. While this difference is in the expected direction, it is not significant at the conventionally accepted levels of confidence ($F=1.88$; $df=1/32$, $p<.20$).

Thus, with respect to both the utilization of average and "best" resources, instructed groups functioned as expected and hypothesis 1 is supported. "High" and "low" self-oriented groups did not significantly differ on these variables and, therefore, hypothesis 2 is not supported.

Achievement of the assembly effect bonus

The assembly effect bonus is closely related to the gain-loss criteria of group effectiveness. It is potentially available to all groups, and as Collins and Guetzkow (1964) have suggested, its achievement is contingent upon the manner in which groups reconcile interpersonal and task obstacles. Groups which produced decisions which were qualitatively superior to those produced by their "best" resource, were credited with having achieved the event.

Of the instructed groups, 13 or 72% surpassed the performance of their most proficient members. By comparison, of the uninstructed groups, only 6 or 33% achieved the assembly effect bonus as defined here. Since the occurrence of the effect is, in essence, a dichotomous situation, it is easy to test any significant differences that might exist between groups by assigning a "+" to those groups who achieve the effect and a "-" to those who do not. Using a one-tailed test for significance of difference between two proportions (Brunning and Kintz, 1968, p 199), a z of 2.34 was obtained which is significant beyond the .01 level. Therefore it may be concluded that a significantly higher proportion of instructed

groups achieved the assembly effect.

In comparing "high" and "low" self-oriented groups, 7 or 39% of the "high" groups achieved the assembly effect, while 12 or 67% of the "low" groups achieved it. This difference was also found to be significant ($z=1.67$, $p<.05$), indicating that the proportion of "high" self-oriented groups out-performing their own "best" resource was significantly less than the proportion of "low" self-oriented groups achieving this event.

It will be recalled that the analyses of observer and self-reports indicated that "high" and "low" self-oriented groups differed significantly in the degree to which they used averaging of rankings in resolving differences (Figure 1). This difference was noted only for "high" and "low" groups in the uninstructed (control) conditions. When averaging of rankings is the modus operandi, it is reasonable to assume that the likelihood of achieving the assembly effect bonus will be greatly reduced. Therefore, one might expect differences in the proportion of "high" and "low" groups (in the uninstructed condition) achieving the assembly effect. Another analysis was performed comparing "high" and "low" self-oriented groups in the uninstructed condition only. Of the "high" groups, only 1 (11%) achieved the assembly effect. Over half of the "low" groups in this condition outperformed their "best" member resource (55% of total). Using the proportions test delineated previously, a significant difference was obtained ($z=2.00$, $p<.05$). It is interesting to note that in the instructed condition, "high" and "low" groups achieved the assembly effect almost the same number of times (Table 2, column 6). Therefore, it may be concluded that only in the uninstructed condition do "high" and "low" groups significantly differ in the proportion of times they achieve the

effect. This difference, it appears, is due to the greater use of averaging of rankings by "high" self-oriented groups in the control condition.

Time Criterion

As a final measure of group functioning, the time each group used to complete the task was recorded. Reference to Table 2 indicates that instructed groups averaged 30.39 minutes, uninstructed groups, 21.17 minutes; "high" self-oriented groups averaged 26.05 minutes while "low" self-oriented groups required on the average 25.50 minutes to complete the NASA Task. A factorial analysis (Table 3) yielded an $F=10.01$ (df of 1/32, $p<.01$) for factor A (instructions), indicating that instructed groups utilized significantly more time than uninstructed groups in completing the task. No other significant time differences among groups were obtained.

DISCUSSION

The instructions employed in the present study were designed to upgrade group efficacy by promoting group members to utilize a consensual approach to decision-making. The results clearly indicate that this occurred and hypothesis 1 was confirmed. When compared with uninstructed groups, instructed groups were found to produce qualitatively better decisions, to more fully utilize both their average and best resources, and to achieve the assembly effect bonus a greater proportion of the time. Based on the findings here, it appears that the consensual techniques employed by instructed groups were superior because they promoted a fuller sharing of ideas among participants. This "fuller sharing of ideas" appears to have been brought about by avoiding quick compromise techniques such as majority rule, trading, or averaging of rankings, thus breaking a "strain toward convergence" phenomenon noted in procedurally unwise decision-making groups. With increased tolerance for others' opinions, more information was made available to members of instructed groups, thereby increasing their chances of "hitting" upon the correct solutions. Patently, instructed groups performed more effectively than uninstructed groups; however, it was not without a price. Instructed groups utilized almost 50% more time in fashioning their group decisions on the experimental task. This finding is contrary to the results presented by Hall and Williams (1970) and Hall and Watson (1971), who purport that trained or instructed groups, while performing more effectively than untrained groups, required no more time to complete their task when using a consensual approach.

It seems reasonable that groups making quick compromises via majority

rule techniques or the like should require less time to complete a task than groups using a consensual technique which, by definition, requires that all members are allowed the opportunity to express their opinions. Just why these previous researchers did not find the time differences noted here is open to speculation. One could not argue that the decision problem utilized created the discrepancy in findings between the present study and the Hall et al studies since the task demands in all of the studies were similar, if not identical. Perhaps the fact that the present investigation imposed a constant time limit of 40 minutes on all groups, while the Hall et al studies did not, influenced the differential outcomes noted. Further speculation would seem unwarranted. Based on the results of this study, however, a consensual technique is not without its drawbacks. Specifically, it appears that it requires more time, and as pointed out by Maier (1967), the effective utilization of discussion time is a critical factor in determining overall group efficacy.

