IDENTIFYING COALITIONS
Generating Units of Analysis

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A coalition refers to any subgroup within a larger group which has at least one binding force. Coalitions are talked about in terms of decision making, status, class, familial connections, voting records, seating arrangements, group histories, and many other social phenomena. There are as many ways to define a coalition in a group as there are group variables.

Fisher (1974) argues that "subgroups typically form and maintain themselves because of some social conflict within the larger system." The coalitions tend to be more stable than the larger social system which contains them. However, social conflict does not have to be the binding force.

This article maintains that coalitions form as a function of the *popularity* of an individual and the *reciprocation* between individuals. An algorithm is introduced, incorporating both popularity and reciprocation components, to generate units of analysis for coalition identification.

The algorithm is useful because it reflects aspects of the whole group and simultaneously indicates the intensity of dyads (and, by extension, triads or larger subgroups). The units of analysis can be analyzed by multivariate techniques.

METHOD

Three levels of analysis will be presented in developing the algorithm suggested in this paper. The first level will focus

SMALL GROUP BEHAVIOR, Vol. 10 No. 3, August 1979 343-354

solely on the power of individuals within the group. The second level will focus only on the reciprocation between individuals in the group. The third level will focus on the algorithm combining the components of the first two levels.

An example, based upon an attraction exercise, is used to illustrate each level. Ten persons in an interpersonal communication class, including the teacher, were given a red, a white, and a blue token (poker chip). Each group member was asked to write down on a slip of paper (1) the person whom they liked the best, (2) the person whom they liked second best, and (3) the person whom they liked third best. Then, each group member distributed the red token to the first person on the list, the white token to the second person on the list, and a blue token to the third person on the list. After the distribution, the members discussed why particular persons received the specified numbers of tokens. The exercise was performed about the thirteenth week of the semester.

POPULARITY ANALYSIS: LEVEL ONE

Table 1 reports the results of "who gave what to whom." If the person received a red token (best liked), three units of attraction were assigned. If the person received a white token (second liked), two units of attraction were assigned. If the person received a blue token (third liked), one unit of attraction was assigned. The assumption is that the most attractive person is the most liked.

The total number of attraction units each person received provides a simple pattern for systematic examination. However, it does not necessarily identify a set of coalitions. There are many ways to group the participants. For example, the mean attraction units received is 5.9. The group could be split into those above the mean and those below the mean. Or, the group could be split into those within a standard deviation (5.5) of the mean and those who lie outside a standard devia-

TABLE 1
Who to Whom Matrix

	Bob	Steve	Ted	Amy	Denise	Sherry	Jerry	Don	Wendy	Myra
Bob	**	0	0	0	2	1	0	0	0	3
Steve	1	**	0	0	3	2	0	0	0	0
Ted	3	0	**	0	1	0	2	0	0	0
Amy	0	2	0	**	3	1	0	0	0	0
Denise	0	0	0	0	**	0	0	2	3	1
Sherry	0	0	3	2	0	**	0	0	0	1
Jerry	0	0	0	0	3	1	**	0	2	0
Don	0	0	2	0	3	0	0	**	1	0
Wendy	3	0	1	0	2	0	0	0	**	0
Myra	2	0	1	0	3	0	0	0	0	**
Totals	9	2	7	2	20	5	2	2	6	4

NOTE: The rows represent what was given; the columns represent what was received.

tion of the mean. In this case, two groups emerge: Denise is in one group, and the rest of the members in the other group. Or, the group could be split into those within one-half standard deviation of the mean. In this case, three subsets emerge.

The problem is that the members within the various groups may or may not be bound by a mutual force. In fact, since Denise received tokens from everyone except Sherry, it suggests that she belongs to some coalitions and should not be isolated.

RECIPROCATION ANALYSIS: LEVEL TWO

In coalition analysis, *patterns* of dyadic relationships are more informative. By definition, a dyadic relationship is stipulated as any exchange of attraction units between two persons.

If there are N people in a group, there are always ½N(N–1) dyadic relationships. In the example, there are 45 dyadic relationships.

The total units of attraction, A, for any dyad, can be expressed in the terms of the following formula:

$$A = \sum_{i=1}^{2} (a_i). \qquad [1]$$

where a_i = units of attraction. For example, the total units of attraction between Bob and Steve is 1.

Table 2 reports the total units of attraction for each dyad. The weakest relationship occurs when neither person gives the other a token; A = 0. The strongest relationship occurs when both persons give each other a red token; A = 6.

Twenty dyads have no units of attraction. This is partially a function of how many tokens were allowed in the exercise. No dyads have the maximum units. Three dyads, Bob and Myra, Denise and Wendy, Denise and Don, have a high number of attraction units (A = 5).

