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A MULTIDIMENSIONAL SCALING ANALYSIS OF GROUP MEMBERS' INTERPERSONAL PERCEPTIONS

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ABSTRACT

A MULTIDIMENSIONAL SCALING ANALYSIS OF GROUP MEMBERS' INTERPERSONAL PERCEPTIONS

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Group members' interpersonal perceptions are the topic of the study. Three theoretical areas merge in the field of interpersonal perception. These include theories of perception, theories of interpersonal behavior, and small group theory. An integrative focus on these three theoretical areas was used to approach the study of interpersonal perception in groups.

Multidimensional scaling techniques were used in the study. Previous research using multidimensional scaling to analyze interpersonal perceptions in groups was reviewed. Complex judgments were found to be structured parsimoniously along a relatively small number of dimensions. The identification of these dimensions was hindered by the lack of a comprehensive external criteria that was needed to label the dimensions given by a multidimensional scaling analysis.

The aims of the study were, first to describe the best fitting dimensional representation of group members' perceptions, second to label these dimensions, and third to compare group leader and participant subject weights on each dimension. Data were collected from five

interpersonal process groups that were affiliated with psychology and education courses at Michigan State University during Winter term 1977. Four groups had eight members, and the remaining group had nine members. Measures were administered during the eighth week of the groups' nine-week duration. Two types of measures were taken on seven-point Likert scales. Subjects completed similarity ratings of all possible pairs of group members in their own group, and also rated each group member, including themselves, on sixteen adjective pairs of a Group Semantic Differential (GSD). The sixteen adjective pairs were chosen to describe four factors: dominance, affiliation, activity, and goal orientation. A factor analysis and elementary linkage analyses were performed post hoc on the GSD adjective pairs to check the construct validity of the proposed factor clusters. The factor analysis yielded a four-factor solution and a three-factor solution that both modified the proposed factor clusters. The linkage analyses showed that each group contained a distinct pattern of adjective-pair clusters. The GSD was designed to be an external criteria for labeling dimensions derived from the similarity ratings. The proposed clusters of adjective pairs, the clusters defined by the two factor analysis solutions, and the clusters described by the linkage analyses were used for further analysis.

An individual differences multidimensional scaling analysis (INDSCAL) was used to analyze the similarity ratings made by each subject. Three dimensions accounted for between 63 and 84 percent of the variance in similarity ratings across the five groups. The three-dimensional

solution was chosen as best representing subjects' similarity perceptions. Spearman rank correlations were computed between the INDSCAL dimensions and the GSD ratings in each group. The results indicated that the labels of the dimensions varied from group to group. The adjective-pair clusters most highly correlated with the INDSCAL dimensions were used to identify the dimensions. The amount of total similarity variance recovered by the GSD clusters from the INDSCAL dimensions was approximately 50 percent in each group studied. Four of the INDSCAL dimensions across the five groups were not well identified. The subject weights of leaders and participants on the INDSCAL dimensions were compared. Generally, leaders weighted activity heavier than did participants, and participants weighted dominance heavier than did leaders. The variations found in the attribute selection for similarity judgments in the groups are discussed and highlighted the applicability of a domain-specific dimensional model.

Dedicated to James W. and Eileen P. Grimm for their mutual interests in people and performance.

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CHAPTER I

THE PROBLEM

Introduction

Interpersonal perception involves how people experience their human environment. The stimuli in interpersonal perception are people and their interpersonal behavior. The internal representations employed by subjects in interpersonal perception have long been of concern in social psychology (Tagiuri, 1958). The importance of individual differences in perceptual processes was initially professed by the Gestalt school of psychology. The Gestalt emphasis on perception broke ground for later interest in person perception. Hastarf, Richardson, and Dornbusch (1958) suggest that the relevance of the field of interpersonal perception lies in its relation with interpersonal behavior.

> The study of the categories of interpersonal perception is primarily important as a prerequisite for investigating the vital problem of the extent to which knowledge of perceptual categories will provide us with a tool for understanding interpersonal behavior in general (p. 59).

Cronbach (1958) proposes another reason for the significance of research in interpersonal perception.

> Until we are in a position to standardize judgments of particular others in manner proposed here, (on stimulus properties) ... judgments will be confounded with constant differences between judges as perceivers (p. 366).

Cronbach suggests that ignorance of a judges perceptual map will be a roadblock to the analytic treatment of interpersonal perception and behavior.

A mutually shared perception of interpersonal interaction and the perceptual representation of the field forms a complex domain of many elements. Cronbach (1958) states that

> ... theories of perceptual response should take into account the traits being perceived, the constant tendencies in this perceiver with respect to those traits, and finally the effect of the particular other as a social stimulus to the perceiver (p. 375).

Bieri, Atkins et al. (1975), outline four elements: (a) input, or stimulus variables, (b) output, or response variables, (c) characteristics of the perceiver, and (d) situational variables. A coherent theory and suitable methodology in social perception must attend to attributes of the perceiver, attributes of the person being perceived, and attributes of the situation that the interaction is embedded within.

Research methods in the field of interpersonal perception must take into account a broad range of individual styles of perception. Traditional sociometric methods do not identify attributes underlying a subject's perceptions (Jones and Young, 1972). Many investigators (Hartley, 1968; Bales, 1950, 1970) have resorted to selecting attributes a priori. Jackson (1969) states that in the domain of personality theory and interpersonal processes little is known about attributes underlying interpersonal perception due to scarce criteria for goodness of fit. Consequently, Jackson (1969) warns against specifying attributes to subjects. The arbitrary selection of variables results in the

loss of an important source of variability. Differences between individuals in regard to the attributes they choose to use in perception are neglected (Bryson, 1974).

Early investigators (Taguiri, 1958; MacLeod, 1958) in the field of person perception promoted a phenomenological mode of study. MacLeod (1958) defines phenomenology as "the systematic attempt to observe and describe in all its essential characteristics the world of phenomena as it is presented" (p. 34). This approach centers on the phenonemenal data of self, other, and the social context. An assessment of individual differences is possible. Attributes most relevant to subjects perceptions may be described. In the present study, attributes most relevant to subjects in their perceptions of other members of a small group are analyzed.

Purpose

The purpose of this study is to describe the interpersonal perceptions of subjects in an interpersonal process-oriented group. The identity and importance of attributes underlying subjects' perceptions are analyzed in three steps. (a) Subjects' similarity/dissimilarity judgments of all group members are analyzed through a multidimensional scaling analysis. (b) Semantic differential scales are used in an attempt to externally define the attributes derived from the scaling analysis. (c) the importance of the attributes in group members' perceptions is examined in relation to the member's role as leader or participant in the group. The study analyzes interpersonal perceptions

as they relate to the interpersonal relationships that comprise a group's social structure.

Research Questions

The aim of the study is to identify the attributes most relevant to group members' interpersonal perceptions. The objectives are clarified in the following research questions.

Question 1. How many attributes are used by subjects in making similarity judgments?

Question 2. What are the identities of the attributes derived from the subjects' similarity ratings?

Question 3. Do group participants and group leaders differ in regard to the importance of particular attributes in making similarity judgments?

Theory

Studies in interpersonal perception investigate characteristics of the perceiver, personality attributes of the person being perceived, and the structure and dynamics of groups. The nature of interpersonal perception dictates a review of these three areas of theory. Fiedler (1958) points out that research in interpersonal perception provides "an integrative focus for three major fields in psychology: perception, personality theory, and small group behavior" (p. 243). Theory in each of these areas will be discussed, beginning with attributes of the perceptual process.

The study of interpersonal perception in American social psychology may be traced to the Gestalt school of psychology. The basic assumption, that a social relation depends upon interpersonal perception is derived from the Gestalt school. Snygg and Combs (Kelly, 1955) have formalized this assumption into the postulate, "all behavior is determined by and pertinent to the phenomenal field of the behaving organism" (p. 40). Jones and Young (1972) have defined interpersonal perception as "both instrumental to social interaction and conditioned by it" (p. 108). The phenomenal field of interpersonal perceptual processes is characterized by inter-dependence of perception and action.

Kelly's (1955) theory of personal constructs is derived solely on the basis of man's perceptual processes. He emphasizes the "creative capacity of the living thing to represent the environment, not merely respond to it" (p. 8). A "construct", defined by Kelly as "a way in which some things are construed as being alike and yet different from others" (p. 105), is the means through which a person represents their environment. The fundamental postulate of Kelly's (1955) theory is that "a person's processes are psychologically channelized by the ways in which he anticipates events" (p. 46). Consequently, a construct's continuing validation and maintenance depends upon its predictive effectiveness. This process is referred to by Kelly as "constructive alternativism" and assumes "that all of our present interpretations of the universe are subject to revision or replacement" (p. 15). Kelly views man as a scientist, contemplating and understanding in his own way his stream of experience.

The effects of Kelly's (1955) postulates in the field of interpersonal relations are specified in the "commonality" and "sociality" corollaries. The commonality corollary states that people may have similar constructs and psychological processes. The sociality corollary states that people can play roles in the social field of another through their understanding of the outlook of another person. These corollaries are sufficient to explain social relations in a system that is based upon individualized, personal constructs. Kelly determined that

> ... by recognizing the subsuming of other people's construing efforts as the basis for social interaction, we have said that social psychology must be a psychology of interpersonal understandings, not merely a psychology of common understandings (p. 209).

Kelly employs a restricted definition of a role as a "psychological process based upon the role player's construction of aspects of the construction system of those with who he attempts to join in a social enterprise" (p. 97). A role is anchored to an individual's construct system and not to situational attributes as in most sociological concepts of the term. Role constructs are "constructs which have other persons as elements in their context.... They are constructs which have the presumed constructs of other persons as elements in their context" (p. 209).

The postulates of personal constructs and constructive alternativism were developed in conjunction with Kelly's proposal "to postulate a process as the point of departure for the formation of a psychological theory" (p. 37). Osgood, Suci, and Tannenbaum (1957) also described a theory of perception based upon cognitive attributes of the

perceiver. A dimensional model is applied by both Kelly (1955) and Osgood et al. (1957). A "construct", in Kelly's theory, is assumed to be a bipolar dimension for construing similarity/dissimilarity. Osgood et al. (1957), describes three specific factors in a dimensional representation. Characteristics of the dimensional model are briefly reviewed.

Attributes are represented as continucus, bipolar variables in a dimensional model. Zajoc (Thompson, 1977), describes psychological dimensions in the following way:

> A psychological dimension is one's capacity to map consistently a set of responses onto a collection of stimuli that is itself ordered. A specific act of 'perceiving' or 'cognizing' a given stimulus object or event is regarded as involving the projection of a stimulus onto a set of psychological dimensions, and thereby attributing to it one value from each of these dimensions. These projected values, attributes, are the elements of the cognitive structure under analysis. They are what is commonly understood by the traits, characteristics, qualities, etc., of the object, event, or concept as the person perceive them. (p. 27).

Accordingly, attributes are treated as vectors in a n-dimensional space. Factor analysis and multidimensional scaling techniques are used to interpret data in terms of factors, or dimensions with assigned weights.

The concept of psychological distance is synonymous with but broader than perceived similarity. Psychophysics attempts to bridge psychological distance with Euclidean distance. Equating psychological distance with euclidean distance has two advantages according to Jackson (1969). The method provides generality, allowing for inferences on many social psychological attributes, and has the advantage of being analytic, permitting geometric and matrix algebra transformations.

This model has been accurate in studies on perception of physical stimuli (Jackson, 1969), however, in the domain of personality theory and social processes the lack of criteria for goodness of fit often generates difficulties.

Osgood et al. (1957), assumed a single set of factors that are embedded in the cognitive components of semantic ability. These dimensions are evaluation, potency, and activity. Factor analytic studies by Osgood et al. (1957) support this assumption. The three dimensions were found to be independent when describing impersonal events. Potency and activity became less independent when describing people and social events.

Thompson (1977) discusses the assumption made by Osgood et al., that a single set of attribute dimensions applies to all cognitive elements. This is a restricted dimensional model. Another model of attribute structure can be postulated. Thompson (1977) states

> ... such a model--a domain--specific dimensional model--suggests that cognitive elements may be divided into categories on the basis of some set of characteristics, with possibly differing sets of attribute dimensions being used within each category (p. 28).

The domain specific dimensional model allows greater flexibility than the model used by Osgood et al. (1957).

The theories of Kelly (1955) and Osgood (1957) describing perceptual processes have been reviewed. An emphasis on perception and the mutual phenomena involved in a social relation was traced to the Gestalt school of psychology. The dimensional model of attribute representation was also reviewed. The dimensional model underlies the

use of a multidimensional scaling analysis in the study as well as in the theories of interpersonal behavior and personality that will now be discussed.

Attributes of the people being perceived are the second relevant area in interpersonal perception. Theories of interpersonal behavior describe and categorize these attributes. Theoretical foundations in the field of personality have a broad empirical base. Typically, representations used to describe interpersonal behavior have been two dimensional. Earliest findings are the observations of Hippocrities (Adams, 1964). Sanguine, melancholic, choleric, and phlegmatic temperaments reveal behavior that may be categorized above or below the mean on two dimensions. Foa (1961) found a "strong convergence" of conceptualization in two dimensional schemes developed from many different lines of research. For example, Leary (1957) devised a system for classifying interpersonal behavior on two scales, love-hate, and dominance-submission. Adams (1964) describes the two axes.

> The affection-hostility dimension reflects variations in the degree of positive or negative affect manifested toward others. The positive extreme describes warm, friendly, kind, affiliative acts, while the negative extreme describes hostile, critical, angry, disaffiliative acts (p. 195).
>
> One pole of the dominance-submission axis is defined by acts of self-confident, assertive leadership and achievement in the face of obstacles. At the opposite pole are acts of passivity, submission, and acquiescence (p. 195).

Another researcher, Hurley (1975), also highlights convergent evidence identifying two dimensions of interpersonal behavior, but leaves open the possibility of other dimensions emerging. He labels the two dimensions as self acceptance-rejection, corresponding to a

dominance-submission dimension, and acceptance-rejection of others, corresponding to an affection-hostility dimension. Although these two dimensions appear firmly entrenched, the question of new dimensions accounting for additional variance continues. Hurley (1975) concludes, "other important interpersonal dimensions will probably emerge from future research, but their chances of eclipsing acceptance-rejection of others, and self acceptance-rejection do not seem large."

Other theorists have not been contented with a two dimensional framework. Bales (1950, 1970) has developed a three dimensional euclidian representation of interpersonal behavior and group social structure. The three dimensions are labelled likeability, control, and task orientation. Bales (1970) states that "it is desirable to go further than two dimensions when one is interested in the relation of values or attitudes to interpersonal behavior" (p. 52). The task orientation factor is a values dimension. The poles represent convergent versus divergent values and task orientation. Likeability and control correspond with the two dimensions noted earlier from Leary (1957) and Hurley (1975).

All of the above theories of interpersonal behavior are subject to two lines of criticism. First, the dimensions typically are arbitrarily selected and represent the investigator's <u>a priori</u> decisions in research methodology. Second, individual differences in the subject's social perceptions are ignored. This hinders the power and generality of these theories in providing a comprehensive explanation of interpersonal behavior.

A third theoretical area pertinent to interpersonal perception involves attributes of the situation. The dynamic system of small groups is of particular importance in the present study since data are collected from small interpersonal process-oriented groups. Descriptions of stages of group development have been reviewed by Tuckman (1965), and Cohen and Smith (1976). A five stage model of group development integrates information from the work of both theorists previously mentioned. A trend toward more meaningful perceptions and understanding of others evolves through the phases of group development.

The first stage of group development involves testing and dependence. The participants' interactions are characterized by expressions of dependency directed toward group leaders and other participants. Frequently, quick solutions or structures are set up to deal with a situation in which norms are not yet specified. Inclusion and belonging are central issues of participants. Perceptions of others often rely on stereotypes since participants are primarily in the process of getting to know one another. Cohen and Smith (1976) describe this as a "superficial acquaintance process" involving "categorizing one another or ... pigeon-holing each other with outside roles and statuses often determining inside ones" (p. 76). Tuckman concludes that "orientation, testing, and dependency constitute the group process of forming" (p. 396).