McGregor (1967) has suggested that increasing member involvement in decision-making can encourage fuller acceptance of the decision and, in turn, is likely to affect the attitudes of group members toward group work. Therefore, one might reasonably expect that such changes would be reflected in a person's responses to questions concerning group functioning. It will be recalled, however, that on the questions designed to assess subjects' reactions to their group in terms of satisfaction with group decisions, satisfaction with self-performance and perceived group effectiveness, no differences were noted among any of the conditions. An inference can be made, therefore, that consensual decision techniques

while permitting increased member involvement in the decision-making process, do not necessarily lead to increased acceptance of the group's final product, nor do they automatically create favorable attitudes toward group work.

In addition to investigating the decision techniques employed by groups and the effects of consensual instructions on group functioning, the present study examined the efficacy of manipulating a group's composition with respect to its level of self-orientation. It was hypothesized that "high" self-oriented groups, regardless of whether or not they received the instruction, would perform less effectively than "low" groups because they would have a more difficult time effectively integrating task and socio-emotional concerns. This assumption, however, was not supported by the results obtained. It was noted that "high" and "low" groups in the instructed conditions did not differ on any of the criteria measured; however, "high" and "low" self-oriented groups in the uninstructed condition did significantly differ in two important ways: 1) on the extent to which they utilized averaging of rankings in decision-making and, 2) on their achievement of the assembly effect bonus. These findings suggest multiple implications. First, it appears that the consensual instructions were a "leveler", as no significant differences between "high" and "low" groups were noted in any of the performance criteria, observer reactions, or self-reports. A similar finding has been reported by Hall and Williams (1970). Secondly, it appears that when "high" and "low" self-oriented members are left to their own devices, they do function differently in multi-stage decision-making situations of this kind.

It is interesting to note that while "high" and "low" self-oriented groups used majority rule and trading techniques to the same degree, "high" groups resorted to averaging significantly more than "low" groups in the control condition. While increased use of this technique apparently did not affect overall decision-quality, the data indicates that it hindered the achievement of the assembly effect bonus. As mentioned previously, the assembly effect does not automatically occur; rather, it represents the potential of a group to out-perform its own "best" resource. As such, it is closely related to group creativity (Hall and Watson, 1971). Therefore, it is not surprising that compromise techniques, such as averaging, hinder group creativity and are reflected in fewer occurrences of the assembly effect bonus. This suggests that "high" self-oriented group members handled conflict less creatively than "low" self-oriented group members, albeit no marked differences in other performance criteria were obtained.

From the present study, one could draw the conclusion that a majority vote technique, while clearly inferior to consensual approaches, is a somewhat more creative technique than is the averaging approach. If circumstances did not permit a consensual resolution of differences (e.g., time constraints), then it appears that it might be advantageous to "take a vote" to solve the problem rather than "pooling" or averaging group suggestions into a final solution.

Additionally, the findings of the present study indicate several practical suggestions for upgrading group performance on multi-stage decision tasks: 1) if possible, select members whose self-oriented needs are of a less intense variety, 2) employ procedural guidelines which promote a "consensual" resolution of conflicts.

Both the feasibility of an intervention in the social context in which it will be employed and the efficacy of the intervention in promoting the desired outcomes are critical concerns. Selecting members for a decision-making conference whose self-oriented needs are of a less intense variety may prove difficult for a variety of reasons. Furthermore, as indicated by the present findings, such an intervention may not be powerful enough to evince the desired results.

The major implication of the present study is that it is possible to improve group performance even with potentially "poor" group members via a simple structured intervention. It will be recalled that although "high" and "low" self-oriented groups functioned somewhat differently in the control condition, they performed uniformly in the instructed condition. This supports the generality of the procedural intervention utilized in the present study, as well as indicating the simplicity of the approach.

One must be aware that the type of task or problem a group is faced with is also a critical concern, and the previous comments might only be applicable to multi-stage rating tasks of the kind used here. Furthermore, one should not overlook the possibility that personality characteristics may interact with both problem type and group decision-making procedures. Such considerations represent future questions for research.

REFERENCES

Barnlund, D.C. "A Comparative Study of Individual, Majority, and Group Judgment." Journal of Abnormal Social Psychology, 1959, 58, 55-60.

Bass, B.M. Leadership, Psychology, and Organizational Behavior. New York: Harper, 1960.

Bass, B.M. The Orientation Inventory. Palo Alto: Consulting Press, Inc., 1962.

Bass, B.M. "Social Behavior and the Orientation Inventory: A Review." Psychological Bulletin, 1967, 68, 260-292.

Bass, B.M. and Dunteman, G. "Behavior in Groups as a Function of Self-, Interaction-, and Task Orientation." Journal of Abnormal Social Psychology, 1963, 66, 419-428.

Bouchard, T.J. "Personality, Problem-Solving Procedure, and Performance in Small Groups." Journal of Applied Psychology, 1969, 53, 1-29.

Brunning, J.L. and Kintz, B.L. Computational Handbook of Statistics. Palo Alto: Scott, Foresman, 1968.

Collins, B. and Guetzkow, H. A Social Psychology of Group Processes for Decision-Making. New York: Wiley, 1964.

Hall, J. and Williams, M.S. "A Comparison of Decision-Making Performances in Established and Ad-Hoc Groups." Journal of Personality and Social Psychology, 1966, 3, 214-222.

Hall, J. and Williams, M.S. "Group Dynamics Training and Improved Decision-Making." Journal of Applied Behavioral Sciences, 1970, 6, 27-32.

Hall, J. and Watson, W.H. "The Effects of a Normative Intervention on Group Decision-Making Performance." Human Relations, 1971, 23, 299-317.

Kanfer, F.H. and Bass, B.M. Dyadic Speech Patterns, Orientation and Social Reinforcement. Journal of Consulting Psychology, 1963, 27, 199-205.