These three dyads provide the starting point for coalition identification and analysis. Denise is the pivotal member for two of three members. Also, she is strongly related to Myra who, in turn, forms a strong link with Bob. Based on this information, the following coalition can be identified (Figure 1) using elementary linkage technique (McQuitty, 1957). The decision rule is to include only those links with the strength of A = 5.

Five members are left to place in a coalition. With a relaxed decision rule—allowing links with the strength of A = 1—a less cohesive coalition can be structured. Sherry is the pivotal member. She is the only member who is related to each of the others. Figure 2 shows the graphical representation.

The researcher is now in a position to examine the effect of particular coalitions in the group, speculate on why a specific coalition exists, and study the function of individuals in the

TABLE 2
Dyadic Attraction Units and Degree of Reciprocation

	Bob	Steve	Ted	Amy	Denise	Sherry	Jerry	Don	Wendy	Myra
Bob	**	1	3	0	2	1	0	0	3	5
Steve	.2	**	0	2	3	2	0	0	0	0
Ted	.5	.0	**	0	1	3	2	2	1	1
Amy	.0	.3	.0	**	3	3	0	0	0	0
Denise	.3	.5	.2	.5	**	0	3	5	5	4
Sherry	.2	.3	.5	.5	.0	**	1	0	0	1
Jerry	.0	.0	.3	.0	.5	.2	**	0	2	0
Don	.0	.0	.3	.0	.8	.0	.0	**	1	0
Wendy	.5	.0	.2	.0	.8	.0	.3	.2	**	0
Myra	.8	.0	.2	.0	.7	.2	.0	.0	.0	**

NOTE: The upper triangular matrix represents the attraction units for each dyad; the lower triangular matrix represents the degree of reciprocation for each dyad.

coalition. Using the attraction exercise—even with incomplete information because only three ranks were used—the analyst obtains a strong sense of the whole structure of the group.

COMBINED ANALYSIS: LEVEL THREE

The third level of analysis does not ignore the person's popularity or the reciprocation factor. The simplest way to deal with the degree of reciprocation, R, is to stipulate that it is to be defined as the ratio of actual reciprocation to the total possible reciprocation. In the example, the total possible reciprocation occurs when each person gives the other a red token representing three units of attraction. The *degree of reciprocation* is A divided by A*. Table 2 reports the degree of

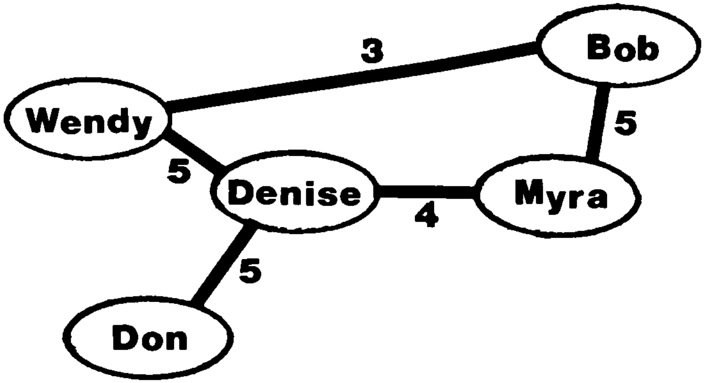

Figure 1: Strong Coalition

reciprocation for all dyads. The degree of reciprocation between Bob and Steve, for example, is .2.

INTENSITY OF RECIPROCATION

A final adjustment of the reciprocation coefficient is needed. Reciprocation ranges from 0% to 100%. With the three-token limitation of the example, there are only three cases of 100% reciprocation. The exchange of a red token by each person is the strongest case. The exchange of a white token by each person is the second strongest case. And the exchange of a blue token is the third strongest case.

The intensity of reciprocation should be different even if the dyadic attraction units are identical for various dyads *if it is asymmetrical reciprocation.* For example, in a three-rank system, there are three ways to accumulate four attraction units in a dyad: (1) 2 + 2, symmetrical reciprocation; (2) 1 + 3, asymmetrical reciprocation; and (3) 3 + 1, asymmetrical reciprocation.

A reasonable way to adjust the algorithm is based upon squared deviations; that is, subtract from the strength of the dyad a coefficient which reflects asymmetrical reciprocation.

