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A STUDY OF COALITION BEHAVIOR IN
DECISION MAKING GROUPS

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College of Commerce and Business Administration
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Abstract

The present study tested the predictions of four theories of coalition behavior in five-person decision-making groups. Each group made a decision which affected the payoff to the group as a whole. The group's decision-making behavior determined the formation of coalitions, which were compared to the coalitions predicted to form by the different theories. The analyses did not support the predictions of either minimum resource theory (Gamson, 1961; Riker, 1962) or minimum range theory (Leiserson, 1966). Policy distance minimization theory (DeSwaan, 1970) was neither supported nor rejected. Vinacke's (1959) anticompetitive theory produced the only prediction which received clear support. In addition to the tests of the different theories, the implications indicated for decision-making groups were discussed.

A STUDY OF COALITION BEHAVIOR IN DECISION MAKING GROUPS

Research and theory which has been concerned with coalition behavior has uniformly failed to consider one of the salient aspects of "real world" groups which are faced with coalition situations. The general assumption that groups exist in order to fulfill the needs of its members (e.g., Thibaut and Kelley, 1959) has contributed to the notion that groups establish goals for themselves (e.g., Zander, 1971). It is only one short step from the establishment or pursuit of goals to the making of decisions which are necessary to attain or at least approach those goals. Certainly in formal groups (Schein, 1970), decision making activities are central to the group's functioning.

If one can accept the assumption that one of a group's primary behaviors is the making of decisions, the most immediate question becomes "How does the group make its decisions?" The formation of coalitions is one possibility. Von Neumann and Morgenstern (1947) argued that in

many conflict situations involving more than two actors a decision can be reached only through the formation of some coalition. Zinnes (1970) has pointed out that "since unanimous agreement frequently does not exist among members of a group, group decision making is usually made in favor of some members of the group and in opposition to others." Thus, the study of coalition behavior and the study of group decision making are interrelated, and, to date, have not been considered together in either of the two major areas of inquiry into coalition behavior. While both the theoretical orientation taken by game theory and the empirical research in sociology and social psychology have made significant contributions to the study of coalition behavior, the inclusion of a decision-making context might substantially enhance the generalizability of subsequent findings.

The present paper presents data originally collected in a study of decision-making groups. Although the study was not designed to investigate coalition formation, it provides a large amount of data on decision-making groups which is amenable to an investigation of the predictions of several theories of coalition formation. Groups in the study were composed of five members each having equal power. The groups were not given specific instructions concerning the process which they were to use in making their decision. In addition, although the participants were college students meeting in a laboratory setting, each group made a decision which had an impact on the payoff which each group member received as payment. In fact, the group members gave every indication that they were not just participating in an experiment, but were genuinely concerned about the outcome.

The predictions of several theories from sociology, social psychology, and political science could be tested by the present data sample.

Because n-person game theory makes no predictions concerning the formation of specific coalitions, and because the present study did not utilize a divisible payoff (which is necessary for game theory's predictions), game theoretic solution concepts were not considered.

The first theory which the present study addresses is the most widely known theory of coalition formation, Gamson's (1961) minimum resource theory. Gamson's theory (1961) states that individuals in coalition situations will form that coalition which maximizes their own personal payoff, and, due to an assumption of the general acceptance of the parity norm, minimum winning coalitions with the minimum amount of resources necessary to win are predicted to form. Past research (cf., Chertkoff, 1970) has generally supported this prediction. In relationship to the present study, the predictions of the minimum resource theory, and from Riker's theory of political coalitions (1962), are identical: In five-person groups here the players each have equal resources, coalitions composed of three people should form. Caplow's original theory (1956) and Chertkoff's (1967) revision of Caplow's theory (if one takes the liberty to extend them to greater than three-person games) also make the same prediction.

Another well-known theory, Vinacke's (1959) anticompetitive theory of coalition formation, presents the hypothesis that males will act exploitatively and that females will act accomodatively in coalition situations. Those studies which have included females (cf. Chertkoff, 1970) have generally supported these predictions. In this particular study, mixed-sex groups should find a greater percentage of males in the majority coalition and a greater percentage of females in the minority coalition.

