Introduction to Sociometry

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WHAT IS SOCIOMETRY?

The word *sociometry* comes from the Latin "socius," meaning social and the Latin "metrum," meaning measure. As these roots imply, sociometry is a way of measuring the degree of relatedness among people. Measurement of relatedness can be useful not only in the assessment of behavior within groups, but also for interventions to bring about positive change and for determining the extent of change. For a work group, sociometry can be a powerful tool for reducing conflict and improving communication because it allows the group to see itself objectively and to analyze its own dynamics. It is also a powerful tool for assessing dynamics and development in groups devoted to therapy or training.

Jacob Levy Moreno coined the term *sociometry* and conducted the first long-range sociometric study from 1932-38 at the New York State Training School for Girls in Hudson, New York. As part of this study, Moreno used sociometric techniques to assign residents to various residential cottages. He found that assignments on the basis of sociometry substantially reduced the number of runaways from the facility. (Moreno, 1953, p. 527). Many more sociometric studies have been conducted since, by Moreno and others, in settings including other schools, the military, therapy groups, and business corporations.

A useful working definition of sociometry is that it is a methodology for tracking the energy vectors of interpersonal relationships in a group. It shows the patterns of how individuals associate with each other when acting as a group toward a specified end or goal (Criswell in Moreno, 1960, p. 140). Moreno himself defined sociometry as "the mathematical study of psychological properties of populations, the experimental technique of and the results obtained by application of quantitative methods" (Moreno, 1953, pp. 15-16).

Sociometry is based on the fact that people make choices in interpersonal relationships. Whenever people gather, they make choices--where to sit or stand; choices about who is perceived as friendly and who not, who is central to the group, who is rejected,

who is isolated. As Moreno says, "Choices are fundamental facts in all ongoing human relations, choices of people and choices of things. It is immaterial whether the motivations are known to the chooser or not; it is immaterial whether [the choices] are inarticulate or highly expressive, whether rational or irrational. They do not require any special justification as long as they are spontaneous and true to the self of the chooser. They are facts of the first existential order." (Moreno, 1953, p. 720).

SOCIOMETRIC CRITERIA

Choices are always made on some basis or *criterion*. The criterion may be subjective, such as an intuitive feeling of liking or disliking a person on first impression. The criterion may be more objective and conscious, such as knowing that a person does or does not have certain skills needed for the group task.

When members of a group are asked to choose others in the group based on a specific criteria, everyone in the group can make choices and describe why the choices were made. From these choices a description emerges of the networks inside the group. A drawing, like a map, of those networks is called a *sociogram*. The data for the sociogram may also be displayed as a table or matrix of each person's choices. Such a table is called a *sociomatrix*.

A SIMPLE EXAMPLE

A simple example of applied sociometry is to have group members make a selection on the basis of a simple, non-threatening criterion. Ask everyone in the group to stand up and then say: "Whom in this group would you choose to take sandwich orders from everyone in this room, go to the store, *and* come back with the right sandwiches and the right change? Show your choice by placing your right hand on the shoulder of the person you choose. Move about the room as you need to in order to make your choice. There are only two requirements: (1) you may choose only one person and (2) you must choose someone." Typically the group members will make their choices after only a little hesitation.

This exercise may be repeated several times in the period of just a few minutes using different criteria each time. The exercise graphically illustrates not only the social reality of

choice-making, but also the fact that different criteria evoke different patterns of choices. The sandwich money criterion would probably identify someone who is good with details. An intuitive, big picture, future-oriented person would be likely to be identified by this criterion: "If you had to project a new cultural phenomenon, unheard of at this point in time, whom in this room would you ask for information?"

Regardless of the criterion, the person who receives the most hands on his or her shoulder is what is known as the *sociometric star* for that specific criterion. Other sociometric relationships which may be observed are *mutuals* , where two people choose each other; *chains*, where person A chooses person B who chooses person C who chooses person D and so on; and gaps or *cleavages* when clusters of people have chosen each other but no one in any cluster has chosen anyone in any other cluster.

Here are some other sample criteria that could be used for this exercise: Whom in this room would you choose…

1. for advice on repairing the transmission of your car?
2. to generate creative ideas?
3. for support in taking risks?
4. to relay messages accurately?
5. for help in dealing with a difficult client?
6. to run a business for profit?
7. to get reliable information on top management decisions?
8. to keep a confidence?
9. who gives recognition for a job well done?
10. who has shown the most growth in the past year?

This "hands-on" exercise can be very helpful for teaching a group about sociometry and about the reality of the informal organization. While the group is in each pattern, the consultant can ask the group to describe the pattern, how the pattern reflects "real life", and what the group would need to do to close up any cleavages. Participants learn very quickly and concretely about the informal organization underlying their formal organization. As one participant said, "It shows how we really feel, but we don't say it very often."

