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The Effects of Reference Groups on Bargaining in Coalition Situations

Abstract

The predictions of four theories of coalition behavior were compared to the results obtained from three coalition games conducted under two reference group conditions. Participants were instructed to establish a reference group composed of the other members of their group or players in other groups in the same position as themselves. While the different games had an impact on the accuracy of the theoretical predictions, the data as a whole tended to support Bargaining theory (Komorita and Chertkoff, 1973) and the Weighted Probability model (Komorita, 1974) over Minimum Resource theory (Gamson, 1961) and Minimum Power theory (Shapley and Shubik, 1954). The results also indicated that a reference group of other similar players led to higher payoffs and a higher inclusion rate for the powerful player in each of the games, even though his demands were higher in these conditions. The use of four-person coalition games in coalition research was also discussed.

The Effects of Reference Groups on Bargaining in Coalition Situations

The study of coalition behavior has recently been enchanced by several new theories (e.g., Komorita and Chertkoff, 1973; Komorita, 1974; Lawler and Youngs, 1975). In addition, several earlier theories (e.g., Caplow, 1956; Gamson, 1961; Shapley and Shubik, 1954) have continued to be mentioned in the literature. It might be seriously argued that the study of coalition behavior suffers from too many theories and too little empirical research (Davis, Laughlin, and Komorita, 1976). The present paper offers data to begin to fill this void and addresses both new and old theories.

Almost all theories of coalition behavior assume that participants attempt to maximize outcomes. However, several studies (e.g., Kalisch, Milnor, Nash, and Nering, 1954; Stryker and Psathas, 1960; Trost, 1965; Vinacke, 1959) have noted a tendency of some participants to exhibit cooperative behavior. Although studies generally include instructions which encourage participants to maximize their rewards, these instructions may not be sufficient to instill a completely competitive spirit in the players. The present study was designed, in part, to test the hypothesis that the manipulation of an individual's reference group (Kelley, 1952) determines an individual's comparison level (Thibaut and Kelley, 1959), which in turn may determine whether he adopts a competitive or cooperative orientation.

An individual who holds a powerful position and whose reference group is the other members in his own group will be able to maintain his "superiority" (Laing and Morrison, 1974) even though he may allow the weaker members of his group to obtain payoffs which are more than the equity norm (Adams, 1965; Gamson, 1961) might predict. In other situations, however, an individual in a powerful position may compare himself to individuals in other groups who also hold powerful positions. In this case, the powerful person will be motivated to extract the maximum he can from the payoffs which are available to his group, thus increasing his power relative to the leaders of these other groups. A political example of this type of individual might be a prime minister, a dictator or a president. If his reference group consists of other prime ministers, dictators, or presidents, he may attempt to increase his power relative to these other individuals at the expense of the people in his country (i.e., his group). Presidents of industrial firms, labor unions, and chairmen of financial institutions and university departments may experience these same motivations (Marris, 1963).

The study was also designed to compare the accuracy of the predictions of four descriptive theories of coalition behavior. The present study was conducted, therefore, to answer two questions: (1) What are the effects of an individual's reference group in bargaining situations? And (2) Which of the relevant theories of coalition behavior adequately predict coalition behavior, not only with respect to the bargaining outcomes but also with respect to the bargaining processes which ensue?

The Theories

Minimum Resource Theory. Gamson's (1961) theory is based on the "parity norm" which specifies that rewards be divided in direct proportion to the resources of the members. Assuming that individuals are motivated to maximize their share of the rewards, the theory predicts that the coalition which minimizes resources and is just large enough to win (the "cheapest winning") will form.

Minimum Power Theory. Minimum power theory is based on an index of pivotal power proposed by Shapley and Shubik (1954). Assuming that each coalition is equally probable, the pivotal power of a participant is determined by the marginal value each player adds to each coalition when he joins it. That coalition with the least total pivotal power but which still attains a majority is the coalition which is predicted to form. Minimum power theory implies (Gamson, 1964) that the payoffs to the coalition members will be proportional to each position's pivotal power.

