Equity theory as a predictor of payoff apportionment among partners in coalition formations*

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The Adams equity model is extended to predict the apportionment of payoff among coalition partners in two experiments. The results partially support Adams in coalition formations among equals but not in coalition formations among unequals. The perception of equity in the females is different from that in the males. The females view equity as nondifferential outcomes, where coalition payoff is divided equally, regardless of the initial resources. The males view equity as differential outcomes, where coalition payoff is divided equally after the payment of initial resources.

This paper proposes that the apportionment of payoff among partners in coalition formations is determined by equity norms. The importance of equity norms is inferred from a body of literature dealing with inequity in social exchange. In the last decade, several models have been advanced proposing that people seek justice or equity in the process of social exchange (Homans, 1961; Jacques, 1961; Adams, 1965). A common feature of these models is that inequity leads to cognitive dissonance, which, in turn, is reduced by a variety of cognitive or behavioral methods. Most of the research in equity theory is based on the Adams model. Adams (1965) proposes that inequity exists for a person whenever he perceives that the ratio of his outcomes to his inputs and the ratio of the other's outcomes to the other's inputs are unequal. For example, inequity exists for Person A and Person B when:

$$\frac{\text{Outcome A}}{\text{Input A}} > \frac{\text{Outcome B}}{\text{Input B}}$$

In experimental coalition formations, the relevant inputs are the initial resources of coalition partners and the relevant outcomes are the partners' shares of coalition payoff. As such, Adams's (1965) inequity model can be extended to explain the method by which the partners divide coalition payoff. The model implies that coalition payoff will be divided proportionally to the initial distribution of resources among the

partners such that:

$$\frac{\text{Outcome A}}{\text{Input A}} = \frac{\text{Outcome B}}{\text{Input B}}$$

Specifically, the following predictions are suggested by Adams's model: (1) In coalition formations among equals, coalition payoff will be divided equally. (2) In coalition formations among unequals, the share of each partner will be proportional to his initial resources, where the larger the initial resources, the larger the share, and vice versa.

Two experiments were designed to test the above predictions, first in the males and second in the females. Four of Caplow's triads (1956) were employed in the two experiments. The initial distribution of resources in these triads is presented in Table 1.

EXPERIMENT 1

Subjects

Forty-eight male undergraduate students served as Ss in 16 triads. A minimum wage of \$1.60 per hour was guaranteed for each student, with the possibility of additional earnings according to the points gained in the experiment. The Ss were recruited from the campus at large by advertisement in order to minimize friendships.

Apparatus

The apparatus consisted of a round table and four chairs, three for the triad members and a fourth for an

administrator, a standard deck of 52 playing cards, a stopwatch, and a game matrix showing the initial resources in the triad and the coalition payoff to be divided among partners. Each member was given the following: a pencil, a budget sheet, 60 bargaining sheets (one for each trial), and six identification cards marked A, B, or C (two for each letter).

Procedure

The procedures were similar to those recommended by Swingle (1968). This procedure was chosen over Vinacke's parchisi game and Gamson's political convention to permit bargaining after, not before, coalitions are formed and to emphasize the relative importance of the Ss' initial resources in determining coalition success. The Ss were assigned randomly to triads, with the condition that no two members had known each other previously. Four groups were assigned randomly to the four triads in Table 1. There were 60 trials, and the Ss were rotated randomly in each trial between Positions A, B, or C. Each position was assigned specific initial resources according to the type of triad. It was impossible to discover who was in which position for a given trial before a coalition was formed. Consequently, personal preferences or preferences due to the ease of bargaining were eliminated as criteria for the choice of a partner, and the assigned resources were the only possible criteria. The Ss were instructed to indicate their choice of a partner by the identification cards. The two members who chose each other were considered a coalition, and they pooled their resources together against the third member in competition for coalition payoff. If there were no mutual choices, the trial was terminated and all members lost their resources. Once a coalition was formed, a card game was played in tricks, where the coalition drew 26 cards consecutively and multiplied the values of the drawn cards by the total resources of the two partners. The third member did the same, using his individual resources. It was possible for either the coalition or the third member to win the coalition payoff, according to the total number of tricks won. It was obvious that the probability of a coalition success was

Table 1
Initial Distribution of Resources in Four Triads

Triad Type	Initial Distribution of Resources	Assigned Resources (Cents)			Coalition Payoff (Cents)
		A	B	C	
I	A > B, B = C, A < (B + C)	12	8	8	28
II	A < B, B = C	4	8	8	20
III	A > B > C, A < (B + C)	16	12	8	36
IV	A > B > C, A = (B + C)	12	8	4	24

