AN EMPIRICAL EXAMINATION OF THE REFERENTIAL FUNCTION OF INFORMAL COMMUNICATION GROUPS

> Thesis for the Degree of M. A. MICHIGAN STATE UNIVERSITY JAMES ALLEN TAYLOR 1976



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#### ABSTRACT

## AN EMPIRICAL EXAMINATION OF THE REFERENTIAL FUNCTION OF INFORMAL COMMUNICATION GROUPS

By

James Allen Taylor

It has been argued that the informal relations between members of an organization significantly affect the attitudes and work behaviors of participants. This research reports an attempt to examine hypotheses derived from this proposition. Derivation of hypothesis is made through linear force aggregation theory. This theory specifies that a person's perception of a given attitude object is a linear function of the amount and valence of all messages received about the object. It is argued, therefore, that members of a communication network who are highly embedded into a subset of the network (e.g., a communication group) will have a high degree of similarity on certain attitude items because of the frequency of contact. Additionally, it is hypothesized that the degree to which an individual is integrated into the group will predict the degree of similarity.

Hypotheses are examined by using network analysis to determine the underlying informal structure, and by using items derived from the Institute for Social Research Interorganizational Survey Instruments. Results strongly support the notion that informal groups do determine the attitudes of members on work related topics; however, predicted linearity did not emerge.

# AN EMPIRICAL EXAMINATION OF THE REFERENTIAL FUNCTION OF INFORMAL COMMUNICATION GROUPS

Ву

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# TABLE OF CONTENTS

Chapter	Page
INTRODUCTION	1
1. STATEMENT OF THE PROBLEM	5
SUMMARY	13
2. THEORY AND HYPOTHESES	14
HYPOTHESES 1-5	23 24
SUMMARY	25
3. METHODS AND RESULTS	26
DESCRIPTION OF DATA SOURCE	31
RESULTS	35
DISCUSSION	52
CONCLUSIONS	54
IMPLICATIONS FOR MANAGEMENT THEORY	56
SUMMARY	56
APPENDIX A - ITEM ANALYSIS	
APPENDIX B - TABLE 17. Descriptive Statistics: All Respondents	
APPENDIX C - PROCEDURES FOR DISCRIMINANT CLUSTER ANALYSIS	
BIBLIOGRAPHY	

# LIST OF TABLES

Table		Page
1.	Network Roles for Employees by Category	32
2.	ICLS Variables	33
з.	Descriptive Statistics: Group and Non-Group Respondents	36
4.	t-Tests Between Group and Non-Group Populations	38
5.	Variables with Significant t Differences Between Group and Non-Group Populations	40
6.	One-Way Anova: Variable by Group	43
7.	Network and Predicted Groupings	44
8.	Variables by Connectedness Rank	47
9.	Chi-Square Goodness of Fit Tests - Variables by Connectedness	48
10.	Chi Square Goodness of Fit Tests - Variables by Integrativeness	50
11.	Variables by Connectedness	51
12.	Inter-Item Zero Order Correlations	51
13.	Partial Correlations Controlling for Connectedness	52
14.	ICLS Scales Inter-Item Correlations	61
15.	Median and Range of Inter-Item Correlations, Item-Cluster, and Item Communalities of Scales in ICLS	62
16.	Alphas of ICLS Scales	62
17.	Descriptive Statistics: All Respondents	63
18.	Discriminant AnalysisStep Wise Variable to Enter Sequence Wilke's Lambda Procedure	64
19.	Discriminant AnalysisGroup Size for Analysis	65
20.	Wilkes $\lambda$ for Entered Variables	65

# LIST OF FIGURES

Figure		Page
1.	Alternative Levels of Integration Within a Network	21
2.	Various Levels of Connectedness	22
3.	Comparison of Mean Variables for Group and Non-Group Population	37
4.	Average Standard Deviations for all Variables by Connectedness Rank	46
5.	Mean Standard Deviations for Variables by Integrativeness Rank	49

## INTRODUCTION

It has been an accepted canon of organizational theory that the informal system of relations prevailing among participants in an organization has significant impact upon the nature of the organization (Selznick, 1947). Selznick advanced three propositions: (1) every organization creates an informal structure; (2) in every organization, the goals of the organization are modified by processes within it; and (3) the process of modification is effected through the informal structure. Further, Selznick argues that informal groups are norm-providing systems of relations which arise spontaneously within rational systems as a consequence of the idiosyncratic intrapersonal needs of system members. Following the studies at the Hawthorne plant of Western Electric Company, Rothlesberger and Dickson (1939) commented that:

> The study of the bank wiremen showed that their behavior at work could not be understood without considering the informal organization of the group and the relation of this information organization to the total social organization of the company. (p. 551)

The importance of the role played by the group in industrial organizations has been emphasized by Lewis (1952), Nelson (1949), and Blake and Mouton (1968). Empirically, however, these studies have focused on groups as formally structured entities rather than as informal liaisons among mutually attracted individuals.

Following Selznick, this thesis presents the view that people who interact regularly and repetitively among themselves create a conjoint information space wherein values, attitudes, and beliefs are exchanged

through the process of information transmission among the members in the space. This view is held irrespective of purposiveness; rather, purposiveness is held to be "not something inherent in the situation, but rather something in the way a situation is evaluated" (Rappoport, 1963). By developing a theoretical model which demonstrates that individuals form groups which have the effect of restricting both information inputs and outputs (and assuming for the moment that no member of the system "intended" to form this group), we can derive a model which will account for the emergence of what has been called "the organizational man."

It is often noted in both the literature on organizational relations and in common parlance that people who join organizations are changed out of all proportion to the significance of the work they perform (White, 1964). Individuals from diverse backgrounds become similar in their behavioral patterns and in the way they structure their symbolic environment.

Laski (1942) argues that this process of behavioral differentiation arises from the conflict between organizational units competing for control. He states:

> (1) Cooperative effort, under the conditions of increasing number and complexity of functions, requires the delegation of functions. Thus action which seeks more than limited, individual results becomes action through agents. It is the activity of officials acting as agents with which the discussion of bureaucracy is concerned.

(2) The use of intermediaries tends to create bifurcation of interest between the initiator of the action and the agent employed. This is due to the creation of two sets of problems: for the initiator, the achievement of the goal which spurred him to action, and for the intermediary, problems which are concerned chiefly with his social position as agent. The character of the agent's new values are such as to generate actions whose objective consequences undermine the professed aims of the organization. This conflict need not be between the employer as a person or a group and the agent, for the latter may be able to manipulate the ideas of the former, but between the actual course of the organization and those aims formally asserted, whether the employer recognizes the conflict or not.

(3) This bifurcation of interest makes dominant, for initiator and agent alike, the issue of control. What is at stake for each is the control of the conditions (the organizational mechanism) which each group will want to manipulate (not necessarily consciously) toward solving its special problems. In this struggle for control, an informal structure is created, based largely on relationships involving personal influences rather than formal rules.

As individuals enter an organizational system, they become exposed to a new set of behavioral expectations which are communicated from many sources. While one's tenure increases, the individual continually limits the number of successive input stimuli by choosing those with whom one wishes to interact, from the variety of personalities within the organization. Attitude change is induced by usual and frequent interaction patterns with this chosen body of personalities. It will be argued that attitude change stems from the messages an individual receives about the kinds of activities and behaviors which are considered appropriate and expected by the group of which the source is a member.

Implicit in the source's messages is an attitude set which conditions the type of information and the bias attached to the information being transferred. This attitude set will be adopted over time by the new member, although not holistically. The new member will also contribute some subset of his attitude set to the perceptions of the group. Thus, attitudes related to the specific environmental context change continuously within groups.

This thesis will examine the role of the group as the psychological field within which organizational norms are developed and maintained. While many observers (Schein, 1967; Huse, 1975; Lawrence and Lorch, 1966) have indicated that informal groups establish these norms, a methodology by which informal groups can be detected within large systems has only recently become available.

This thesis is organized into three sections. In the first section we discuss some of the classic research performed within the group context. In particular, our interest focuses on the nature of group communication processes and the manner in which the group influences the attitudes and beliefs of participants.

The second section advances a theoretical explanation which attempts to parsimoniously account for the phenomenon of interest. We will discuss the concept of an interactive human system as a network and describe a method for heuristically characterizing relations within the network.

In the third section, we will present data in order to test several aspects of the theory. We will then attempt to draw conclusions and point to further research which needs to be done.

#### Chapter 1

## STATEMENT OF THE PROBLEM

In reviewing the literature on group process, Merton (1952) points to 26 different properties which have been articulated by various researchers from a wide variety of paradigms and disciplines. Principal among these properties have been studies into the relationship between size of membership and structure (Simmel, 1950); stratification, or hierarchical levels (Likert, 1967; Landecker, 1951); group openness versus closedness; duration of group; and clarity of social definitions of membership in a group (Merton, 1953; Goldberg and Larson, 1974).

Each of the 26 properties listed by Merton has been used as the dependent variable in a set of experimental situations. Of particular interest here, however, are the variables related to the clarity of the social definition of group membership.

Certainly, clarity of membership varies across many social situations. The individual, for example, may be a member of the Elks Club, a member of a Friday night Poker Club, an employee of an organization, or all three simultaneously. In each of these cases the social unit has some formal manner in which membership in the group is acknowledged. The Elks Club has membership cards and initiation rites. The Poker Club, likewise, has an approval process, and a chair at the table. The corporation has hiring processes, formal work routines, and status conferral systems. In each case the membership is a formal, acknowledged process. The member of the group acknowledges both his <u>membership</u> in the group, and the <u>exist</u>ence of the group.

Such an acknowledged collective framework fits the conceptualization of many scholars studying the social psychology of the group. According to Smith (1945), the group as a psychological entity may be defined as, ". . . a unit consisting of a plural number of organisms who have a collective perception of unity and who have the ability to act, or are acting in a unitary manner toward their environment."