Maier, N.R.F. "Assets and Liabilities in Group Problem Solving: The Need for an Integrative Function." Psychological Review, 1967, 74, 239-249.

Maier, N.R.F. and Solem, A. "The Contribution of a Discussion Leader to the Quality of Group Thinking: The Effective Use of Minority Opinions." Human Relations, 1952, 5, 277-288.

Maier, N.R.F. and Hoffman, L.R. "Using Trained Developmental Leaders to Improve Further the Quality of Group Decisions." Journal of Applied Psychology, 1960, 44, 247-251.

Mangham, I. and Cooper, C.L. The Impact of T-Groups on Managerial Behavior. Journal of Management Sciences, 1969, 6, 53-70.

McGregor, D. The Human Side of Enterprise. New York: McGraw-Hill, 1960.

McGregor, D. The Professional Manager. New York: McGraw-Hill, 1967.

Winer, B.J. Statistical Principles in Experimental Design. New York: McGraw-Hill, 1962.

TABLE 1

Means, Standard Deviations and F Ratios for Observer Responses to Questions 1) frequency of majority vote; 2) frequency of averaging of rankings in resolving differences; and 3) the frequency of trading occuring in the group.

	Q1	Q2	Q3
Instructed High Self-Ori.			
M	3.33	2.11	3.00
SD	1.94	1.45	2.60
Instructed Low Self-Ori.			
M	3.04	2.44	3.15
SD	1.30	1.44	1.98
Uninstructed High Self-Ori.			
M	5.52	5.48	6.00
SD	2.14	1.83	1.99
Uninstructed Low Self-Ori.			
M	4.33	3.41	3.92
SD	1.45	1.06	1.02
F Ratios			
A ("Instructions")	9.02**	19.49**	8.21**
B ("Self-Orientation")	ns	ns	ns
A x B	ns	6.02*	ns

*p <.05
**p <.01

TABLE 2

Summary Data of Means for Decision-Making Performance Criteria

Condition	Before Group Discussion		After Group Discussion				
	Mean Error Score of Group Members	Error Score of Most Accurate Group Member	Group Error Score	Gain-Loss over Mean Error Score of Group Members	Gain-Loss over Most Accurate Group Member	Percentage and Proportion of Groups Achieving Assembly Effect	Time in Minutes
Instructed (A1)	41.79	31.00	26.50	+15.43	+4.50	13/18=72%	30.39
Uninstructed (A2)	39.09	26.84	29.77	+ 8.76	-2.94	6/18=33%	21.17
High Orientation (B1)	39.68	27.61	28.50	+11.30	-0.89	7/18=39%	26.05
Low Orientation (B2)	41.20	30.22	27.77	+12.90	+2.44	12/18=67%	25.50
"High" Instructed (A1B1)	42.08	30.22	27.67	+14.64	+2.55	6/9=67%	30.09
"Low" Instructed (A1B2)	41.50	31.78	25.33	+16.22	+6.44	7/9=78%	30.78
"High" Uninstructed (A2B1)	37.29	25.00	29.33	+ 7.96	-4.33	1/9=11%	22.11
"Low" Uninstructed (A2B2)	40.90	28.67	30.22	+ 9.57	-1.55	5/9=55%	20.22
	1.	2.	3.	4.	5.	6.	7.

TABLE 3

Summary of F Ratios for Decision-Making Performance Variables

Condition	df	Group Error with mean resource as covariate	Group Error with most accurate resource as covariate	Gain-Loss of Group Error over mean resource	Gain-Loss of Group Error over most accurate member	Time in Minutes
Instructions (A)	1	4.62*	9.30**	6.17*	9.40**	10.01**
Self-Orientation (B)	1	.66	2.16	.36	1.88	.04
AxB	1	.02	.03	.00	.05	.21
Error (df) co-variance procedures	31					
Error (df) ANOVA	32					