Theories from political science (Riker's has been mentioned previously) also present testable hypotheses. Leiserson (1966) presented a theory, since named the minimum range theory, which used Riker's size hypothesis as a base and added one assumption. In addition to predicting that coalitions with minimum amounts of resources would tend to form, Leiserson predicted that, if parties or actors were arranged along a unidimensional scale of ideologies (e.g., from extremely conservative to extremely liberal), that coalition which covers the minimum range on the scale should form. In other words, a coalition will form which is just large enough to win a majority and which is composed of parties who hold similar ideologies (i.e., who are adjacent to one another on the ideological scale). Only two studies (Lawler and Youngs, 1975; Leiserson, 1970) have addressed this hypothesis; the findings from both studies were supportive. In the present study, the minimum range theory predicts that those three individuals whose preferences are most similar to one another will form a coalition and will be the potent force in determining the group decision.

The final theory under consideration is DeSwaan's (1970) policy distance minimization theory. This was derived to account for the relatively large number of greater-than-minimum winning coalitions found in political coalition situations. The theory states that when larger than minimal winning coalitions form, one actor or party has been successful in adding coalition members who have affected a coalition policy which is more similar to his own most preferred policy. In other words, an influential actor will attempt to add members to the coalition so that their added influence will increase the probability that his own preferred policy or set of policies is adopted. For this

particular study, the policy distance minimization theory would predict that the most influential person in the group will attempt to include additional group members in the winning coalition so that, due to the addition of other viewpoints within the coalition, the group's ultimate decision will be more similar to his own. No experimental data has been published concerning this prediction.

To summarize, the present study tested four predictions, derived from different theories concerning coalition formation. They are:

- (1) Minimum resource coalitions will form (Caplow, 1956; Chertkoff, 1967; Gamson, 1961; and Riker, 1962).
- (2) Minimum resource, minimum range coalitions will form (Leiserson, 1966).
- (3) Males will act exploitatively and females will act accomodatively (Vinacke, 1959).
- (4) In cases where minimum resource, minimum range coalitions do not form, a larger coalition will be the result of the addition of a member to the coalition which increases the similarity between the personal preference of the most influential group member and the final group decision (DeSwaan, 1970).

METHOD

Subjects. The subjects were 245 undergraduate students enrolled in an introductory psychology class. All subjects completed a portion of their class requirements by participating. While all of the subjects also received an LP record album as payment in the experiment, none were told that they would receive payment until after they had arrived at the experiment.

Procedures. To begin the experiment, subjects completed a form in which they individually ranked a set of five LP record albums. They were then placed in five-person, face-to-face groups whose task was to rank the five albums as a group using "majority rule". The only instruction concerning their decision process was the statement: "Make your decision using majority rule." Throughout their discussion, subjects were observed from behind one-way mirrors, but were not interrupted until their decision had been completed. Prior to their decision, subjects were told that the group's decision would have an impact on the record album each of them might receive after the experiment. They were told that a lottery would be constructed from their decision and that the selection of one chip in the lottery would determine the album which they all received. The lottery was constructed so that the alternative the group ranked first received 40% of the total number of chips, the record ranked second received 30%, third rank received 20%, fourth rank received 10%, and fifth rank received no chips.

Following the group decision all subjects completed a questionnaire which elicited their responses on 100-point scales concerning: (1) their satisfaction with the group decision; (2) how committed they would be to the group decision if they were asked to defend it; (3) how difficult the group decision was; and (4) to what extent the group decision fairly represented the opinions of the group members. Subjects also rated the amount of influence each member had in the group decision, by ascribing portions of 100% to each of the five group members. This last question was later segmented into two parts so that a measure could be taken of how each individual perceived his own influence in the group and the average influence rating the individual received from the other group members.