For Kretch and Crutchfield (1953), the group is defined in terms of the psychological processes of self-recognition. They wrote, "The criteria for establishing whether or not a given set of individuals constitute a psychological group are mainly two: (1) all the members must exist as a group within the psychological field of each individual, i.e., be perceived and reacted to as a group, and (2) the various individuals must be in dynamic interaction with one another" (p. 62).

Both definitions are fairly representative of the thinking of social psychologists on the distinction between an aggregate or collectivity and a group. However, several objections must be raised to these viewpoints. First of all, each definition contains an inherent tautology. In a sense, each says, in order for a group to exist, a group must exist. Second, it is difficult to operationalize the perception of the relationship <u>between</u> the members and the common distinction each group member makes between his membership and the environment. Third, each requires that the set of relations inherent in "groupness" comprise some objectively ascertainable unity of mind or purpose -- a group "consciousness." This implies that aggregated behavior is imposed by the goals of the group rather than emerging from needs of the individuals.

An alternate approach which avoids this particular notion of collective consciousness emphasizes instead the role of independent expectations as they interact within the forum of the group.

Cattell (1953) defined a group as a "collection of organisms in which the existence of all (in their given relationships) is necessary to the satisfaction of certain individual needs in each." The underlying assumption of this definition was expressed by Rappoport (1963). Rappoport, in discussing the characteristics of operational philosophy, commented that one of the fundamental invariants in the human condition is the need to belong. Groups fulfill this need by providing a field wherein behavior can take place and needs can be satisfied.

According to Cattell, individuals belong to groups only because they achieve certain satisfactions, and in the absence of satisfaction, the group will dissolve. Cattell comments that implicit in his formulation is acceptance of the view that psychodynamic events can be operationalized through the use of any one of three sets of concepts: (1) the stimulus situation-cue-response, emphasizing the detailed environmental conditions; (2) the satisfaction of "ergic" or "metanergic" motives which concentrates on the <u>drive</u> phenomena; (3) the energy expression formulation which directs attention to the work done in the motivational situation. However, it is difficult to clearly define the character of the motives of force within these concepts.

Cattell, echoing Durkeim's (1933) sociological conceptualization of group consciousness, asserts that groups have a pseudo-personality (syntality) which creates and is created by the expectations and perceptions of the members. The components of this personality provide the drive reduction mechanisms which direct the group behavior and the conforming response patterns of individual members. The behaviors of members, then, would seem to be directed by an unobservable whole, while the reinforcers of that behavior are measurable at the individual level.

Sherif (1967) has assembled a large body of literature on groups which further suggests that the "self-determinancy" concept is not continuously present among researchers into group processes (c.f., Hiller, 1947; Monge and Lindsey, 1974; Richards, 1974; Whyte, 1943; Shaw, 1930; Roethlisberger, 1937). Sherif claims that, in general, researchers have applied three criteria before a collectivity may be said to be a group. First, members must exhibit some sort of structural interdependency. Second, status levels and role differentiation must be present at some level. Third, a set of norms or values common to the group must be identifiable. In addition, Sherif requires that interaction episodes among the participants be more than transitory.

The question of groupness, then, directly corresponds with the degree to which these properties are present. It is not enough to identify dichotomously the nominal presence or absence of any of these variables. Groupness, in this sense, is a continuous emergent property which springs from the needs and gratifications of the participants and is given predictive power by the patterning of interaction among the participants. The precise formulation has been stated by Borgatta and Cattell (1955):

> Even if the assumption is made that some collectivities are groups, and others are not, and that there is a difference in kinds, when the effort is made, we find ourselves considering variables on which all collectivities can be ordered, and in terms of which they can be variously classified for different purposes. Thus, the question shifts from whether an aggregate is a group or not to one considering the degree to which such an aggregate is characterized by a specific complex of variables assumed to be the components of groupness. Such a formulation points to the necessity for identifying the relevant critical component variables in terms of which any collection of persons may be assessed and, at a given point, classified.

Some of these variables with continuous properties have already been mentioned. For our purposes, we will be primarily concerned with variables

which vary, at least in part, as a function of the integrativeness of the group, the isolation of the group, and the homogeneity of structure within groups. By structure (Danowski and Farace, 1974), we mean the <u>degree</u> to which relations are homogeneously distributed within the group. A group itself may be linked relationally to a greater or lesser degree into a group of groups, or an organization. The degree to which it is isolated affects the pertinence of information pertaining to the organization which circulates within the group. Finally, groups may be more or less similar on a comparative, aggregated basis. The structure of the linkage paths, the structure of between-group links, and the relative isolation or predominance of individual members also affects the nature of the group.

All of these variables may be continuously scaled. The higher the loading for any complex of variables, we would assume, the greater the groupness. Bales (1953) supports this view when he argues that it is necessary to include both the overt behavior of individuals and the situational environment which spawned the behavior (the organization) in an analysis in order to arrive at valid empirical generalizations.

In looking at groups, as we have noted, it is often heuristically useful to employ a notion of group syntality or a consensual consciousness. Hence, one would expect to find that, within groups, the whole is not the sum of the individual component members, but a uniquely determined set of behaviors which arise from the expectations and objectives of individual members. It is at the group level that investigators begin to observe conformity and socially altruistic behaviors. Talcott Parsons (1967) makes a distinction which is useful in understanding the theoretical assumptions being maintained here. He wrote:

The latter concept referred to a body of beliefs and sentiments held in common; the collectiveness of it consisted of the "in commonness." Now the collectiveness consists in the nature of reality exterior to the individual to which the individual's "representations" refer. It is not a subjective community of belief which is the source of solidarity, but rational orientation to the same set of phenomena in the environment of action, an "objective" source of uniformities. (p. 141)

In other words, the group collectivity provides an arena within which the individual learns to represent reality. It is not a community of belief about sets of social objects, but orientations toward classes of phenomena from which commonalities consisting of beliefs may be said to be independently and objectively derived by any single member of the collectivity. Therefore, it would seem wise to focus on the processes by which groups have come to common orientations.

When individuals adopt a common orientation toward an object of perception through socially facilitated learning processes we say they have conformed (Campbell, 1961). While often misrepresented in the public controversy surrounding the inducement of conforming acts and attitudes within corporate and governmental organizations, researchers have taken great pains to point out the normative nature and acceptability of conformity as a phenomenon (Schein, 1967). The language we use, the clothes we wear, the toys we play with, are largely acquired or chosen as the outcome of a "socially facilitated learning process."

Social-exchange theorists (Adams, 1965; Blau, 1964; Gouldner, 1960; Homans, 1958, 1962; Jones, 1964; Thibault and Kelly, 1959) view conformity as a social process in which certain behaviors (referred to as "expected behaviors") are the reinforcing acts for others who engage in interaction. In this sense, a conforming behavior is a kind of advance payment for the positive effects the ego anticipates will emerge from a

social interaction. In the organizational context, this might take the form of deference to status others, or persons with greater seniority. It would also take the form of listening or paying attention to others with whom one is interacting. In repetitive interaction episodes with the same individual, a conforming behavioral cycle could be anticipated, which would lead to greater and greater amounts of learning.

For example, a person is seeking interaction with another person for the reinforcing value of interaction alone. In the course of that interaction, reinforcement (social exchange) takes the form of attentiveness, or voiced agreement, toward the interacting other. The other person is reinforced to engage in interaction and provides cues, implicitly or explicitly reflecting a value orientation. This orientation facilitates learning in the organizational novitiate or reinforces liking (Moreno, 1934), making subsequent interaction more probable.

Related to the social-exchange conceptualization is the idiosyncracy credit model proposed by Hollander (1958, 1964). Hollander looks at conformity as one input to the accumulation of status. In this case, a person is awarded credits by others for displaying approved behaviors. For the novice, these credits can accumulate rapidly, making the installation of long-lasting behavioral sets more likely. Hollander's view provides for a greater latitude of behavior than does a strict interpretation of the social exchange model.

Conformity and nonconformity are not invariably defined relative to a fixed norm as in the Sherif's (1966) paradigm. Rather, an accumulation of credit allows actors to be variably perceived (in terms of their status) and they are thus allowed to behave variably with respect to certain norms or conventions. Conformity is thus considered to be to some degree

person specific and functionally related to status. Such a view accounts for the finding that individuals with higher status or esteem have a wider latitude for social deviation (Berkowitz and Macaulay, 1961; Julian and Steiner, 1961; Wiggins, Dill and Schwartz, 1965). Further, it could be argued that the existence and distribution of this kind of organizational "slack" to higher status individuals would motivate novitiates to conform through <u>time</u>, not simply at the moment a reinforcing episode occurs.

Clearly, conformity facilitates socialization processes within an organization. While social-exchange theory may be only a partial answer to the total causal mechanism it does provide a basis for predicting the changing of attitudes when an individual enters an organizational system. The totality of the requirement for change is defined by the system's culture, which is the aggregate of rules, folkways, and behavioral patterns which are adopted by members during tenure within the system, and for which Hollander's credit is distributed. As Asch (1959) has put it:

> Each social order confronts its members with selected portions of physical and social data. The most decisive feature of the selectivity is that it presents conditions lacking in perceptable alternatives. There is no alternative to the language for one's group, to the kinship relations it practices, to the diet that nourishes it, to the art it supports. The field of the individual is, especially in a closed society, in large measure circumscribed by what is included in the given culture setting.

Within the organization an individual will either learn the ropes or will not survive. How then does the socialization process take place? We are arguing here that the individual comes to perceive that the value set spawned by the organization is both necessary and right, even if it is at wide variance to his former beliefs. The change is what Parsons

called orientation, and it is fundamental in that it manifests itself on the totality of a person's organizationally relevant value systems.

## Summary

Groups have been the subject of a considerable body of behavioral research. The focus of this research has usually been upon intact groups with known goals. However, "groupness" can be taken to be a continuous property which varies with respect to the amount of conscious acquiescence required of members. Groups, including informal groups, provide an arena wherein the ego's expectations and rewards may be clarified. To the extent that an individual accepts his position in the group and engages in approved behavior, he has conformed. By conforming, he achieves the satiation of needs and expectations.