*p <.05
**p <.01

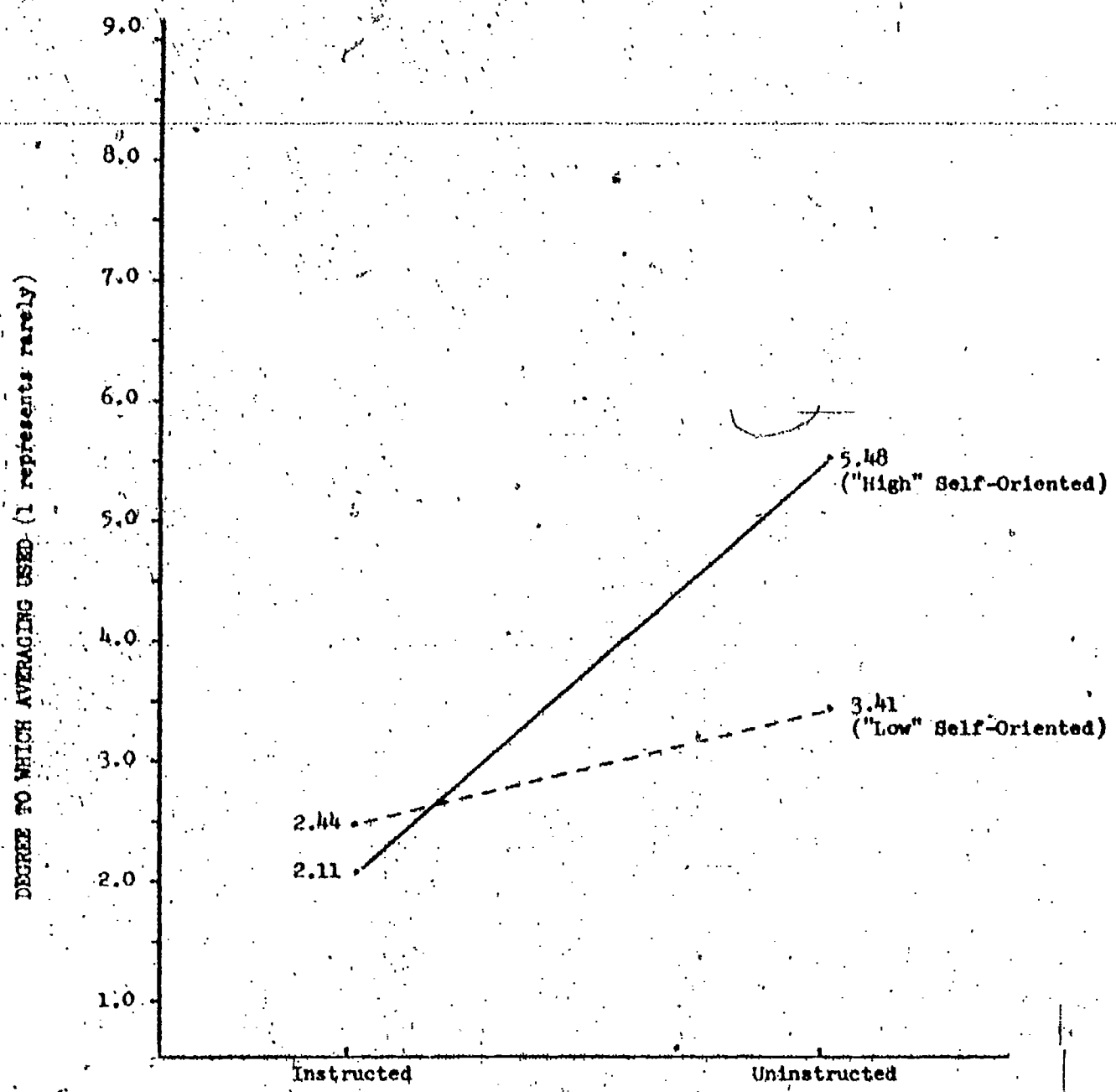

FIGURE 1. Profile of Observer responses to Question 2 - How often group members resorted to averaging of rankings in resolving differences.

The following is a listing of Institute Papers which are still in supply. Copies may be obtained from the Secretary of the Institute Paper and Reprint Series, Krannert Graduate School of Industrial Administration, Purdue University, West Lafayette, Indiana 47907.

(When requesting copies, please specify paper number.

Paper No.	Title and Author(s)
101	CLASSIFICATION OF INVESTMENT SECURITIES USING MULTIPLE DISCRIMANANT ANALYSIS, Keith V. Smith.
150	PORTFOLIO REVISION, Keith V. Smith.
154	HEROES AND HOPLESSNESS IN A TOTAL INSTITUTION: ANOMIE THEORY APPLIED TO A COLLECTIVE DISTURBANCE, Robert Perrucci.
158	TWO CLASSICAL MONETARY MODELS, Cliff Lloyd.
161	THE PURCHASING POWER PARITY THEORY: IN DEFENSE OF GUSTAV CASSEL AS A MODERN THEORIST, James M. Holmes.
162	HOW CHARLIE ESTIMATES RUN-TIME, John M. Dutton and William H. Starbuck.
163	PER CAPITAL CONSUMPTION AND GROWTH: A FURTHER ANALYSIS, Akira Takayama.
164	THE PROBABILITY OF A CYCLICAL MAJORITY, Frank De Meyer and Charles R. Plott.
166	THE CLASSROOM ECONOMY: RULES, RESULTS, REFLECTIONS, John A. Carlson.
169	TAXES AND SHARE VALUATION IN COMPETITIVE MARKETS, Vernon L. Smith.
181	EXPERIMENTING WITH THE ARMS RACE, Marc Pilisuk and Paul Skolnick.

Paper No.	Title and Author(s)
186	REGIONAL ALLOCATION OF INVESTMENT: CORRIGENDUM, Akira Takayama.
187	A SUGGESTED NEW MONETARY SYSTEM: THE GOLD-VALUE STANDARD, Robert V. Horton.
189	PREDICTING THE CONCLUSIONS OF NEGRO-WHITE INTELLIGENCE RESEARCH FROM BIOGRAPHICAL CHARACTERISTICS OF THE INVESTIGATOR, John J. Sherwood and Mark Nataupsky.
198	OPTIMAL DISPOSAL POLICIES, Carl Adams.
202	SOME FORMULAS ENCOUNTERED IN THE DEDUCTIVE ANALYSIS OF THIRD-ORDER AUTOGRESSION PROCESS, R. L. Basmann and R. J. Rohr.
217	ON A "CONCAVE" CONTRACT CURVE, Akira Takayama.
218	THE EFFECTS OF FISCAL AND MONETARY POLICIES UNDER FLEXIBLE AND FIXED EXCHANGE RATES, Akira Takayama.
219	A MATCHING THEOREM FOR GRAPHS, D. Kleitman, A. Martin-Lof, B. Rothchild and A. Whinston.
224	GENERALIZED OPINION LEADERSHIP IN CONSUMER PRODUCTS: SOME PRELIMINARY FINDINGS, Charles W. King and John O. Summers.
226	THE FIRM AS AN AUTOMATION - I., Edward Ames.
227	SECOND-BEST SOLUTIONS, PEAK-LOADS AND MARGINAL COST PRICE POLICIES FOR PUBLIC UTILITIES, Robert A. Meyer , Jr.
228	EQUIPMENT REPLACEMENT UNDER UNCERTAINTY, Robert A. Meyer, Jr.
233	ECONOMIC EFFECTS OF UNIFORM CONSUMER CREDIT CODE: A COMMENT, David C. Ewert.
234	OPTIMAL ADVERTISING EXPENDITURE IMPLICATIONS OF A SIMULTANEOUS-EQUATION REGRESSION ANALYSIS, Leonard J. Parsons and Frank M. Bass.
237	OPPOSITION OF PREFERENCES AND THE THEORY OF PUBLIC GOODS, Robert A. Meyer, Jr.