Bargaining Theory. Compared to the previous theories, the underlying basis of the Bargaining theory is much more complex. It is one of the few theories (if not the only one) which makes assumptions about the process of coalition formation and makes differential predictions for the initial trial and at the asymptotic level. At the asymptote, the theory predicts that the division of rewards will converge to a solution which minimizes each member's temptation to defect from the coalition.

In general, Bargaining theory predicts that rewards will be divided in direct proportion to each member's maximum expectation in alternative coalitions. For a more detailed description of the theory, the reader is referred to the paper by Komorita and Chertkoff (1973).

The Weighted Probability Model. The basic assumption underlying the Weighted Probability model is that large coalitions are more difficult to form than small ones. As the size of a potential coalition increases, the problem of achieving reciprocity and achieving unanimous agreement on the terms of the offer also increases. This is consistent with the inverse relationship between group size and the cohesiveness of a group reported by Cartwright and Zander (1968).

The theory predicts, therefore, that only minimal winning coalitions will form--a winning coalition in which the deletion of any single member will convert it into a losing coalition. This assumption is consistent with Gamson's Minimum Resource theory. However, unlike Gamson's theory which focuses on the resource distribution and predicts that the "cheapest winning" coalition will form (one which is just large enough to win), the Weighted Probability model predicts that the coalitions of minimum size will form more frequently than larger "cheapest winning" coalitions.

Method

Subjects. The subjects were 168 male undergraduates, predominantly juniors, enrolled in an introductory course in organizational behavior. Each received credit toward completion of a course requirement for participating in the study.

Design. Two variables were manipulated: The player's reference group (by means of instructions) and the distribution of resources of the players (by means of three different games). Each of the coalition games involved four-person groups, and the possible winning coalitions in the three games were identical. The games were as follows: 9(8-3-3-3), 9(8-7-1-1), and 15(8-7-7-7), where the first number denotes the number of votes needed to form a winning (majority) coalition, and the subsequent numbers denote the number of votes (resources) at the disposal of the players. If the players are identified by letter (A, B, C, and D) on the basis of decreasing order of resources seven winning coalitions are possible in each of the games: AB, AC, AD, ABC, ABD, ACD, and BCD. The "grand coalition" of four players was not permitted. Table 1 shows the predictions of the four theories of coalition formation for the three games. The theories make differential predictions for the set of three

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Insert Table 1 about here

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games: (1) Minimum Power theory, unlike the other three theories, uniformly predicts that the Weak-Union (coalition of the three weaker players) will form; (2) Minimum Resource theory can be differentiated from the remaining two theories on the basis of the first two games 9(8-3-3-3) and 9(8-7-1-1), and on the basis of the predicted reward division for 15(8-7-7-7); and (3) the last two theories make very similar predictions but can be differentiated on the basis of coalition frequency in 9(8-7-1-1) and on reward division in 15(8-7-7-7).

For each of the three games, two instructional conditions were used: one set of instructions was designed to establish the player's reference group as the other four players who were present at that particular session, while the second set of instructions was designed to establish the player's reference group as other players in the same position as themselves. The reference group of the participants in the "A" position who heard the "present group" instructions was composed of four weak players. For the weak players in this condition, their reference group was composed of one strong and three weak players. Participants who heard the "similar others" instructions had reference groups which were identical in power to themselves.

Procedure. The four participants were seated around a set of opaque partitions which shielded them from view of each other and the experimenter. The partitions were constructed in the configuration of the "wheel" communication network (Bavelas, 1951), with the experimenter in the central position. Each player's position (A, B, C, or D) was randomly assigned after they were seated behind the partitions. No verbal communication, save procedural questions, was permitted and subjects did not know which position any other player held.

Each player was required to propose one, and only one, coalition per trial. Only coalitions with the necessary minimum number of votes were allowed (i.e., one of the seven possible winning coalitions listed above). In addition, subjects were not told beforehand how many trials would be run.