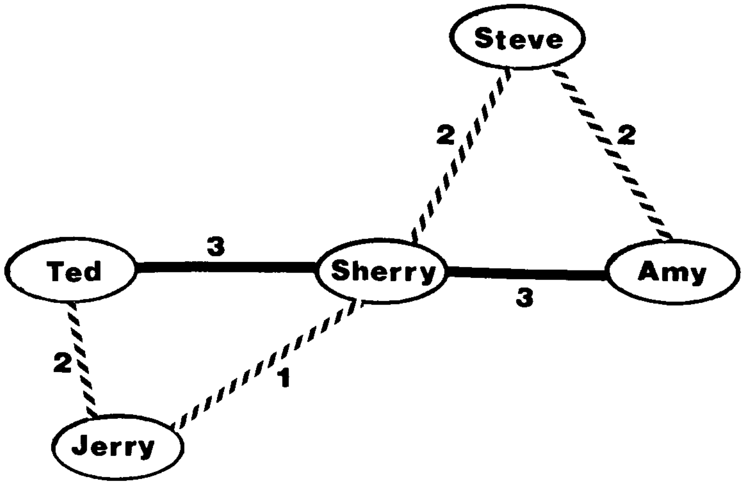

Figure 2: Weak Coalition

The reduction can be calculated from the following formula:

$$R^* = \frac{(a_1 + a_2) - \dfrac{\sum_{i=1}^{2} (a_i - \bar{a})^2}{A^*}}{A^*}. \qquad [2]$$

where R* is the adjusted reciprocation coefficient and $\bar{a}$ is the average rank between a_1 and a_2. Equation 2 can be simplified for the three-rank system to:

$$R^* = a_1/6 + a_2/6 - (a_1 - a_2)^2/72. \qquad [3]$$

Based on equation 3, the degree of reciprocation differs for a symmetrical reciprocation versus an asymmetrical reciprocation. Thus, the degree of reciprocation for a dyad with four (2 + 2) attraction units differs from a dyad with four (3 + 1) attraction units. R* for the former case is .67; R* for the latter case is slightly less, .61.

POPULARITY OF DYAD

The second component needed for the combined analysis is the person's total popularity. The indicator is found in the total's column in Table 1. For instance, Bob received nine units of attraction. The total popularity of any given dyad, then, is the sum of attraction units each person received *minus what they gave each other.* For the Bob and Steve dyad, the total popularity is ten. That is, between the two of them, Bob and Steve commanded ten units of attraction from others.

TOTAL INFLUENCE OF DYAD

The total measure of interpersonal influence, I, for any dyad takes into account the degree of reciprocation, R*, and the total power, P, of each dyad. This can be expressed the following way:

$$I = (\text{reciprocation}) \times (\text{popularity}) = R^* \times P \qquad [4]$$

$$I = R^* \times (p_1 + p_2 \quad A)$$

$$\text{where } p_i = \sum_{\substack{j=1 \\ j \neq i}}^{N} (a_i)$$

In the Bob-Steve example, I for the dyad is 1.5. Table 3 shows the total influence, I, for all dyads. *This table represents the generated units with which to identify and analyze coalitions via multivariate techniques.*

The generated matrix can be examined using such methods as elementary linkage analysis, smallest space analysis, factor analysis, or any number of other analyses which cluster or group variables. For illustrative purposes, the structure of the matrix in Table 3 is analyzed by elementary linkage analysis. Figure 3 graphically shows the structure.

Some potential conclusions are suggested which are not immediately apparent in the first two levels of analysis. First,

TABLE 3
Total Influence of Each Dyad

	Bob	Steve	Ted	Amy	Denise	Sherry	Jerry	Don	Wendy	Myra
Bob	**	1.5	4.9	0.0	7.6	2.0	0.0	0.0	4.6	6.6
Steve		**	0.0	.6	7.2	1.4	0.0	0.0	0.0	0.0
Ted			**	0.0	3.9	3.4	2.0	2.0	1.8	1.5
Amy				**	7.2	2.0	0.0	0.0	0.0	0.0
Denise					**	0.0	7.2	13.9	17.2	12.2
Sherry						**	.9	0.0	0.0	1.4
Jerry							**	0.0	1.7	0.0
Don								**	1.0	0.0
Wendy									**	0.0
Myra										**

NOTE: For Figure 3, the decision rule was to include only those links which exceeded 4.0 and the numbers were rounded off to the nearest whole number.