#### Chapter 2

#### THEORY AND HYPOTHESES

A theoretical rationale for the assumption that shared communication necessarily leads to a convergence of attitude among a set of communicants can be derived from a general theory of attitude change provided by Woelfel and Saltiel (1974). They argue that every message has an effect which changes the way in which concepts related to the message are arrayed with respect to one another within the mind of the receiver. The amount of movement or change can be described by a vector between the advocated position and the receiver's previous opinion.

Total (net) change is a function of the amount of change advocated and some value for the importance of the source and the salience of the information at the time of input. Under this formulation we would expect that a communication group would increase the redundancy with which any specific group member would advocate a position for another member. Since Woelfel-Saltiel argue that an initial position is the weighted linear sum of all previous inputs with respect to a set of attitude objects, increased redundancy will, over time, continuously shift a receiver's balance point towards that of source.

This is not necessarily a recursive process. As the receiver interacts with and changes in the direction of the source, the source is simultaneously responding to the receiver's feedback. Hence, the discrepancy between the two is being reduced. Given a number of such give-and-take relationships within a communication, one would predict that, over time,

the opinions, rules, drive and motivations of organizational colleagues will shape the attitudes of the novice as he advances toward the organizational equivalent of tenure. In turn he passes at least a part of what he inherits onto later members. It should be noted that each individual, to the extent that he is communicative, adds messages to the total pool and influences the direction of the change processes.

The Woelfel-Saltiel theory differs from traditional theories of attitude change or formation (Heider, 1946; Newcomb, 1956; Festinger, 1957; Osgood, Suci and Tannenbaum, 1957) by suggesting that attitudes are embedded in a continuously changing, multivariate "balance point." Attitudes, themselves, are conceptualized as a predisposition to respond; however, the W-S theory emphasizes that the individual processes information related to the attitude through a multidimensional cognitive space. This space consists of an array of attitude-objects wherein the distances between the objects are the scalar representations of the underlying predispositions. Attitude-objects are taken to be those phenomena within the environment to which an individual assigns a valence, either positive or negative, for evaluation purposes. The space, which is essentially an unstandardized orthogonal factor rotation, specifies the dimensions which underlie the relative locations of the attitudeobjects.

Unlike Heider (1956), the Woelfel-Saltiel theory specifies the relationship between message volume, the significance of the source, and attitude mass. Message volume is the quantity of input to the receiver across all sources. Attitude mass is that characteristic of an attitude which reflects its resistance to change; mass is a function of the number of messages a person has previously received about the objects of the

attitude. In an organizational context, this means that an individual with low tenure is likely to have low-mass attitudes toward informal work rules. Hence, his attitudes will be highly amenable to change. As he passes through the organization, the message history behind his balance point grows large, making change less and less likely.

Heider attributed attitude change to search processes initiated by the individual as a result of some internal state of attraction. The individual attempts to remain consonant with both his state of attraction to another person and an incongruent attitude between ego and the other. While this scenario is not excluded by the Woelfel-Saltiel formulation, it also includes other circumstances in which the individual encounters valenced information towards the objects of an attitude. In other words, according to Woelfel-Saltiel, <u>all</u> information, from <u>all</u> media are seen as contributing to the magnitude, valence, and mass of an attitude.

Woelfel-Saltiel also deviate significantly from Festinger's (1950) conceptualization of the role of dissonance and cognitive consistency as the impetus to attitude change. Again, internal states may initiate an information search which changes the locus of a balance point. However, other motives are not excluded by Woelfel-Saltiel. Similarly, Newcomb's A-B-X model may be seen as a special case of the Woelfel-Saltiel theory. In dyadic interactions, particularly those taking place in a laboratory setting, the issues of discussion are likely to not have had a large message history (e.g., low mass). A great many messages may be exchanged rapidly which will induce considerable movement in the locus of the balance point in a relatively short period of time. Woelfel-Saltiel cover the individual attitude change case (c.f., Woelfel and Haller, 1972) and the generalized case of attitude change across an entire culture (Taylor, Barmett and Serota, 1975).

At its simplest level the theory suggests that an attitude is the joint effect of a set of messages:  $x_1, x_2, x_3, \ldots, x_n$ . The consequent attitude <u>a</u> is the linear sum of the messages divided by the number <u>n</u> of messages. Attitude a can be represented as:

$$\underline{a} = \overline{\mathbf{x}} = \frac{1}{n}\mathbf{x}_1 + \frac{1}{n}\mathbf{x}_2 + \frac{1}{n}\mathbf{x}_3 \cdot \cdot \cdot \frac{1}{n}\mathbf{x}_n + \frac{1}{\Sigma} \cdot \mathbf{x}_1$$
$$\underbrace{\mathbf{x}}_{\mathbf{x}_1} = \mathbf{x}_1$$

This equation assumes that each incoming message stimulus has a unique effect equal to the effect of all other incoming stimuli. Further, it assumes that no other variables have a substantial effect.

Each message,  $x_i$ , is postulated to be a force which pulls the attitude in one direction or another. The mean  $(x_i)$  of all forces constitutes the balance point at which all forces sum to zero since:

$$\sum_{i=1}^{n} (x_{i} - \underline{a}) = 0$$

This conceptualization can be expanded to explain complex empirical phenomena at either the individual level (Woelfel and Haller, 1972) or cultural level (Barnett and Wigand, 1975). The theory allows the investigator to specify the impact of messages given control over certain contingent variables. Messages can be weighted either for the significance of the source (Woelfel and Haller, 1972), or the salience of the information for the receiver. In fact, the precise effect of an additional number of messages required to change an attitude where the message history, or the mass, is known, can be specified. In field studies, however, lack of experimental controls prevents adequate empirical examination of these equations. Attitude change, then, is actually treated as a simple quantitative function of the number of messages an individual has received about a given attitude-object. Thus, the greater the information history about the objects of an attitude, the more difficult it becomes to foster attitude change.

Four factors are, therefore, causally related to attitude change according to this theory:

- (1) the number of new messages
- (2) the number of messages comprising the initial balance point
- (3) the amount of discrepancy between the old attitude and the mean position advocated by the new messages.

Woelfel and Saltiel state:

. . . the amount of attitude change is directly related to the product of the average discrepancy between incoming information and the old attitude (average change advocated) and the number of such messages, and inversely related to the sum of the number of messages out of which the change message and the original message is composed. (pp. 4-5)

Our interest here is particularly concerned with attitude change processes and attitude formation processes as a longitudinal activity. For the organizational novice, attitude formation processes about the nature of work and the organizational environment begins with socialization processes during childhood and adolescence. Organizations like the Boy Scouts, Girl Scouts, educational institutions, and the family stress the development of leadership qualities and conforming behavior with an eye to "learning to live in the adult world." At least some component of these childhood exercises influence the formation of attitudes toward the working environment. It is argued here that these attitudes are of low mass; that is, experiences are likely to have been infrequent, and inconsistent. In effect, the organizational novice is an attitudinal tabula rasa.

Within organizational groups, since inputs are by definition limited, the opportunity to receive variably valenced information is also limited. Were any single individual free to experience the entire range of opinion on a given attitude-object, the theory would predict that his self-position would converge on the mean for the whole system. However, the group has to a certain extent self-selected itself (Moreno, 1934), according to affiliation needs, task-similarity, proximity, and other reasons. Prior to an individual's entrance into a group, attitude formation processes have already been at work within the group; hence, depending on the integrativeness of the group, attitudes may already be said to be homogeneous on a set of culturally determined objects to some degree. Thus, we would predict that on admission to a communication group (or more precisely, when an individual becomes integrated such that he is a member of a communication group), the associated information stimuli are <u>a priori</u> restricted in variability. The degree of restriction will be a function of the group's cohesiveness, connectedness, and integrativeness.

<u>Cohesiveness</u> (Jacobson and Seashore, 1951) is the sum of cognitive and environmental forces which act to keep a group together. These forces include intrapersonal needs for social clarification and social definition, particularly in the work context. Hence, the greater <u>inte-</u> <u>grativeness</u>, or the degree to which people who are linked to others are also linked to each other, is a measure of network redundancy. The more a group is integrated, the greater the probability of encountering redundant information, and hence, the greater the attitude similarity and the lower the variance. A low level of integration indicates that members of the group have a large number of non-group contacts (since groups are, by definition, connected at a minimal level). Thus integrativeness is a function of the ratio between-group and within-group interaction. <u>Connectedness</u>, or the degree to which individuals are connected by onestep links, would limit distortion, increase the opportunity for face-to-

face interpersonal exposure, and hence, high connectedness reduces variability also.

Cohesiveness, then, is a consequence of integrativeness and connectedness. Festinger, Schacter, and Back (1951) point out that chance properties of a neighborhood communication network, particularly propinquity, determine the affiliation behaviors of members of the network. As affiliation increases, liking increases, and liking reinforces the pattern. Balance theorists would argue that as individuals interact, their attitudes will grow more similar over time, and the <u>perceived agreement</u> will constitute another force for holding the group together. Further, habitual use of a link, like any other contiguous behavior pattern, is predictable from the pattern of reinforcement developed early in the relationship. Thus, cohesiveness is a complex variable which will predict whether the group will be sustained.

Integrativeness is an individual measure of the degree of intraconnectedness among <u>all</u> of an individual's organizational contacts. To the extent that a group member has a wide variety of non-group connections, the probability grows small that these links will be connected with each other (see Figure 1). Therefore, these links will provide the group member with unique and unpredictable stimuli. An individual may also have a large number of links outside the group, and still have a high integration score. This would be the case wherein the individual is connected to several members of another group, and they are connected to each other.

It is not, however, argued that the maximum integrativeness score is a desirable goal for a group. Moderate integration gives a group what Mitchell (1969) identifies as "reachability." That is, the extent to which a person can be reached or can reach other groups or individuals within the system. However, if a group is not reachable, that is to say,



FIGURE 1. Alternative Levels of Integration Within a Network.

Person 3 is highly integrated. All individuals with whom 3 is connected are connected to each other by short (one-step) paths.

Person 2 is moderately integrated. Person 2 is connected to Person 6 and Person 15, who are only linked by the path:  $15 \rightarrow 17 \rightarrow 5 \rightarrow 8$  or  $7 \rightarrow 6$ .