The reward for forming a winning coalition was 100 points, divided among the members of the coalition. To make a proposal, each subject first decided which coalition he wanted to form and how many points of the total of 100 each member (including himself) should receive. He then sent an offer slip which contained this information to each of the other members of the proposed coalition, via the experimenter. The experimenter waited until all four players had submitted their offer slips before distributing them to the appropriate players. The players could either accept or reject the offers they received. Each player could accept at most one coalition offer. In order to form a winning coalition, acceptance by all potential coalition members was required. Furthermore, in determining a winning coalition, any player's proposal, if accepted, was considered to have priority over any offer he might accept, thus committing him to his own offer. The experimenter announced winning coalitions and notified the coalition members in writing of the number of points they had obtained for that trial.

Before every session, a practice trial was conducted to insure understanding of the rules and procedures. In this practice trial, each player was given identical resources and only three-person coalitions had enough votes to win.

Instructions. Each player was completely informed of his own resources, those of the other players, and all possible winning coalitions. A tape-recording of the game instructions was played while subjects read a typewritten copy. To provide an incentive for subjects to attempt to

maximize their outcomes, subjects in all conditions were advised that they would receive a small sum of money based upon their performance (number of points won) during the game.

Reference groups were manipulated by re-wording a portion of the instructions which pertained to the determination of each player's payoff. Half of the groups in each game condition received the following instructions, designed to elicit a reference group composed of the players in the present group:

> . . .The more points you win, the more money you will receive. A conversion scale will be used to determine how much money you receive, but it will not be based on one cent for one point.

The remaining subjects, however, were told that their payoffs depended on their performance relative to the performance of players in other groups. Thus, the following instructions established a reference group of other strong players for each of the powerful players and a reference group of other weak players for the weaker players in the group:

> . . .The more points you win, the more money you will receive. However, the conversion scale to determine how much money you receive will not be the same for each person; i.e., the number of points you win will be compared with the performance of other subjects <u>in the same position as you</u>. Thus, the conversion from points to money will depend upon your position (in the game).

Substitution of this single passage was the only difference in the two sets of instructions.

After the final trial, all subjects received a written explanation of the purposes of the experiment and questions and comments were invited. Spirited discussions were quite common, indicating active interest in the proceedings.

Results

As a test of differences in coalition frequencies, the group was used as the unit of observation and the frequency of each of the 7 coalitions in each group was converted to arc sins. A 3 x 2 x 7 (games by reference group by coalitions) analysis of variance (with repeated measures on coalitions) was performed on the arc sin values. Since the frequency of coalitions in each group must sum to 12 (the number of trials), the main effects of game type and reference group could not have been significant in this analysis. Hence, the critical tests in this analysis were the main effect of coalitions and the interactions between coalitions with game type and with reference group. The only significant effect was the main effect of coalitions: F (6, 216) = 45.70, $p < .01$. Tables 2 and 3 show the frequencies of each coalition and the mean reward division, for the three games and in the two reference group conditions, respectively. These data represent the means and frequencies pooled over 7 groups and 12 trials. The three-way coalition involving

Insert Tables 2 and 3 about here

the strongest person (ABC, ABD, and ACD) occurred infrequently; hence, these coalitions have been combined and are denoted AXX.

The six degrees of freedom for the main effect of coalitions were partitioned into several planned comparisons; only two of these comparisons were significant: BCD vs. (AB, AC, and AD): F (1, 216) = 15.39, $p < .01$ and AXX vs. all others: F (1, 216) = 80.71, $p < .01$. These

results indicate that two-way coalitions were more frequent than three-way coalitions, but no particular two-way coalition was more frequent than any of the others.

With regard to the division of rewards, Table 4 shows the mean outcome of Player A, the strongest player, in each of the six conditions. The strong player's mean outcomes were analysed in a 3 X 2 X 3 (games by reference group by trial blocks) analysis of variance. The only significant

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Insert Table 4 about here

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effect was the reference group main effect: $F\ (1, 36) = 9.10$, $p < .01$. When the strong player's reference group was other strong players, he received higher outcomes than when his reference group was weaker players in his own group. This analysis included only those trials where A was included in the winning coalition. The same results were found, however, in an analysis of A's payoffs for all trials, including outcomes of zero when he was excluded from the winning coalition).