The second stage of group development is characterized by intragroup conflict. As Tuckman (1965) describes, "group members become hostile toward one another and toward a therapist or trainer as a means

of expressing their individuality and resisting the formation of group structure" (p. 386). Issues over control result in polarization and competition. Cleavage between dependent and counter-dependent factions within the group may emerge. Cohen and Smith (1976) identify primary group transferences as occurring at this stage. Participants behavior and perceptions are clouded within the turmoil of an ambiguous situation. Cohen and Smith (1976) suggest that this ambiguity

> ... may lead group members to respond to the leader (or other members) with feelings and behaviors learned in earlier, usually family, and other primary group relationships, i.e., they tend to transfer primary feelings and modes of relating (p. 83).

Tuckman (1965) labels this stage as "storming".

A third stage describes the development of group cohension. New norms and roles are adopted. Self-disclosure becomes more personal. A sense of harmony develops as participants become more accepting of each other and group leaders. The emphases on commonality and mutuality may affect social perception. Honesty may be less important than harmony. Cohen and Smith (1976) state that "Individual identity is submerged in the group in that members deny their own identity in pursuit of group unity" (pp. 91-92). Tuckman (1965) refers to this as the stage of "norming".

Functional role relatedness is identified in the fourth stage. The group process is more collaborative. Participants are simultaneously autonomous and cooperative. Self disclosure becomes more open as roles become flexible and functional. Cohen and Smith (1976) describe an increase in the development of empathy and also state that:

> there are more unbiased evaluations of the contributions of members, and members' questions are evaluated with less regard for power or status in the group. Insight into others is common with group members perceiving defenses, faulty value systems of other group members, and seeking to understand underlying reasons (p. 96).

Tuckman (1965) labels this stage as "performing".

The final stage of the group is generated by the final task of separation and termination of the group. Tuckmam (1965) has ignored this stage completely. Cohen and Smith state that participants' behavior varies. Overly optimistic evaluations about the effects of the group, withdrawal from group interaction, or denial may all be responses of certain participants. Separation may evoke sadness and regret as well as excitement about completion and implementing new discoveries. The process of termination is the least well described stage of development.

The dynamic system of an interpersonal process group can be expected to influence social perceptions within the group. The complexity, nature, and salience of dimensions of social perception may shift as the developmental trend toward more meaningful perceptions and understanding of others emerges in the group.

Three areas of psychology have been identified as relevant to social perception and have been reviewed. These areas include: (a) theories of perception, (b) theories of interpersonal behavior and personality, and (c) theories of small group development. An integrative focus of these three areas is needed to approach the complex field of social perception.

Overview

A review of the relevant literature on social perception in groups is presented in Chapter Two. The design of the study is described in Chapter Three and includes detailed information regarding the sample, measures, research questions, and means of analysis. The analysis of results is contained in Chapter Four. The study will contribute information in the area of interpersonal perception through analyzing the relevant dimensions underlying the interpersonal perceptions of members of a small group.

CHAPTER II

REVIEW OF THE LITERATURE

Multidimensional scaling techniques have aided the study of the relevant dimensions in an individual's internal representation of others. Studies employing multidimensional scaling of interpersonal perceptions are of concern to the present study. Three studies using multidimensional scaling of interpersonal perceptions are reviewed in depth in this chapter. The first study examined fraternity brothers' perceptions of one anothers' personality. The second study analyzed perceptions of members of an ongoing work group. The last study described is a multidimensional scaling analysis of T-group members interpersonal perceptions. This chapter reviews research on the multidimensional representations of interpersonal perceptions in a variety of groups.

One of the earliest multidimensional scaling analysis of social perceptions was reported by Jackson, Messick, and Solley (1957). The research was designed to investigate the usefulness of multidimensional scaling for structuring the perception of personality. The investigators were seeking to overcome the problem of choosing a priori dimensions. They state that "a priori abstraction of reasonable dimensions in relatively unexplored areas, may be too many, too few, or generally irrelevant for adequately describing a particular domain" (p. 311). The multidimensional scaling method of successive intervals was used to determine

the number and structuring of dimensions of perceived personality.

The subjects, who served as stimuli and judges, were 20 college age males who were members of a social fraternity and lived in the same house. Each subject was presented with a randomized list of all possible pairs of the 20 names. They were asked to judge the distance between each person and every other person with respect to similarity in personality along a nine point scale from very similar to very different. The average judged distances were obtained for input into a multidimensional scaling analysis. The twenty subjects completed the Stern's Activity Index in a group administration after the collection of the similarity data. The Stern's Activity Index is a 300 item inventory assessing the extent to which a person likes or dislikes particular types of activities. The inventory is theoretically linked with Murray's need theory (1938). Friendships ratings, ACE intelligence scores, and age were also obtained.

The multidimensional scaling analysis solved for a F-matrix with a rank of 4 rotated to approximate simple structure. The rank of the matrix corresponded to the number of dimensions. The first two factors accounted for over 70% of the variance in ratings while the remaining factors were successively smaller. Factor 1 was best described by the theoretical-intellectual area of the Activity Index with a correlation of -0.42. Factor 2 correlated 0.75 with the friendship ratings. Factor 3 correlated -0.46 with age and was interpreted as a status dimension since age corresponds with class status and most likely time as a member of the fraternity. Factor 4 accounted for residual variance

and was not interpretable. The interpretations of the dimensions are considered tentative and suggestive. The investigators state that more reliable information is needed for an external criteria to be used in labeling the dimensions.

Jackson, Messick, and Solley (1957) conclude that "The results suggest that the method is appropriate and extremely promising for the study of social perception. Judgments about 20 unique and complex personalities were found to be ordered parsimoniously along not 20, but a relatively small number of dimensions" (p. 316). A lack of correspondence was found between the Activities Index and the dimensions important to fraternity brothers' interpersonal perceptions. This implies limited congruence between the psychologists' and laymens' terms. The investigators suggest factors such as personality style and structure may be important.

In summation, the study by Jackson, Messick, and Solley (1957) demonstrates the suitability of multidimensional scaling in exploring social perception. One weakness of the design is the successive intervals model which requires averaging ratings across group members to define a group space. This prohibits the analysis of individual differences in the dimensions of perception. A different method of multidimensional scaling is required to perform an accurate evaluation of the individual, as well as group representations.

Jones and Young (1972), in a longitudinal study of an ongoing work group, describe the application of an individual differences multidimensional scaling analysis (INDSCAL) (Carroll and Chang, 1970).

Similarity ratings of all possible pairs of group members are made by each subject. The method inputs each similarity matrix constructed from the similarity ratings made by each subject. INDSCAL reports the amount of variance accounted for by an n-dimensional representation of the similarity data. The INDSCAL method yields two types of configurations, a group stimulus space and a subject space. The individual subject space is related to the group stimulus space by individual subject weights reported for each dimension. The subject weights matrix indicates the salience of the dimensions to that subject. This technique allows an analysis of individual differences and consequently is more powerful than other multidimensional scaling techniques.

The INDSCAL model is used by Jones and Young (1972) to answer four questions about the perceived social structure of a work group: (a) What attributes or dimensions do individuals use in judging or perceiving others? (b) Are subject weights on the dimensions related to role differences among the individuals? (c) What is the social structure of the group and can it be used to predict interpersonal behavior? (d) How stable is the social structure over time?

The study used students, faculty, and staff of a psychometric laboratory as members of a long-term intact social structure. Data was collected in February 1969, and February 1970. The 17 stimuli were a subset of 19 judges in 1969 and 31 judges in 1970. This setting was selected for reasons of convenience, the physical proximity of the work group, and the well-defined role and status differences.

A number of instruments were administered. The subjects rated their familiarity with the stimulus person. They rated the similarity of all possible pairs of stimuli persons. Subjects rated each stimulus person on several unidimensional scales indicating perceived degree of interest in professional activities. Finally, subjects were asked to choose the two groups of three individuals with whom they associated least and most frequently for advice on research, and socially.

INDSCAL analysis of the 1969 and 1970 data were run. Three derived dimensions were labeled through correlations with the unidimensional rating scales. Dimension 1 was labeled "status". Projections onto this dimension correlated over 0.90 with mean unidimensional ratings of status. Dimension 2 was labeled "political persuasion". Scale values on this dimension correlated over 0.80 with a left-right or liberal-conservative political spectrum. "Professional interests" was the label for Dimension 3. This scale correlated high with interest in statistical problems (-0.91), interest in content areas (0.72), and interest in experimentation (0.85). The 1970 results replicated the 1969 results in most cases. The correlations between the 1969 and 1970 status, political persuasion, and professional interests dimensions were 0.92, -0.94, and -0.92, respectively, indicating that the structure of the group did not change very much.

Faculty and graduate student judges differed in how they used the dimensions. Faculty relied most heavily on status. Graduate students tended to weigh political persuasion and professional interests more heavily. The salience of the dimensions shifted systematically from

one year to the next. Jones and Young (1972) state that "The overall pattern of these shifts in salience suggests that the stability of a subjects' perception of the relationship between the various members of the group, including himself, increased as a function of time in the group" (p. 118).

The authors were able to successfully use the three dimensional group space to predict the formation of doctoral committees, the frequency of interaction between individuals in social contexts, and the frequency of interaction for research collaboration and advice. The relationship between sociometric choice and perceived group structure was very strong. The authors interpret the sociometric choice results in terms of social comparison theory (Festinger, 1954) which assumes that individuals are most attracted to people perceived as similar to themselves.

The study by Jones and Young (1972) demonstrates the suitability of the INDSCAL model for studying groups. The model allows the derivation of the "relevant" dimensions of similarity that underly sociometric choices. Methods making a priori selections of variables must deal with the fact that many variables and selection criteria are available to choose from. Many different representations of the same social structure can result from these choices. The INDSCAL model bypasses this problem by reporting the dimensions relevant to the subjects perceptions. The study demonstrates the accuracy of predictions based upon a social structure represented through subjects' perceptions.

The three labels for the derived dimensions in the report of Jones and Young (1972) are of interest to the present study. The dimensions of interpersonal perception were "few and interpretable" (p. 119) as hypothesized. Status may be interpreted as involving power and influence in the system. The political values dimension corresponds to specific values and beliefs. The third dimension is descriptive of professional interests. The effective functioning of the work group must involve an awareness of these professional interest areas. The authors note the absence of a like-dislike dimension in the social structure. They suggest that the affective dimension "is an important determinant of interaction only when role differentiation in a group is not too great" (p. 119). This would imply that an affective dimension would be a factor in the less structured groups described in the present study. Thus, Jones and Young provide some preliminary evidence identifying the dimensions of interpersonal perception.

A study to describe the "nature and development" (p. 44) of T-group members social perceptions during the life of a group has been reported by Lewis, Lissitz, and Jones (1975). Questions were raised in four areas including "the nature of dimensions along which members perceive one another, the complexity of their perceptions, the stability of interpersonal perceptions over time, and the relative importance of the interpersonal dimensions used at various points in the development of the group" (p. 44). The investigators assume the underlying dimensions of perception are interpersonal. They also state that "As members of the group gain an increasing amount of direct experience with one

another, their perceptions of one another might be expected to become more differentiated" (p. 44).

The T-group that was studied met for 13 ninety minute sessions over six and one-half weeks. The subjects were five undergraduate students who volunteered to participate. The sixth subject, and group leader was a male clinical psychologist. "Similarity ratings were obtained immediately after each group meeting with the use of a questioneer that called for similarity judgments of all possible paired comparisons among the six members of the group" (p. 45). The leader rated each group member after each session on the eight following bipolar scales: popular-unpopular, uninvolved-involved, traditional-radical, empathic-insensitive, defensive-open, active-passive, anxious-calm, and weak-strong. "These eight rating scales were chosen to represent a range of important interpersonal characteristics and are similar to those described by Carson (1969) in his survey of interpersonal behavior" (pp. 45-46).

The study reports a three-dimensional solution had a "substantially higher correlation coefficient with the actual similarity ratings (0.73) than did the two- or one-dimensional solutions (0.65 and 0.52, respectively)" (p. 46). The correlations between the three dimensional solution and the similarity ratings improved over the thirteen group sessions indicating an increasing tendency for group members to view one another along the same three dimensions. Interpersonal perceptions neither increased nor decreased in complexity over the thirteen sessions.

The INDSCAL dimensions were labeled by Lewis, Lissitz, and Jones through their relationship with the group leader's average post-session ratings. A multiple regression analysis was performed. A simple product-moment correlation of -0.81 was reported between the second INDSCAL dimension and the traditional values--radical values rating scale. The first INDSCAL dimension was not as well-described yielding a 0.41 correlation with the same traditional values-radical values dimension. A multiple correlation of 0.50 resulted with the addition of the popular-unpopular rating scale. The third INDSCAL dimension had a multiple correlation of 0.51 with a scale along an actively calm to passively anxious continuum.

A matrix of subject weights was presented to determine the importance of each derived dimension to each group members' perceptions. The study reported that "the response patterns of the T-group leader and the other group members differ markedly. The group leader made considerably greater use of the second INDSCAL dimension, traditional-radical, than did any other group member and considerably less use of the first" (pp. 46-47). The fact that only one group leader was studied limits generalizations about the leader role.

The greatest strength in the design used by Lewis, Lissitz, and Jones (1975) is in the collection of data after each session. The complex nature of members' perceptions was found to have meaningful representation in three dimensions, and the dimensions were found to be relatively stable throughout the group life. Repeated measures after each group session also allowed for comparison of subject weight shifts

with the proposed developmental processes of the group. For example, it was reported that dimension 3 (actively calm to passively anxious) was more important for making judgments earlier in the group than it was in later sessions. The authors see this as consistent with Tuckman's (1965) theoretical framework describing the forming and storming periods of group development in which anxiety is very high due to the unstructured situation. The study presents a potent approach to investigate group development.

One failure of the study was to provide an adequate label for the dimensions. The average ratings of the group leader did not correspond to all three INDSCAL dimensions. The authors pointed out two problems with the procedure. First, the ratings which were averaged across the thirteen sessions actually had changed considerably for certain group members. Secondly, the leaders' perceptions were reported as differing from other group members because of a heavily weighting of dimension 2. This may have easily contaminated what was to serve as an external criteria. Other possible methods of analysis may involve taking ratings from all group members, or taking ratings from observers. A third criticism of the procedure may be leveled at the selection of bipolar scales. The scales were chosen to represent a range of important interpersonal characteristics; however, there are no theoretical supports for these choices. Attempts at labeling derived dimensions may be more successful by attending to the theories of interpersonal behavior in creating any rating scales to serve as an external criteria.

Summary

Three studies using multidimensional scaling techniques on social perceptions have been described. Each study exhibits the usefulness of multidimensional scaling in the field of social perception. The ability to obtain ratings unbiased by an investigator's *a priori* choices of important variables is one distinct advantage of multidimensional scaling. INDSCAL (Carroll and Chang, 1970) has the additional advantage of indicating the quality and degree of individual differences in social perception, thus adding to the robustness of the analysis. The parsimony and power of the INDSCAL technique in the area of interpersonal perception have substantial implications for future research.

All of the research reviewed indicate that the dimensions underlying social perceptions are relatively few. Jackson *et al.* (1957) discovered a 4 dimensional representation. Jones and Young (1972) found a 3 dimensional solution, and Lewis *et al.* (1975) described a 3 dimensional solution. Complex judgments were found to be structured parsimoniously along a relatively small number of dimensions (see Table 2.1).