A MORE COMPLEX EXAMPLE

Suppose we want to know how much interpersonal trust exists within a small group of six members. Let's call the group members Ann, Bob, Claire, Don, Edna, and Fred. For the purposes of this example, we will use the following criterion: "I trust this person to keep oral agreements and commitments, and not to undercut me or go behind my back." We will use the symbols "+" to indicate "High Trust", "O" to indicate "Moderate Trust", and "-" to indicate "Distrust/Conflict".

Next we interview each group member individually. When we have established rapport, and have explained that all responses will be kept confidential, we ask the person we are interviewing to rate every other person in the group, based on the criterion.

Say we are interviewing Ann. Ann rates the others as follows:

Bob +
Claire -
Don O
Edna +
Fred O

This means that Ann has high trust of Bob, distrusts or is in conflict with Claire, has moderate trust of Don, and so on.

In the course of the interviews we can elicit details about all of these relationships. We can ask Ann, for example, why she distrusts Claire, and Ann's ideas about what Claire could do to improve the situation.

After conducting all the interviews and obtaining ratings from everyone, the next step is to chart all the responses in the ***sociomatrix***.

Here is the sociomatrix for our sample group:

	Ann	Bob	Claire	Don	Edna	Fred	
Ann		+	-	O	+	O	
Bob	O		-	+	+	O	
Claire	-	O		+	+	+	
Don	O	+	-		O	O	
Edna	+	+	O	+		O	
Fred	+	+	O	O	+		

You can see that Ann's choices have been charted in Ann's row: Ann's High Trust (+) rating of Bob is in the cell where Ann's row intersects Bob's column, her Distrust/Conflict (-) rating of Claire is in the cell where Ann's row intersects Claire's column, etc.

This matrix already tells us a great deal about the group dynamics. With a little analysis the matrix becomes something like an x-ray or CAT scan of the group's interpersonal relationships. Columns showing a large percentage of +'s can identify the informal leader(s) of the group. Columns showing -'s can identify those people the group may be close to rejecting. Rows showing all O's or all +'s may highlight people who fear self-disclosure or people who are undifferentiated in social relationships.

Another important pattern to look for is what are called ***mutuals***. A mutual occurs when I rate you at the same level you rate me. A positive mutual is when we both rate each other +; a negative mutual is when we both rate each other -. Positive mutuals show bonding in a group. Negative mutuals show areas of conflict. The identification of negative mutuals gives the consultant or therapist insight as to where to start to repair a dysfunctional group.

Here are the column totals, and mutuals for our sample group:

	Ann	Bob	Claire	Don	Edna	Fred
TOTAL +	2	4	0	3	4	1
TOTAL 0	2	1	2	2	1	4
TOTAL -	1	0	3	0	0	0
Total Choices Received:	5	5	5	5	5	5
Not Chosen By:	0	0	0	0	0	0
MUTUALS:						
MUTUAL +	1	2	0	1	2	0
MUTUAL 0	1	0	0	2	0	1
MUTUAL -	1	0	1	0	0	0

We can see that the informal leaders are Bob and Edna, because they both received the most +'s and received no -'s. A closer look at the sociomatrix shows that Ann and Claire have mutual Distrust/Conflict.

If this were a work group and we were asked to improve the functioning of this group, we could start by improving the relationship between Ann and Claire before bringing the group together for teambuilding.

Constructing a sociomatrix for a small group like this one is a simple task, but when the number of people in the group is more than about five or six, the clerical work and calculations become quite tedious and open to error. With a large matrix, the identification of mutuals begins to resemble a migraine headache. Fortunately there are computers. Software exists to automate all the tedious calculations involved in creating a sociomatrix of up to 60 people. The software produces not only the sociomatrix itself but also several useful group and individual reports.

CRITERION SELECTION

The selection of the appropriate criterion makes or breaks the sociometric intervention. As in all data-collection in the social sciences, the answers you get depend on the questions you ask. Any question will elicit information but unless the right question is asked, the information may be confusing or distracting or irrelevant to the intervention's objective.

A good criterion should present a meaningful choice to the person in as simple a format as possible. For example: "Whom would you most like to have as part of this [specified type of] work team [e.g.: *auditing*] to [work in this specified way] [e.g.: *to audit remote sites*]?".

The criterion must be like a surgeon's knife: most effective when it cleanly isolates the material of interest. In responding to the question, each person will choose based on an individual interpretation of the criterion. These interpretations, or sub-criteria, for this particular question could include: do I want a person who works hard, who is a power-broker, who is amiable, a minority, etc. A clear statement of the criterion will tend to reduce the number of interpretations and will therefore increase the reliability of the data.