Tests of Four Theories

There are several possible ways to compare the relative validity of the four theories, but all of these procedures have serious problems, especially with regard to the statistical analysis of the data. Hence, in comparing the validities of these theories, we have been forced to adopt a "piecemeal" approach based on various criteria of comparison.

Coalition Frequency. With regard to the accuracy of predicting the coalitions which are likely to form (Table 3), Minimum Power theory is clearly inadequate. It predicts that the Weak-Union (BCD) should form in all three games and this coalition occurred infrequently. Hence, Minimum Power theory can be immediately rejected and will not be considered in the following presentation.

To compare the remaining theories with regard to predicting coalition frequencies, the following index was used:

$$D_f = \frac{\Sigma|O_f - P_f|}{2n}$$

where O_f and P_f denote the observed and predicted frequencies of each coalition, n denotes the number of trials, and the summation is over the seven possible coalitions. The desirable property of this index is that when $D_f = 1.0$, all predictions are in error and when $D_f = 0$, all predictions are correct.

The vectors of predicted frequencies for coalitions (AB, AC, AD, BCD, ABC, ABD, and ACD) for 12 trials are: (1) Minimum Resource theory: (0, 0, 0, 12, 0, 0, 0) in 9(8-3-3-3), (0, 4, 4, 4, 0, 0, 0) in 9(8-7-1-1), and (4, 4, 4, 0, 0, 0, 0) in 15(8-7-7-7); (2) Bargaining theory: (4, 4, 4, 0, 0, 0, 0) in both 9(8-3-3-3) and in 15(8-7-7-7), and (0, 6, 6, 0, 0, 0, 0) in 9(8-7-1-1); and (3) Weighted Probability model: (24/7, 24/7, 24/7, 12/7, 0, 0, 0) in all three games. The predicted frequencies of the Weighted Probability model are based on the fact that it specifies the exact probability of each coalition; in all three games, it predicts that the probability of each of the two-way coalitions should be 2/7 and the probability of the BCD coalition should be 1/7.

Insert Table 5 about here

For each theory separately, a 3 x 2 x 3 (games by reference group by trial blocks) analysis of variance was used to analyze the D_f values. In all of these analyses, the main effects and the interactions for reference group and for trials were not significant; hence, the data were collapsed over these variables.

Though the three analyses were not independent (since they were based on the same set of observations), they were conducted primarily to identify the weaknesses of each theory. Table 5 shows the mean D_f values for the three games, pooled over trials and reference group conditions. For Minimum Resource theory, the only significant effect was the main effect of games: $F(2, 36) - 35.88$, $p < .01$. Table 5 shows that this effect can be attributed to the large D_f value in 9(8-3-3-3). Minimum Resource theory predicts that the Weak-Union (BCD) is likely to form in this game, but this coalition did not form very often (see Table 2). This suggests that this theory fares poorly in a situation where the "cheapest winning" coalition was not the Weak-Union. In the other two games, the "cheapest winning" coalition was not the Weak-Union and the predictions of the theory for coalition frequency were relatively accurate.

Similarly, the main effect of games was found to be significant for Bargaining theory: $F(2, 36) = 6.82$, $p < .01$. Table 5 shows that this effect can be attributed to the large value of D_f in 9(8-7-1-1). Bargaining theory predicts that the (8-1) coalition (AC, AD) should have

formed in this game. The theory cannot account for the relatively large frequencies of the AB and BCD coalitions. It should be noted, however, that Bargaining theory does not make as strong a prediction in the 9(8-7-1-1) game as it does in the other two games. Finally, for the Weighted Probability model, no significant effects were found. This indicates that this model was equally accurate in predicting coalition frequencies across the three games and for the two reference group levels.