The interpretability of the dimensions of perceptions is a difficult problem. Interpretation is complicated by the need for a reliable external criteria. Jackson *et al.* (1957) used activities reports, friendship ratings, and age as variables to label four dimensions underlying fraternity brothers perceptions of one another. Dimension 1 correlated -0.42 with theoretical-intellectual activities. Dimension 2 correlated 0.75 with friendship ratings. Dimension 3 correlated -0.46

with age and Dimension 4 was not interpretable. Jones and Young (1975) used unidimensional scales to assess interest in a variety of social and work areas of an ongoing academic work group. Status correlated above 0.90 with dimension 1. Political persuasion correlated above 0.80 with dimension 2. Professional interests correlated highly with dimension 3. Lewis et al. (1975) reported correlations of 0.41 with a traditional-radical scale -0.81 with a traditional-radical scale, and 0.47 with an active-passive scale for the three respective dimensions used by members of a T-group (see Table 2.1). The study by Jones and Young (1972) was most successful at interpreting the dimensions. The two other studies were less successful. The differing social structures may be a cause of this. The work group has well-defined roles. The labels found by Jones and Young (1972) correspond to the group roles. Political persuasion is an exception to this since it describes more personal characteristics. Judgments in the fraternity and T-group involve more personal characteristics. Jackson et al. (1957) suggest variables such as socioeconomic status and social skills may provide a better fitting criteria. These factors appear to be far too global. A specific evaluation of the type of interpersonal behavior exhibited would lead to clearer labels, particularly in a group involving a degree of personal intimacy between the members. The research by Lewis et al. (1975) evaluated the members interpersonal behavior. This design was hindered by the lack of a coherent theory of interpersonal behavior and by reliance solely upon the leaders ratings. An accurate means of interpreting the dimensions of a multidimensional scaling analysis can occur only through reliable external criteria.

Table 2.1. Dimensions of Interpersonal Perception Identified Through Multidimensional Scaling

Dimension	Fraternity[a]		Work Group[b]		T-group[c]	
	Corr.	Label	Corr.	Label	Corr.	Label
1	-0.42	theoretical-intellectual activities	above 0.90	status	0.41	traditional-radical
2	0.75	friendship ratings	above 0.80	political persuasion	-0.81	traditional-radical
3	-0.46	age (status)	above 0.85	professional interests	0.47	active-passive
4	not interpretable					

[a]Jackson, Messick and Solley, 1957.

[b]Jones and Young, 1972.

[c]Lewis, Lissitz and Jones, 1975.

Few studies examining the interpersonal perceptions between people in a group have been reported. Each of the three studies reviewed in this chapter had one group as the unit of analysis. Limited generalization can be made from these studies in spite of assumptions about the similarities of these groups with other groups of their particular class. Further research is needed to broaden this base of analysis of social perceptions in groups. The implications of these three studies have been integrated into the design of the present study. This is described in the next chapter.

CHAPTER III

DESIGN OF THE STUDY

Information describing the population sample, measures, research questions, and analysis of data in the study is contained in the present chapter.

Sample

Data were collected from students enrolled in two undergraduate courses offered at Michigan State University during Winter term, 1977. One course was offered through the Department of Psychology and the other through the College of Education. The courses were concerned with group processes and interpersonal communication strategies. Ongoing small groups were used as interpersonal behavior laboratories. Three groups from the psychology class and two groups from the education class participated in the study in exchange for individual and group feedback given at a later date.

Psychology Groups

The three groups affiliated with the psychology class lasted for nine weeks. The groups met for two ninety-minute sessions each week with two twelve-hour extended sessions during the third and seventh

weeks of the term. Course grades were based partially upon group attendance. Consequently, few sessions were missed by group participants.

Group participants were junior- and senior-level undergraduate students who were screened by the course instructor prior to enrollment. Participants self-selected a group at the start of the term, most often on the basis of scheduling convenience. An effort was made by the instructor to make the groups balanced in sexual makeup. Group members were instructed about the confidential nature of group material and were requested to limit contact with one another outside of the group. The class, which included all three groups, met once a week with the instructor to cover didactic material on interpersonal behavior.

Group leaders were selected and trained by the course instructor. Leaders were graduate and undergraduate students who had to have experience as participants and, in some cases, as observers of a group. Also they must have demonstrated competent interpersonal communication in their group experiences. All group leaders met with the course instructor and other leaders once a week for supervision. The group process was primarily "here and now" interaction oriented. Group leaders typically provided minimal structure to the group's activities. They were trained to make group process interventions as well as personal interventions. For the convenience of the study, group leader and group participant are defined as subsets of the term group member. Consequently, throughout the study, the term group member is by definition inclusive of leaders and participants.

The psychology groups were labeled group A, B, and C. Group A had eight members; five were males and three were females. There were two co-leaders, one male and one female. Group B consisted of eight members; five being male and three being female. Group B had three co-leaders; two of the leaders were male and one was a female. Group C also had eight group members. It was equally balanced with four males and four females; however, the two co-leaders were both females. One female participant in group A was asked to leave the group just prior to data collection; however, data from this participant were included in the study.

The course instructor had each group member complete ratings of all group members, including themselves, on a series of semantic differential scales during the fifth and ninth weeks of the groups. These ratings scales clustered along two dimensions identifying self acceptance-rejection and acceptance-rejection of other. A self report and others report were returned to the group members as feedback. An administration of these rating forms was done three weeks prior to the data collection of this study.

Education Groups

Data were also collected from groups in an undergraduate education course (Education 200). The course is a required introductory class for all education majors and is designed to train students in communication skills necessary for effective teaching. Reading materials, lectures, individualized carrel activities, and tutorial services are used to develop skills in the content demands of teaching. The Interpersonal

Process Lab (IPL) facilitates the development of skills in group process and interpersonal communication strategies.

The structure of an IPL group is distinctly different from an encounter or sensitivity group. The purpose of an IPL group is to teach specific interpersonal skills. The IPL leader will lecture, initiate exercises in communication skills, and monitor the group process for self-disclosure and the communication of responsible feedback by group members. Students must demonstrate competence in interpersonal communication skills in the IPL section to pass the course, which is graded pass-no pass. Students who receive non-passing grades are allowed to participate in an IPL group another term. The group leader is responsible for evaluating the student's skills in the IPL group. Lopis (1975) describes the specific skills that are evaluated:

(a) Interaction Assessment--"The ability to identify the cues of an interaction as primarily affective (dealing with feelings), or cognitive (dealing with content) and to respond appropriately."

(b) Active Listening--"The listener takes an active responsibility in helping the speaker's self-clarification."

(c) Exploratory Questioning--"The ability to seek further information or clarification for self and others without cuing a particular response."

(d) Observation Skill--"The ability to recognize and interpret diverse modes of nonverbal communication; that is, hands, face, posture, gestures, and so on."

(e) Self Disclosure--"The ability to share one's own ideas, opinions, and feelings as they relate to the immediate situation."

(f) Feedback Skill--"The ability to relate honest reactions caused by another person's behavior to the first person. A rationale is included to determine whether appropriate reaction would be positive or negative and to distinguish responsible reactions from irresponsible reactions."

(g) Value Awareness--"The ability to recognize, for self and others, consistency or inconsistency between one's professed value system and the expressed values interpreted through behaviors."

(h) Process Model--"The ability to systematically assess behavior, set goals, identify strategies, and to evaluate behavioral changes in relation to the stated goals."

Typically the leader will introduce these skills to the group at a graduated rate with the most structure occurring early in the term. Structure is reduced after all concepts have been introduced allowing students time to initiate process and demonstrate the skills. Students are given a feedback sheet twice during the term on which the leader evaluates their demonstrations of the skills.

Students in the IPL groups were typically in the second or third year of their undergraduate program. They selected the particular IPL section from a pool of over thirty sections on the basis of convenience in time and location. They met twice a week with approximately five hours per week in the group. Group leaders were graduate students in education and met weekly as a staff for training and supervision from the course instructors. The leaders were selected by the instructors and employed by the university as teaching assistants for the duration of the school year.

The two smallest IPL sections were selected to participate in the study so that the Education and Psychology groups would be similar in size. The IPL groups are labeled group D and E. Group D consisted of nine group members including two male and six female participants. The leader of group D was male. Group E had eight members composed of two male and five female participants and had a male leader.

Measures

Five sets of rating booklets were constructed that contained similarity rating forms and semantic differential rating forms. The names in each set corresponded with the members of either group A, B, C, D, or E. Subjects rated only members of their own group. Groups A, B, and C were administered the instruments during the weekly class meeting that included all three groups. Groups D and E completed the instruments independently at their regularly scheduled group time. Two rating tasks were included in the booklet. The first task consisted of rating on a Likert scale all pairs of stimulus persons in the group. The second task was a group semantic differential rating of all group members. Data were collected during the eighth week of the nine-week term.

A seven-point Likert scale was used for both ratings scales and was selected on the basis of the following research. Miller (1956), after a review of research on the absolute judgment of simple unidimensional stimuli, suggested that the average person's capacity for processing information is limited in accuracy with a span of absolute judgment in the neighborhood of seven. Green and Rao (1970) report that limiting response categories to two or three deteriorates information recovery, and they also found that product moment correlations increase with the fineness of response categories up to six. Another researcher, Finn (1972) concludes that, when "taking into account reliability of ratings and the desire to maximize variances of ratings" (p. 264), the optimal level is six or seven response categories. Evidence that testing time increases with an increase in the number of response categories and

that neutral responses increase with a three- or five-point scale as opposed to a seven- to nineteen-point scale has been reported by Matell and Jacoby (1972). The research indicates using seven response categories maximizes the variance of the ratings without presenting an excessive number of categories that may exceed the subject's ability to discriminate; hence, the similarity ratings and group semantic differential ratings utilized seven-point scales. A sample form of the rating booklet is contained in Appendix A.

Similarity Ratings

The first two pages of the rating booklet contained the similarity ratings task. Subjects were instructed to rate the similarity of the group members according to what they felt to be the most relevant attributes of the individuals. Each group member rated all the possible pairs of individuals, including themselves, within that member's group. A seven-point Likert scale with the rating of one labeled very dissimilar and the rating of seven labeled very similar followed the names of each pair of group members. The list of pairs of group members was presented in a Ross (1934) ordering. This method yields a balanced order of pairs that Ross (1934) states has the following advantages: "(1) They maintain the greatest possible spacing between pairs involving identical members, (2) they are so balanced as to remove time and space errors, (3) they avoid regular repetitions which might have suggestion effects" (p. 382). The Ross ordering facilitates the rater in treating each pair to be rated independently of the preceding pairs.

These similarity ratings were used to construct the half matrices that are used as the input for the multidimensional scaling analysis.

Group Semantic Differential (GSD)

The GSD consisted of sixteen sets of bipolar adjectives and followed the similarity ratings in the booklet. Subjects were instructed to describe each group member on the adjective scales and to be as discriminating as possible by using the entire scale. A bipolar adjective headed a seven-point Likert scale that followed each name on a list of group members. The polarity direction of the sixteen GSD adjectives was randomly assigned to control response sets. The listing of group members names maintained the same order throughout the sixteen adjective pairs. Scores were summed across group members; providing an average group rating of each group member on each bipolar adjective.

The GSD provided a means of structuring the perceptual domain of the group members. The structure described by the GSD was compared to the multidimensional scaling analysis in an effort to label the dimensions underlying the similarity ratings. The selection of bipolar adjectives was crucial to the success or failure of the descriptive function of the GSD. Maguire (1973) described four criteria in selecting scales for the semantic differential: (a) They must be representative and provide adequate coverage of the domain, (b) They should be well-defined for the population of interest, (c) They must be appropriate as descriptors of the stimulus of the study, and (d) They must be polar opposites. The literature in the area of interpersonal behavior in groups was combed for descriptive words and phrases

to select an appropriate and broad range of adjective pairs. The four factors selected were dominance, affiliation, activity, and goal orientation. Four sets of bipolar adjectives were selected to represent each factor. Strong-weak, independent-dependent, leads-follows, and rugged-delicate were expected to describe the dominance scale. Accepting-rejecting, warm-cold, friendly-unfriendly, and gentle-harsh were used for the affiliation scale. The activity scale was described by active-passive, fast-slow, talkative-silent, and involved-withdrawn. Goal orientation included orthodox-heretical, loyal-disloyal, traditional-radical, and obeys-disobeys. Each person's position on a particular factor was calculated by summing the average scores on each of the four subscales. The order of presentation of the sixteen bipolar adjectives was randomly assigned.

The sixteen bipolar adjectives selected for the GSD were taken primarily from research reported by Burke and Bennis (1961), Hartley (1968), Hurley (1976), Osgood et al. (1957), and Bales (1970). Burke and Bennis (1961) reported a factor analysis of a group semantic differential instrument with nineteen bipolar adjectives. Three factors accounted for 86 percent of the variance in ratings. Factor A was labeled evaluation and had high correlations with nine of the adjective pairs. The bipolar adjectives and the correlations were: friendly-unfriendly (0.90), accepted-rejected (0.90), adaptable-rigid (0.87), harmonious-discordant (0.87), good-bad (0.84), warm-cold (0.81), sensitive-insensitive (0.77), close-distant (0.79), and included-excluded (0.74). Factor B was labeled potency and had high loadings on the following six adjective pairs: strong-weak (0.93),

independent-dependent (0.91), leads-follows (0.84), important-unimportant (0.74), hard-soft (0.72), and central-peripheral (0.71). Factor C had high loadings on three adjective pairs. These three bipolar adjectives were talkative-silent (0.85), involved-withdrawn (0.78), and active-passive (0.75). Factor C was labeled participation. Another researcher, Hartley (1968), used a semantic differential for assessing group process changes. Evaluative, potency, and activity were the three factors measured. The evaluative factor was composed of cruel-kind, unfriendly-friendly, tense-relaxed, annoying-pleasing, and fair-unfair adjectives. The five adjective pairs describing potency were shallow-deep, unconcerned-concerned, easygoing-aggressive, soft-loud, and weak-strong. The third factor activity, was derived from quiet-talkative, repetitive-varied, remote-intimate, insensitive-sensitive, and passive-active adjectives. Hurley (1976) used the semantic differential to assess two factors that are labeled self acceptance-rejection (SAR), and acceptance-rejection of others (ARO). The six adjectives that measure SAR were shows feelings-hides feelings, active-passive, strong-weak, like self-dislike self, open-guarded, and calm-tense. ARO included gentle-harsh, accepting-rejecting, listens-tunes out, warm-cold, permissive-controlling, and reaches out-holds back adjectives. The median correlation within the sextets of SAR and ARO was $r = 0.54$, generally supporting the construct validity of the scales. Hurley states that "Improvement in the selection of the ARO subscales is plainly desirable, however, because the reaches out-holds back and listens-tunes out scales, intended to assess ARO, correlated more

strongly with some of the SAR scales than they did with other ARO scales" (p. 186). The fourth factor selected for the GSD, goal orientation, was selected from the research of Bales (1970). Bales studied task groups and described interpersonal behavior along a dimension labeled task orientation. This factor is characterized by acceptance of group values at one pole and the rejection of group values at the other. The convergent values pole describes a work orientation that is instrumental, conservative, and analytic, focusing on problem solving. Interpersonal behavior is impersonal and serious since the individual is primarily focused on group goals. The divergent value pole reflects an emphasis on expression and fantasy. Heretical rejection of group norms may be expressed in joking, playing, laughing, or side conversations. The finding by Lewis et al. (1975) that a traditional-radical scale describes a dimension of perception in a T-group supports Bales' construct of task orientation.

The adjective pairs selected for the activity, dominance, and affiliation scales have previously established validity in the research of Burke and Bennis (1961), Hartley (1968), and Hurley (1976). The adjective pairs describing goal orientation do not have prior validity established as semantic differential scales. The goal orientation adjective pairs were selected by the researcher from Bales' descriptions of that dimension. The adjective pairs utilized for the four GSD scales attempt to provide adequate coverage for the relevant domain and maintain the independence of each factor.

Preliminary results using the original GSD adjective pair clusters suggested that these clusters were not independent. A factor analysis and an elementary linkage analysis (McGuitty, 1957) were performed post hoc on the data from the GSD adjective pairs. The correlation matrix of the adjective pairs across the forty-one subjects in the five groups (see Table 3.1) was used in the factor analysis. The elementary linkage analysis used the adjective pair correlation matrix from each group. The factor analysis and linkage analysis are methods of clustering the GSD adjective pairs. The two methods identified clusters that were different from one another, as well as from the original clusters.