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Table 2
Frequency of Payoff Apportionment in Each Coalition Formation in the Males

Method of Apportionment									
Triad Type	Coalition Formed	$\frac{O_i}{I_i} = \frac{O_j}{I_j}$	$I_i + \frac{O_c - I_{ij}}{n}$	$O_i = O_j$	$O_i > O_j$	χ^2	df	Disagree	Total Coalitions Formed
A < B B = C	AB	7	64	16	3	26.7*	3	2	92
A < (B + C)	AC	10	45	14	2	24.6*	3	2	73
$O_c = 28$ cents	BC		18		0	—	—	7	25
A < B B = C	AB	0	20	9	1	34.2*	3	4	34
	AC	0	34	6	1	19.3*	3	4	45
$O_c = 20$ cents	BC		105		0	3		0	105
A > B > C A < (B + C)	AB	4	81	47	3	31.2*	3	11	146
	AC	4	31	13	0	20.2*	3	5	53
$O_c = 36$ cents	BC	3	5	2	0	5.2	3	1	11
A > B > C A = (B + C)	AB	7	66	41	2	21.1*	3	5	121
	AC	1	43	9	0	21.3*	3	1	54
$O_c = 24$ cents	BC	0	19	8	0	34.7*	3	5	32

* $p < .001$

partially dependent upon the joint resources of the partners and partially on the value of the cards drawn. This procedure assured a more accurate perception by the Ss of the assigned resources, because the higher the joint resources of the partners, the higher the probability of coalition success, and vice versa. If the third member won the game, he was to receive his initial resources. If the coalition won, the partners were asked to divide coalition payoff silently by using the bargaining sheets. The third member was asked to turn his back to the table and was not informed about the payoff division. The bargaining sheets included all possible offers and counteroffers for a given payoff at intervals of 1 cent. A coalition partner was to check his offer in the proper space and give his bargaining sheet to the administrator, who, in turn, was to transmit the offer to the other partner, and vice versa. The negotiation was to be completed in 60 sec; otherwise the coalition partners would lose the payoff and the third member would receive his initial resources. The Ss were provided with a budget sheet to record cumulative gains and losses. The initial resources were recorded in Column 1 at the beginning of each trial, and any gains were recorded in Column 2 at the end of the trial; the differences between Columns 1 and 2 determined the S's additional earnings. The first three trials were devoted to training to assure the understanding of procedure. Talking, signaling, or communicating by any means were absolutely prohibited. At the end of

the experiment, each S was paid the total of the minimum wage, \$1.60 per hour, in addition to his additional earnings in the experiment (each point = 1 cent).

RESULTS

To facilitate the presentation of the results, let I = input, O = outcome, O_c = coalition payoff, i = Partner i , and j = Partner j . A careful inspection of the observed frequencies of coalition payoff indicates that the data could be classified as close to one of four possible categories. (1) $O_i/I_i = O_j/I_j$, or proportional apportionment of payoff. (2) $O_i = I_i + [(O_c - I_{ij})/n]$ and $O_j = I_j + [(O_c - I_{ij})/n]$, or repayment of initial resources, then equal division of coalition gains. (3) $O_i = O_j$, or equal apportionment of payoff. (4) $O_i > O_j$, or apportionment that favors the partner with the small resources.

Table 2 presents the observed frequencies under the four methods of apportionment for each coalition formed (predicted fractions of a cent by the proposed four methods of apportionment were rounded to the closest cent). Before completing the analysis, a chi-square test of independence was applied to a contingency table (4 groups by 4 frequencies) to test for group effect within each triad. The test showed no significance ($df = 6$).

A chi-square test shows a significant difference between the observed frequencies of apportionment and a theoretical distribution of equal frequencies, both when the fourth method of apportionment ($O_i > O_j$) is

included ($df = 3$, $p < .001$) and when it is excluded ($df = 2$, $p < .001$). In the case of coalition formations among equals, the first three methods of apportionments yield an equal outcome for both partners. As such, it was not possible to use the four proposed classifications in coalitions among equals. The results, however, indicate that Adams's predictions are supported in coalitions among equals but are not supported in coalitions among unequals. In coalitions among equals, such as Coalition BC in Triad A < B, B = C, the payoff is divided equally. On the other hand, in coalitions among unequals, such as Coalition AB in Triad A < B, B = C, the payoff is not divided proportionally; rather, coalition gain is divided equally after repayment of the initial resources. Apportionment that favors the partner with the small resources is the least frequent, especially in coalitions among equals. Such method of apportionment is the result of the bargaining skills of the second partner and his desire to maximize his personal gains. The low frequency of this classification, however, indicates that bargaining skill is less important than equity norm in the apportionment of payoff. The frequency of disagreement is generally lower in coalitions among equals than in coalitions among unequals. This reveals that norms of equity are easily accepted by all partners in coalitions among equals. The trends in coalitions among equals are the same whether coalitions are formed between the two weak members, such as Coalitions BC