With regard to the relative validity of the three models, the mean D_f values can be compared with an Equal Probability (Base Rate) model which predicts that all coalitions are equally likely. The last column of Table 5 shows the D_f values for such a model. For each game, pooled across the two levels of reference groups, each of these theoretical models, including the Equal Probability model, was tested against each other, a pair at a time. These pairwise tests were based on F-tests with 1 and 12 df's each (equivalent to t-tests for correlated means, with N = 14 g oups). Across each row of Table 5, values with a common subscript indicate that the pairwise comparisons were not significantly different from one another. The Weighted Probability model was at least as accurate as Bargaining theory in the 9(8-3-3-3) game, more accurate than any of the other models in the 9(8-7-1-1) game, and along with Minimum Resource theory and Bargaining theory, more accurate than the Equiprobability model in the 15(8-7-7-7) game. Bargaining theory was a poor predictor only in the 9(8-7-1-1) game. Again, this result should be tempered by the theory's weak prediction for this game. Minimum resource theory surpassed the Equiprobability model only in the 9(8-7-7-7) game.

Comparisons Based on the Strong Player's Outcomes. For the reward division data, the analysis focussed on the discrepancy between the predicted and observed outcomes for the strong player. Each of the models made similar predictions for the reward division for the BCD coalition; all closely approximate an equal division except Minimum Resource theory, which predicts a 78-11-11 division for the BCD coalition in the 9(8-7-1-1) game. The previous analysis of frequencies, however, indicated that this was an infrequent coalition. In addition, when the BCD coalition did form in the 9(8-7-1-1) game, the mean payoff division (see Table 2) was much closer to an equal division than to Minimum Resource theory's prediction.

The differences between the observed and predicted outcomes of the strong player (when he was included in the winning coalition) were analyzed

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Insert Table 6 about here

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in 3 x 2 x 3 (games by reference group by trial blocks) analyses of variance for each of the models individually. Although each of the model's predictions were more accurate in the later trials than they were in the early trials, none of the effects for trials were significant. After pooling over trials, the analysis revealed significant main effects for reference group for each of the models and significant main effects for games for Minimum Resource theory and the Weighted Probability model (see Table 6). The results for reference group support theoretical expectations: When a competitive motivation is induced (i.e.,

when reference groups are manipulated to result in comparisons to other similar players), the predictions, which are based on the assumption that each of the players are competitively motivated, are more accurate.

The main effects for games yielded several interesting findings. Minimum Resource theory's predictions were relatively poor in each of the games, and especially poor in the 15(8-7-7-7) game. The fact that the main effect for games was significant for the Weighted Probability model is damaging, for it treats the three games as if they were equivalent. Finally, while Bargaining Theory's predictions were relatively good for each of the games, its worst prediction came in the game where it makes the weakest prediction.

Demands. An analysis of the players' demands was undertaken to further explicate the dynamics of the bargaining process. Two sets of analyses were performed: one for the strong player and the other for the weak players. A 3 x 2 x 3 (games by reference group by trial blocks) analysis of variance was performed for the strong player's demands. The results revealed significant effects for reference group and for trial blocks. His demands were larger when his reference group was other powerful players ($F(1, 39) = 14.69$, $p < .01$), and *post hoc* tests of the trials effect ($F(2, 51) = 5.40$, $p < .01$) revealed that his demands increased significantly from the first to the second trial block and that the subsequent increase in the third trial block was not significant.

The analysis for the weaker players involved an additional factor, the position of the players (B, C, and D). This analysis resulted in

significant game and trials effects: $F(2, 50) = 6.73$, $p < .01$ and

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Insert Table 7 about here

$F(2, 84) = 6.44$, $p < .01$, respectively. The game by player interaction was also significant: $F(4, 90) = 4.93$, $p < .01$. The trials effect was a mirror image of the effect for the strong player: the weak player's demands dropped significantly from the first to the second trial blocks and the further drop between the last two trial blocks was not significant. The means and the results of the *post hoc* tests for the two other effects are shown in Table 7. The weaker players demanded more when they had seven votes than when they had one or three votes. The *post hoc* analysis of the game by player interaction indicated that B (who held seven votes) demanded more than the other weaker players in the 8-7-1-1 game.