The VARIMAX rotated factor matrices and proportion of variance for the three- and the four-factor solutions are reported in Table 3.2. Two factors, labeled activity and affiliation, accounted for 88% of the variance in ratings in the four factor solution. Two factors, labeled affiliation and dominance-activity accounted for 93% of the variance in ratings in the three factor solution. The factor clusters derived from the factor analysis are described in Table 3.3. Results from the four factor solution showed factor 1 included the four adjective pairs expected to describe activity with the addition of the leads-follows adjective pair, which was expected to cluster with dominance. Factor 2 was composed of the four affiliation adjective pairs with the addition of loyal-disloyal and obeys-disobeys, which had been expected to describe goal orientation. Factor 3 contained three adjective pairs from the dominance cluster. Factor 4 included orthodox-heretical, and traditional-radical subscales describing goal orientation. The three factor

Table 3.1. Correlations of GSD Adjective Pairs Across All Groups (n = 41)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Strong-Weak																
2. Independent-Dependent	.83															
3. Leads-Follows	.87	.74														
4. Rugged-Delicate	.51	.74	.36													
5. Accepting-Rejecting	.38	.03	.36	-.25												
6. Warm-Cold	.37	.00	.45	-.37	.87											
7. Friendly-Unfriendly	.55	.18	.59	-.10	.87	.87										
8. Gentle-Harsh	.03	-.38	.00	-.59	.76	.77	.60									
9. Active-Passive	.77	.57	.93	.26	.44	.54	.68	.07								
10. Fast-Slow	.74	.61	.88	.20	.41	.56	.61	.12	.86							
11. Talkative-Silent	.71	.50	.91	.17	.43	.56	.70	.11	.95	.83						
12. Involved-Withdrawn	.60	.32	.81	-.05	.59	.76	.78	.34	.88	.78	.92					
13. Orthodox-Heretical	-.08	-.35	-.24	-.41	.31	.35	.18	.59	-.14	-.15	-.18	-.02				
14. Loyal-Disloyal	.41	.00	.39	-.29	.79	.84	.82	.74	.48	.49	.45	.63	.50			
15. Traditional-Radical	-.34	-.51	-.45	-.49	.04	.13	-.07	.44	-.34	-.33	-.38	-.23	.88	.30		
16. Obeys-Disobeys	.06	-.29	.08	-.53	0.59	.70	.60	.78	.17	.27	.18	.37	.64	.80	.53	

Table 3.2. Varimax Rotated Factor Matrices and Proportion of Variance

Adjective pairs	4 Factor Solution				3 Factor Solution		
	1	2	3	4	1	2	3
Strong-Weak	.60	.24	.71	-.02	.17	.93	.02
Independent-Dependent	.44	-.12	.82	-.20	-.24	.89	-.13
Leads-Follows	.86	.16	.42	-.15	.32	.89	-.24
Rugged-Delicate	.10	-.33	.75	-.27	-.53	.61	-.16
Accepting-Rejecting	.23	.92	.05	.02	.81	.20	.11
Warm-Cold	.46	.82	-.12	.15	.93	.22	.10
Friendly-Unfriendly	.52	.79	.09	.00	.83	.42	.00
Gentle-Harsh	.02	.82	-.27	.34	.81	-.19	.37
Active-Passive	.90	.22	.26	-.09	.45	.79	-.23
Fast-Slow	.81	.26	.28	-.07	.43	.75	-.18
Talkative-Silent	.93	.22	.14	-.14	.50	.72	-.31
Involved-Detached	.86	.42	-.02	-.05	.71	.56	-.22
Orthodox-Heretical	-.14	.33	-.09	.86	.32	-.15	.88
Loyal-Disloyal	.37	.77	.02	.37	.82	.26	.36
Traditional-Radical	-.26	.09	-.26	.90	.15	-.37	.80
Obeys-Disobeys	.17	.65	-.23	.52	.74	-.06	.48
Proportion of Variance	.54	.34	.07	.05	.57	.36	.07

solution reported factor 1 contained the four original affiliation adjective pairs plus involved-withdrawn, loyal-disloyal, and obeys-disobeys. Factor 2 was composed of the four dominance adjective pairs plus three activity adjective pairs. Two adjective pairs, orthodox-heretical, and traditional-radical correlate with factor 3. The activity cluster was divided and merged with either affiliation or dominance clusters in the three factor solution. The labels activity, affiliation, dominance, and goal orientation were maintained for the four factor solution. The labels used for the three factor solution were affiliation, dominance-activity, and goal orientation.

Table 3.3. Expected Adjective Pair Clusters and Adjective Pair Clusters from Factor Analysis

Expected Factor Clusters			
DOMINANCE	AFFILIATION	ACTIVITY	GOAL ORIENTATION
Leads-Follows Strong-Weak Independent-Dependent Rugged-Delicate	Accepting-Rejecting Warm-Cold Friendly-Unfriendly Gentle-Harsh	Active-Passive Fast-Slow Talkative-Silent Involved-Withdrawn	Orthodox-Heretical Traditional-Radical Loyal-Disloyal Obeys-Disobeys
FACTOR ANALYSIS 4 Factor Solution			
1-Activity	2-Affiliation	3-Dominance	4-Goal Orientation
Active-Passive Fast-Slow Talkative-Silent Involved-Withdrawn Leads-Follows	Accepting-Rejecting Warm-Cold Friendly-Unfriendly Gentle-Harsh Loyal-Disloyal Obeys-Disobeys	Strong-Weak Independent- Dependent Rugged-Delicate	Orthodox-Heretical Traditional-Radical
FACTOR ANALYSIS 3 Factor Solution			
1-Affiliation	2-Dominance-Activity	3-Goal Orientation	
Accepting-Rejecting Warm-Cold Friendly-Unfriendly Gentle-Harsh Involved-Withdrawn Loyal-Disloyal Obeys-Disobeys	Strong-Weak Independent-Dependent Leads-Follows Rugged-Delicate Active-Passive Fast-Slow Talkative-Silent	Orthodox-Heretical Traditional-Radical	

An elementary linkage analysis classified the GSD adjective pairs in a typal structure. Linkage is defined as the largest correlation that an adjective pair has with any or all of the other adjective pairs. A typal structure is defined by McQuitty (1957) as "one in which every member of a type is more like some other member of that type than he is like any member of any other type"(p. 209). The linkage analysis was performed on the adjective pair correlation matrix of each group because it was suspected that the adjective pairs' association with one another would change from group to group. The lower limit defining a significant correlation for the linkage analysis was $\pm$ .71, which will describe about 50% of the variance in the adjective pair ratings. The adjective pair clusters derived from the linkage analysis for each group are reported in Table 3.4. Diagrams of the adjective pairs' typal structure in each group are presented in Figure 3.1. The numbers in the diagrams correspond to the adjective pairs as listed in Table 3.1.

Three typal clusters were found in group A. Two of the three types are equally large. One of these clusters (Cluster IA) was complex with items from the dominance cluster and a sharply defined negative pole formed by goal orientation adjective pairs. The other large cluster in group A (Cluster IIA) contained all activity adjective pairs, and one adjective pair each from dominance and affiliation. The third type (Cluster IIIA) in group A was smaller than the first two and described largely by affiliation adjective pairs with the addition of loyal-disloyal and obeys-disobeys. Cluster IIIA also had weak positive connections with type IIA and with type IA's negative pole.

Table 3.4. Elementary Linkage Analysis Adjective Pair Clusters f

Table 3.4. Elementary Linkage Analysis Adjective Pair Clusters for Each Group

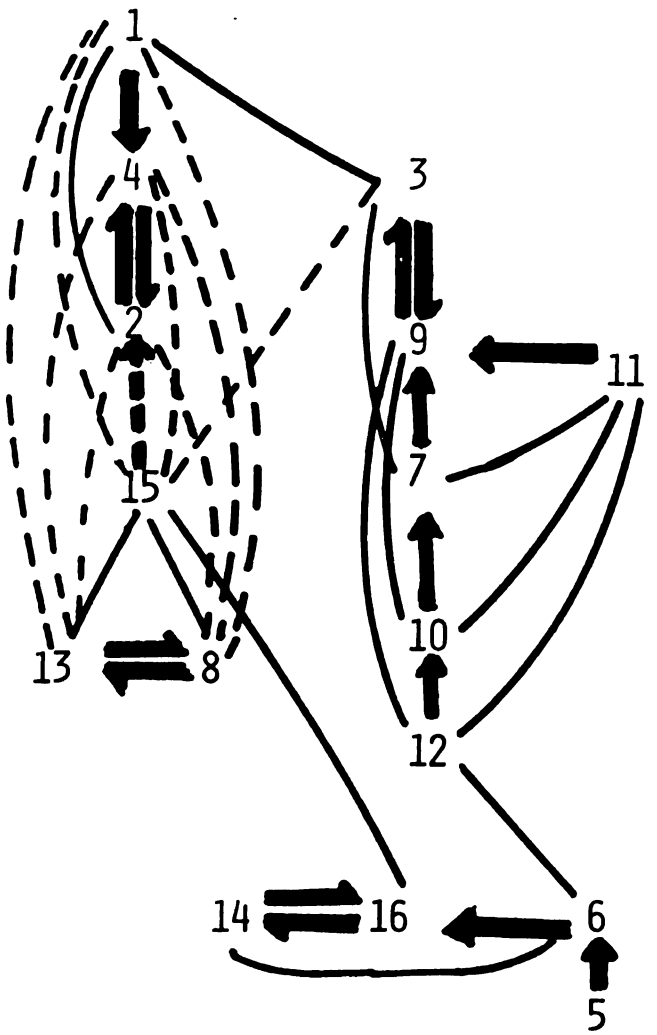
Group	Cluster I	Cluster II	Cluster III
A	1. strong-weak	3. leads-follows	5. accepting-rejecting
	2. independent-dependent	7. friendly-unfriendly	6. warm-cold
	4. rugged-delicate	9. active-passive	14. loyal-disloyal
	-8. harsh-gentle	10. fast-slow	16. obey-disobey
	-13. heretical-orthodox	11. talkative-silent	
	-15. radical-traditional	12. involved-withdrawn	
B	I		II
	3. leads-follows	10. fast-slow	1. strong-weak
	5. accepting-rejecting	11. talkative-silent	2. independent-dependent
	6. warm-cold	12. involved-withdrawn	4. rugged-delicate
	7. friendly-unfriendly	14. loyal-disloyal	-16. disobey-obey
	8. gentle-harsh	-13. heretical-orthodox	
	9. active-passive	-15. radical-traditional	
C	I		II
	1. strong-weak	8. gentle-harsh	13. orthodox-heretical
	2. independent-dependent	9. active-passive	15. traditional-radical
	3. leads-follows	10. fast-slow	
	4. rugged-delicate	11. talkative-silent	
	5. accepting-rejecting	12. involved-withdrawn	
	6. warm-cold	14. loyal-disloyal	
	7. friendly-unfriendly	16. obeys-disobeys	
D	I	II	III
	5. accepting-rejecting	1. strong-weak	4. rugged-delicate
	6. warm-cold	2. independent-dependent	-13. heretical-orthodox
	7. friendly-unfriendly	3. leads-follows	-15. radical-traditional
	8. gentle-harsh	9. active-passive	
	12. involved-withdrawn	10. fast-slow	
	14. loyal-disloyal	11. talkative-silent	
	16. obey-disobey		

Note: - indicates reversed polarity.

continued

Table 3.4--continued

Group	Cluster		
	I		II
E	1. strong-weak	7. friendly-unfriendly	-4. delicate-rugged
	2. independent-dependent	9. active-passive	8. gentle-harsh
	3. leads-follows	10. fast-slow	13. orthodox-heretical
	5. accepting-rejecting	11. talkative-silent	14. loyal-disloyal
	6. warm-cold	12. involved-withdrawn	15. traditional-radical
			16. obeys-disobeys



A

Figure 3.1. Diagrams of adjective pair typal structures for all groups.

Note: Heavy solid lines indicate positive typal structure..
Heavy dashed lines indicate negative typal structure.
Light solid lines indicate $r \geq .71$ correlation.
Light dashed lines indicate $r \geq -.71$ correlation.

Figure 3.1--continued

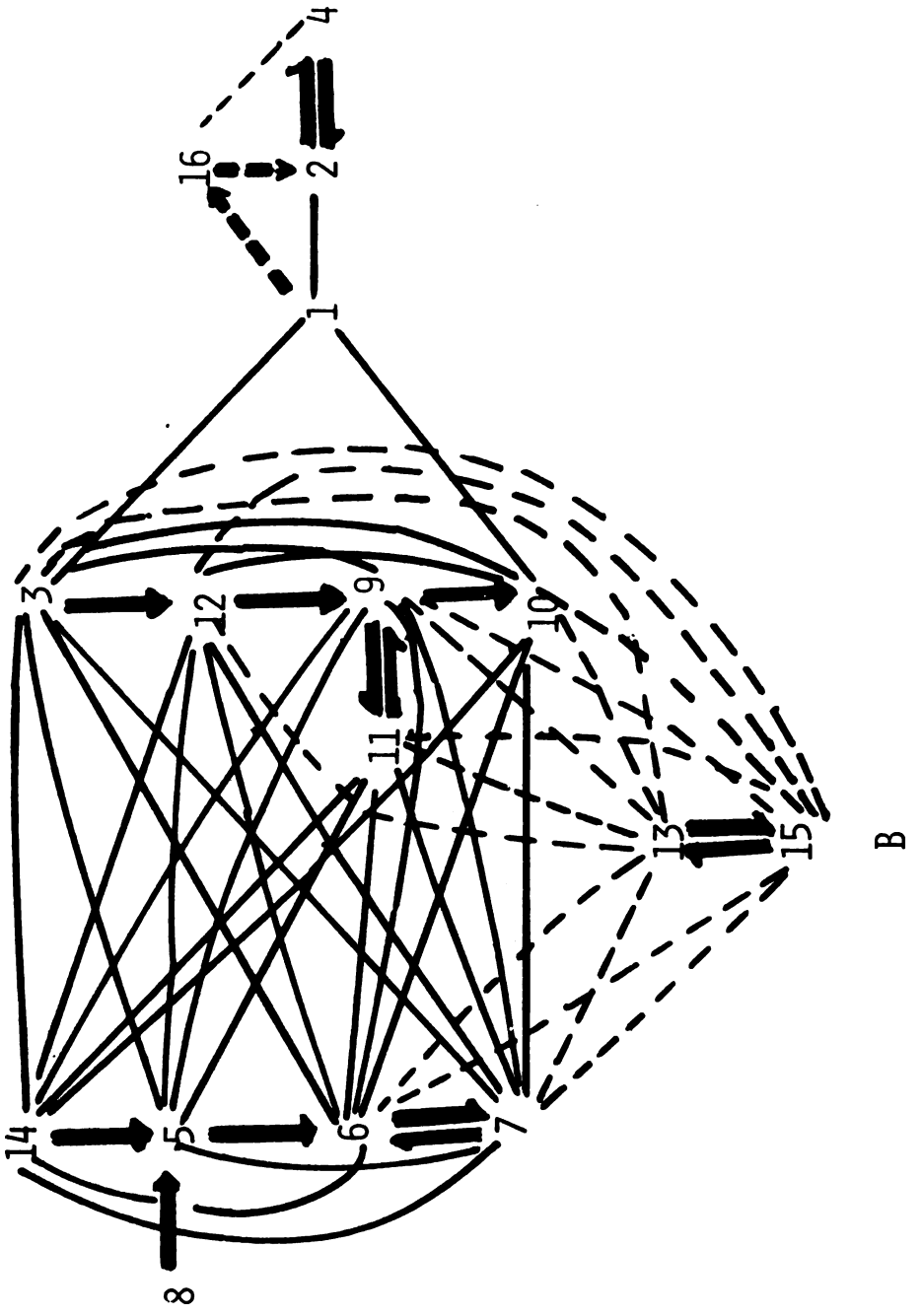
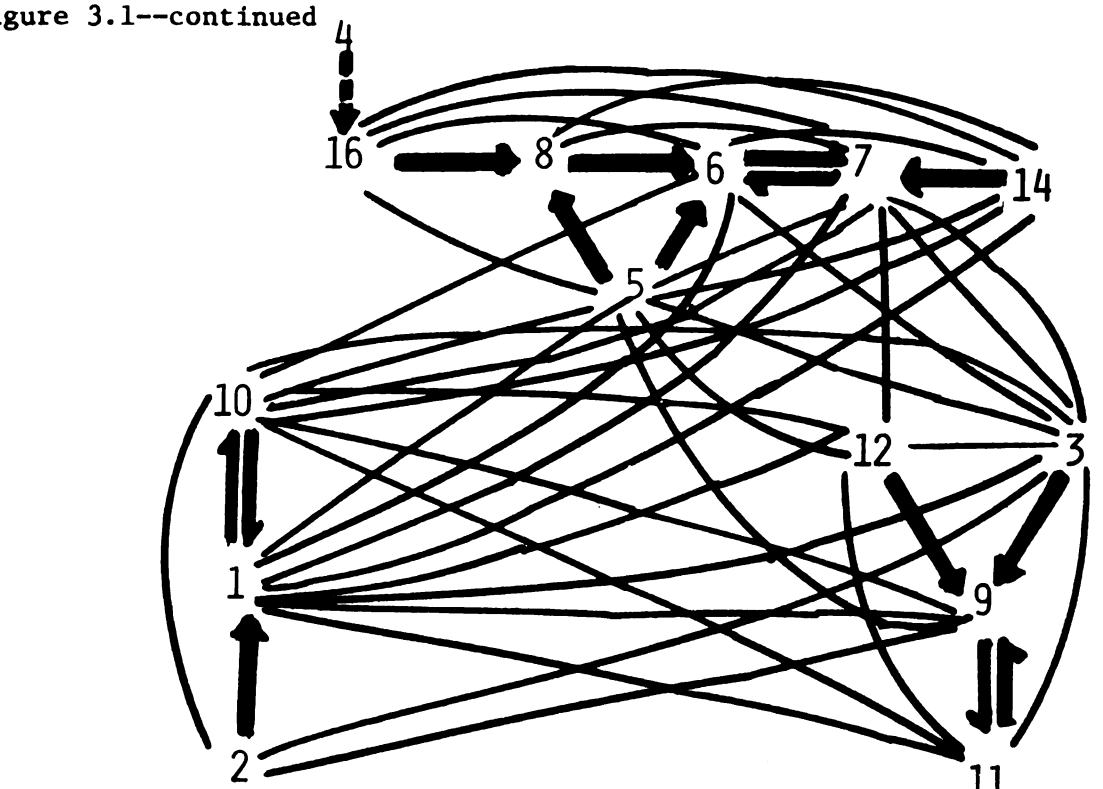