Another dependent variable was also included in the questionnaire. Subjects were individually asked to put a monetary value on the lottery which had been constructed from their group decision. Subjects were told that, if the total of the monetary values the group members had placed on the lottery exceeded \$4.50, each group member would be able to purchase the album chosen in the lottery for the amount he had stipulated. If the group total did not reach \$4.50, no group member would have the opportunity to purchase the album chosen in the lottery. Subjects' responses to this question, then, could effectively range from \$0.00 to \$4.50, and were operationalized as a measure of behavioral commitment to the group decision.

After the subjects had completed the questionnaire, a chip was selected from the lottery and the group was informed whether or not they could purchase the album chosen. The subjects were then debriefed and dismissed.

Design. Two independent variables were used in the present study. The first variable considered was the relationship between different coalitions' most preferred choices (as determined by majority rule predictions using the exhaustive pairwise comparisons method)¹ and the groups final decision. This variable concentrates on the "most predictive coalition," the coalition which, in all probability, did form. Observation of the group indicated that implicit coalitions did form.² The relationship, then, between a coalition's preferences and the decision reached by the entire group would indicate which coalition actually did form. In particular, the most predictive three- and four-person coalition (MPC3 and MPC4, respectively) were determined by correlating the majority rule prediction (see footnote 1) of each possible three- and four-person coalition with the group's actual decision to determine which

coalitions' preferences were, in fact, most predictive of the group decision.

In addition, identification of the most likely three- and four-person coalitions (MLC3 and MLC4, respectively) were determined by calculating Kendall's coefficient of concordance for each possible majority subgroup. Thus, four coalition types, MLC3, MPC3, MLC4, and MPC4, were generated.

The second variable which was considered was the diversity of the preferences of the members of the group. Diversity was measured by Kendall's coefficient of concordance, \underline{W} . Using the subjects' individual preference rankings, groups were constructed at four levels of diversity: (1) very high diversity, where $.00 \leq \underline{W} \leq .19$; (2) high diversity, where $.20 \leq \underline{W} \leq .39$; (3) moderate diversity, where $.40 \leq \underline{W} \leq .59$; and (4) low diversity, where $.60 \leq \underline{W} \leq 1.00$. By design, diversity rarely exceeded a coefficient of concordance greater than .80.

Data Analysis. The analysis placed first priority on the predictability which separate coalitions showed for the actual group decision. However, in no case did an explicit coalition form. In order to discuss the formation of coalitions in the present study, the first portion of the analysis was undertaken to verify the conclusion that (1) the study of coalitions is useful in determining the dynamics of group decision making; and (2) implicit rather than explicit coalitions did form. The utility of the concept of coalitions (and, to some extent, whether coalitions did form) was tested by determining whether or not segmentation of the group into different coalitions increased (1) the similarity between the majority rule predictions for the specific coalitions and the actual group decision over (2) the similarity

between the majority rule prediction of the entire group's preferences and the same group decision. The procedures used to determine the majority rule predictions in each case are described in footnote 1.

The formation of implicit coalitions was also tested by considering the influence ratings of the group members. In particular, for both one's own ratings of one's influence within the group, and for the average of the ratings of one's influence by the other group members, the members of the majority coalition should have been rated as more influential than non-members.

The final portions of the data analysis consider the initial hypotheses presented earlier and the effects due to preference diversity within the group.

RESULTS

A fixed-effects analysis of variance which used both the coalition type (MLC3, MPC3, MLC4, MPC4, and the entire group) and the preference diversity within the group (4 levels) was conducted to test the utility of the concept of coalitions in predicting the actual decision. The results showed that both independent variables significantly affected the predictability of the group's decision ($F_{\text{coalition type}} = 6.36$, $df = 4,225$, $p < .0001$ and $F_{\text{diversity}} = 59.21$, $df = 3,225$, $p < .00001$) and that the interaction between the two was also significant ($F = 2.48$, $df = 12,225$, $p < .005$). Post hoc tests using the Newman-Kuels procedure

Insert Table 1 about here.