Denise is the strong pivotal member for the group. Every member is related to her except Sherry and Ted. Second, the people most likely to sway her, defend her, do things for her, or acquiese to her are Don, Myra, and Wendy—the three strongest links to her. Third, Denise also has a relatively strong link to the second most popular member, Bob, who received ten units of attraction. Fourth, there is only one strong coalition in the group revolving around Denise. There are no competing coalitions. Fifth, there are only two strongly structured, three-person coalitions: (a) Denise, Myra, and Bob; and (b) Denise, Wendy, and Bob. Sixth, Sherry is isolated from the group. Consequently, she should be a special point of interest. She may be rebellious, socially deviant, withdrawn, preoccupied, unloved, arrogant, elitist, handicapped, socially inept, afraid, jealous, angry, or any one of many other possibilities. Separate qualitative data would be needed to throw light on these aspects. Seventh, Ted occupies an interesting

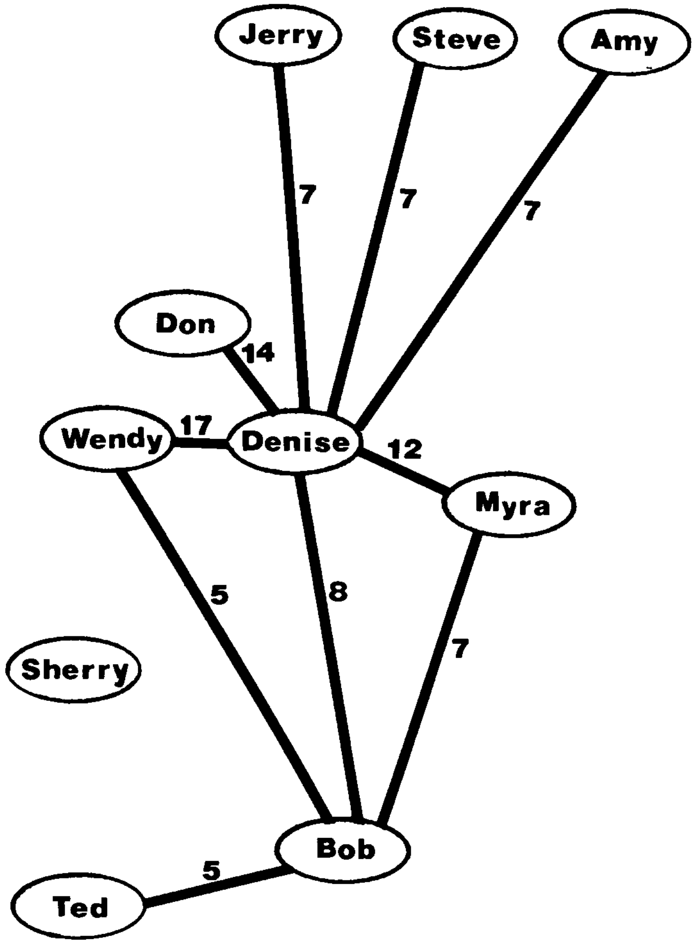

Figure 3: Group Structure Using Generated Units of Total Influence

position for two reasons. Even though there is no strong link, he is the person closest to Sherry. And, he is not linked to the pivotal member, Denise, but to the second most popular member, Bob. Thus, the potential for a competing coalition is present.

These conclusions, of course, are contingent upon the researcher's ability to provide a convincing explanation related to the structure. In short, the alogithm provides the researcher with weighted coefficients which take into account reciprocal bonds and individual popularity.

FEATURES OF THE ALGORITHM

The features of the algorithm stress reciprocation and individual popularity. If there is no reciprocation, the strength of the dyad is discounted regardless of the attraction units accrued by each person in the dyad. If, for example, two persons had accumulated 20 attraction units each but had not given each other anything, the strength of dyad is zero.

Reciprocation can compensate for attraction units. If two persons give each other the maximum units of attraction (3 + 3) and they each accumulate eight units of attraction, the strength of the dyad is ten. On the other hand, if two more popular members receive 10 and 13 units of attraction and give each other one and two units, the strength of the dyad is approximately ten (9.8).

Finally, the strength of a dyad in a group is zero if the persons in the dyad only receive attraction units from each other. If two persons give each other two units of attraction and neither person receives units from other group members, the strength of the dyad is zero.

In summary, two axioms are presented: (1) reciprocation strengthens the interpersonal influence of a dyad in a group, and (2) popularity is a function of attraction units gained external to the dyad in the group.

SUMMARY

The researcher who uses this algorithm is committed to the notion that reciprocation and individual popularity are essential to coalition identification and analysis. The generated matrix can be studied by numerous multivariate methods.

When information from all members of the group is put together—even though the information is fragmented—it can be systematically analyzed so that the researcher can determine the underlying structure of the group. By attending to the subtleties of reciprocation in conjunction with a person's popularity, the researcher can gain insights regarding the whole group and the way individuals function within it. In particular, analysis of coalitions becomes more accurate, identification of pivotal members is made easier, and discovery of "bridge" members and peripheral members is facilitated.

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