Figure 3.1--continued



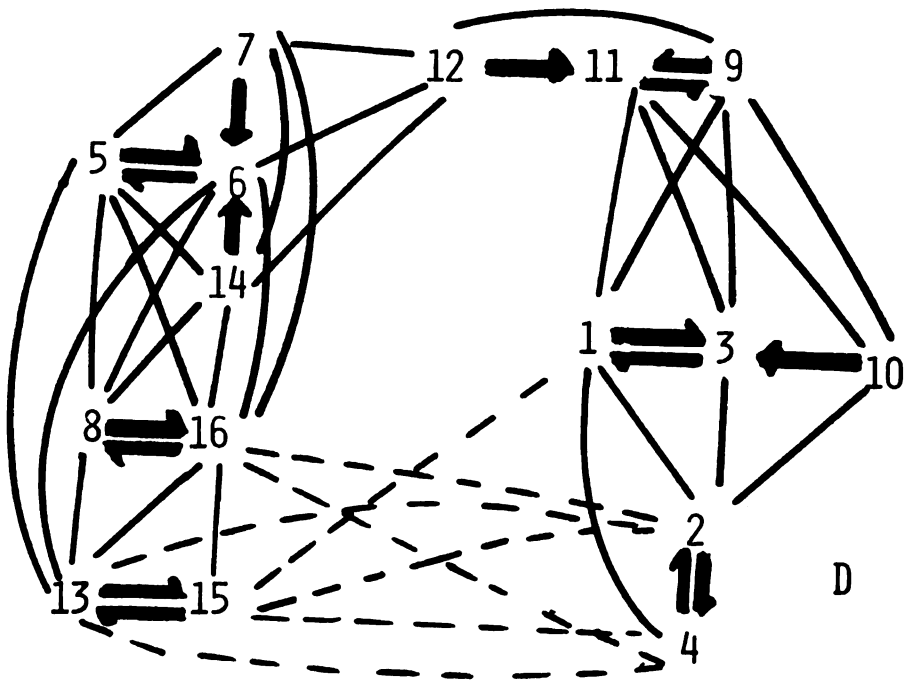
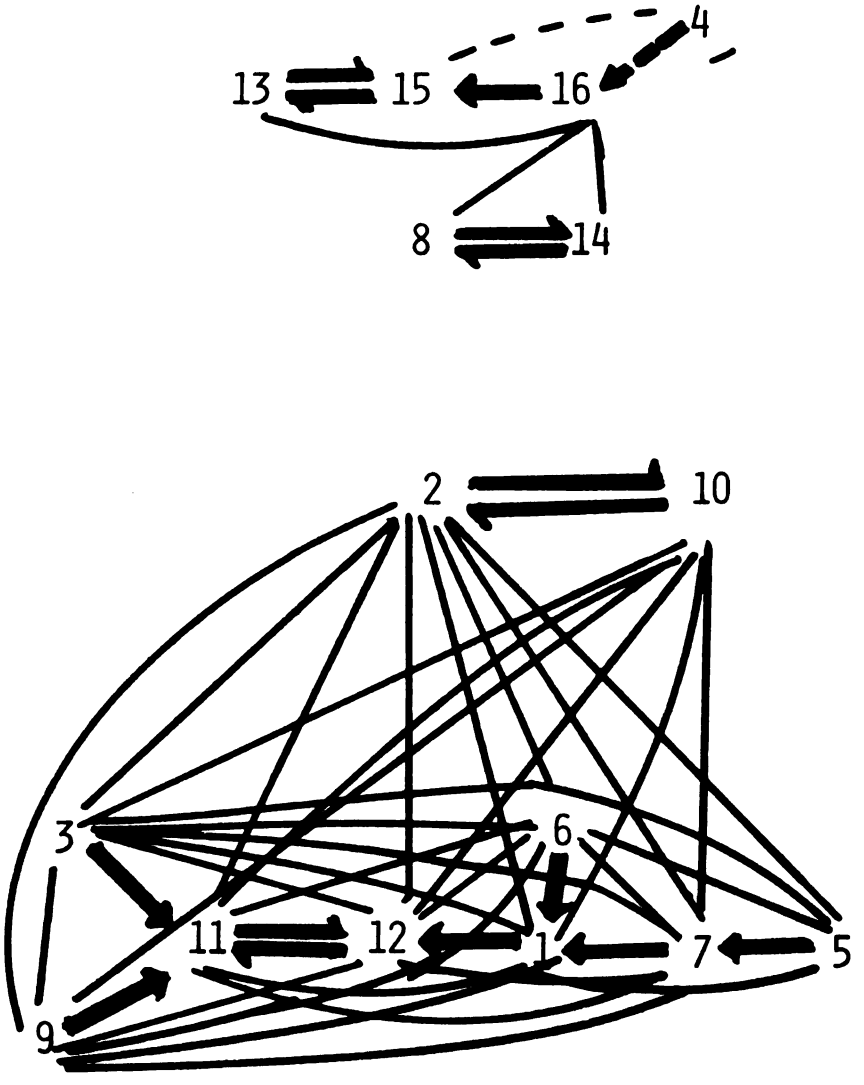


Figure 3.1--continued



E

The typal structure of the adjective pairs in group B was dominated by one major cluster (Cluster IB) that embraced two five-item types mainly consisting of affiliation and activity items. Two goal orientation adjective pairs were strongly related inversely to the two five-item types and defined a negative pole of the major cluster. A small but distinct secondary cluster (Cluster IIB) was composed of mainly dominance adjectives and also had a slight correspondance to the activity portion of the major cluster in group B.

Group C was found to contain a comprehensive major cluster (Cluster IC) of three directly related types with distinctive facets of affiliation and activity in them. A small secondary cluster (Cluster IIC) was made up of two goal orientation adjective pairs and was weakly related negatively with an activity adjective pair in the major cluster.

Group D presented the most complex picture of adjective pair typal structure. Six types were identified that were linked with one another in a circular pattern. The pattern was broken by the researcher to form three clusters used in further analysis. The most central type was made up of four affiliation adjective pairs and was joined with a two-item type containing gentle-harsh and obeys-disobeys adjective pairs. Adjective pair 12 was separated from a three-item activity type and joined with the two types previously noted to form Cluster ID. The two remaining items in the activity cluster and a three-item typed structure containing mostly dominance items joined adjective pair 2 to form Cluster IID. Adjective pair 2 was separated from a two-item type that related strongly to the three-item dominance type. Cluster IIID

contained item 4 at the negative pole and a two-item goal orientation type at the positive pole. These two goal orientation items also corresponded moderately with the affiliation types in Cluster ID.

Group E contained four typal structures that were formed into two completely separate clusters. One major cluster (Cluster IE) contained two types the largest of which was laden with dominance, affiliation, and activity items. The smaller type in Cluster IE was formed by only two items, 2 and 10. The second, smaller cluster (Cluster IIE) was primarily composed of goal orientation items. Item 4 found an inverse pole of Cluster IIE.

The results of the factor and linkage analyses indicated that the groups and subjects interpreted the adjective pairs differently than had been expected, consequently, the most independent clusters of adjective pairs do not correspond in all cases with the expected factor clusters. Goal orientation was most clearly defined by only two adjective pairs, traditional-radical and orthodox-heretical which were inversely related to dominance in groups A and D, inversely related with affiliation and activity in group B, and centered a distinct cluster in groups C and E. The two other items from the a priori goal orientation factor (loyal-disloyal and obeys-disobeys) were clustered with affiliation in the factor analysis, and generally in the linkage analysis, with the exception of group E. The a priori adjective pairs describing the activity cluster were highly intercorrelated through the factor analysis and linkage analysis, however, activity was often bonded with either dominance or affiliation items depending

upon the particular group studied. Activity items were linked with both affiliation and dominance items in three of the five groups. The interrelationships within the a priori dominance and affiliation items were much more complex than expected. The linkage analysis found that the GSD adjective pairs did not cluster into four independent factors in any group. The adjective pairs formed three clusters in two groups and two clusters in three groups. The factor and linkage analyses suggested that the a priori adjective pair clusters were not the most valid combinations for use as an external criteria in the study. The analysis of data initially used the a priori adjective pair clusters. Post hoc analyses were performed using the clusters described by the factor and linkage analyses.

Research Questions

The study is designed to describe the dimensions used in five different groups by group members in formulating similarity judgments of other group members. Each group constitutes a separate replication. The three following research questions outline the aim of the data analysis.

Question 1. How many dimensions best represent group members' similarity judgments of one another in each of the five groups sampled?

Question 2. What are the identities of the dimensions derived from the similarity ratings in each group?

Question 3. Do group leaders and group participants differ in regard to the salience of particular dimensions in making similarity judgments?

Analysis of the Data

Similarity ratings from each group member are used to construct a similarity matrix with $N(N-1)/2$ ratio scale proximity judgments. The similarity matrix provided input for an individual differences multidimensional scaling analysis (INDSCAL) (Carroll and Chang, 1970). The analysis of the data involves three steps: (a) obtaining the INDSCAL output that would best represent the dimensions underlying the similarity ratings, (b) identification of the INDSCAL dimensions, and (c) comparison of leader and participant subject weights on each dimension.

The INDSCAL model postulates a common set of psychological dimensions that Carroll and Chang (1970) state "correspond to fundamental sensory, perceptual, or judgmental processes that vary in salience, or strength of effect on perception, across individuals" (p. 285). INDSCAL assumes a common set of factors underlying the perception of the stimuli. It also assumes the similarity judgments of each subject are linearly related to a weighted Euclidean distance. These assumptions are restrictive but the model allows for verification of the assumptions. INDSCAL outputs two types of configurations.

A Stimulus X Dimensions matrix defined the group stimulus space. The dimensions identify fixed reference axis that correspond to properties of the stimuli. The position of each stimuli as seen by all

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group members is charted on each axis. The number of dimensions that best fit members' ratings is determined by the additional amount of variance accounted for in one, two, three, or more dimensional solutions. The dimensions are ordered in correspondence to the relative variance accounted for. The axis are fixed and no rotation is allowed due to the judges weights, resulting in a direct interpretation of the particular axis derived by the analysis.

A Subject X Dimensions matrix identifies an individual's subject space through subject weights. Each individual's perception of the stimuli is related to the group's perception by the weight matrix. The weights derived from the analysis are "stretching factors" that reveal how much a dimension is stretched or contracted relative to the group configuration to represent that particular subject's judgments. The coordinants of a given subject's point in the subject space correspond to the weights on the various dimension for that subject. The distance from the fixed origin corresponds directly to an approximation of the variance accounted for by that dimension for a particular subject. Carroll and Chang (1970) state that "one subject's being closer to the origin on that line would indicate simply that less of the variance in his data is accounted for by that common configuration (either because his data are noisier or because additional dimensions are needed to fully account for this subject's data)" (p. 297). INDSCAL describes the pattern of a subject's perceptual space that may relate to other relevant attributes. The reader is referred to Carroll and Chang (1970) or Subkoviak (1975) for a more technical treatment of INDSCAL.

The underlying dimensions that best represent subjects' similarity judgments are derived through INDSCAL. The identification of these derived dimensions is the second step of the analysis. Dimensions must be labeled through an external criteria since the similarity ratings asked for judgments based on the "most relevant" attributes perceived by the subjects. The GSD serves as an external criteria in an attempt to label the INDSCAL dimensions. Ratings on the GSD adjective pairs for each stimuli (group member) are obtained by averaging the n-ratings made by each member group. The GSD adjective pair ratings were then summed according to the original factor clusters (see Table 3.3). Spearman rank correlations were computed between the INDSCAL dimensions and the original factor groupings. A post hoc analysis involved computing Spearman correlations between the INDSCAL dimensions and clusters defined through three alternative means of clustering the GSD adjective pairs. These three methods included the four and three cluster factor analysis solutions (see Table 3.3), and the clusters derived through the linkage analysis (see Table 3.4). The results of the analysis and post hoc analysis are reported in Chapter IV.

Through the derivation of a subject weight matrix, INDSCAL allows an analysis of individual differences. The INDSCAL model assumes that individuals differentially weigh the common dimensions underlying their perceptions. The final step of the data analysis is a comparison of leader and participant subject weights. The analysis of subject weights as a function of designated role is restricted by the small sample size; however, the subject weights for group leaders and group participants will be examined for similarities and dissimilarities.

Summary

The design of the study is presented in this chapter. Detailed descriptions of the sample, measures, research questions, and analysis of data are presented. The aim of the study is to describe and identify dimensions assumed to underly group members perceptions of one another.

Data were collected from a sample of five interpersonal process-oriented groups. Three of the groups were part of an undergraduate Psychology class and the remaining two groups were part of an undergraduate Education course. The groups associated with the Psychology course have been labeled groups A, B, and C. Groups D and E are the two groups from the Education course. Measures were administered during the eighth week of the groups' nine-week duration.

Two types of measures were taken. Similarity ratings of all possible pairs of group members presented in a Ross (1934) ordering were completed first. Subjects were then asked to rate each member of their own group, including themselves, on sixteen adjective pairs of a Group Semantic Differential (GSD) instrument. The sixteen adjective pairs were composed of bipolar adjectives expected to describe four factors: dominance, affiliation, activity, and goal orientation. Two *post hoc* analyses were performed on the GSD adjective pairs to check the validity of the proposed factor clusters. The first procedure was a factor analysis across all group members ($N = 41$) that solved for three and four cluster solutions. The factor analysis clusters had different

compositions from the original clusters. The second procedure was an elementary linkage analysis of the adjective pair ratings in each group that found differences between the groups in the formation of adjective pair clusters. The GSD clusters were designed to be an external criteria for labeling dimensions derived from an analysis of the similarity ratings.