(see Table 1) showed that: (1) the preferences of the members of the most predictive coalitions (MPC3 and MPC4) were better predictors of the actual group decision than were the preferences of either the most likely

coalitions or the group as a whole; (2) predictions of the actual group decision were the poorest in the highest diversity groups; and (3) the significant interaction could be attributed almost completely to the highest diversity conditions. These results support those previously reported by Castore and Murnighan (1973) which indicated that the impact of a group decision process is greatest at the highest levels of diversity. This data also supports the hypothesis that coalitions may be able to account for group decisions which are discrepant from those predicted from the preferences of the entire group. For groups with substantial amounts of disagreement among themselves, the formation of implicit coalitions seems to explain the decisions which were reached. The fact that the most likely coalitions did not differ in predictability from the decisions predicted by the groups' preferences tends to disconfirm Leiserson's (1966) minimum range theory.

The analysis of the influence ratings is shown in Table 2. For both the ratings by the subject himself, and for the average influence

Insert Table 2 about here.

rating by the other group members, those members of the most predictive majority coalitions were rated as significantly more influential in three out of four cases (the fourth is marginally significant) than members of the corresponding minorities. The data for the most likely coalitions, however, is uniformly non-significant. Again, these results do not support the minimum range theory. However, they indicate that not only were the MPC's more predictive of the final group decision, but also that the members of the MPC's were perceived to be more influential than non-members. It seems, then, that implicit coalitions did form,

and that they had a definite impact on the group decision.

Turning now to a comparison between the four- and three-person coalitions, the data show that: (1) in 16 groups, the most predictive three-person coalition was the best predictor of the actual group decision; (2) in 18 groups, the three- and four-person coalitions were equally good predictors; and (3) in 15 groups, the four-person coalition was superior. These data contradict the predictions of the minimum size theories (Gamson, 1961; Leiserson, 1966; Riker, 1962), which predict a greater incidence of three-person coalitions.

DeSwaan's (1970) prediction, that the most influential actor may attempt to add members to a coalition of minimum size so as to increase the similarity between his own position and the position taken by the coalition, may have been relevant to those cases where the four-person coalition predicted the group decision better than the three-person coalition. In order to test this hypothesis, those individuals who were rated as the most influential member of the group were isolated. These individuals' preferences were correlated with the decision which was predicted to occur by the most predictive four-person coalition to determine if these correlations were higher than similar correlations which could be obtained between these individuals' preferences and the decisions which would be predicted by potential three-person coalitions. In addition, those members of the most predictive four-person coalitions who were not members of the most predictive three-person coalition but who entered the most predictive four-person coalition and were rated as the most influential group member were taken as support of DeSwaan's hypothesis. Results showed that in nine out of fifteen cases where the MPC4 was more predictive than the MPC3, the most influential member

either entered the coalition or was able to effect a final decision more similar to his own preferences. Although these data do not result in a significant chi square test ($\chi^2 = .75$), they are in the predicted direction and they do not contradict the predictions of the theory. In light of the previous evidence which did not support the previously tested theories, these data do offer some minimal support for DeSwaan's theory.

The frequency of males and females in the majority and minority coalitions was also analyzed to determine the ability of Vinacke's anti-competitive theory to account for the results. As mentioned previously, in eighteen groups the MPC3's and MPC4's predicted the group decision equally well. However, for those groups which did produce such coalitions, the data from both sets of coalitions (MPC3's and MPC4's) can be pooled to test the theory's prediction that males are more often members of the majority coalition than are females. An argument (Gamson, 1961) can be made, however, that when a three- or a four-person coalition may have formed, it is more reasonable to assume that the three-person coalition formed, for what is the purpose of adding the fourth person? The results, therefore, were analyzed both ways. Contingency tables which classified males and females who were either in the coalition or outside of it were constructed (see Tables 3 and 4) and the appropriate chi square analyses were performed. For the data in Table 3, $\chi^2 = 4.36$, $df = 1$, $p < .05$. For the data in Table 4, $\chi^2 = 4.95$, $df = 1$, $p < .05$. In both cases, the predictions of the anticompetitive theory were supported. In addition, more refined analyses were conducted for those

Insert Tables 3 and 4 about here.

coalitions whose predictions were not just equal to the predictions of

the entire group but were decidedly superior in predicting the group decision. For these coalitions, the two chi-squares which are analogous to those computed above were 5.07 and 4.19, respectively. Both are again significant at the .05 level. Both again support the hypotheses of the anticompetitive theory.