Paper No.	Title and Author(s)
238	THE TAXATION OF RESTRICTED STOCK COMPENSATION PLANS, G. W. Hettenhouse and Wilbur G. Lewellen.
239	DECOMPOSABLE REGRESSION MODELS IN THE ANALYSIS OF MARKET POTENTIALS, Frank M. Bass.
241	OPPORTUNITY COSTS AND MODELS OF SCHOOLING IN THE NINETEENTH CENTURY, Lewis Solmon.
242	ESTIMATING FREQUENCY FUNCTIONS FROM LIMITED DATA, Keith C. Brown.
246	ON OPTIMAL CAPITAL ACCUMULATION IN THE PASINETTI MODEL OF GROWH, S. C. Hu.
250	MONEY, INTEREST AND POLICY, P. H. Hendershott and George Horwich.
252	A STUDY OF ATTITUDE THEORY AND BRAND PREFERENCE, Frank Bass and W. Wayne Talarzyk.
253	A NOTE ON TECHNICAL PROGRESS, INVESTMENT, AND OPTIMAL GROWTH, Sheng Cheng Hu.
254	MANUFACTURERS' SALES AND INVENTORY ANTICIPATIONS: THE OBE COMPUTATIONAL PROCEDURES, John A. Carlson.
256	TWO ALGORITHMS FOR INTEGER OPTIMIZATION, Edna Loehman, Tuan Ph. Nghiem and Andrew Whinston.
260	AGE-DEPENDENT UTILITY IN THE LIFETIME ALLOCATION PROBLEM, Kenneth Avio.
264	AIR POLLUTION AND HOUSING: SOME FINDINGS, Robert J. Anderson, Jr.; and Thomas D. Crocker.
265	APPLICATION OF REGRESSION MODELS IN MARKETING: TESTING VERSUS FORECASTING, Frank M. Bass.
267	A LINEAR PROGRAMMING APPROACH TO AIRPORT CONGESTION, Donald W. Kiefer.
268	ON PARETO OPTIMA AND COMPETITIVE EQUILIBRIA, PART I. RELATIONSHIP AMONG EQUILIBRIA AND OPTIMA, James C. Moore.
269	ON PARETO OPTIMA AND COMPETITIVE EQUILIBRIA, PART II. THE EXISTENCE OF EQUILIBRIA AND OPTIMA, James C. Moore.
272	A REPRESENTATION OF INTEGER POINTS IN POLYHEDRAL CONE, Ph. Tuan Nghiem.

Paper No.	Title and Author(s)
275	THE FULL-EMPLOYMENT INTEREST RATE AND THE NEUTRALIZED MONEY STOCK, Patric H. Hendershott.
276	SOME APPLICATIONS OF THE CHANGE OF BASE TECHNIQUE IN INTEGER PROGRAMMING, Ph. Tuan Nghiem.
277	A WELFARE FUNCTION USING "RELATIVE INTENSITY" OF PREFERENCE, Frank DeMeyer and Charles R. Plott.
279	RACE AND COMPETENCE AS DETERMINANTS OF ACCEPTANCE OF NEW-COMERS IN SUCCESS AND FAILURE WORK GROUPS, Howard L. Fromkin, Richard J. Klimoski, and Michael F. Flanagan.
280	LEADERSHIP, POWER AND INFLUENCE, Donald C. King and Bernard B. Bass.
281	RECENT RESULTS IN THE THEORY OF VOTING, Charles R. Plott.
282	DISAGGREGATION OF ANALYSIS OF VARIANCE FOR PAIRED COMPARISONS: AN APPLICATION TO A MARKETING EXPERIMENT, E. A. Pessemier and R. D. Teach.
283	MARKET RESPONSE TO INNOVATION, FURTHER APPLICATIONS OF THE BASS NEW PRODUCT GROWTH MODEL, John V. Nevers.
284	PROFESSIONALISM, UNIONISM, AND COLLECTIVE NEGOTIATION: TEACHER NEGOTIATIONS EXPERIENCE IN CALIFORNIA. James A. Craft.
285	A FREQUENCY DOMAIN TEST OF THE DISTURBANCE TERM IN LINEAR REGRESSION MODELS, Thomas F. Cargill and Robert A. Meyer.
286	EVALUATING ALTERNATIVE PROPOSALS AND SOURCES OF NEW INFORMATION, Edgar A. Pessemier.
287	A MULTIVARIATE REGRESSION ANALYSIS OF THE RESPONSES OF COMPETING BRANDS TO ADVERTISING, Frank M. Bass and Neil E. Beckwith.
288	ASSESSING REGULATORY ALTERNATIVES FOR THE NATURAL GAS PRODUCING INDUSTRY, Keith C. Brown.
289	TESTING AN ADAPTIVE INVENTORY CONTROL MODEL, D. Clay Whybark.
291	THE LABOR ASSIGNMENT DECISION: AN APPLICATION OF WORK FLOW STRUCTURE INFORMATION, William K. Holstein and W. L. Berry.
295	THE INTERACTION OF GROUP SIZE AND TASK STRUCTURE IN AN INDUSTRIAL ORGANIZATION, Robert C. Cummins and Donald C. King.
296	PROJECT AND PROGRAM DECISIONS IN RESEARCH AND DEVELOPMENT, Edgar A. Pessemier and Norman R. Baker.