SOME PRINCIPLES OF CRITERION SELECTION

- The criterion should be as simply stated and as straightforward as possible.
- The respondents should have some actual experience in reference to the criterion, whether *ex post facto* or present (in Moreno's language, they are still "warmed up" to them) otherwise the questions will not arouse any significant response.
- The criterion should be specific rather than general or vague. Vaguely defined criteria evoke vague responses. (Note for example that "friendship" is actually a cluster of criteria.)
- When possible, the criterion should be actual rather than hypothetical.
- A criterion is more powerful if it is one that has a potential for being acted upon. For example, for incoming college freshmen the question "Whom would you choose as a roommate for the year?" has more potential of being acted upon than the question "Whom do you trust?"
- Moreno points out that the ideal criterion is one that helps further the life-goal of the subject. "If the test procedure is identical with a life-goal of the subject he can never feel himself to have been victimized or abused. Yet the same series of acts performed of the subject's own volition may be a 'test' in the mind of the tester"

(Moreno, p. 105). Helping a college freshman select an appropriate roommate is an example of a sociometric test that is in accord with the life-goal of the subject.

> "It is easy to gain the cooperation of the people tested as soon as they come to think of the test as an instrument to bring their wills to a wider realization, that it is not only an instrument for exploring the status of a population, but primarily an instrument to bring the population to a *collective self-expression* in respect to the fundamental activities in which it is or is about to be involved." (Moreno, 1953, pp. 680-681).

As a general rule questions should be future oriented, imply how the results are to be used, and specify the boundaries of the group (Hale, 1985). And last, but not least, the criteria should be designed to keep the level of risk for the group appropriate to the group's cohesion and stage of development.

Examples Of Criteria For Use In A Work Setting

(A) I trust this person to: • Keep oral agreements and commitments, • Work for win-win solutions, and • Not to undercut me or go behind my back.

+ = High Trust

O = Moderate Trust

- = Distrust/Conflict

(B) Based on ability to work effectively as a team member, whom would you choose to work with you on an important team project?

+ = I definitely WOULD WANT to have this person on my team.

O = I wouldn't mind having this person on my team.

- = I definitely would NOT WANT to have this person on my team.

(C) Consider each of your coworkers listed below and rate them as to how much or little you trust each of them.

+ = High Trust

O = Moderate Trust

- = Distrust/Conflict

[Note: Example C is an example of what Moreno called "near-sociometric" because the criterion is somewhat vague. You "trust" your coworkers to do or not do what? Keep secrets? Perform surgery on me? Example A is more specific.]

(D) Consider each of your coworkers listed below. What is your level of trust to share your feelings with each of them about issues at the workplace?

+ = High Trust

O = Moderate Trust

- = Distrust/Conflict

EXAMPLES OF CRITERIA USED IN OTHER SETTINGS

Military:

(A) If you were going on pass what person (or persons) would you *want* to go on pass with and what person (or persons) would you *not want* to go with?

(B) If you had leave to go home what person (or persons) would you *want* to invite to your home and what person (or persons) would you *not want* to invite to your home?

(C) If you were told to pick the persons whom you wanted to live in a tent or barracks with what person (or persons) would you choose and what person (or persons) would you *not choose*?

(D) During an attack what person (or persons) would you *choose* to share a foxhole with and what person (or persons) would you *not choose* to share a foxhole with?

(E) If you were to lead an advance through an enemy town what person (or persons) would you *choose* to cover you and what person (or persons) would you *not choose* to cover you?

(F) If you were wounded what person (or persons) would you *choose* to help you back to an aid station and what person (or persons) would you *not choose* to help you back to an aid station?

Summer Camp:

At camp, you like to do lots of things with other campers. In order to help the staff work out your groups we would like you to tell us which campers you would like best to do things with. Whom would you like to

(A) cabin with?

(B) go on a canoe trip with?

(C) to be in your favorite activity with?

VALIDITY

Does sociometry really measure something useful? Jane Mouton, Robert Blake and Benjamin Fruchter reviewed the early applications of sociometry and concluded that the number of sociometric choices do tend to predict such performance criteria as productivity, combat effectiveness, training ability, and leadership. An inverse relationship also holds: the number of sociometric choices received are negatively correlated with undesirable aspects of behavior such as accident-proneness, sick bay attendance and frequency of disciplinary charges" (Mouton, Blake, and Fruchter in Moreno, 1960, pp. 362 - 387). The more frequently you are chosen, the less likely you are to exhibit the undesirable behavior.

Here are some representative early sociometric studies:

- One study found a significant positive correlation between group sociometric cohesion and field performance of small military combat units (Goodacre, Daniel M., in Moreno, 1960 pp. 548 - 552).