An individual differences multidimensional scaling analysis (INDSCAL) (Carroll and Chang, 1970) was used to analyze the similarity ratings made by each group member. INDSCAL derived fixed dimensions underlying the similarities data and charted the coordinates of each stimulus in a group subject space defined by those dimensions. Obtaining the number of dimensions that best represent the similarities data was the first purpose of the study. The identity of the dimensions was the second research question. The derived dimensions are correlated using Spearman's rank correlation with the GSD factor clusters in an attempt to label the INDSCAL dimension. INDSCAL also reports individual differences in the salience of each dimension. Differences between group leaders' and group participants' subject weights are explored and concern the studies final research question. The results of the data collection and analysis described in this chapter are the topic of Chapter IV.

CHAPTER IV

ANALYSIS OF RESULTS

The results of the present study are organized into three areas. The initial concern of the study was the dimensional representation of group members' interpersonal perceptions of one another. The dimensional representation was derived through an individual differences multidimensional scaling analysis (INDSCAL) (Carroll and Chang, 1970). The second area of results to be described involved the identification of the INDSCAL dimensions. Finally, the results of a comparison between leaders and participants' subject weights on the derived dimensions is described.

Dimensional Representation

Question 1. How many dimensions best represent the subjects' similarity judgments in each group?

One, two, and three dimensional INDSCAL solutions to the similarity ratings were compared for each group. The amount of information recovered from the similarity ratings by one, two, and three dimensional INDSCAL solutions was indicated by the average subject correlation coefficients computed between the INDSCAL scores and the original similarity data. These correlations are presented in Table 4.1. The higher

Table 4.1. Average Subject and Mean Square Correlation Coefficients Between Computed INDSCAL Scores and Original Similarity Data

	Group									
	A		B		C		D		E	
	r	r^2	r	r^2	r	r^2	r	r^2	r	r^2
3 dimensions	.92	.84	.80	.64	.82	.67	.79	.63	.80	.64
2 dimensions	.88	.78	.72	.55	.73	.55	.72	.54	.72	.53
1 dimension	.82	.68	.61	.41	.62	.39	.57	.39	.53	.33

the correlation, the better the fit between the dimensional representation of underlying structure and the input data. The correlations increase as the number of dimensions increase. The object is to obtain the best fit in as few dimensions as possible. The mean square correlation coefficient (r^2) provides an estimate of the amount of the variance in similarity ratings that is accounted for and is also presented in Table 4.1.

A three-dimensional solution accounted for less than two-thirds of the total variance in similarity ratings in four of the groups. Similarity judgments involve a number of attributes in these groups. The remaining one-third of the total variance contains a number of dimensions accounting for a diminishing proportion of the variance. The four groups have a common pattern in the graduated amount of variance accounted for by one-, two-, and three-dimensional representations of the data. The amount of total variance accounted for in these four groups averaged 38% for a one-dimensional solution, 54% for a two-

dimensional solution, and 65% for three dimensions. The amount of variation from these averages was very slight across the four groups. The relative contribution of each of the three dimensions to the total variance was more balanced than reported in previous research (Jackson et al., 1957). The second and third dimension account, on the average, for 16% and 11% of the total variance respectively, however the major proportion of the variance remains attributed to the first dimension. The additional information provided by the second and third dimension was large enough to judge the three-dimensional structure as best fitting the data. Consequently the three-dimensional structure was used for further analysis.

Group A was different than the other groups since the overall correspondence of the data in group A with the INDSCAL solution was much better than in the other groups. One dimension in group A accounted for over two-thirds of the total variance in the data. A second dimension increased the proportion of variance 10%, and a third dimension increased the proportion 6%. The members of group A were in much greater accord regarding the dimensions used for similarity judgments than were members of the other groups. The individual subject's judgments were very well represented by the group configuration defined by INDSCAL and suggests that subjects' perceptions were more cohesive than in the other groups. The three dimensional solution of group A was also used in further analysis.

Dimension Labels

Question 2. What are the identities of the three INDSCAL dimensions derived from the similarity ratings in each group?

Four different methods of clustering the sixteen GSD adjective pairs have been described in Chapter III. The various clusters will be referred to throughout this chapter as follows. The a priori four factor clusters are affiliation, dominance, activity, and goal orientation. The four factor-analysis clusters are designated affiliation', dominance', activity', and goal orientation'. The three factor-analysis clusters are referred to as affiliation", dominance/activity, and goal orientation". The linkage analysis clusters are designated by roman numerals I, II, or III followed by a letter indicating the group the cluster is from.

The adjective pair clusters from the four methods of grouping were correlated with the INDSCAL dimension using Spearman's rank correlation coefficient. High negative correlations were as useful as high positive correlations in identifying the INDSCAL dimensions since the polarity of an INDSCAL dimension can be reversed in the results. The correlations between the sixteen adjective pairs and the INDSCAL dimensions are reported in Table 4.2. The GSD adjective pairs and adjective pair clusters were used to identify the INDSCAL dimensions. A discussion of the relationships between the GSD adjective pairs and clusters and the INDSCAL dimensions in each group follows.

Table 4.2. Spearman Rank Correlations Between the INDSCAL Dimensions in Each Group and the Sixteen GSD Subscales

			INDSCAL DIMENSIONS IN GROUPS													
			A			B			C			D			E		
			D1	D2	D3	D1	D2	D3	D1	D2	D3	D1	D2	D3	D1	D2	D3
G	1.	Strong-Weak	.40	.40	-.73	.55	.74	-.07	-.40	-.54	-.77	-.66	.87	.01	.31	-.72	-.04
S	2.	Independent-Dependent	.63	.22	-.61	.19	.60	-.07	-.20	-.71	-.55	-.20	.88	.08	.60	-.40	-.21
D	3.	Leads-Follows	.21	.33	-.38	.83	.64	.05	-.24	-.81	-.57	-.62	.84	.08	.34	-.71	-.05
	4.	Rugged-Delicate	.48	.18	-.67	-.17	.46	-.31	.30	.69	-.22	-.22	.81	-.35	.52	.37	-.34
S	5.	Accepting-Rejecting	-.37	.42	-.16	.80	-.12	.38	-.25	-.72	-.51	-.32	-.43	-.38	.27	-.52	-.20
U	6.	Warm-Cold	-.72	-.29	-.08	.81	0	.51	-.38	-.43	-.54	-.46	-.29	-.07	.02	-.71	.10
B	7.	Friendly-Unfriendly	-.43	.07	-.10	.81	.24	.45	-.41	-.42	-.54	-.88	.18	-.06	.36	-.60	-.07
S	8.	Gentle-Harsh	-.83	-.31	.40	.34	-.48	.13	-.44	-.53	-.37	-.17	-.66	.03	-.64	-.50	-.21
C	9.	Active-Passive	.02	.29	-.21	.92	.50	.50	-.24	-.81	-.57	-.95	.60	.07	.43	-.55	-.05
A	10.	Fast-Slow	-.25	.28	-.23	.73	.76	.13	-.36	-.57	-.79	-.56	.76	.21	.65	-.28	-.12
L	11,	Talkative-Silent	-.02	-.10	.02	.87	.57	.41	-.07	-.63	-.51	-.98	.48	.15	.29	-.71	-.02
E	12.	Involved-Withdrawn	-.57	.17	-.05	.99	.37	.45	-.24	-.81	-.57	-.98	.28	.13	.24	-.67	0
S	13.	Orthodox-Heretical	-.79	.02	.60	-.76	-.61	-.41	-.67	.14	.14	-.13	-.60	-.28	-.67	-.08	.61
	14.	Loyal-Disloyal	-.76	.38	0	.80	.53	0	-.95	-.07	-.33	-.69	-.10	-.02	-.38	-.68	.25
	15.	Traditional-Radical	-.60	-.49	.62	-.38	-.69	-.14	-.55	.48	.17	.15	-.70	.03	-.74	-.16	.46
	16.	Obeys-Disobeys	_.95	.04	.40	-.35	-.67	.01	-.53	-.51	-.22	-.07	-.73	-.20	-.73	-.55	.20

Group A. The correlations of each of the three INDSCAL dimensions in group A with the original, factor analysis, and linkage analysis clusters are reported in Table 4.3. Dimension 1 was the best identified of the three INDSCAL dimensions. The highest correlations of dimension 1 with separate adjective pairs were obeys-disobeys (-.95), and gentle-harsh (-.83). Clusters containing the affiliation adjectives correlated highest with dimension 1. Goal orientation items also had high correlations with dimension 1, particularly in goal orientation and cluster IA. Cluster IA contained two goal orientation items on the negative pole and three dominance items on the positive pole. Dimension 1 was complex containing elements of warm, loyal, and submissive behavior on one pole and cold, rejecting, and domineering behavior on the other pole. Approximately 44% of the total similarity variance was predictable from dimension 1 using the most highly correlated GSD cluster. Dimension 2 was the least well defined of the INDSCAL dimensions in group A. The highest correspondences of dimension 2 with the GSD adjective pairs were traditional-radical (-.49) and accepting-rejecting (.42). The highest correlation with a GSD cluster was -.45 with goal orientation'. The amount of similarity variance accounted for by dimension 2 was about 2% due partially to the poor identification of that dimension by the GSD adjective pairs. Dimension 3 had high correlations with dominance and dominance'. The correlation of the dominance-activity cluster was lower for dimension 3 than with clusters using only dominance adjective pairs. An active person in group A was not necessarily perceived as being domineering. The adjective pairs

Table 4.3. Spearman Rank Correlations Between the 3 INDSCAL Dimensions in Group A and the GSD Adjective Pair Clusters

GSD Clusters	Group A INDSCAL Dimensions		
	D1	D2	D3
Activity	-.26	.10	-.17
Affiliation	-.88	-.19	.02
Dominance	.43	.31	-.67
Goal Orientation	-.88	.07	.50
Activity'	-.23	.07	-.12
Affiliation'	-.88	.10	.10
Dominance'	.40	.43	-.69
Goal Orientation'	-.64	-.45	.60
Affiliation"	-.75	.03	.06
Dominance/Activity	.35	.38	-.52
Goal Orientation"	-.64	-.45	.60
Cluster IA	.76	.36	-.50
Cluster IIA	-.24	.07	-.12
Cluster IIIA	-.81	.14	.00

strong-weak, rugged-delicate, and independent-dependent were highly correlated inversely with dimension 3. Goal orientation' was a secondary cluster that correlated .50 with dimension 3. The positive pole of dimension 3 described submissive, dependent, and slightly conservative behavior while the opposite pole identified dominant, independent, and slightly radical behavior. The amount of total similarity variance predictable by dimension 2 and its GSD correlates was insignificant.

Group B. Dimension 1 was the best identified of the INDSCAL dimensions in group B. Table 4.4 describes the correlations of all the GSD factor clusters with dimension 1. Involved-withdrawn (.99), active-passive (.92), and talkative-silent (.87) were the highest correlated adjective pairs with dimension 1. Activity and activity' both correlated highly while affiliation and affiliation" gave moderately high correlations with dimension 1. The correlation of dominance/activity was lower than activity and activity' alone. Cluster IB correlated very high (.95) with dimension 1. The large complex cluster of activity, affiliation, and goal orientation items identified dimension 1 extremely well. Dimension 1 may be best described as active, friendly, and radical on the positive pole and passive, unfriendly, and conservative on the negative pole. Approximately 37% of the total similarity variance was predictable from dimension 1 and the best identifying GSD cluster. Goal orientation correlated highest (-.81) of all clusters with dimension 2. A high positively correlated secondary cluster was dominance/activity. The adjective pairs that correlated moderately high with dimension 2 were fast-slow (.76), strong-weak (.74), and

Table 4.4. Spearman Rank Correlations Between the 3 INDSCAL Dimensions in Group B and the GSD Adjective Pair Clusters

GSD Clusters	Group B INDSCAL Dimensions		
	D1	D2	D3
Activity	.83	.65	.31
Affiliation	.76	-.12	.38
Dominance	.55	.74	-.07
Goal Orientation	-.24	-.81	.07
Activity'	.84	.61	.25
Affiliation'	.67	-.19	.24
Dominance'	.07	.57	-.24
Goal Orientation'	-.44	-.68	-.19
Affiliation"	.79	-.02	.36
Dominance/Activity	.71	.76	.02
Goal Orientation	-.44	-.68	-.19
Cluster IB	.95	.40	.45
Cluster IIB	.19	.59	-.07

traditional-radical (-.69). Dimension 2 was complex containing elements of radical, dominant, and active behavior at one pole and traditional, submissive, and passive behavior on the other pole. Dimension 2, with the best GSD cluster descriptor, accounted for 9% of the total similarity variance in group B. Dimension 3 did not correlate even moderately with any cluster. The highest correlations between dimensions 3 and adjective pairs were warm-cold (.51), and active-passive (.50). The GSD factors did not provide suitable identification for dimension 3. The total amount of similarity variance recovered by the most highly correlated clusters from the three INDSCAL dimensions summed to 46%.

Group C. Dimension 1 in group C, as reported in Table 4.5, correlated highly with goal orientation. Goal orientation', which was identical with goal orientation" and cluster IIC, correlated much less well than goal orientation with dimension 1. The highest adjective pairs correlated with dimension 1 were loyal-disloyal (-.95), and orthodox-heretical (-.67). Dimension 1 characterized loyal, obedient, and conservative behavior on one pole and disloyal, radical behavior at the opposite pole. The amount of total similarity variance accounted for by dimension 1 with the GSD descriptor was 24%. Dimension 2 was best identified by active-passive, involved-withdrawn, and leads-follows adjective pairs that had equally high correlations (-.81) with that dimension. Activity, activity', and dominance/activity were all the highest correlated clusters of their respective groupings. Dominance and affiliation" were secondary identifying clusters with moderate correlations, however, activity appears to be the primary component.

Table 4.5. Spearman Rank Correlations Between the 3 INDSCAL Dimensions in Group C and the GSD Adjective Pair Clusters

GSD Clusters	Group C INDSCAL Dimensions		
	D1	D2	D3
Activity	-.31	-.74	-.62
Affiliation	-.36	-.48	-.55
Dominance	-.36	-.57	-.79
Goal Orientation	-.78	.00	-.16
Activity'	-.31	-.74	-.62
Affiliation'	-.45	-.45	-.43
Dominance'	-.29	-.07	-.93
Goal Orientation'	-.55	.48	.17
Affiliation"	-.26	-.69	-.48
Dominance/Activity	-.36	-.76	-.62
Goal Orientation	-.55	.48	.17
Cluster IC	-.21	-.62	-.76
Cluster IIC	-.55	.48	.17

Cluster IC correlated moderately (-.62) and composed a global cluster containing fourteen of the sixteen adjective pairs. Dimension 2 may be interpreted as describing primarily active, involved behavior at one pole and passive, withdrawn behavior at the other pole. Elements of friendliness and dominance appear to be moderately linked with activity in dimension 2. Approximately 12% of the total similarity variance was accounted for through dimension 2 and the highest correlated cluster. Dimension 3 correlated highest with the adjective pairs fast-slow (-.79), and strong-weak (-.77). Dominance' correlated very high (-.93) with dimension 3 while dominance had a more moderate correlation (-.79). Cluster IC correlated -.76 with dimension 3 and merged affiliation and activity adjective pairs with dominance adjective pairs. Dimension 3 involves strong, independent, and rugged behavior that was moderately related to activity and friendliness on one pole and weak, dependent behavior with moderate elements of passivity and unfriendly behavior at the opposite pole. Dimension 3, through the dominance' cluster, predicted 10% of the total similarity variance in group C. The amount of total similarity variance recovered from the three INDSCAL dimensions in group C by the GSD clusters summed to 43%.

Group D. Table 4.6 reports the correlations of the INDSCAL dimensions in group D with the GSD adjective pair clusters. The highest correlated adjective pairs with dimension 1 were involved-withdrawn (-.98), talkative-silent (-.98), and active-passive (-.95). The activity cluster was made up of these three adjective pairs with the addition of fast-slow and correlated extremely high (-.98) with dimension 1.

