

A STUDY OF THE INTERRELATIONSHIP
BETWEEN THE SOCIAL STRUCTURE AND
THE COGNITIVE BELIEF SYSTEM OR
"CULTURE" OF A SOCIAL UNIT

Thesis for the Degree of M. A.
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ABSTRACT

A STUDY OF THE INTERRELATIONSHIP BETWEEN THE SOCIAL STRUCTURE AND THE COGNITIVE BELIEF SYSTEM OR "CULTURE" OF A SOCIAL UNIT

By

Margaret Brophy

This study investigates the interrelationship between the social structure and the cognitive belief system or "culture" of a social unit. While many theorists have discussed this relationship, this thesis has been based largely on the work of Emile Durkheim who specifies that the cognitive belief system of any social unit varies with "the nature and number of channels of communication." Durkheim further stipulates that in order to accurately describe social and cognitive structure we must consider the "aggregate in its totality." In other words, we are not concerned with individuals per se, but rather, the relationships that exist among the members or elements of the social unit and how the aggregate social structure is related to the cultural system.

The main assumption of this thesis is that the patterned similarities of people as perceived by the cultural aggregate will correspond to the social structure of that system. In other words, there will be a general correspondence between the pattern of similarities perceived

among members of a social unit and their position in the communication network. From this general reasoning three hypotheses were derived.

The first two hypotheses represent a dyadic test of conditions under which networks of interaction vary with the similarity/dissimilarity judgments or "culture" of the system: 1) with frequency of communication; and, 2) the distance or number of links between any pair of individuals. Hypothesis 3 deals with the frequency of interaction of an individual with the group as a whole.

The sample consisted of all faculty and funded graduate students in the Department of Communication at Michigan State University. Respondents were provided with the names of all their colleagues in the department and requested to estimate their frequency of communication with each individual during the previous academic term. An eight point rating scale was provided. Additionally, respondents were given 15-16 unique pairs of faculty members and requested to make similarity/dissimilarity judgments by means of direct paired comparisons. Respondents based their estimates of dissimilarity as a ratio of a standard distance provided by the investigator. And finally, questionnaire items were used to measure unidimensional attributes as reliability and validity checks of the measurement instruments. Data were transformed into indices, and zero order correlations and multiple regression procedures were used to analyze the data.

The statistical tests of Hypotheses 1 and 2 fail to indicate any significant relationship between communication frequency, distance or links separating the members of the social unit, and perceived distance in the aggregate (cultural) belief system. Although each of these indicators of "distance apart" or "discrepancy of position" in the communication network may well be a reliable and valid indicator of some aspect of overall "distance," there seems reason to suspect, due to low correlations, that these characteristics are not of sufficient scope to accurately describe the totality of the relationship.

The results of the statistical tests of Hypothesis 3 clearly indicate a high degree of correspondence between the integrativeness of an individual in the communication network and the perceived similarity of that individual from all other members of the social unit. Additionally, based on the Multiple Correlations of Network Integration and the Galileo Coordinate values, we can conclude that the degree to which an individual is integrated into the communication network is clearly an attribute which people recognize when comparing individuals. Given this pattern of findings, and the reliability and validity checks of the measurement instruments, we can not reject the theory based on this analysis.

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By

Margaret Brophy

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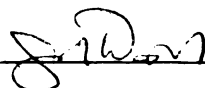
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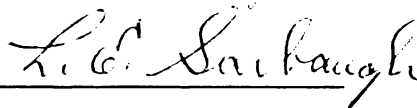
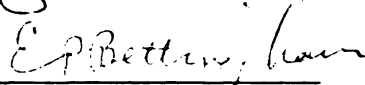


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CHAPTER I

I. GENERAL THEORY

All social units, whether they be dyads, groups, formal organizations, etc., consist of relationships which have become interwoven into ongoing patterns of observable regularities. These regularities are manifested in two ways: (1) as a social structure whose elements are organized with roles and activities interrelated; and, (2) as a culture or collective cognitive belief system that is associated with patterns or social structure within the process of social organization. Any theory of social organization must invariably incorporate the two, and any accurate description of such must be concerned with their relationship.

A. SOCIAL STRUCTURE

Social structure emerges as interactions and relationships evidenced by predictable regularities or arrangements. Social structure thus consists of patterned recurrent social interactions that maintain their uniformity with some degree of stability over time. This concern is evident, for example, in the following definition of social systems proposed by Parsons and Shils (1951:107):

The most general and fundamental property of a system is the interdependence of parts and variables. Interdependence consists in

the existence of determinant relationships among the parts or variables as contrasted with randomness or variability. In other words, interdependence is order in the relationship among the components of the system

This same notion is also evident in Mead's (Miller, 1973:

43) definition of a system as a:

. . . set of entities or concepts so related and connected as to form a unity or a whole . . . and such that there is a sustaining relationship between the entities so related

B. CULTURE

Shared cultural ideas in turn emerge from social structure, as the participants communicate with each other about their activities and create common ideas of how social life should and can be organized. Cultural ideas largely reflect and express their underlying patterns of social structure. Although discrepancies often exist between ideas and practices, these differences cannot become too great without imposing severe strains and conflicts on both the social structure and its accompanying culture. As a consequence of the emergence of cultural ideas from collective social life, patterns of social order gain unity, stability through time, and functional effectiveness in achieving goals.