Person 5 is poorly integrated. With the exception of withingroup links (7,8), no node with whom 5 is connected is connected to another. Node 5 has the most unpredictable, most highly variable, information sources. if a group has a low level of integrativeness, it will be relatively unconstrained by disturbing, countervailing information.

Connectedness, as conceptually defined here, is a measure of the density of interaction within the group (Danowski, 1974), and density (Mitchell, 1969). Connectedness is the indicator of the affective strength of within-group relationships. As Danowski (1974) has noted, "The more friends exchange information, the greater the probability of homogeneous information being exchanged." Connectedness is calculated by determining the number of actual links within the group, and dividing that number by the total number possible, or:

$$C = \frac{\text{Actual links}}{\frac{n(n-1)}{2}},$$

where n equals the number of possible links.

To the extent that a group is completely connected we would expect it to exhibit a greater degree of attitudinal similarity. Completely connected groups will guarantee that at least some amount of meaningful information travels undistorted between all possible dyads, and at some continuous rate. Conversely, in the poorly connected group, information will move more slowly, and with greater distortion and lower effect.

## Figure 2

Various Levels of Connectedness







Partially Connected

C=0.5





The Woelfel-Saltiel theory suggests the following hypotheses:

H<sub>1</sub> Communication groups will be more homogeneous with respect to a set of work-related attitudes than will non-group organizational members.

The groups are designated as a function of frequent and repetitive interactions which pass between members. As a result, attitudes should converge as the number of within-group messages mount. As the attitudes converge, variance will be decreased, irrespective of the mean value for any given group. Hence, greater redundancy of message stimuli should decrease variability among communicants.

H The grand mean for group members with respect to any workrelated attitude should not vary from the grand mean for the non-group population.

We are assessing the validity of the null hypothesis in this case. Since each group member has a restricted ratio of input stimuli, each group should converge on a unique mean. These means, assuming that groups themselves are not highly interconnected, should vary about the mean for the non-group organizational population randomly.

 $^{\rm H}_{\rm 2}$  Groups will differ from one another with respect to a set of work-related attitudes.

This hypothesis addresses the issue of within-group cultural variability. That is, the organization has an overall set of norms and values which constrain the behavior of any individual member. The extent to which any norm acts to constrain is a function of the degree to which that norm is held to be important by a substantial proportion of the organizational or subsystem population. Since the groups have lowered variability due to the homogeneity of input, each group should converge on a unique locus or mean position for each normative item. Thus, not only will groups be more uniform with respect to these norms, they will also be different from each other.

# H<sub>3</sub> The greater the within-group connectedness, the lower the within-group variability.

Not only may groups have greater or lesser communication with the environment, they may also be variably linked within the group. The more that individuals are linked together, the greater the probability of redundant information. The more that communication is restricted to individuals who are tightly linked together, or the more that the group can be said to be connected, the more uniform that group will be in their attitudes toward organizational policies and practices. In statistical terms, the consequences of repetitive contact will be the reduction of variance around a mean response given by members of a group on some attitude item.

 ${\rm H}_{\rm 4}$  The greater the integrativeness, the lower the within-group variability.

Since integrativeness is a ratio that is dependent upon both withingroup and outside-of-group contacts, we would predict that a high score reflects a reduction of the variability of both environmental and withingroup stimuli. When integrativeness is low, variable and unpredictable stimuli from the environment are likely to disturb the normal group processes.

 $H_r$  The greater the connectedness, the greater the cohesiveness.

Cohesiveness has been defined as the sum of all forces acting to keep a group together (Jacobson and Seashore, 1951). Cohesiveness, in this sense, can be taken to be the consequence of repetitive interaction. Festinger (1953) has demonstrated that familiarity breeds liking. Farace and Danowski (1974) have discussed cohesiveness as a "function of the interpersonal attraction of a group for each other, and will be a function of the perceived potential rewards to be obtained relative to the amount of energy required to participate in the work group." Farace and Danowski

note that cohesiveness is mutually causally related to greater withingroup message exchange. Instead of arguing that similarity builds familiarity (Sherif, 1964), we are arguing the information contiguity between individuals both causes them to become more similar through time, and causes them to like one another.

## Summary

The observation of attitude can be treated as a longitudinal activity rather than a discrete event and change can be treated as motion in a multidimensional space. As Woelfel and Saltiel have shown in their discussion of cognitive processes, the concept of attitude may be treated as a set of interrelationships which define any cognitive element's proximity to all other cognitive elements. Definition and evaluation of elements must be regarded as a function of the information an individual receives. Within organizations groups may be detected which are based on the communication behavior of system members. These groups limit the variability of information available to members causing attitude means for the group to converge on a value different from that of the parent organization and with lower variability. These processes were identified as functions of the <u>connectedness</u>, the <u>integrativeness</u>, and the <u>cohesiveness</u> of the group. Hypotheses relating these variables to the distribution of work related norms are presented.
### Chapter 3

# METHODS AND RESULTS

Methods of group detection have been discussed from a graph-theoretic perspective by Harary, Norman and Cartwright (1965); Flament (1963); and Roby (1968). The application of network analysis to the study of human communication systems has been extensively reviewed by Farace and Danowski (1973); Guetzkow (1971); Festinger, Schacter, and Back (1951); Jacobson and Seashore (1951); Collins and Ravin (1965); and Porter and Lawler (1972).

The technique employed in this study -- network analysis (Farace and Russell, 1972; Danowski, 1974; Richards, 1974b) -- is a method developed out of sociometric techniques which takes a set of paired data specifying the interactions between individuals within a social environment and displays those interactions into an N by N person matrix. Each cell entering is an <u>interaction frequency</u> between two individuals. The matrix is rearranged in such a way as to place individuals who communicate frequently with each other proximate to one another in the column and row entries. Cluster analysis techniques (Richards, 1974b) exist which decompose the dense clusters of the matrix into "groups."

These "groups," arising from the data matrix, are ordinarily defined by a set of parameters. Richards (1974) has developed an algorithm which enables these groups to be formed from large organizational data sets. The algorithm allows the investigator considerable flexibility in the detection of such groups, but in general, groups usually meet the following

specified parameters:

- The amount of communication by members within the group, must be greater than the amount members engage in outside the group.
- No group member may be more than a pre-set number of links (that is, communication "steps") from any other member of the group.
- 3. There must be a path of communication such that any two members of the group are linked together.
- 4. There must be no subset of nodes or links making up more than a small pre-specified percentage of the total links or nodes, which, when removed, would cause the groups to become disconnected.
- 5. No group may be smaller than four members.

Notice -- the criteria do not require that the group recognize its own existence.

Festinger, Schacter and Back's (1952) classic study of friendship patterns within a housing community found sociometric clique detection procedures useful for analyzing group properties. Schacter demonstrated that contact, principally a function of proximity, determined the development of friendship relationships. The more individuals interacted, the more they grew to like one another. Festinger <u>et al</u>. found that cohesiveness of a psychological group was an important determinant of the number of deviants and how effectively a group norm was maintained. In other words, the greater the cohesiveness, the greater the number of deviants (in absolute terms), and the easier it was for a group to maintain obedience to a norm. We would argue that this is supportive of our contention that group membership leads to attitudinal uniformity. Note that Festinger's definition of a psychological group is conceptually similar to Smith et al.; however, his clique detection routine is conceptually

equivalent to that employed by Richards.

Sociometric groups have, then, been hypothesized to be referential, norm providing, and socially rewarding. It is argued that communication groups within organizations perform functions similar to those of the social group.

Similarly, Bales (1953) found it useful to use communication behavior to describe the functions of social systems. Brown (1974) used interaction patterns to detect patterns of racial and male chauvinism within a college community. The preceding studies differ from the present effort in an important respect. At the operational level, each requires something of a respondent beyond a report of his communication behavior. The Festinger studies ask the respondent to name his friends. Bales (1951) was more interested in measuring the individual components of a group than differentiating a group from its environment. In the present case, our interests lie in extracting a group from an environment according to a rigid set of criteria and then demonstrating that the fact of patterned interaction has consequences for the individual and the organization.

At its simplest level, network analysis requires individuals to indicate with whom they communicate and how often. The naming can be done either by asking a person to list individuals with whom he/she has frequent contact, or by providing the person with a list of the names of individuals believed to be members of a common social system. Specifying the names to be used on such a list is not a trivial problem. Often one of the most difficult operational problems is specifying who should and should not be included in the system census. This is generally known as a boundary problem, and in the present case has been unambiguously resolved by including only those individuals who are on the payroll of the

organization under study.

Often, network analysts will specify the content which is relevant to a particular study. Hence, the investigator might be interested in change processes, would attempt to have respondents indicate with whom they discuss "new ideas," or innovations. In the present investigation content was not restricted. Subjects were asked to choose those people with whom they interacted on the job.

Channel -- that is, face-to-face, telephone, memo or other mediated transmissions -- can also be used to discriminate different networks within a common organizational boundary (Farace and Johnson, 1974). In the present study, channel was restricted to face-to-face contacts.

After data are gathered, they are placed in an N by N matrix where N is equal to the population of the network. The matrix is rearranged by moving individuals into proximity along the diagonal of the matrix with those with whom they interact. This is accomplished by shifting the position location of a person's column and row entries such that they lie next to or nearly adjacent to others with whom they interact. The clusters of individuals along the diagonal are then analyzed according to the criteria we have discussed and groups are formed. In the Richards' algorithm, the diagonal is treated as the base of a histogram and the interaction frequency between individuals forms the length of the perpendiculars of the histogram. In addition, the distances between the frequency lines are manipulated according to the strength of the link between individuals. As strong links are identified, this distance is continuously shrunk such that dense clusters of lines form. Cluster analysis is performed on these dense areas and groups are discriminated from the histogram.