Paper No.	Title and Author(s)
298	SEGMENTING CONSUMER MARKETS WITH ACTIVITY AND ATTITUDE MEASURES, Thomas Hustad and Edgar Pessemier.
299	R & D MANAGERS' CHOICES OF DEVELOPMENT POLICIES IN SIMULATED R & D ENVIRONMENTS, Herbert Moskowitz.
300	DILUTION AND COUNTER-DILUTION IN REPORTING FOR DEFERRED EQUITY, Charles A. Tritschler.
301	A METHODOLOGY FOR THE DESIGN AND OPTIMIZATION OF INFORMATION PROCESSING SYSTEMS J. F. Nunamaker, Jr.
303	ON PRODUCTION FUNCTIONS AND ELASTICITY OF SUBSTITUTION, K. R. Kadiyala.
305	A NOTE ON MONEY AND GROWTH, Akira Takayama.
309	WAGES AND HOURS AS SIGNIFICANT ISSUES IN COLLECTIVE BARGAINING, Paul V. Johnson.
311	AN EFFICIENT HEURISTIC ALGORITHM FOR THE WAREHOUSE LOCATION PROBLEM, Basheer M. Khumawala.
312	REACTIONS TO LEADERSHIP STYLE AS A FUNCTION OF PERSONALITY VARIABLES, M. H. Rucker and D. C. King.
313	FIRE FIGHTER STRATEGY IN WAGE NEGOTIATIONS, James A. Craft.
314	TESTING DISTRIBUTED LAG MODELS OF ADVERTISING EFFECT - AN ANALYSIS OF DIETARY WEIGHT CONTROL PRODUCT DATA, Frank M. Bass and Darrall G. Clarke.
317	BEHAVIOR OF THE FIRM UNDER REGULATORY CONSTRAINT: CLARIFICATIONS, Mohamed El-Hodire and Akira Takayama.
321	LABORATORY RESEARCH AND THE ORGANIZATION: GENERALIZING FROM LAB TO LIFE, Howard L. Fromkin and Thomas M. Ostrom.
322	LOT SIZING PROCEDURES FOR REQUIREMENTS PLANNING SYSTEMS: A FRAMEWORK FOR ANALYSIS, William L. Berry.
326	PRIORITY SCHEDULING AND INVENTORY CONTROL IN JOB LOT MANUFACTURING SYSTEMS, William L. Berry.
328	THE EXPECTED RATE OF INFLATION BEFORE AND AFTER 1966: A CRITIQUE OF THE ANDERSEN-CARLSON EQUATION, Patric H. Hendershott.

Paper No.	Title and Author(s)
330	A FURTHER PROBLEM IN LEAD-LAG DETECTION, Robert A. Meyer, Jr.
332	THE SMOOTHING HYPOTHESIS: AN ALTERNATIVE TEST, Russell M. Barefield and Eugene E. Comiskey.
333	CONSERVATISM IN GROUP INFORMATION PROCESSING BEHAVIOR UNDER VARYING MANAGEMENT INFORMATION SYSTEMS, Herbert Moskowitz.
334	PRIMACY EFFECTS IN INFORMATION PROCESSING BEHAVIOR - THE INDIVIDUAL VERSUS THE GROUP, Herbert Moskowitz.
339	UNEXPLAINED VARIANCE IN STUDIES OF CONSUMER BEHAVIOR, Frank M. Bass.
340	THE PRODUCTION FUNCTION AS A MODEL OF THE REQUIREMENTS OF THE INFANTRY SERGEANT'S ROLE, Richard C. Roistacher and John J. Sherwood.
341	SELECTING EXPONENTIAL SMOOTHING MODEL PARAMETERS: AN APPLICATION OF PATTERN SEARCH, William L. Berry and Friedhelm W. Bliemel.
342	AN INTEGRATED EXAMINATION OF MEDIA APPROACHES TO MARKET SEGMENTATION, Albert Bruno, Thomas Hustad & Edgar Pessemier.
343	LABORATORY EXPERIMENTATION, H. L. Fromkin and S. Streufert.
344	REVERSAL OF THE ATTITUDE SIMILARITY-ATTRACTION EFFECT BY UNIQUENESS DEPRIVATION, H. L. Fromkin, R. L. Dipboy and Marilyn Pyle.
345	WILL THE REAL CONSUMER-ACTIVIST PLEASE STAND UP, Thomas P. Hustad and Edgar A. Pessemier.
347	THE VALUE OF INFORMATION IN AGGREGATE PRODUCTION PLANNING - A BEHAVIORAL EXPERIMENT, Herbert Moskowitz.
348	A MEASUREMENT AND COMPOSITION MODEL FOR INDIVIDUAL CHOICE AMONG SOCIAL ALTERNATIVES, Edgar A. Pessemier.
349	THE NEOCLASSICAL THEORY OF INVESTMENT AND ADJUSTMENT COSTS, Akira Takayama.
350	A SURVEY OF FACILITY LOCATION METHODS, D. Clay Whybark and Basheer M. Khumawala.
351	THE LOCUS AND BASIS OF INFLUENCE ON ORGANIZATION DECISIONS, Martin Patchen.