Table 4.6. Spearman Rank Correlations Between the 3 INDSCAL Dimensions in Group D and the GSD Adjective Pair Clusters

GSD Clusters	Group D INDSCAL Dimensions		
	D1	D2	D3
Activity	-.98	.48	.15
Affiliation	-.53	-.22	-.10
Dominance	-.53	.90	-.03
Goal Orientation	-.18	-.59	-.19
Activity'	-.78	.46	.49
Affiliation'	-.39	-.26	.05
Dominance'	-.04	.81	.10
Goal Orientation'	-.04	-.67	-.06
Affiliation"	-.77	.01	.00
Dominance/Activity	-.63	.85	.02
Goal Orientation"	-.04	-.67	-.06
Cluster ID	-.77	.02	.04
Cluster IID	-.64	.85	.02
Cluster IIID	-.17	.87	.05

Cluster ID correlated moderately high with dimension 1 and contained predominantly affiliation adjective pairs. Dimension 1 primarily described active, involved behavior versus passive, withdrawn behavior. Friendly behavior was also linked to the active side of dimension 1. The total amount of similarity variance recovered by the activity cluster was 37%. The adjective pairs that correlated highest with dimension 2 were independent-dependent (.88), strong-weak (.87), leads-follows (.84) and rugged-delicate (.81). These four adjective pairs compose the dominance cluster that correlated .90 with dimension 2. Dominance/ activity and cluster IID were also highly correlated with dimension 2. The adjectives that describe the negative pole of dimension 2 were weak, dependent, traditional, and follows. The positive pole was described by strong, independent, radical, and leads. Leadership behavior in the group corresponded with a divergent goal orientation. Approximately 16% of the similarity variance was recovered from dimension 2 by dominance. The GSD clusters did not provide a good description of dimension 3. Accepting-rejecting (-.38) and rugged-delicate (-.35) were the highest correlated adjective pairs and activity correlated .49 with dimension 3. Minimal information about the identity of dimension 3 was provided. Close to one-half of the total similarity variance was recovered by the GSD clusters from the three INDSCAL dimensions in group D.

Group E. The correlations of the three INDSCAL dimensions in group E with the GSD adjective pair clusters are reported in Table 4.7. The highest correlations of dimension 1 with adjective pairs were

Table 4.7. Spearman Rank Correlations Between the 3 INDSCAL Dimensions in Group E and the GSD Adjective Pair Clusters

GSD Clusters	Group E INDSCAL Dimensions		
	D1	D2	D3
Activity	.31	-.57	-.05
Affiliation	.05	-.73	.01
Dominance	.60	-.40	-.21
Goal Orientation	-.69	-.38	.33
Activity'	.31	-.57	-.05
Affiliation'	-.12	-.90	.05
Dominance'	.60	-.40	-.21
Goal Orientation'	-.76	-.07	.50
Affiliation"	.02	-.88	-.02
Dominance/Activity	-.60	-.40	.21
Goal Orientation"	-.76	-.07	.50
Cluster IE	.36	-.59	-.07
Cluster IIE	-.71	-.48	.26

traditional-radical (-.74), obeys-disobeys (-.73), and orthodox-heretical (-.62). Goal orientation' and cluster IIE were highly correlated with dimension 1. Moderate correlations with the dominance clusters are also reported. Dimension 1 can be described by radical, leadership behavior on the positive pole and conservative, submissive behavior on the negative pole. The total amount of similarity variance recovered was 20%. Dimension 2 correlated moderately with strong-weak (-.72), leads-follows (-.71), warm-cold (-.71), and talkative-silent (-.71) adjective pairs. Affiliation' and affiliation" correlated extremely high with dimension 2. Cluster IE and activity were slightly related to dimension 2. Warm, friendly, loyal behavior was the primary description of behavior on one pole of dimension 2 while cold, unfriendly, disloyal behavior are the primary descriptors of the opposite pole. A small component of activity was also involved in dimension 2. Active behavior combines with friendly acts and passivity with unfriendly behavior in group E. Approximately 16% of the total similarity variance was recovered by the GSD clusters from dimension 2. The third INDSCAL dimension in group E was not well described by the clusters. Goal orientation' corresponded only slightly with dimension 3 and was the most highly correlated cluster. The highest adjective pair correlations were orthodox-heretical (.61) and traditional-radical (.46). The amount of similarity variance recovered by the clusters from dimension 3 was 3%. The sum of the similarity variance recovered in group E through all three dimensions was 39%, the smallest proportion reported by any of the five groups. The GSD adjective pairs did the least well in identifying

the INDSCAL dimensions in group E.

The first INDSCAL dimension in each group accounted for the largest proportion of similarity variance for that group. The adjective pair clusters provided identification for all five of the first dimensions well. The natures of the INDSCAL dimensions were complex. Dimension 1 in group A correlated highly with both affiliation and goal orientation. The results suggest subjects seen as friendly were also perceived as traditional, unfriendly behavior was associated with radicalness. The first dimension in group B was identified as an activity dimension with secondary components matching activity with friendliness and radicalness and passivity with unfriendly, traditional behavior. The alignment of friendly with radical was a reversal of the finding in group A where friendly corresponded with traditional behavior, pointing out the fact that the associations of the adjective pairs with one another changed from group to group. The first dimension in group C was less complicated and was clearly identified by goal orientation, although this correlation was not extremely high. Dimension 1 in group D was a complex dimension. Activity was the primary component of a dimension that also had weaker association with affiliation clusters. Active support may be an appropriate descriptor of dimension 1 in group D. The first INDSCAL dimension in group E described submissive conforming behavior at one pole and assertive nonconforming behavior at the opposite pole. The most important group dimensions of perception vary from group to group.

The shifting associations of the adjective pairs across the groups indicated that adjective pair clusters expected to be valid for all groups, such as the a priori and factor analysis clusters, could not maintain validity. Consequently the linkage analysis was expected to be a more accurate means of identifying the INDSCAL dimensions since the clusters formed were unique to the particular group. The linkage analysis clusters, however, failed to yield higher correlations with the INDSCAL dimensions in all cases, often one of the original or factor analysis clusters gave a better description of a dimension. The small sample sizes underlying the derivation of the correlation matrix for each group may have been a factor in the inconsistency of the linkage analysis. Consequently, a shotgun approach of interpretation was employed as a means of gathering as much information as possible from various adjective pair clusters and their correlations with the INDSCAL dimensions.

Subject Weights

Question 3. How do the group leaders' and group participants' subject weights on the INDSCAL dimensions compare?

Group members' subject weights on each of the three INDSCAL dimensions are given as part of the INDSCAL analysis. As noted previously, the larger the subject weight, the more variance is accounted for by that dimension in the data for that subject. Conversely, low subject weights are indicated by closeness to the origin and that relatively little variance is accounted for by that dimension in the data

for that subject. Table 4.8 presents a comparison of the range and average of group leaders' and participants' subject weights on the INDSCAL dimensions in each group.

The small sample of leaders precluded any significance testing of differences. The data were presented to describe general tendencies in the data. There are five instances in which leaders' average subject weights are at least .17 above the average subject weights of the participants. Three of these cases involve activity as the primary factor. Dimension 1 in group B recorded the largest of the differences in the importance of activity, while dimension 2 in group C and dimension 1 in group D show more moderate differences in the same direction. Leaders' average subject weights were greater than the participants' average subject weights in every case where activity was the primary component of the dimension. The average subject weights of participants were greater than the average subject weights of leaders in each case that dominance was the primary component of the dimension, including dimension 3 in group A, dimension 3 in group C, and dimension 2 in group D. Dominance issues appear of more concern in participants' perceptions than in leaders' perceptions. The directions of the leaders' and the participants' average subject weight differences do not show any constant tendencies on other dimensions. Activity and dominance appear to be of differential value in leaders' and participants' similarity ratings.

Table 4.8. Average and Range of Leader and Participant Subject Weights of INDSCAL Dimensions in Each Group

Groups	INDSCAL Dimensions	Subject Weights: Leaders $\bar{X}$	Leaders: Range	Participants $\bar{X}$	Participants: Range
A	D1	.94	.91 to .97	.77	.69 to .94
	D2	.18	.07 to .28	.33	.15 to .48
	D3	.04	.03 to .04	.22	.01 to .62
B	D1	.80	.71 to .86	.40	.27 to .55
	D2	.18	.17 to .19	.43	.11 to .68
	D3	.15	.07 to .30	.20	.06 to .72
C	D1	.51	.50 to .51	.46	.14 to .78
	D2	.58	.45 to .70	.33	.07 to .64
	D3	.13	.09 to .17	.37	.17 to .78
D	D1	.68	.68 *	.50	.08 to .85
	D2	.30	.30	.43	.19 to .76
	D3	27	.27	.27	-.04 to .52
E	D1	.38	.38 *	.55	.19 to .80
	D2	.12	.12	.36	.04 to .72
	D3	.76	.76	.26	.10 to .44

*Only 1 leader in groups D and E.

Summary

Chapter IV contains the results of an examination of the nature of group member's perceptions of one another. The results describe (a) a dimensional representation of the perceptions, (b) identities of the dimensions, and (c) differences between group leaders and participants in regard to their subject weights on the dimensions. Results are reported for each of the five groups.

Three-, two-, and one-dimensional INDSCAL solutions were obtained, as well as the average subject correlation coefficients between computed INDSCAL scores and the original similarity data. An estimate of the amount of variance accounted for in the similarity data was provided by the mean square of the correlation coefficient. The range of variance accounted for in the five groups by three dimensions was 63 to 84 percent. The mean square correlations in the three dimensional representations ranged 0.06 to 0.12 above the mean square correlations with two-dimensional solutions. Further analysis was performed on the three-dimensional representations for identification.

The INDSCAL dimensions were identified through their relationship with the GSD adjective-pair clusters. Four of the fifteen INDSCAL dimensions across the five groups could not be identified. The remaining eleven dimensions were found to be much more complex than had been anticipated. The identifications of the dimensions varied from group to group. Secondary adjective pairs and clusters shifted association with primary clusters across the groups leaving most dimensions

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identified by a complex blend of the GSD adjective pairs. The total amount of similarity variance recovered through the GSD clusters from the three INDSCAL dimensions in each group was typically in the neighborhood of 50%.

A comparison of the group leader's and participant's subject weights on the derived INDSCAL dimensions completed the analysis of results. Participants weighed dominance more heavily than leaders in each group in which it was a primary factor. Leaders placed more importance on activity than participants in each group in which it was a primary factor.

A summary and conclusions of the study are presented in Chapter V.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

Subject's interpersonal perceptions in process-oriented groups are the topic of this study. Three major areas are involved in the field of interpersonal perception including theories of perceptual processes, personality theory, and theories of group behavior. A discussion of the theories of Kelly (1955) and Osgood et al. (1957) described concepts of perceptual processes. Theories of interpersonal behavior that were reviewed included the work of Leary (1957) and Bales (1950,1970). A five stage model of group development derived from Tuckman (1965) and Cohen and Smith (1976) revealed information regarding situational factors in a small group. An integrative focus of these three theoretical areas was employed to approach the field of interpersonal perception.

The a priori selection of attribute variables by researchers has been a weakness of previous methodology in the study of interpersonal perception. Multidimensional scaling techniques have provided methods to analyze the attributes relevant to the subject. Data are not biased by the researchers decisions. Studies using multidimensional scaling of interpersonal perceptions in groups were reviewed and complex judgments were found to be structured parsimoniously along a relatively

small number of dimensions. The identification of these dimensions was hindered by the lack of comprehensive and reliable external criteria. Few studies examining interpersonal perceptions in small groups have been reported. The aim of the current study was to broaden the knowledge of interpersonal perception in small groups.

Data were collected from five interpersonal process-oriented groups that were affiliated with Psychology and Education courses at Michigan State University during Winter term, 1977. Four groups had eight members and one group had nine members. The two groups from Education had single leaders, while the three Psychology groups had co-leaders. The structure and purpose of the groups are described in Chapter III. Measures were administered during the eighth week of the groups nine-week duration.

Two types of measures were taken on seven-point Likert scales (see Appendix A). Subjects first completed similarity ratings of all possible pairs of group members in their group. Subjects then rated each member of their own group, including themselves on sixteen adjective pairs of a Group Semantic Differential (GSD) instrument. The sixteen adjective pairs were composed of bipolar adjectives intended to describe four factors: dominance, affiliation, activity, and goal orientation. A factor analysis of the GSD ratings was performed post hoc to check the validity of the proposed factor clusters. The factor analysis yielded a four factor solution that modified three of the expected factor clusters. Elementary linkage analysis was also performed post hoc on the adjective-pair correlation matrix of each group. Each group

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contained a distinct pattern of adjective-pair linkages that reported the adjective pairs that correlated .71 or above. The GSD was designed to be an external criteria for labeling dimensions derived from a multidimensional scaling analysis of the similarity ratings.

An individual differences multidimensional scaling analysis (INDSCAL) (Carroll and Chang, 1970) was used to analyze the similarity ratings made by each group member. One-, two-, and three-dimensional representations of the similarity data were attained through INDSCAL. Three dimensions accounted for between 63% and 84% of the variance in similarity ratings in the five groups. A three-dimensional solution correlated substantially higher than a two-dimensional solution with the original similarity ratings. Subjects' similarity judgments in the groups were well accounted for by a relatively small number of dimensions.

Spearman rank correlations were computed between the INDSCAL dimensions and the GSD adjective pair clusters in each group. The correlations revealed that the dimensions used by group members varied from group to group. Adjective pair associations with one another also changed from group to group. The adjective pair clusters most highly correlated with the fifteen INDSCAL dimensions may have been from any of the four methods of clustering. The amount of total similarity variance that was recovered by the GSD adjective pair clusters from the three INDSCAL dimensions in each group was usually near 50%.

INDSCAL also provides a Subject X Dimensions matrix that identified each subject's perceptual space through subject weights.

The subject weights reveal how much a dimension is stretched or contracted relative to the group configuration. The subject weight corresponds directly to an approximation of the amount of variance accounted for by the dimensions for that particular subject. The subject weights of leaders and participants of groups were compared. These results varied from group to group. Generally, leaders weighted activity heavier than did participants, and participants weighed dominance heavier than did leaders.

Conclusions

The findings of the study describe the complexity, identity, and relative importance of the attribute dimensions that best represent group members' interpersonal perceptions of one another. A variety of conclusions follow from these findings. The conclusions are given below.

1) Members of a group come to share a common perceptual field in their interpersonal perceptions of one another. The INDSCAL model assumes a common set of dimensions underlying the perceptions of group members. The importance of these dimensions vary from person to person. The average proportion of total similarity variance accounted for by the three INDSCAL dimensions across the five groups was 66%. This finding indicated that a large proportion of the variance in similarity ratings can be described by a common group configuration.

2) Group members perceived one another as multidimensional stimuli. Group members based their similarity ratings on more than one dimension.

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One dimension accounted for a range of 33 to 41% of the variance in similarity ratings in four of the five groups studied. The findings indicate that one dimension does not provide a good explanation of subjects' similarity ratings. Group A was an exception to the general pattern. One dimension accounted for 68% of the variance in similarity ratings in group A. The cause of this deviation cannot be specified by the current study.

3) Three dimensions recover a substantially greater amount of information from the similarity ratings than does a two-dimensional representation. A third dimension accounts for an additional 6% to 12% of variance above a two-dimensional INDSCAL solution to the similarity ratings. Group members seem to employ three or more dimensions when making similarity judgments. The third dimension was least important to members of group A in which the third dimension recovered the least amount of additional variance (6%) in similarity ratings.

4) The dimensions group members' use in making similarity judgments of one another are specific to the group to which members belong. Adjective pair clusters labeled activity, affiliation, dominance and goal orientation corresponded with the dimensions found to be underlying group members' similarity perceptions in most cases; however, none of the four labels were identified as primary components of dimensions in all five of the groups studied. The dimensions of interpersonal perception vary from group to group. Apparently group-specific factors affect the selection and valuation of the dimensions of perception used by the group members.

5) Activity, goal orientation, dominance, and affiliation were not precise labels for all of the dimensions of interpersonal perception in interpersonal process groups. Four of the INDSCAL dimensions in the five groups were not well described by the most highly correlated GSD cluster. The four dimensions correlated below $\pm$ .51 with all of the GSD adjective pair clusters and revealed scarcely any information regarding the total variance in the similarity ratings. The adjective pairs employed were not broad enough to describe the entire range of dimensions underlying group members' perceptions.