Individuals are assigned different roles as a result of their interaction patterns. Dense clusters become groups. Single individuals linking groups are called liaisons since they provide a means by which information may be exchanged between two groups. Certain group members are linked to other group members in other groups, and are referred to as bridges. Other persons have no links and are referred to as isolates. Two types of isolates are specified: <u>Type 1</u> isolates are linked to one other person within the network, either a group member or a dyad member; <u>Type 2</u> isolates are not linked to anyone in the network. While this may be an artifact of measurement error, it is also possible that certain individuals are remote from the entire organization communicatively. Also, Type 2 isolates are likely to be found in topic specific networks. Finally, certain individuals meet none of the other criteria and are classified as Others.

Within the algorithm itself, the investigator has a number of parameters at his control. In the present study only reciprocated links, links which are acknowledged by both members of any given dyad, have been included. The links are assumed to be bidirectional, or initiation of contact is presumed to be equal for both members of each dyad. This simplifying assumption is subject to the criticism that it does not recognize the normative force of status rules within hierarchically constrained relationships. Links may also be characterized as having varying strengths. In the present data set the link strength was inadequately operationalized as frequency of contact only, disregarding the length for an average contact. Link strength was operationalized as:

How frequently do you talk to ?

5 Very frequently 4 Frequently 3 Occasionally 2 Infrequently 1 Very infrequently

Responses in the "Very infrequently" category were eliminated from the data set. Thus, while strength, and strength discrepancies, are not employed as independent variables, link strength values 2-5 are considered to constitute a "communication link" for purposes of this research.

# Description of Data Source

The data employed in this study were gathered by survey instruments from a Midwest manufacturing concern of moderate size (approximately 450 employees).<sup>1</sup> The data were originally gathered during 1970 as a part of an effort to monitor an ongoing organizational development program.

This program originated with the introduction of a Scanlon Plan<sup>2</sup> in 1952. The Scanlon Plan is a theory and method of management which rests on the assumption that employee motivation can be facilitated through the distribution of decision-making authority to committees. According to Heinen (1972) the Scanlon Plan stresses the need for:

- 1. a system of sharing with the employees information about the organization's objectives and problems,
- 2. a system for increasing organizational effectiveness through the participation of employees in decisions that affect themselves and their jobs, and
- 3. a system for establishing a reward structure and leadership practices that foster cooperation.

Subsequent behavioral science inputs have modified the original Scanlon Plan design. Management grid training programs were introduced through Likert (1967) and the Institute for Social Research at the University of Michigan. These programs transformed the committee structures into a series of work teams. A work team was defined as a group of people with common responsibility for the organization's work. Each

<sup>&</sup>lt;sup>1</sup> The data were gathered by Professors Heinen (1972) and E. Jacobson, Dept. of Psychology, M.S.U., and made available for secondary analysis.

<sup>&</sup>lt;sup>2</sup> Thorough discussions of the Scanlon Plan can be found in McGregor (1952), Lesieur (1958), and Doyle (1970).

foreman or supervisor was responsible for from one to three work teams of approximately 13 individuals per team. The work team functions to plan the work, identify and solve problems, and to evaluate the activities of the team.

It should be stressed that this organization is unusually sensitive to the need for cooperative or participative management systems. The resultant communication policy may be judged to have enhanced the amount of communication.

Survey data were obtained from the Inter-Company Longitudinal Survey (ICLS) of the Institute of Social Research. Attitude items were measured on five-point Likert scales (see Table 2). The characteristics of the items used in measuring each variable from the ICLS questionaire were examined through a cluster analysis (Heinen, 1972). As a result of this analysis (Appendix A), 23 items were chosen from a possible 212 on the basis of their ability to discriminate between subjects. Means and standard deviation for each variable are presented in Appendix B. In addition, variables related to age, education and tenure with the firm were added to the set.

The breakdown of individuals into network roles is given in Table 1.

TABLE 1. Network Roles for Employ	ees by Category.
ROLE	SUBJECTS
Group members (includes bridges)	180
Liaisons	5
Dyads	2
Isolates T <sub>l</sub>	16
Isolates T <sub>2</sub>	63
Others	148
TOTAL	414

# TABLE 2. ICLS Variables.

- To what extent do persons in your work group keep each other informed about important events and situations?
- 2. How friendly and easy to approach are the persons in your work group?
- 3. When you talk with persons in your work group, to what extent do they pay attention to what you're saying?
- 4. To what extent are persons in your work group willing to listen to your problems?
- 5. How much do persons in your work group encourage each other to give their best effort?
- 6. To what extent do persons in your work group maintain high standards of performance?
- 7. To what extent do persons in your work group help you find ways to do a better job?
- 8. To what extent do persons in your work group provide the help you need so that you can plan, organize, and schedule work ahead of time?
- 9. To what extent do members of your work group plan together and coordinate their efforts?
- 10. To what extent do you feel that you and the other persons in your work group belong to a team that works together?
- 11. To what extent do you have confidence and trust in the persons in your work group?
- 12. When did you first come to work here?
- 13. Into what age bracket do you fall?
- 14. How much schooling have you had?
- 15. On the basis of your experience and information, how would you rate your work group on effectiveness? How well does it do in fulfilling

its missing or achieving its goals in comparison with other work groups in the company?

- 16. How much do the members of your work team want to stay in your work team rather than join any other work team?
- 17. In discussing a problem in your work team, to what extent do team members feel free to suggest ideas that are different from the majority opinion?
- 18. In arriving at a decision to a work team problem, how often does your work team outline a detailed action plan?
- 19. To what extent does your work team feel free to change a previous team decision?
- 20. To what extent are your interests and needs taken into account when work activities are assigned?
- 21. To what extent are you important to the smooth operation of your work team?
- 22. To what extent do the members of your work team see eye to eye on most matters?
- 23. To what extent do the members of your work team agree with you on what are the basic purposes of your work team?

Nineteen groups (in Table 1) were generated with a mean size of 9.5 and a range of three to 26 members. Two groups with less than five members were eliminated from the analysis of groups for statistical considerations. They were, however, retained as a part of the group population when analysis calls for the aggregation of all group member data. The communication groups cut across work-team boundaries. All respondents were, first of all, members of a work team. Of the 180 group members, 68, or approximately 38%, were assigned to a communication group which differed from their work team.

### Results

H<sub>1</sub> Communication groups will be more homogeneous with respect to a set of work-related attitudes than will non-group organizational members.

Figure 3 shows the trajectories of the mean variances (Table 3) for both the non-group and the group populations. Of the 23 items, the variance for the grouped population is exceeded by the variance for the non-group respondents on 12 items. Since this represents just barely more than 50% of the variables, Hypothesis 1 is not supported.

H<sub>1A</sub> The grand mean for group members with respect to any workrelated attitude should not vary from that for the work group population.

The results of t-tests for all variables broken down by group and non-group populations are given in Table 4. For 18 of the 23 variables the t-value is non-significant (p<.05). Given the nature of the exceptions noted below, Hypothesis 1A is regarded as supported.

For those variables in which significant differences (p<.05, Table 5) are obtained, it is possible to observe a pattern.

TABLE 3. Descriptive Statistics: Group and Non-Group Respondents

		Gro	up		Non-Group					
Variables	<u>n</u>	x	S	<sup>2</sup>	n	<u>x</u>	<u> </u>	<sup>2</sup>		
Provided Information	178	3.40	1.01	1.02	225	3.47	1.09	1.18		
Peer Friendly	160	3.02	1.21	1.45	209	3.19	1.36	1.85		
Peer Attention	156	4.40	.66	•44	199	4.46	.67	.45		
Peers Listen	154	4.27	.69	.48	197	4.37	.67	.45		
Work Group Encouraged	155	4.18	.86	.73	195	4.31	.73	.54		
Work Group Has High Standards	157	4.26	.70	.49	199	4.39	.60	.36		
Work Group Innovative	155	4.49	.64	.41	196	4.58	.53	.28		
Work Group Plans Ahead	153	4.18	.77	.59	190	4.35	.70	.49		
Work Group Coordinates	157	4.36	.66	.44	196	4.34	.63	.39		
Team Work	169	3.43	.91	.83	212	3.58	.95	.90		
Trust	170	3.37	.93	.87	212	3.60	1.05	1.11		
Tenure	165	1.29	.46	.21	209	1.31	.46	.21		
Age	167	2.47	1.06	1.13	214	2,64	1.17	1.37		
Education	167	3.18	1,96	3.85	207	3.76	1.94	3.78		
Rate My Group	161	2.61	1.17	1.37	213	2.97	.97	.94		
Stay With My Group	144	4.02	1.07	1.14	209	4.02	1.91	1.42		
Suggest Ideas	123	3.51	1.36	1.84	195	3.49	1.33	1.76		
Detailed Plan	140	3.27	1.07	1.13	207	3.38	1.22	1.48		
Change Decision	134	2.94	1.04	1.08	198	2.90	.98	.96		
Your Needs	133	3.15	.93	.86	190	3.38	1.02	1.03		
Self Importance	137	3.21	.93	.86	204	3.40	1.02	1.03		
Team Agrees	135	3.47	.94	.88	201	3.54	1.03	1.06		
Goal Agreement	132	3.26	.85	.73	201	3.50	.80	.64		
	n = x =	sample sample	size mean	s s <sup>2</sup>	= stand = vari	ard de ance	viatio	'n		

Comparison of Mean Variances for Group and Non-Group Population. FIGURE 3.



		Means	t-Value	df	Sig.
Provided	Information				
	Non-Group Group	3.47 3.40	.59	402	.56
Peer Frie	endly				
	Non-Group Group	3.19 3.02	1.19	367	.24
Peer Atte	ention				
	Non-Group Group	4.45 4.39	.84	353	.40
Peers Lis	ten				
	Non-Group Group	4.38 4.28	1.32	349	.19
Work Grou	p Encouraged				
	Non-Group	4.31	1.56	348	.12
	Group	4.18			
Work Grou	p Has High Standards				
	Non-Group	4.38	1.83	354	.07
	Group	4.26			
Work Grou	p Innovative				
	Non-Group	4.58	1.39	349	.17
	Group	4.49			
Work Grou	p Plans Ahead				
	Non-Group	4.54	2.15	341	.03
	Group	4.17			
Work Grou	p Coordinates				
	Non-Group	4.43	1.03	351	.30
	Group	4.36			
Team Work					
	Non-Group	3.58	1.11	379	.27
	Group	3.47			
Trust					
	Non-Group	3.59	2.21	380	.03
	Group	3.37			
Tenure					
	Non-Group	1.31	.42	372	.68
	Group	1.29			
Age					
0	Non-Group	2.64	1.44	379	.152
	Group	2.47			

TABLE 4. t-Tests Between Non-Group and Group Populations.