- Voluntary re-grouping of construction workers based on sociometric choices resulted in a superior level of output, a drop in monthly turnover, and 5% savings in total production (Van Zelst, R. H. "Sociometrically Selected Work Teams Increase Production." *Personnel Psychology*, 1952, 5, 175-186.) Another study of voluntary regrouping of construction workers in which workers in the experimental groups chose their work partner resulted in superior performance by the experimental group on factors of job satisfaction, turnover rate, index of labor cost, index of material cost. Financial savings were such that every 29th house was "free," relative to the cost of construction by the control group (Van Zelst, R. H. "Validation of a Sociometric Regrouping Procedure." *Journal of Abnormal Social Psychology*, 1952, 47, 299-301).

• Sociometric ratings by coworkers for desirability as work partners and other job related activities correlate with positive attitudes toward work and with quality and quantity of performance on the job (Springer, Doris. "Ratings of Candidates for Promotion by Co-workers and Supervisors." *Journal of Applied Psychology*, 1953, 37, 347-351; Van Zelst, R. H. "Worker Popularity and Job Satisfaction." *Personnel Psychology*, 1951, 4, 405 - 412).

• Accident proneness is inversely correlated with sociometric choices received. (Speroff, B., and W. Kerr. "Steel Mill 'Hot Strip' Accidents and Interpersonal Desirability Values." *Journal of Clinical Psychology*, 1952, 8, 89-91.; Fuller, E. M., and H. A. Baune. "Injury-Proneness and Adjustment in a Second Grade." *Sociometry*, 1951, 14, 210 - 225; Zeleny, L. D. "Selection of Compatible Flying Partners." *American Journal of Sociology*, 1947, 52, 424 - 431.)

• Consistent with these findings about safety are studies in military settings which show that flight accidents, frequency of sick bay attendance, and number of disciplinary offenses are negatively related with the number of sociometric choices received when the criterion measures a positive aspect of behavior (Zeleny, L. D. "Selection of Compatible Flying Partners." *American Journal of Sociology*, 1947, 52, 424 - 431; French, R. L. "Sociometric Status and Individual Adjustment among Naval Recruits." *Journal of Abnormal Social Psychology*, 1951, 46, 64 - 72.)

• A study of leadership showed that when leaders were chosen by sociometric procedures, their groups were more efficient than when members not seen as leaders were assigned that role (Rock, M. L., and E. N. Hay. "Investigation of the Use of Tests as a Predictor of Leadership and Group Effectiveness in a Job Evaluation Situation." *Journal of Social Psychology*, 1953, 38, 109 - 119.)

• A study of navy pilots suggested that low morale and cliques may result when the official leader is not a sociometric star (Jenkins, John G. in Moreno, 1960 pp. 560 - 567).

• A study of choices of playmates in fourth-grade children showed a high correlation between the choices children made on the sociometric test and the choices children made in actual play (Byrd, Eugene. "A Study of Validity and Constancy of Choices in a Sociometric Test. *Sociometry*. Vol. IX (1946), Nos. 2-3, 21, cited in Northway (1967)).

APPLICATIONS OF SOCIOMETRY IN THE WORK SETTING

The typical process for a sociometric intervention in an organization follows these basic steps: (1) Identify the group to be studied, (2) Develop the criterion, (3) Establish rapport / warm-up, (4) Gather sociometric data, (5) Analyze and interpret data, (6) Feed

back data, either: (a) to individuals, prior to group meeting, or (b) in a group setting, (7) Develop and implement action plans, (8) Post-test (optional).

My colleagues and I have used sociometry in a corporate setting to diagnose problems, to influence group development, and to measure results of organizational development interventions. In one instance (Hoffman et al, 1992) we used the sociometric data to help work groups diagnose their own problems and to document the effectiveness of the intervention. Pre/post sociometric measurements showed that Distrust/Antagonism had been cut in half and High Trust had increased by 19% over the course of the intervention.

More recently I was asked to help a group with "teambuilding." I began by interviewing all nine members of the group and collecting sociometric ratings from each. An analysis of the sociometric data showed that the "team problem" was primarily a conflict between two individuals on the team. I gave sociometric feedback individually to every member of the team, telling each person where he or she stood in relation to the rest of the group. The sociometric data allowed me to do this without breaking confidentiality. (Each person received an individualized report. A pie chart on the report showed the percentage of positive, negative and neutral choices received by that person.) From the interview data I was also able to give each person positive reinforcement for effective behaviors and specific corrective coaching for ineffective behaviors, again without breaking confidentiality.

The sociometric data so affected the individuals in conflict that they were able to use the coaching and resolve the conflict on their own. We never had to hold a "teambuilding" session. This saved hours of productive time. A post-test with the sociometric instrument showed that the negative choices made by the group had dropped from 11 to zero. Neutral choices went from 16 to 21 and positive choices increased from 45 to 50. Informal feedback from the group's secretary confirmed that things were "really better."

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