Paper No.	Title and Author(s)
352	A PLEA FOR A FOURTH TRADITION - AND FOR ECONOMICS, Robert V. Horton.
353	EARLY APPLICATIONS OF SPECTRAL METHODS TO ECONOMIC TIME SERIES, Thomas F. Cargill.
354	STUDENT APPLICATIONS IN A PRINCIPLES COURSE OF ECONOMIC ANALYSIS TO SELF-DISCOVERED ITEMS, Robert V. Horton.
355	BRANCH AND BOUND ALGORITHMS FOR LOCATING EMERGENCY SERVICE FACILITIES, Basheer M. Khumawala.
357	AN EFFICIENT ALGORITHM FOR CENTRAL FACILITIES LOCATION, Basheer M. Khumawala.
358	AN EXPERIMENTAL STUDY OF ATTITUDE CHANGE, ADVERTISING, and USAGE IN NEW PRODUCT INTRODUCTION, James L. Ginter & Frank M. Bass.
359	DENIAL OF SELF-HELP REPOSSESSION: AN ECONOMIC ANALYSIS, Robert W. Johnson.
360	WAREHOUSE LOCATION WITH CONCAVE COSTS, Basheer M. Khumawala and David L. Kelly.
361	LINEAR AND NONLINEAR ESTIMATION OF PRODUCTION FUNCTIONS, R. A. Meyer and K. R. Kadiyala.
362	QUASI-CONCAVE MINIMIZATION SUBJECT TO LINEAR CONSTRAINTS, Antal Majthay and Andrew Whinston.
363	PRODUCTION FUNCTION THEORY AND THE OPTIMAL DESIGN OF WASTE TREATMENT FACILITIES, James R. Marsden, David E. Pingry and Andrew Whinston.
364	A REGIONAL PLANNING MODEL FOR WATER QUALITY CONTROL, David E. Pingry and Andrew Whinston.
365	ISSUES IN MARKETING'S USE OF MULTI-ATTRIBUTE ATTITUDE MODELS, William L. Wilkie and Edgar A. Pessemier.
366	A SOCIAL PSYCHOLOGICAL ANALYSIS OF ORGANIZATIONAL INTEGRATION, Howard L. Fromkin.
367	ECONOMICS OF WASTEWATER TREATMENT: THE ROLE OF REGRESSION, J. R. Marsden, D. E. Pingry and A. Whinston.
368	THE ROLE OF MODELS IN NEW PRODUCT PLANNING, Edgar A. Pessemier and H. Paul Root.

Paper No.	Title and Author(s)
369	A NOTE ON PREFERENCE ORDERINGS WHICH ARE CONVEX TO THE ORIGIN, James C. Moore.
370	AXIOMATIC CHARACTERIZATIONS OF CONSUMER PREFERENCES AND THE STRUCTURE OF THE CONSUMPTION SET, James C. Moore.
371	BUSINESS POLICY OR STRATEGIC MANAGEMENT: A BROADER VIEW FOR AN EMERGING DISCIPLINE, Dan E. Schendel and Kenneth J. Hatten.
373	INFORMATION AND DECISION SYSTEMS FOR PRODUCTION PLANNING: AN INTER-DISCIPLINARY PERSPECTIVE, Herbert Moskowitz and Jeffrey G. Miller.
374	ACCOUNTING FOR THE MAN/INFORMATION INTERFACE IN MANAGEMENT INFORMATION SYSTEMS, Herbert Moskowitz and Richard O. Mason.
375	A COMPETITIVE PARITY APPROACH TO COMPETITION IN A DYNAMIC MARKET MODEL, Randall L. Schultz.
376	BEHAVIORAL MODEL BUILDING, Randall L. Schultz & Dennis P. Slevin.
377	THE HALO EFFECT AND RELATED ISSUES IN MULTI-ATTRIBUTE ATTITUDE MODELS - AN EXPERIMENT, William L. Wilkie and John M. McCann.
378	AN IMPROVED METHOD FOR THE SEGREGATED STORAGE PROBLEM, Basheer M. Khumawala and David G. Dannenbring.
379	ON THE PROBABILITY OF WINNING IN COMPETITIVE BIDDING THEORY, Keith C. Brown.
380	COST ALLOCATION FOR RIVER BASIN PLANNING MODELS, E. Loehman, D. Pingry and A. Whinston.
381	FORECASTING DEMAND FOR MEDICAL SUPPLY ITEMS USING EXPONENTIAL AND ADAPTIVE SMOOTHING MODELS, E. E. Adam, Jr., W. L. Berry and D. C. Whybark.
382	SETTING ADVERTISING APPROPRIATIONS: DECISION MODELS AND ECONOMETRIC RESEARCH, Leonard J. Parsons & Randall L. Schultz.
383	ON THE OPTIMAL GROWTH OF THE TWO SECTOR ECONOMY, John Z. Drabicki and Akira Takayama.
384	UNCERTAIN COSTS IN COMPETITIVE BIDDING, Keith C. Brown.
385	EFFECTS OF THE NUMBER AND TYPE OF ATTRIBUTES INCLUDED IN AN ATTITUDE MODEL: MORE IS NOT BETTER, William L. Wilkie and Rolf P. Weinreich.