		Means	t-Value	df	Sig.
Education					
	Non-Group Group	3.26 3.17	.40	372	.69
Rate My G	roup Non-Group Group	1.17 .97	3.28	372	.01
Stay With	My Team Non-Group Group	4.02 4.02	.02	351	.98
Suggest I	deas Non-Group Group	3.49 3.51	10	316	.92
Detailed :	Plan Non-Group Group	3.38 3.27	.87	345	.39
Change De	cision Non-Group Group	2.89 2.94	37	330	.71
Your Need	s Non-Group Group	3.38 3.15	2.11	321	.04
Self Impo	rtance Non-Group Group	3.4 3.24	1.49	338	.13
Team Agre	es Non-Group Group	3.54 3.47	.66	334	.51
Goal Agree	ement Non-Group Group	3.50 3.25	2.66	331	.01

	Mean	t-Value
Work Group Has High Standards		
Non-Group Group	4.38 4.26	1.83
Work Group Plans Ahead		
Non-Group Group	4.54 4.17	2.15
Trust		
Non-Group Group	3.59 3.17	2.21
Rate My Group		
Non-Group Group	1.16 .97	3.28
Your Needs		
Non-Group Group	3.38 3.50	2.11
Goal Agreement		
Non-Group Group	3.50 3.25	2.66

TABLE	5.	Variables	with	Significant	t	Differences	Between	Group	and
		Non-Group	Popul	lations.					

Note that the mean values for these (Table 5) variables are generally lower for the group members than for the non-group individuals. Lower values represent less support for work team processes. Having knowledge not available to the rest of the work team about the functioning of the rest of the organization may enable the group member to assess the ability of his work team to plan ahead, relative to other work teams. Significantly, use of outside sources might reflect greater trust in the outside sources and a consequent (or as a consequence of) lowering of trust within the work team. Following this line of reasoning, one would then predict the differences found for rating of the work team, relative desire to stay with the work team, and the perceived importance of self to the functioning of the work team.

Since communication groups do not strictly reflect the work team structure, members of communication groups are more likely than non-group members to receive information from a wider variety of sources. Hence, an individual would be less likely to rely upon the work team for social and work-related support. Thus we would expect that group members would vary significantly from the non-group population on variables like goal agreement, intrapersonal needs, rating for the work group, work group standards, work group planning, and work group trust.

 $\rm H_2$  Groups will differ from one another with respect to a set of work-related attitudes.

This hypothesis indicates that groups will converge on a unique value for the various independent variables. The one-way analysis of the variance table (Table 6) shows that the groups significantly varied on nine of the 23 items (p<.05). While this is supportive of the hypothesis, additional analysis is required to eliminate the possibility of spurious findings.

Additionally, it is hypothesized that if the groups are creating a unique informational environment for members, the complex of all attitudes should discriminate the groups. That is, since each group is uniquely achieving a mean value for each work-related attitude, it was predicted that rotating the group members through an N-dimensional discriminant space where N is equal to the number of variables should recreate the network groupings from clusters of the items alone.

A step-wise discriminant analysis was performed in the data with hierarchical clustering. Appendix C gives the entering sequence and the

F probability of each entered variable. The procedure employed allowed the investigator to indicate the initial group structure. Following the cluster analysis, clusters are compared to the original group and Table 7 gives the comparison between actual and predicted results on a group by group basis. To read the table, look across the row to see how individuals from the network groups are distributed into discriminant clusters. Reading down the columns gives the membership of the discriminant cluster. For example, six individuals from network group 1 were placed in discriminant cluster 1, seven in cluster 6, and one in cluster 17.

Note that due to list-wise deletion of cases only 121 subjects are included in this analysis. (By list-wise deleting, we mean that when missing data were encountered for a respondent on a variable, all values for all variables for that respondent were deleted from the analysis. Therefore, the number of subjects was reduced.) Further, because 60 of the respondents did not complete one section of the questionnaire, eight variables (stay with my team; suggest ideas; detailed plan; your needs; self importance; team agrees; goal agreement) were eliminated from the analysis.

The results of the discriminant analysis provide strong support for this hypothesis, and for the theoretical value of the network cliquedetection routine. In 59.6% (p<.0001) of the cases, individuals were correctly placed in their predicted groups. Given 17 groups of known size, random procedures would correctly place only 6%. In other words, simply knowing the complex of attitudes and the age, tenure, and the education of the communication groups enabled the groups to be reproduced with nearly 60% accuracy. Hypothesis 2 is, therefore, supported by the evidence.

Variable	Sum of Squares	<u>D.F.</u>	<u>F Ratio</u>	F Prob.
Provided Information	212.16	175	1.77	.04
Peer Friendly	227.97	157	1.49	.11
Peer Attention	66.62	153	2.29	.01
Peers Listen	72.39	151	1.02	.44
Work Group Encouraged	110.88	152	1.93	.02
Work Group Has High Standards	75.68	154	1.93	.02
Work Group Innovative	62.21	152	1.45	.13
Work Group Plans Ahead	88.17	150	.74	.75
Work Group Coordinates	67.48	154	1.26	.23
Team Work	139.63	166	.36	.99
Trust	145.62	167	1.23	.22
Tenure	33.87	162	3.90	.00
Age	187.07	162	3.21	.00
Education	625,90	164	3.47	.00
Rate My Group	216.34	158	15.23	.00
Stay With My Team	162.94	141	1.33	.21
Suggest Ideas	222.25	.20	.54	.88
Detailed Plan	154.12	137	2.69	.00
Change Decision	138.39	131	1.47	.15
Your Needs	110,95	130	1.63	.08
Self Importance	116,99	135	.77	.68
Team Agrees	115.02	132	.26	.99
Goal Agreement	89.57	129	1.00	.45

Networ Group	rk os	Size																		
Group	1	16	6					7									2		1	
Group	2	9		4		1										1			2	
Group	3	8			6			l			1									
Group	4	8				4			1	1									1	
Group	5	7					5				2									
Group	6	21	2					16	l					1						
Group	7	4		l					3											
Group	8	4					1	1		l								1		
Group	9	5									4		1							
Group	10	7				l						2				1	2		1	
Group	11	4			4	l							2					l		
Group	12	4						l						3						
Group	13	4													3					
Group	14	2														2				
Group	15	6										2					4			
Group	16	2																2		
Group	17	3															1		l	
Discri Grou	iminar ups	nt	1	2	З	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
TOTAL (Disc)	SIZE	ant)	8	5	8	6	6	2	5	2	7	4	4	4	3	4	9	4	6	

TABLE 7. Network and Predicted Groupings.

Classified: n = 121

59.6% Cases Correctly Classified

p < .000

H<sub>3</sub> The greater the within-group connectedness, the lower the within-group variability.

Hypothesis 3 is not directly supported by the evidence. Figure 4 gives the average standard deviations for all variables across all groups. The groups are ranked for mean connectedness along the X-axis, and clearly there is no increasing trend from left to right. It was felt that perhaps size was suppressing the relationship. The Pearson correlation between size and connectedness was a -.76. However, the partial correlations between connectedness and the independent variables (see Table 8) show little change. While most correlations became slightly positive, the absolute value of the correlations reflect little change.

However, chi-square results indicate that connectedness does enable us to discriminate between the groups (Table 9). Significant differences are found for ten variables (p<.05) and nearly significant variations are found for two other variables (p<.10). Therefore, it can be concluded that connectedness does manifest itself in the attitudes of the group members.

 ${\rm H}_{\rm 4}$  The greater the integrativeness, the lower the within-group variability.

The prediction of a linearly decreasing variance with respect to integrativeness is not supported. Again, the pattern of the average standard deviations of the variable by group (Figure 5) is linear, but the overall trend is negligible. Controlling for size (with integrativeness, Pearson r = -.76) only marginally affects the correlations (Table 10). The relationship between integrativeness and connectedness was examined to remove the possibility of non-independence between the variables. The Spearman-Rank order correlation coefficient between the two variables is equal to .25 (p<.01). While this is a significant correlation, it is still relatively low, the shared variance being equal to 6.3%.



FIGURE 4. Average Standard Deviations for all Variables by Connectedness Rank.\*

\* Variables limited to those used in discriminant analysis to maintain sample sizes.

TABLE 8. Variables by Connectedness Rank.

Variable	Zero Order Correlation	Controlling for Size
Provided Information	08	01
Peer Friendly	08	.04
Peer Attention	08	.05
Peers Listen	003	.09
Work Group Encouraged	09	.06
Work Group Has High Standards	s <b></b> ll	.10
Work Group Innovative	.03	.13
Work Group Plans Ahead	.12	.16 <sup>×</sup>
Work Group Coordinates	04	.11
Team Work	03	003
Trust	.02	.07
Tenure	.19 <sup>×</sup>	.11
Age	19 <sup>×</sup>	23 <sup>x</sup>
Education	13	11
Rate My Group	36	05
Stay With My Team	004	.16 <sup>×</sup>
Suggest Ideas	05	04
Detailed Plan	21	09
Change Decision	09 <sup>x</sup>	16
Your Needs	19 <sup>x</sup>	11
Self Importance	05	.06
Team Agrees	02	05
Goal Agreement	09	.02

(p<.05)

TABLE 9. Chi Square Goodness of Fit Tests - Variables by Connectedness.

	x <sup>2</sup>	dif.	<u>sig.</u>
Provided Information	12.95	16	.70
Peer Friendly	12.18	16	.73
Peer Attention	15.67	12	.20
Peers Listen	7.72	12	.80
Work Group Encouraged	11.73	16	.76
Work Group Has High Standards	16.68	12	.16
Work Group Innovative	9.23	8	.32
Work Group Plans Ahead	20.37	16	.20
Work Group Coordinates	9.16	8	.33
Team Work	11.71	16	.76
Trust	11.14	16	.80
Tenure	18.93	4	.00
Age	17.85	16	.33
Education	14.99	16	.52
Rate My Group	33.97	8	.00
Stay With My Team	23.52	16	.10
Suggest Ideas	11.61	16	.77
Detailed Plan	28.05	16	.03
Change Decision	24.42	16	.08
Your Needs	35.59	16	.00
Self Importance	15.58	16	.48
Team Agrees	22.75	16	.12
Goal Agreement	13.34	16	.64

Chi-square goodness of fit tests indicate that integrativeness does account (p<.05) for differences in the distribution for seven independent variables (Table 10). While it is difficult to determine an overall pattern for the chi-square results, they demonstrate that the groups can be affected by different levels of integrativeness.