6) Process group leaders and participants differ in regard to the importance of the particular dimensions underlying their judgments of one another. Dominance was more important to participants in making similarity judgments than to leaders. Activity, on the other hand, was more important in leaders' perceptions than participants. Leaders and participants value the common dimensions of their perceptual field differently.

7) The designated roles of leader and participant of a process group do not predispose the selection of dimensions underlying similarity judgments. These dimensions vary from group to group. For example, affiliation was the primary description of the most heavily weighted factor in group A, and group leaders weighted affiliation much higher than participants; however, affiliation was a factor in only one other group studied. The dimensions leaders use in making similarity ratings are specific to the particular group.

8) There were no distinct differences between the sample of psychology groups (A, B, and C) and the sample of education groups (D and E) in regard to the results of the study.

Limitation of the Study

The selection of the sample, measures, and means of analysis have impact upon the generalizability and validity of the study. The sample was entirely composed of college students. Consequently, the dimensions of perception described by the analysis may not be considered representative of other groups. The groups selected are viewed as representatives of a broad range of interpersonal process-oriented groups. The generality of these groups, however, is affected by the particular course structure they are embedded in as well as the class of group leaders. The time of data collection also restricts the generality of the findings. Data were collected during the eighth week of the groups nine-week duration. Inferences from the results of the study can be made only about process groups in their final stages. The findings of the study are to be considered within the context of this sample of group members in groups with a certain type of structure and common experience.

A number of restrictions arise from the use of the INDSCAL model in the study. The most general limitation involves the assumption that subjects' similarity ratings are linearly related to a weighted Euclidian distance. The assumption equates psychological distance (perceived similarity) with Euclidian distance in which linear

relationships are established. The vectors correspond to dimensions in the attribute space. The model cannot account for points that are not linearly related. The INDSCAL model is also restricted in the assumption of a common set of factors underlying a subject's perceptions of the stimuli. Subjects who base their judgments on dimensions other than the common group dimensions will not be well represented.

Perhaps the weakest aspects of the study involve the GSD adjective-pair clusters used to identify the INDSCAL dimensions. The post hoc analysis indicated that the construct validity of the original adjective-pair clusters to be lacking. The factor analysis of the total sample of adjective-pair correlations and the elementary linkage analysis of each groups' adjective-pair correlations altered the adjective-pair clusters. The resulting clusters often contained a different number of adjective-pairs in their composition, consequently affecting the comparative reliability of each cluster. The sample of the GSD bipolar adjectives set strict boundaries upon the development of the most exact adjectives for describing the particular factors. A final limitation of the GSD factors was that the exclusion of measures on factors other than goal orientation, activity, affiliation, and dominance put a limit on the identification process of the computed dimension. An INDSCAL dimension could not be identified unless it corresponded with one of these four factors.

Lastly, the study was also restricted in the analysis of leader and participant differences in the salience of the dimensions of perception. Descriptive tendencies are reported. No formal statistical

analysis of significance testing could be used due to the small sample of leaders in each group. The possibility exists that the reported differences between leaders and participants subject weights are due to chance.

Discussion of Findings

The theory of personal constructs (Kelly, 1955) emphasizes the creative capacity of man to cognitively represent the environment. Kelly (1955) defines a "construct" as "a way in which some things are construed as being alike and yet different from others" (p. 105). Constructs are, in Kelly's terms, the means through which a person represents their environment. The dimensions identified in the current study are derived from similarity judgments and can be considered "constructs" in the terms of Kelly (1955). These dimensions are the means group members use to represent the social structure of the group. The findings of the study support the "commonality" corollary, which states simply that people may have similar constructs and psychological processes. Common perceptual representations of group members' interpersonal relationships were found by the study. The shared experience of the group setting appear to foster the development of common constructs. Kelly (1955) postulates a process of "constructive alternativism" to describe the development of a construct. Constructive alternativism postulates that "a person's processes are psychologically channelized by the ways in which he anticipates events" (p. 46). The postulate of constructive alternativism, when adapted to the common group dimensions, indicates

that these constructs are useful to the group members in anticipating events in the group. Shared group constructs are developed and maintained by their predictive effectiveness, thus providing a utility and meaning to the shared representations. The processes affecting personal constructs described by Kelly (1955) should also affect shared group constructs.

The revision and replacement of group constructs does not appear to be a very dynamic process. Lewis et al. (1975) found a process of growing solidarity in group members representations of the group structure. The amount of variance accounted for in similarity ratings became larger over the course of the group. The authors suggest either the additional experience with one another or the developing concensus about the task of the group are pertinent to this finding. An alternative explanation may be attained by focusing on predictive efficiency, as does Kelly (1955). The shared group constructs may become more important in group members working representations as they become more effective in predicting events in the group. Since group members may base their actions upon the group constructs, the constructs may be self validating. Group members may behave in a manner that validates their perception of what the group expects from them. To summarize, the findings of the current study identify a relevant group space of common constructs in each of the five groups studied. Questions regarding the development and maintenance of these perceptual representations are raised.

Osgood's (1957) conceptualization of perceptual space describes three factors presumed to be embedded in the cognitive components of

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semantic ability. Evaluation, potency, and activity are the three dimensions that are assumed to apply to all cognitive elements with potency and activity merging when assessing social behavior. The findings of this study do not support the model proposed by Osgood (1957). The dimensions relevant to group members perceptions of one another are not, in all cases, described by evaluation and potency/activity. Although these factors do correspond with some of the dimensions found in this study, difficulty develops due to the restrictive nature of Osgood's (1957) model. The dimensions of perception were not constant across groups. A domain-specific model, described by Thompson (1976), is more readily employed in interpreting these results than Osgood's (1957) model. The domain-specific dimensional model does not assume that a single set of dimensions will apply to all domains. The domain-specific model suggests that sets of characteristics may categorize certain cognitive elements. Each category may be composed of differing sets of attribute dimensions. The domain-specific model is more flexible than Osgood's model and provides a means of interpreting the distinctly different dimensional representations across the five groups.

The results of the current research support the findings of previous studies in regard to the number of dimensions that best represent group members similarity ratings. Jones and Young (1972) and Lewis et al. (1975) both reported three-dimensional representations of subjects' similarity ratings. Jackson et al. (1957) reported four dimensions, however, the fourth dimension was unidentified and accounted for residual variance only. The similarity ratings in the present study were

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adequately represented by three dimensions. Group members' perceptions are typically too complex to be comprehensively accounted for by one or two dimensions. Three dimensions provide a meaningful representation of subjects' interpersonal perceptions of similarity.

The theories of interpersonal behavior provided guidelines for the selection of the GSD factors measured in the study. The study was not designed to evaluate the validity of these theoretical constructs; however, the results of the present research do provide some interesting implications in the field of interpersonal behavior. Bales (1950,1970) described a three-dimensional categorization of interpersonal behavior. These factors were likeability, control, and task orientation. The three factors were labeled by Bales through extensive empirical research on small task-oriented groups. Likeability corresponds with affiliation, control with dominance, and task orientation with goal orientation in the current study. Bales' (1950,1970) dimensions provided a suitable external criteria for identifying the dimensions relevant to group members' perceptions. Goal orientation was a frequently used dimension. Lewis et al. (1975) found the scale traditional-radical to be most descriptive of the dimensions of interpersonal perception in a study of a T-group. Jones and Young (1972) identified a dimension of political persuasion in the groups they studied to be relevant to members similarity ratings. The findings of this study replicate the identification of a values dimension in interpersonal perception reported by Lewis et al. (1975) and Jones and Young (1972). The evidence lends added weight to the contention of Bales that the relation of values and attitudes to the

representation of interpersonal behavior is significant. The dimensional representations of group members' similarity ratings were more complicated than a two-dimensional model can describe. Theories relying on two-dimensional representations, such as, Leary 1957 (dominance and affiliation), do not appear comprehensive enough to provide an adequate representation of the many ways that group members perceive one another or the complexity of these perceptions.

A broader range of relevant dimensions than were expected by the study are used in interpersonal perception. The limits of the theoretical constructs of interpersonal behavior in describing the dimensions relevant to group members perceptions are pointed out by two findings of the present study. The diversity of the dimensions identified across the five groups was the first of these findings. The second was the failure of the GSD adjective pairs to correspond well (above $\pm$ .50) with four of the fifteen dimensions in the five groups. The group-specific nature of subjects' interpersonal perceptions appear to defy the broad categorizations used to develop theoretical constructs of interpersonal behavior.

The current study contributes little information to the area of group development since data were collected only one time in the group. The time of data collection was chosen to aid the task of identifying dimensions. A time toward the end of the group was assumed to provide a better fit between subject ratings and INDSCAL dimensions. A common set of dimensions was identified as relevant to group members similarity ratings as assessed during the eighth week of the group.

The data reporting differences between leaders and participants in regard to the salience of dimensions of perception must be treated cautiously since no significance testing of these differences was performed. Jones and Young (1972) have previously described differences in the importance of dimensions as related to role differences in an academic department. Lewis et al. (1975) reported differences between a T-group leader and participants in subject weights on INDSCAL dimensions; the leader tended to value a traditional-radical dimension heavier than did participants. The findings of the present study report that goal orientation was not always more important to group participants than leaders. The higher value put on activity by leaders and upon dominance by participants in this research may be reflective of the competency needs of the leaders and status needs of the participants. Leaders may become more sensitive to participants' needs by becoming cognizant of the different orientations leaders and participants have about the most and least salient dimensions of their perceptions.

The final point of discussion regards the method of analysis. Similarity ratings are a simple technique for deriving a dimensional representation of a domain and provides two major methodological advantages. First, the experimenter does not make a priori selections of variables that bias the construction of a perceptual space. Secondly, indirect access is provided into subjects who may be either unwilling or unable to clearly verbalize the dimensions that represent their perceptions. Similarity ratings, through INDSCAL, provide a description

of the dimensions relevant to subjects' perceptions of other group members. A potential weakness of the method lies in an assumption that similarity and dissimilarity perceptions correspond when it is possible that they may not correspond.

Implications for Future Research

Further research on process-oriented groups is needed. The less defined the group roles are, the more difficult it becomes to identify the relevant dimensions of perception. An expanded number of groups would allow more comparison. Patterns in the dimensional representations used by groups may emerge with a larger sample that cannot be indicated from a smaller sample size. More data on the structure and process of the groups are needed to answer questions regarding what types of groups choose particular dimensions of perception. The characteristics of groups using particular dimensions are central to an attempt to determine why particular dimensions are chosen. For example, group A in the present study stood out from other groups studied due to the salience of a single dimension. The group attributes corresponding with this particular pattern of dimensional representation may have been examined by a more comprehensive monitoring of the group behavior.

The development of the dimensions of interpersonal perception are another area of concern. Future research designs should collect data at regular intervals during the group life instead of just at one time. Changes in the use and importance of various dimensions over time can

yield information relevant to interpersonal behavior in the group. A comprehensive study must monitor the relation of changes in group process with changes in interpersonal perception. A critical incidents method can be used to assess group development and such data may be related to the dimensions of perception being used by a group at a particular point in time. Through these means, many of the assumptions about group members' perceptions in process-oriented groups during different developmental stages may be tested.

The importance of individuals who are seen as similar or dissimilar in the group's perceptual field can be related to a variety of sociometric choices. Measurements of variables such as amount of self-disclosure, selection of friends, selection of working partners, and amount of interaction may be predicted by the similarity or dissimilarity of group members on dimensions in the common group space. Jones and Young (1972) reported accurate predictions from the group perceptual field computed by INDSCAL on the selection of committee members and on people socialized with. The additional power derived from using dimensions relevant to the group members appears to have predictive efficiency.

A larger sample of groups will also allow an assessment of the effects of leadership styles upon the dimensions group members use to represent one another. The effects of directive versus nondirective leadership styles upon the dimensions of interpersonal perception chosen by the group would be of interest as an assessment of the influence of leadership style in groups.

The GSD used in the present study needs further validation and reliability studies. A broader range of adjective pairs should be examined to establish reliable subscales for the various factors that are being scaled. An elaboration of this measure will provide a more precise external criteria for use in describing the INDSCAL dimensions. An equal number of subscales should be used to evaluate each factor cluster. The range of dimensions of perception used in process-oriented groups has not been identified. The GSD should be supplemented with other measures assessing attributes of the stimulus persons in order to attain a good identification of the INDSCAL dimensions derived from group members similarity ratings.

The Likert scales used on the GSD should be modified in future research that performs rank correlations. Many subjects restricted their use of the Likert scale to three or four intervals in spite of directions asking them to "use the entire scale." A procedure requesting that subjects rank order all stimuli on each bipolar adjective scale would be one means of assuring full variability in the ratings. The precision of the GSD instrument would subsequently be increased.

The group stimulus space derived from INDSCAL has descriptive and predictive value. The most striking finding of the present study was that subjects in different groups use different dimensions in making similarity ratings. Further research regarding to what these group differences are related is needed. The group stimulus space may also be used to predict outcome and group process variables. The fact that

the dimensions are relevant to the group members perceptions may increase the power of this procedure in providing an effective predictor of group behavior and outcomes.

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APPENDIX A

APPENDIX A

Instructions: We are interested in the views that you have concerning the members of this group. Please rate the similarity of the group members according to what you feel are the most relevant attributes of the individuals by checking the number that best represents your feeling about each of the following pairs of group members.

	VERY DISSIMILAR						VERY SIMILAR
1 & 2 *	1	2	3	4	5	6	7
9 & 3	1	2	3	4	5	6	7
8 & 4	1	2	3	4	5	6	7
7 & 5	1	2	3	4	5	6	7
6 & 1	1	2	3	4	5	6	7
3 & 2	1	2	3	4	5	6	7
4 & 9	1	2	3	4	5	6	7
5 & 8	1	2	3	4	5	6	7
6 & 7	1	2	3	4	5	6	7
1 & 3	1	2	3	4	5	6	7
2 & 4	1	2	3	4	5	6	7
9 & 5	1	2	3	4	5	6	7
8 & 6	1	2	3	4	5	6	7
7 & 1	1	2	3	4	5	6	7
4 & 3	1	2	3	4	5	6	7

* Subject pairs

	VERY DISSIMILAR						VERY SIMILAR
5 & 2	1	2	3	4	5	6	7
6 & 9	1	2	3	4	5	6	7
7 & 8	1	2	3	4	5	6	7
1 & 4	1	2	3	4	5	6	7
3 & 5	1	2	3	4	5	6	7
2 & 6	1	2	3	4	5	6	7
9 & 7	1	2	3	4	5	6	7
8 & 1	1	2	3	4	5	6	7
5 & 4	1	2	3	4	5	6	7
6 & 3	1	2	3	4	5	6	7
7 & 2	1	2	3	4	5	6	7
8 & 9	1	2	3	4	5	6	7
1 & 5	1	2	3	4	5	6	7
4 & 6	1	2	3	4	5	6	7
3 & 7	1	2	3	4	5	6	7
2 & 8	1	2	3	4	5	6	7
9 & 1	1	2	3	4	5	6	7
[illegible]	1	2	3	4	5	6	7
[illegible]	1	2	3	4	5	6	7
[illegible]	1	2	3	4	5	6	7
[illegible]	1	2	3	4	5	6	7

Describe each group member, including yourself, on the following scales. Be as discriminating as possible between individuals by making use of the entire scale.

	STRONG						WEAK
1*	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

* name of group member

	PASSIVE						ACTIVE
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	ACCEPTING						REJECTING
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	FOLLOWS						LEADS
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	LOYAL						DISLOYAL
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	GENTLE						HARSH
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	DISOBEYS						OBEYS
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	FAST						SLOW
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	TRADITIONAL						RADICAL
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	INDEPENDENT						DEPENDENT
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	COLD						WARM
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	DELICATE						RUGGED
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	TALKATIVE						SILENT
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	HERETICAL						ORTHODOX
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	UNFRIENDLY						FRIENDLY
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

	INVOLVED						WITHDRAWN
1	1	2	3	4	5	6	7
2	1	2	3	4	5	6	7
3	1	2	3	4	5	6	7
4	1	2	3	4	5	6	7
5	1	2	3	4	5	6	7
6	1	2	3	4	5	6	7
7	1	2	3	4	5	6	7
8	1	2	3	4	5	6	7
9	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7