Discussion

The comparison of the four theories indicates that the predictions of Bargaining theory and the Weighted Probability model are more accurate than those of Minimum Resource theory and Minimum Power theory. A comparison between the two of them, however, reveals that the Weighted Probability model has a slight advantage in predicting coalition frequencies and that Bargaining theory has the advantage in predicting the payoff distribution. The non-significant effect for trials for Bargaining theory in the analysis of its predictions of the strong player's payoffs

is damaging evidence. However, the data did show that the predictions improved over trials ($\bar{X}_{T1-4} = -4.20$; $\bar{X}_{T5-8} = -1.93$; $\bar{X}_{T9-12} = -1.34$), as predicted.

The most intriguing results were the findings which showed that the strong player demanded more when his reference group was other similar players than when his reference group was the present group members, and that he succeeded in reaping greater payoffs and even more frequent inclusion in the winning coalition in this situation. It is understandable that he would attempt to increase his payoffs by increasing his demands in this situation, but one would expect that these increased demands would have resulted in less frequent inclusion in winning coalitions.

One explanation of this finding focuses on the subtle interaction between the player's reference group and his power. In the "present group" condition, the weaker players probably compared themselves not only with each other but also with the strong player within their group. When their reference group was other weaker players, they no longer had to compete with someone who held power. For the strong player, the "present group" induced him to compare himself with weaker players, while his reference group in the other condition was composed of other powerful players. The results indicate that when a player's reference group is composed of other powerful players, he will be more demanding and may be able to intimidate an opponent whose reference group is composed of weak players, regardless of his own position of strength. The analysis of the post-experimental questionnaire responses supported this hypothesis:

when their reference group was the present group, the weak players felt that a "fair" payoff division for the two-person, strong-weak coalition should be 55.4 for A and 44.6 for themselves, but 60.3 for A and only 39.7 for themselves when their reference group was other similar players. Paired with the fact that the weaker players began the 12 trials with identical demands on the first trial ($\bar{X}$ = 38.7) in all the conditions, their interaction with the powerful player seems to have led to a higher aspiration level when the strong player's aspiration level was low and a lower aspiration level when the strong player's aspiration level was high. This finding coincides with those reported by Yukl (1974 a, b) in two-person bargaining and is consistent with Siegel and Fouraker's (1960) Level of Aspiration theory of bargaining.

The data collected in this study were much "richer" than the data reported in earlier coalition studies (cf. Stryker, 1972) based on three-person groups. In the present study, where one player not only had more apparent power than the other players (i.e., he had more resources than anyone else), he also had more "real" power than the other players. While resources did lead to misperceptions of power (for instance, B made quite large demands in the early trials of the 8-7-1-1 game), A realized that he had more power than the other players and they also realized this (again, from the post-experimental questionnaires). These findings, therefore, have greater relevance for the effects of power than previous studies. In addition, the present study increased the salience of the power dimension by manipulating the players' reference

group. Although the generalizability of the present findings to other situations may be tenuous, the use of four or more players in a coalition situation in order to vary both real and apparent power leads to a more realistic representation of "real world" power struggles. Studying only three players restricts games to situations where one player has a veto, or where the only power differences are apparent and not real (cf., Kelley and Arrowood, 1960). With four players, however, the use of power becomes crucial. The weak players can usurp the strong player's power, but he can also retain it if his strategies are well-founded. With this in mind, studies of coalition behavior may do well to expand their horizons from the study of triads to groups of larger sizes.

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Table 1. Coalitions and Reward Division Predicted by Four Theories For Three Games.

Theory	GAMES (8-3-3-3)	(8-7-1-1)	(8-7-7-7)
Pivotal Power Shapley (1954)	3-3-3 (33-33-33)	7-1-1 (33-33-33)	7-7-7 (33-33-33)
Minimum Resource Gamson (1961)	3-3-3 (33-33-33)	8-1 (89-11) or 7-1-1 (78-11-11)	8-7 (53-47)
Bargaining Theory Komorita and Chertkoff (1973)	8-3 (69-31)†	8-1 (73-27)†	8-7 (61-38)†
Weighted Probability Komorita (1974)	8-3 (67-33)	8-7 or 8-1 (67-33)	8-7 (67-33)

†The predicted payoff divisions are the payoffs predicted for the nth trial. Bargaining Theory does predict changes in the payoffs over time.