 $H_r$  The greater the connectedness, the greater the cohesiveness.

The correlations between the measures of cohesiveness are presented below. The code variables were chosen on the basis of a cluster analysis of all 23 variables (see Appendix B). Two items which otherwise were eliminated from the analysis are included, despite the fact that the items do not effectively discriminate between subjects.



FIGURE 5. Mean Standard Deviations for Variables by Integrativeness Rank.

TABLE 10. Chi Square Goodness of Fit Tests -- Variable by Integrativeness.

	x <sup>2</sup>	dif.	sig.
Provided Information	9.72	16	.87
Peer Friendly	16.31	16	.43
Peer Attention	27.83	12	.01
Peers Listen	16.67	12	.16
Work Group Encouraged	23.25	16	.10
Work Group Has High Standards	24.43	12	.01
Work Group Innovative	5.97	8	.65
Work Group Plans Ahead	14.94	16	.53
Work Group Coordinates	9.54	8	.29
Team Work	10.38	16	.85
Trust	13.47	16	.64
Tenure	3.80	4	.43
Age	20.83	16	.18
Education	10.43	16	.84
Rate My Group	34.15	8	.00
Stay With My Team	16.10	16	.45
Suggest Ideas	9.33	16	.89
Detailed Plan	21.88	16	.15
Change Decision	22.44	16	.13
Your Needs	20.57	16	.19
Self Importance	11.33	16	.78
Team Agrees	11.82	16	.75
Goal Agreement	19.19	16	.25

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TABLE 11. Variables by Conne	ectedness.
Variables	Pearson Correlations
Peers Friendly	05
Stay with my team	.004
Get along with my team	24 <sup>xx</sup>
Team sticks together	.03
Help each other on the job	03
	(xx = p<.01)

The results clearly do not support the hypothesis. Arguably, the items relate to peers in the work team, and forces which act to keep the work team together. Because one's psychological peers are only partially within the field provided by the work team, these correlations would necessarily be less. However, if this argument holds, then the zero order correlations between the cohesiveness items ought to be substantially increased when the effects of connectedness are partialled out of the relationship (see Table 12).

TABLE 12. Inter-item Zero Order	Correlations.			
(1) Peers Friendly				
(2) Stay with my team	.18 <sup>×</sup>			
(3) Get along with my team	.18 <sup>×</sup> .06			
(4) Team sticks together	.12 <sup>x</sup> .06 .24 <sup>x</sup>			
(5) Help each other on the job	.1001 .25 <sup>x</sup> .71 <sup>x</sup>			
	(1) (2) (3) (4)			
	(x = p < .05)			

TABLE 13. Partial Correlations	Contro	lling	for	Conne	ectedness.	
(1) Peers Friendly						
(2) Stay with my team	.08					
(3) Get along with my team	.04	.06				
(4) Team sticks together	.18 <sup>×</sup>	.04	•	25 <sup>×</sup>		
(5) Help each other on the job	.15	05		25 <sup>×</sup>	.71 <sup>×</sup>	
	(1)	(2)	(	3)	(4)	
	(x = p<.05)					

With the exception of the correlations with perceived peer friendliness, the partial correlations are unaffected by connectedness. Whether this is due to the poor quality of the data or the actual absence of any effect due to coneectedness is undetermined. The hypothesis, in either case, is not supported by the results.

### Discussion

The results of this study reflect the validity of Selznick's observations. Informal structure does appear to be a determinant of the position an individual will adopt with respect to his work. The results are due to an odd reversal on conventional attitude-behavior formulations. Most theorists in the attitude-behavior milieu argue that (Siebold, 1974) attitudes should lead to a set of behaviors in a logical fashion. That is, attitudes are indicants of a predisposition to behave in some consistent manner. The results of this study indicate that attitudes are the consequence of behavioral processes, in particular, communication behaviors. These communication acts, strung together over the career lifespan of an individual, lead to developed patterns of behavior which render the individual's work predictable and his perceived association with the

organization mutually satisfactory.

However, these data are not so strong that such a position can be advanced unequivocally. It is possible, as an alternative explanation, that individuals join or are integrated into communication groups because, <u>a priori</u>, a similarity of attitudes and expectations exist. Such a hypothesis is not in any way disconfirmed by the results reported above. It seems clear that research ought to be undertaken which casts the two alternative explanations against one another.

It is proposed that future research will concentrate on this anomaly. Such research would ideally be carried out longitudinally in a developing organization. If the former hypothesis holds, then a pattern should emerge in which organizational novices would enter the system with widely discrepant attitudes. There would be a correlation between change scores in the attitude configuration (that is, changes in the sum of all attitudes) and level of integrativeness in the organization <u>per se</u>. Secondly, as the novice becomes a member of a group, we should see in that person's attitudes a shift in the direction of the group mean. We have argued, and demonstrated, that the communication group does provide a unique environment within which referential socialization processes take place. Therefore, the final test would rest upon differences between novices as a function of their involvement with a communication group.

The alternative explanation would entail novices entering with an attitude set roughly similar to some specific communication group, or the novice would have to adopt such a set rather rapidly after initiation into the organization. Knowledge of a person's a priori attitude set should enable one to predict which group the individual would associate with, and the probability of a high degree of integration into that group.

Note, however, that this explanation assumes that each individual has an equiprobable chance of contacting the appropriate communication group. This possibility seems inherently unsatisfactory, given that organizational structures exist to constrain such an equiprobable distribution of alternatives. In fact, such a distribution would give an organization an interpersonal uncertainty coefficient of 1.0.

## Conclusions

The results provide strong support for the contention that communication groups are norm-providing mechanisms. The research demonstrates that unique constellations of attitudes can reliably recreate the informal groups detected by the network algorithms. Further, integrativeness and connectedness were found to be related to the process of the development of group normative structures.

It was predicted, however, that the variance for any attitude would linearly decrease with increases in both connectedness and integrativeness. This did not prove to be the case. An examination of Figure 4 and Figure 5 shows that, as predicted, the mean variances for each group on the set of all variables was very low.

The range of variances should have been sufficient for the emergence of the predicted linear effects. The groups were further collapsed into five groups of groups in order to make certain that size was not distorting the results, and again, no linear trend was present. Since these hypotheses were deduced from the propositions advanced by Woelfel-Saltiel, we are forced to consider the possibility that the theory is not supported.

It is possible that connectedness and integrativeness are inadequate operationalizations of frequency. Woelfel-Saltiel is based largely on the notion that attitude change (or states) is a linear function of the

frequency of interaction. Therefore, it would seem wise to test the strength of the links for the predicted linearity. This data set, as mentioned earlier, lacked an adequate operationalization of link strength, and, hence, this alternative hypothesis cannot be tested here.

It should be noted that given the minimal differences between groups and non-group populations (Table 3), the statistical differences observed in the analysis of variance and the chi-square tests take an additional meaning. This study demonstrates that continued research into the informal communication groups will be fruitful for organizational theory. In addition, a study should be conducted which offers greater opportunity to contrast the efficacy of frequency as a predictor against other variables such as within-group hierarchical differentiation, status, size, and longevity.

Such a study is currently in the design stage. If Woelfel and Saltiel are correct, an adequately operationalized link-strength variable should lead to the identification of individuals who are highly embedded in an interactant with an organizational network. These individuals should have the greatest impact on change within the system.

It is proposed that a longitudinal study be carried out which looks at the correlation between changes in the attitudes of the high embedded group and changes in the attitude of the network at large. Secondly, we would argue that the theory requires contact, or interacting opportunities before an individual's messages may impact upon the cognitions of system members. Therefore, a highly embedded group ought also to predict change better than measurements of a management task force. In other words, a second group consisting of members of a self-nominated management task force will be measured and their messages will be counted. Perceived status of the task force will be measured to make certain that

salience of the infrequent messages from this group does not intervene. To the extent that change in the highly embedded group predicts change in the rest of the organization, Woelfel-Saltiel will be supported.

## Implications for Management Theory

A final note should be made about the relationship between the communication group and the work-team management structure. Communication groups are norm-providing mechanisms which channel the attitudes of the members along paths which are at variance from the organization. In the case of this organization, we find that the mean for attitudes which would facilitate the development of work teams are hampered by the informal group structure.

The results show that members of informal groups feel less inclined to trust their work team members; less willing to advocate staying with the work team; less willing to rate highly the performance of their group; and, most importantly, less likely to see themselves as substantially important to the productivity of the team.

This can, however, be looked upon two ways. While these attitudes may affect the performance of the team negatively, these attitudes also might indicate a healthy skepticism. Were each unit to operate in an information vacuum, the importance of the team's existence and the contribution of the team would tend to become artificially inflated.

### Summary

A network analysis was performed at a medium-sized midwestern manufacturing plant. From the network data, two dependent measures were conducted -- integrativeness and connectedness. The data provided strong support for hypotheses which argued that communication groups do have unique attitudes and perceptions with respect to each other. Hypotheses predicting a linear trend as a function of integrativeness and connectedness were not confirmed. APPENDICES

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### APPENDIX A

#### Item Analysis

The characteristics of the items used in measuring each of the variables from the ICLS questionnaire were examined by Heinen (1972) and the results are reproduced here. The cluster analysis was based upon a sample of 306 individuals from all of the company employees, who had returned completed questionnaires and not merely limited to the members of the communication groups. The total organizational pool of subjects was selected for purposes of generalizability and stability of measurement. The measures used in the study were intended to reflect characteristics of work teams in the whole organization rather than the twenty teams with complete data. Also, the characteristics of cluster analysis require a sample of several hundred to insure the stability of the measures in the analysis. For both these reasons the item analysis used the total organization subject pool.