Finally the ratings of subjects in the majority and the minority of the different coalition structures were analyzed using an unweighted means analysis of variance. The data are shown in Table 5. Ratings of the difficulty the group had in reaching its decision, and the representativeness of the group decision, and the measure of behavioral commitment are not shown because they were uniformly non-significant. Members of

 Insert Table 5 about here.

the majority coalition structures were found to be uniformly more satisfied with their group decision, and, in the case of the four-person coalitions, stated that they would also be more committed to support the group's decision. The data for the four-person coalition structures is somewhat questionable, however, because the minority "coalition" consisted of a single person. This may have inflated the differences.

However, the satisfaction ratings certainly show a clear-cut dichotomy between the affective responses of the majority and minority coalition members.

DISCUSSION

The results show fairly strong support for Vinacke's anticompetitive theory, and reveal negative evidence for the minimum resource and minimum range theories. Gamson's minimum resource theory (1961), although it has not been supported in every study of coalition formation

to date (e.g., Kelley and Arrowood, 1960), has found general support. In most cases, coalitions have formed which do not admit members who are not needed for the majority coalition to obtain its payoff. In light of such past results the present findings, many of which used all-male groups, are quite unexpected. However, the inclusion of females in the groups, along with a marked change in the task, may have contributed to the lack of support received by the theory. In particular, a hypothesis which predicts three-person coalitions for all-male groups could be derived from both the minimum resource and anticompetitive theories. It may actually be true that the underlying motivation of males is to maximize their own payoff by minimizing the resources of the minority coalition and minimum resource theory proposes this explanation. However, the question of parsimony can also be raised: If the anticompetitive theory can account for both sets of results, why does one need to consider the underlying motivations of males in coalition situations? In this case, if the underlying mechanism posited by minimum resource theory is accurate, it certainly should reflect "reality" to a greater degree than the more parsimonious predictions of anticompetitive theory. In any event, future research on the coalition behavior of all-male, decision-making groups is necessary to answer the question.

The same research would also address the evidence which has been reported to support Leiserson's minimum range theory. The strong effects due to sex differences in the present study may have "overpowered" the effects of attitude similarity predicted by the theory. A study which investigated all-male groups would test this conjecture.

The results which indicate that males enter coalitions even though their preferences were not as compatible to a possible coalition (i.e.,

a most likely coalition) as were the preferences of other members of the group, in many cases those being female members of the group, give rise to questions concerning the autonomy of females in decision-making groups. It would certainly be a gross overgeneralization to state that women in decision-making groups will tend to have their preferences usurped by the men in the group. The situation which females faced in the present study may be markedly different from the situation they might face in a "real world" decision-making group. In particular, the groups in the present study had no history, but were random, naive groups (Shaw, 1971). However, the suspicion that females in the present age of liberation remain, in general, as compliant as their predecessors in unavoidable. In the present study, the finding that females were anticompetitive was significant, both statistically and practically.

SUMMARY AND CONCLUSIONS

The present study investigated the predictions of four theories of coalition formation in a setting which has not been previously investigated. The formation of coalitions was inferred from the decision-making behavior of five-person groups. The findings contradicted the predictions of Leiserson's minimum range theory and Gamson's and other minimum resource theories. The findings neither supported nor contradicted DeSwaan's policy distance minimization theory. In addition, the analysis showed strong support for one of the four theories considered--Vinacke's anticompetitive theory. The study also supported the notion that coalition formation has utility in explaining the decision-making behavior of groups and suggests that, within groups which make decisions, the formation of coalitions may be especially important in determining the group's final decision.