Table 3
Frequency of Payoff Apportionment in Each Coalition Formation in the Females

Method of Apportionment									
Triad Type	Coalition Formed	$\frac{O_i}{I_i} = \frac{O_j}{I_j}$	$\frac{I_j + O_c - I_{ij}}{n}$	$O_i = O_j$	$O_i > O_j$	χ^2	df	Disagree	Total Coalitions Formed
A > B B = C	AB	2	29	59	2	19.2*	3	8	100
A < (B + C)	AC	0	26	49	2	17.1*	3	10	87
O _c = 28 cents	BC		16		0	—	—	2	18
A < B B = C	AB	0	14	9	0	24.1*	3	4	27
	AC	2	9	12	0	14.5†	3	2	25
O _c = 20 cents	BC		151		0			4	155
A > B > C A < (B + C)	AB	2	39	104	1	48.1	3	11	157
	AC	6	1.	15	0	13.5†	3	8	43
O _c = 36 cents	BC	0	5	6	0	17.4*	3	3	14
A > B > C A = (B + C)	AB	0	30	119	0	63.8	3	15	164
	AC	0	11	25	1	35*	3	2	39
O _c = 24 cents	BC	0	2	6	0	12†	3	2	10

* $p < .001$; † $p < .01$

in Triad A > B, B = C, A < (B + C), or between the two strong members, such as Coalition BC in Triad A < B, B = C. Also, the trends in coalitions among unequals are the same regardless of the magnitude of the difference between the initial resources.

EXPERIMENT 2

The second experiment was an exact replication of the first except for the Ss. The Ss in the second experiment were 48 females recruited by the same method as the males. The observed frequencies of apportionment for each coalition formed are shown in Table 3. A chi-square test of independence ($df = 6$) showed no significance. A chi-square test for coalitions formed shows a significant difference between the observed frequencies and a distribution of equal frequencies both when the fourth method of apportionment ($O_i > O_j$) is included ($df = 3$, $p < .001$ or $p < .01$) and when it is excluded ($df = 2$, $p < .001$ or $p < .01$). The results in the female also support Adams's predictions in coalitions among equals but not in coalition among unequals. In coalitions among equals, coalition payoff is divided equally. However, the frequencies under equal division in the females are higher than those of the males. Unlike males, females also divide coalition payoff equally in coalitions among unequals regardless of the initial distribution of resources. However, there is a higher frequency of disagreement among females than among males. This indicated that equal division of payoff is not easily

acceptable to all partners. The frequency of divisions that favors the partner with the small resources was lower in the females than in the males.

DISCUSSION

The study shows that equity theory can be extended to predict payoff apportionment in coalition formations. The results could be interpreted as supporting the first of Adams' predictions, but not the second. In coalitions among equals, both males and females divide coalition payoff equally; however, equal division of payoff among equals could be also interpreted as supporting a simpler proposition that equity means equality. The proposition that equity means equality is also supported in the females' coalitions among unequals. In contrast, in the males' coalitions among unequals, equity is interpreted as equal division of gains after repayment of the initial resources. The behavior of the males and the females is generally consistent with findings by other studies (Bond & Vinacke, 1961; Uesugi & Vinacke, 1963). Vinacke and his associates explained the difference between the males and females as the difference between typical "masculine" and "feminine" strategies. A feminine strategy is called anticompetitive because females behave along the lines of least resistance in order to minimize conflict and maximize the satisfaction of both partners. A masculine strategy is called competitive because it is directed toward maximizing one's own outcome regardless of the outcome of the other.

The results reveal that the

perception of equity is different in the males and females. What is equitable for the males is not necessarily equitable for the females. The females tend to interpret equity as nondifferential outcomes regardless of the inputs of the partners, while the males tend to interpret equity as differential outcomes, depending upon the inputs of the partners. The results also reveal that the males do not perceive equity as a proportional ratio between inputs and outcomes, as proposed by Adams; rather, they perceive equity as equality after repayments of inputs. The implications of these findings for both coalition formations and equity theory should not be overestimated, and it is evident that further investigation in this area is needed.

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