Table 2. Coalition Frequencies (f) and Mean Division of Rewards in Three Games. (Data are pooled over reference group conditions and over 12 trials)

Games		Possible Coalitions AB	AC	AD	BCD	AXX*
9(8-3-3-3)	f	38	45	49	26	10
	Div.	69-31	65-35	29-31	34-33-33	44-28-28
9(8-7-1-1)	f	43	32	62	29	2
	Div.	54-46	74-26	62-38	38-32-31	47-32-21
15(8-7-7-7)	f	46	42	47	26	7
	Div.	60-40	62-38	59-41	34-33-33	35-31-34
Combined	%	.25	.24	.31	.17	.04
	Div.	60-40	66-34	63-37	35-33-32	41-29-30

*Denotes coalition of strongest player and any two of weaker players; none of the four theories predict that AXX should occur.

Table 3. Coalition Frequencies and Mean Di.ision of Rewards for Two Levels of Reference Group (Data are pooled over three games and 12 trials).

Reference Group		Possible Coalitions AB	AC	AD	BCD	AXX*
Present Group	f	59	62	85	40	6
	Div.	56-44	66-34	58-42	35-33-32	57-22-21
Similar Other	f	68	57	73	41	13
	Div.	66-34	66-34	68-32	35-33-32	33-33-34

* Denotes three-way coalition of strongest player and any two of the weaker players (ABC, ABD, and ACD). None of the theories predict that AXX will occur.

Table 4. Mean Outcome of Strongest Player (A) When Included in the Winning Coalition (frequency of inclusion shown in parentheses).

	Games			
Reference Group	9(8-3-3-3)	9(8-7-1-1)	15(8-7-7-7)	Mean
Present Group	59.4 (68)	61.2 (72)	54.1 (78)	58.2
Similar Others	71.7 (74)	62.1 (67)	62.6 (71)	65.5
Mean	65.6	61.7	58.4	

Table 5. Mean Values of D_f for Three Theories and for an Equal Probability (Base Rate) Model.

Games	Min. Resource	Bargaining	Wtd. Prob.	Equal Prob.
	Theoretical Models			
9(8-3-3-3)	$.845_c$	$.345_a$	$.342_a$	$.514_b$
9(8-7-1-1)	$.434_b$	$.512_b$	$.344_a$	$.567_b$
15(8-7-7-7)	$.274_a$	$.274_a$	$.229_a$	$.461_b$

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

Table 6. Means of the Strong Player's Observed Minus Predicted Outcomes for the Main Effects of Reference Group and Games (including the F-ratios and p-values for each test).

Theories	Reference Group				Games				
	Present Group	Similar Others	F*	p<	9(8-3-3-3)	9(8-7-1-1)	15(8-7-7-7)	F**	p<
Minimum Resource	-8.62	-1.39	8.81	.01	-5.69	-15.63	6.12	26.25	.0001
Weighted Probability	-7.73	0.18	11.39	.005	0.45	-4.51	-7.24	3.52	.05
Bargaining Theory	-6.33	1.04	10.39	.005	-1.47	-4.40	-2.08	<1	ns

*df = 1, 36

**df = 2, 36

Table 7. Mean Demands of the Weaker Players for Three Games*.

	Games		
Player**	9(8-3-3-3)	9(8-7-1-1)	15(8-7-7-7)
B	32.26_{b}	40.82_{a}	38.69_{ab}
C,D	33.94_{b}	31.36_{b}	38.91_{ab}
$\overline{X}$	33.38_{b}	34.51_{b}	38.84_{a}

*Cells with common subscripts, within each main effect and each interaction, are not significantly different from one another at the .05 level using the Newman-Kuels procedure.

**The demands of players C and D, who had identical resources in each of the games, were analyzed both together and separately with no appreciable difference in results.