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FOOTNOTES

1. For both three- and four-person coalitions, and for the group as a whole, majority rule predictions (expressed as a ranking) based on the set of individuals' preferences can be determined by considering each pair of possible alternatives (except in instances of cyclical majorities). In essence, each alternative is paired with every other alternative to determine which alternative would win an independent election against each of the others. That alternative which wins each of the possible pairings would be the alternative ranked first in the majority rule prediction for the group. Similarly, that alternative which only loses one paired "election" will be the alternative the majority rule prediction ranks second. For instance, if individuals A, B, and C ranked the alternatives, a, b, c, d, and e, in the following manner:

		a	b	c	d	e
	A	1	2	3	4	5
participants	B	2	1	4	5	3
	C	2	3	1	4	5

alternative a, when paired against alternatives b and c would win the "election" two to one, and when paired with d and e, would win three to zero. Similarly, alternative b would be ranked second, c third, d fourth, and e fifth. Thus the majority rule prediction for A, B, and C would be 1 2 3 4 5. If the actual group decision was 3 1 2 5 4, the similarity between the majority rule prediction and the group decision would be calculated using Spearman's Rho. The result, where $\rho = .60$, would be compared to other possible subgroups to determine whether A, B, and C formed the most predictive three-person coalition.

2. Observation of the decision-making groups revealed that lines of communication were established between certain members of the group. Other members were often excluded. Although a recording of the communication sequences would have been very enlightening, this data was not recorded. Nevertheless, the formation of implicit coalitions between some of the coalition members was quite obvious, and was independently noted by several observers.

Table 1. The means of the majority coalition structures by preference diversity interaction for the predictability of the group decision.

Preference Diversity (measured by W)	MLC3	MPC3	MLC4	MPC4	Group	$\bar{X}_{.1}$
.00-.19	.28 _a	.78 _{cde}	.49 _b	.67 _{bc}	.55 _b	.55
.20-.39	.80 _{cde}	.92 _{de}	.83 _{cde}	.90 _{cde}	.86 _{cde}	.86
.40-.59	.90 _{cde}	.95 _e	.89 _{cde}	.95 _e	.93 _e	.92
.60-1.00	.95 _e	.97 _e	.93 _e	.94 _e	.97 _e	.95
$\bar{X}_{.1}$.72	.91	.78	.86	.81	.82

Note: Cells with common subscripts are not significantly different from one another at the .05 level of significance level using the Newman-Kuels procedure.

Table 2. Means, F-ratios, and significance values for the influence ratings by each group member for himself (Own) and by the other members of his group (Other) for each of the coalition structures.

		Majority	Minority	F-ratio	p<
MLC3	Own	20.63	21.01	<1	ns
	Other	20.19	19.46	1.12	ns
MPC3	Own	21.97	19.01	6.58	.011
	Other	20.48	19.03	4.42	.04
MLC4	Own	21.04	19.78	<1	ns
	Other	19.99	19.56	<1	ns
MPC4	Own	21.49	17.94	6.34	.02
	Other	20.18	18.76	2.87	.10

Table 3. The frequencies of males and females who were either members of the majority coalition ("In") or were excluded from the majority coalition ("Out") for both of the most predictive coalition structures ($\chi^2 = 4.35$).

	In	Out
Males	117	38
Females	110	60

Table 4. The frequencies of males and females who were either members of the majority coalition or were excluded from the majority coalition for the most predictive coalition which was the superior predictor of the group decision and for the most predictive three-person coalition for cases where the MLC3 and MPC4 were equally good predictors ($\chi^2 = 4.95$).

	In	Out
Males	83	30
Females	76	51

Table 5. The means and F-ratios for ratings of satisfaction and commitment by members of the majority and minority coalitions, for each of the possible coalition structures.

	<u>MLC3</u>			
	<u>Majority</u>	<u>Minority</u>	<u>F-ratio</u>	<u>p</u>
Satisfaction	77.5	66.7	14.48	<.0002
Commitment	67.7	65.7	<1	n ^s
	<u>MPC3</u>			
Satisfaction	79.0	64.4	27.99	<.00001
Commitment	68.9	63.9	2.71	<.11
	<u>MLC4</u>			
Satisfaction	76.4	60.1	22.46	<.00001
Commitment	69.0	58.6	8.07	<.005
	<u>MPC4</u>			
Satisfaction	75.8	62.6	14.23	<.0002
Commitment	68.9	59.1	6.90	<.01





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