Paper No.	Title and Author(s)
386	PARETO OPTIMAL ALLOCATIONS AS COMPETITIVE EQUILIBRIA, James C. Moore.
387	A PLANNING AND COST ALLOCATION PROCEDURE FOR COMPUTER SYSTEM MANAGEMENT, J. F. Nunamaker and A. Whinston.
388	PROFESSOR DEBREU'S "MARKET EQUILIBRIUM" THEOREM: AN EXPOSITORY NOTE, James C. Moore.
389	THE ASSIGNMENT OF MEN TO MACHINES: AN APPLICATION OF BRANCH AND BOUND, Jeffrey G. Miller and William L. Berry.
390	THE IMPACT OF HIERARCHY AND GROUP STRUCTURE ON INFORMATION PROCESSING IN DECISION MAKING: APPLICATION OF A NETWORKS/SYSTEMS APPROACH, David L. Ford, Jr.
391	PROCESSING SYSTEMS OPTIMIZATION THROUGH AUTOMATIC DESIGN AND REORGANIZATION OF PROGRAM MODULES, J. F. Nunamaker, Jr., and W. C. Nylin, Jr. and Benn Konsynski.
392	GPLAN: A GENERALIZED DATA BASE PLANNING SYSTEM, J. F. Nunamaker, D. E. Swenson and A. B. Whinston.
393	SOME ASPECTS OF THE COMPUTATION AND APPLICATION OF FREQUENCY DOMAIN REGRESSION IN ECONOMICS, Robert A. Meyer.
394	EFFECTS OF PROBLEM REPRESENTATION AND FEEDBACK ON RATIONAL BEHAVIOR IN ALIAIS AND MORIAT-TYPE PROBLEMS, Herbert Moskowitz.
395	A DYNAMIC PROGRAMMING APPROACH FOR FINDING PURE ADMISSIBLE DECISION FUNCTIONS IN STATISTICAL DECISIONS, Herbert Moskowitz.
396	ENGINEERING FOUNDATIONS OF PRODUCTION FUNCTIONS, James Marsden, David Pingry and Andrew Whinston.
397	EFFECT OF SOCIAL INTERACTION ON HUMAN PROBABILISTIC INFERENCE, Herbert Moskowitz and Willibrord T. Silva.
398	A COMPARATIVE ANALYSIS OF ATTITUDINAL PREDICTIONS OF BRAND PREFERENCE, Frank M. Bass and William L. Wilkie.
399	THE FINANCING - INVESTMENT FUNDS FLOW, Charles A. Tritschler.
400	THE EFFECTS OF STRUCTURE ON GROUP EFFICIENCY AND INTERJUDGE AGREEMENT FOLLOWING GROUP DISCUSSIONS, David L. Ford, Jr., Larry L. Cummings and George P. Huber.
401	A SOFTWARE SYSTEM TO AID STATEMENT OF USER REQUIREMENTS, Thomas Ho and J. F. Nunamaker.
402	FINANCIAL CONSTRAINTS ON REGULATED INDUSTRIES, Edna T. Loehman and Andrew Whinston.

Paper No.	Title and Author(s)
403	NEURISTIC METHODS FOR ASSIGNING MEN TO MACHINES, An Experimental Analysis, William L. Berry and Jeffrey G. Miller.
404	MODELS FOR ALLOCATING POLICE PREVENTIVE PATROL EFFORT, David G. Olson and Gordon P. Wright.
405	THE EFFECT OF REGULATION ON COST AND WELFARE, Edna T. Loehman and Andrew Whinston.
406	SINGLE SUBJECT DISCRIMINANT CONFIGURATIONS, Edgar A. Pessemier.
407	MARKET STRUCTURE MODELING VIA CLUSTERING AND DISCRIMINANT ANALYSIS: A PORTRAYAL OF THE SOFT DRINK MARKET, Donald R. Lehmann and Edgar A. Pessemier.
408	DEVELOPING DISCRIMINANT SPACE CONFIGURATIONS FROM SMALL SAMPLES, Wesley H. Jones.
409	PROFILES OF MARKET SEGMENTS AND PRODUCT COMPETITIVE STRUCTURES, Edgar A. Pessemier & James L. Ginter.
410	MEASURING THE CUMULATIVE EFFECTS OF ADVERTISING: A REAPPRAISAL, Darral G. Clarke and John M. McCann.
411	ON BIASED TECHNOLOGICAL PROGRESS, Akira Takayama.
412	RESEARCH ON COUNTER AND CORRECTIVE ADVERTISING, William L. Wilkie.
413	ON THE ANALYTICAL FRAMEWORK OF TARIFFS AND TRADE POLICY, Akira Takayama.
414	ESTIMATION OF REGRESSION EQUATION WITH CAUCHY DISTURBANCES, K. R. Kadiyala and K. S. R. Murthy.
415	THE THEORY OF STOCHASTIC PREFERENCE AND BRAND SWITCHING, Frank M. Bass.
416	ANALYSIS OF TIME-SHARING CONTRACT AGREEMENTS WITH RELATED SUGGESTED SYSTEMS EVALUATION CRITERIA, Jo Ann J. Chanoux.
417	THE DESCRIPTIVE VALIDITY OF THE STATIONARITY ASSUMPTION IN TIME DISCOUNTING: AN EXPLORATORY STUDY, Herbert Moskowitz & John Hughes.
418	A RESOURCE MARKET ENIGMA IN PRINCIPLES COURSES - SOME UNCHARTED LINKAGES, Robert V. Horton.
419	PARTIAL POOLING: A HEURISTIC, Dick R. Wittink.
420	AN EMPIRICAL-SIMULATION APPROACH TO COMPETITION, Randall L. Schultz and Joe A. Dodson, Jr.
421	EROTIC MATERIALS: A COMMODITY THEORY ANALYSIS OF THE ENHANCED DESIRABILITY WHICH MAY ACCOMPANY THEIR UNAVAILABILITY, Howard L. Fromkin and Timothy C. Brock.

Paper No.	Title and Author(s)
422	MULTIFIRM ANALYSIS OF COMPETITIVE DECISION VARIABLES, Albert R. Wildt and Frank M. Bass.
423	EARNINGS VARIABILITY AS A RISK SURROGATE, Russell M. Barefield and Eugene E. Comiskey.
424	MARKET STRUCTURE AND PROFITABILITY - ANALYSIS OF THE APPROPRIATENESS OF POOLING CROSS-SECTIONAL INDUSTRY DATA, Frank M. Bass.
425	THE EXPLANATORY EFFICACY OF SELECTED TYPES OF CONSUMER PROFILE VARIABLES IN FASHION CHANGE AGENT IDENTIFICATION, Charles W. King and George B. Sproles.