The items used as measures of the variables for this study that were included in the ICLS questionnaire were:

#### Cohesiveness

- 1. To what extent do you feel that you and the other persons in your work group belong to a team that works together?
- 2. How much do the members of your work team want to stay in your work team rather than join any other work team?

How does your work team compare with the other work teams at \_\_\_\_\_\_ on:

3. the way they get along together?
- 4. the way they stick together?
- 5. the way they help each other on the job?

## Problem Solving

- 11. To what extent do persons in your work group keep each other informed about important events and situations?
- 12. To what extent are persons in your work team willing to listen to your problems?
- 13. To what extent does your work team plan together and coordinate their efforts?
- 14. To what extent does your work team make good decisions and solve problems well?
- 15. In discussing a problem in your work team, to what extent do team members feel free to suggest ideas that are different from the majority opinion?
- 16. In arriving at a decision to a work team problem, how often does your work team outline a detailed action plan?
- 17. To what extent does the work team feel free to change a previous team decision?

## Identification

- 21. To what extent do persons in your work team help you find ways to do a better job?
- 22. To what extent do persons in your work team provide the help you need so that you can plan, organize, and schedule work ahead of time?
- 23. To what extent are your interests and needs taken into account when work activities are assigned?
- 24. To what extent are you important to the smooth operation of your work team?
- 25. To what extent do the members of your work team see eye to eye on most matters?
- 26. To what extent do the members of your work team agree with you on what are the basic purposes of your work team?

## Perceived Team Growth

- 31. To what extent do you have confidence and trust in the persons in your work group?
- 32. On the basis of your experience and information, how would you rate your work group on effectiveness? How well does it do in fulfilling its mission or achieving its goals in comparison with other work groups in the company?
- 33. How do you feel about the progress your work team has made in the last year?
- 34. To what extent do you believe you have ideas for improving your work team that have not been expressed and fully discussed?
- 35. To what extent do you think you and the people you work with need training in how to build a more effective work team?

Table 14 gives the inter-item correlation matrix for these items and Table 15 presents the median and the range of the inter-item correlations, item-cluster correlations, and the item communalities for each of the scales contained in the ICLS questionnaire. For all the variables the inter-item correlations, item-cluster correlations, and the item communalities were moderately high to high.

TABLE	14.	ICLS	Scale	s Int	er-It	em Cc	orrelë	ations														
Items	н	7	m	ŧ	5	=	12	13	Ľ,	15	16	17	21	22	23	24	25	26 3	3	3	31	1 35
Ч	1.00																					
2	.27	1.00																				
с	44	.22	1.0																			
t	.45	.27	.71	1.00																		
2	.45	.15	.64	.64	1.00																	
11	.47	.24	.35	.32	.42	1.00																
12	.41	.14	.28	.28	.26	.39	1.00															
13	.71	.23	.32	.35	.43	.47	.36	1.00														
14	.65	.25	.26	.24	.31	.42	.37	.68	1.00													
15	.36	.26	.21	.26	.17	.28	, 35	.30	.34	1.00						•						
16	.33	.22	.20	.18	.27	.29	.22	.36	.34	.40	1.00											
17	.29	.28	.31	.23	.26	.37	.21	.32	.32	.52	• 39	1.00										
21	.55	.08	.23	.22	.35	.39	.43	.56	.51	.34	.27	.25	1.00									
22	.52	.15	.24	.21	.31	.41	.41	, 55	.47	.27	.24	.22	.68	1.00								
23	.40	.21	.20	.19	.24	.24	.31	.37	.4J	.29	.32	.35	.37	. 35	1.00							
24	.27	.14	.22	.25	.26	.18	.17	.18	.16	.13	.20	.16	.18	.05	.26 ]	• 00						
25	.41	.16	.31	.23	.35	++	.37	.35	.31	.29	.29	.36	.34	.34	.41	.35 1	00.					
26	.45	.25	<b>.</b> 34	• 30	.40	.46	.37	.40	• 39	.40	.32	.36	.36	.37	.41	.29	.59 1.	00				
31	.58	.24	• 39	.40	.40	.41	.45	64.	.50	• 35	.22	• 30	.41	.42	.37	11.	.37	38 1.	00			
32	.55	.31	.43	.41	.41	.32	.27	.51	.49	.31	.35	.25	.35	.33	• 30	.19	.25 .	38	38 1.(	00		
<b>6</b> E	.47	.22	.37	.40	.40	.39	.27	.40	.34	.31	•34	.29	.28	.27	.35	•24	.41	52	35 .1	47 1.	00	
34	.25	.08	.07	.08	.07	.17	.20	.21	. 25	.12	.07	•06	.10	.25	- 60.	••03	.10	18	13	23	25 1.0	0
35	.35	.17	.24	.24	.20	.26	.17	• 30	.28	.23	• 30	.18	.25	.27	.21	.10	.22	27	50	38	41 <b>.</b> 3	0 1.00

Variable Scales	Inter-Ite median low	m r's high	Item-C median	luste <u>low</u>	r r's high	Item Co median	mmuna <u>low</u>	lities high
Coh	54 44	71	80	55	83	64	31	69
PS	35 30	68	62	58	68	39	34	46
Id	37 34	68	67	58	68	45	33	47
PTG	41 38	47	66	58	70	44	35	49

TABLE 15.	Median and Range of Inter-Item Correlations, Item-Cluster	,
	and Item Communalities of Scales in ICLS.	

Alphas were computed for each of these scales for both the total organization sample and also for the twenty production level work teams. The alphas generally are only slightly lower in the smaller production level work team sample (see Table 16).

TABLE 16. Alphas of ICL	S Scales.	
Variable Scales	Total Organization	Twenty Production Teams
Coh	83	83
PS	77	71
Id	79	83
PTG	68	68

APPENDIX	B
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TABLE 17. Descriptive Statistics	S: All Re	espondents.		
	<u>n</u>	x	<u>S</u>	<sup>2</sup>
Provided Information	404	3.44	1.09	1.19
Peer Friendly	369	3.12	1.30	1.69
Peer Attention	355	4.43	.67	.45
Peers Listen	351	4.33	.68	.46
Work Group Encouraged	350	4.25	.79	.62
Work Group Has High Standards	356	4.33	.65	.42
Work Group Innovative	351	4.54	.58	.34
Work Group Plans Ahead	343	4,27	.74	.55
Work Group Coordinates	353	4.40	.64	.41
Team Work	381	3.53	.93	.87
Trust	382	3.50	1.01	1.02
Tenure	374	1.30	.45	.21
Age	381	2.57	1.13	1.28
Education	374	3.22	1.95	3.80
Rate My Group	374	3.22	1.95	3.80
Stay With My Team	353	4.02	1.14	1.30
Suggest Ideas	318	3.50	1.34	1.80
Detailed Plan	347	3.34	1,15	1.35
Change Decision	333	2.92	1.00	1.00
Your Needs	333	3.29	.99	.98
Self Importance	341	3.33	.98	.96
Team Agrees	336	3.51	.99	.98
Goal Agreement	333	3.40	.83	.69

TABLE 17. Descriptive Statistics: All Respondents.

TABLE 18.	Discriminant AnalysisStep Wise Wilke's Lambda Procedure.	Variable	to Enter Se	quence
Step Number	Variable Entered	F to Enter	Wilkes $\lambda$	Sis
1	Provided Information	13.45	.31	.000
2	Peer Friendly	4.65	.18	.000
3	Peer Attention	2.87	.12	.000
4	Peer Listen	2.03	.09	.000
5	Work Group Encouraged	1.844	.07	.000
6	Work Group Has High Standards	1.56	.05	.000
7	Work Group Innovative	.99	.04	.000
8	Work Group Plans Ahead	1.15	.037	.000
9	Work Group Coordinates	1.12	.037	.000
10	Team Work	1.23	.025	.000
11	Trust	1.34	.020	.000
12	Tenure	.80	.018	.000
13	Age	.98	.015	.000
14	Education	.79	.018	.000
15	Rate My Group	.41	.012	.000

APPENDIX C. Procedures for Discriminant Cluster Analysis.

The entry criterion (Wilkes  $\lambda$ ) is that the entered variable produce the greatest increase in the overall F ratio at each successive step.

64

TABLE	19.	Di	scri	ninant	Analysi	.s(	Group	) Size	for .	Analysi	s.		
				<u>N</u>				<u>N</u>				<u>N</u>	
	Grou	ıp	l	16	Gr	oup	7	4		Group	13	4	
	Grou	ιp	2	9	Gr	oup	8	4		Group	14	2	
	Grou	ıр	3	8	Gr	roup	9	5		Group	15	6	
	Grou	ιp	4	8	Gr	roup	10	7		Group	16	2	
	Grou	ıp	5	7	Gr	roup	11	4		Group	17	3	
	Grou	ιp	6	21	Gr	oup	12	4					

TABLE 20. Wilkes  $\lambda$  for Entered Variables.

Variable	<u>Wilkes <math>\lambda</math></u>	F
Provided Information	.81	.140
Peer Friendly	.77	1.77
Peer Attention	.67	2.97
Peers Listen	.74	2.10
Work Group Encouraged	.78	1.68
Work Group Has High Standards	.75	2.02
Work Group Innovative	.74	2.12
Work Group Plans Ahead	.88	.85
Work Group Coordinates	.83	1.27
Team Work	.93	.45
Trust	.86	3.71
Tenure	.79	1.65
Age	.73	2.27
Education	.31	13.24

For Wilkes  $\lambda$  the discriminant criterion is the overall multivariate F ratio for the test of differences among the group centroids.

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69

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