In addition, each group has a sub-culture of its own, a selected and modified version of some parts of the larger culture. The significance of these sub-cultures lies not so much in what they add to the larger culture as in the fact that without its own culture no group would be more than an assemblage of persons. The common meanings, the definitions of the situation, the norms of

belief and behavior - all these go to make up the culture of the group. Durkheim (The Division of Labor 1947:14) a half-century ago described this phenomenon and its significance:

. . . when a certain number of individuals in the midst of a political society are found to have ideas, interests, sentiments, and occupations not shared by the rest of the population, it is inevitable that they will be attracted toward each other under the influence of these likenesses. They will seek each other out, enter into relations, associate, and thus, little by little, a restricted group, having its special characteristics, will be formed in the midst of the general society. But once the group is formed, a moral life appears naturally carrying the mark of the peculiar conditions in which it was developed . . .

Culture, then, is a term applicable not only to the larger society but to its sub-groups as well, and is, indeed, a fundamental feature of the interaction of human beings.

C. INTERDEPENDENCE OF CULTURE AND SOCIAL STRUCTURE:

The culture of the organization will always influence and shape, as well as reflect, its underlying patterns of social order. Nevertheless, culture and social order will inevitably interpenetrate each other, so that both aspects become fused into an overall process of social organization. Theoretically this notion is not new to the social scientist, (Durkheim 1963, 1938; Mead 1938, 1934, 1973; Parsons 1951) for example, Parsons (1951:5) states that:

a social system consists in a plurality of individual actors interacting with each other in a situation . . . whose relation to their situation, including each other, is defined and mediated in terms of a system of culturally structured and shared symbols. . . . Each is

indispensable to the other in the sense that without culture there would be no social system and so on around the roster of logical possibilities

Mead (Miller 1973:45) also supports this notion of mutual causality when he states that:

. . . Men confer meanings on their environments, which in turn makes their behavior different from what it would have been without them. Through meanings the environment adapts to men and men adapt to the environment

The process of social organization necessarily involves at least two interacting persons, but it is not a characteristic of either of them as individual personalities. It arises, rather, through their interaction and communication, as a social order emerges from recurrent social relationships, and as the participants create a shared body of cultural ideas. This is precisely what Durkheim (1963:19) posits when he describes society as collective representations:

. . . No doubt each individual contains a part, but the whole is found in no one. In order to understand it as it is one must take the aggregate in its totality into consideration Society does not depend upon the nature of the individual personality. In the fusion from which it results all the individual characteristics, by definition divergent, have neutralized each other

Mead (Miller 1973:34) concurs when he states:

. . . to share perspectives is to share attitudes, and the attitudes of the community, in their widest meaning, are summarized in terms of the categories with reference to which the experiences of members of the community are interpreted These common attitudes are not built up out of individual attitudes . . .

individual perspectives emerge from within the common perspective, and all are in nature, none in the individual

A phenomenon which exhibits properties that are distinctly its own must have an existence of its own. For example, the substance water cannot accurately be described in terms of its parts, but rather the combination of two parts hydrogen with one part oxygen becomes a unique substance of its own with its own characteristics. This is analogous to describing social units, in that the properties of groups or aggregates may be studied as phenomena in their own right and must be empirically explained as an objective social reality.

This thesis will investigate, therefore, the interrelationship between culture and social structure. In general, it begins with the assumption that (1) cultural beliefs form an organized system or pattern which must be considered as an aggregate entity rather than a simple collection of individual representations; and (2) that social structure as well must be considered as a systematic whole entity; and finally (3) that the relationship between culture and social structure must therefore be studied as the relationship between two organized entities.

II. SPECIAL THEORY

Specifically, this thesis will be concerned with the interrelationship between the culture and the social structure of the Department of Communication at Michigan State University. Any attempt to test empirically the theory presented previously must begin by isolating those aspects of social structure and culture which: (1) display observable regularities which are intrinsic to that organization under study; and, (2) are so culturally specific as to be identifiable.

A. SOCIAL STRUCTURE

Social structure shall be described in terms of the patterns (networks) of communication behavior among the members (elements) of the department. Such networks describe how information passes through a system. Structure is not determined by looking at the sum of the communication of an individual, but rather, how individuals fit into the system, that is, how they are related to other elements in the system. Theoretical support for describing structure in these terms is provided by Durkheim (Simpson, 1963:17-19) when he states:

. . . Society has for its substratum the mass of associated individuals. The system which they form by uniting together, and which varies according to their geographical disposition and the nature and number of their channels of communication, is the base from which social life is raised. The representations which form the network of

social life arise from the relations between the individuals thus combined or the secondary groups that are between the individuals and the total society
 The resultant surpasses the individual as the whole, the part . . . (emphasis added).

B. CULTURE

The impact of culture and society on cognition has long been a point of convergence for many diverse fields of science; e.g., psychology, sociology, anthropology, etc. It is generally believed that shared cultural ideas emerge as individuals communicate with each other and establish norms of belief and behavior and common meanings (definitions) of situations that arise. But an assertion of this degree of generality is not very useful and needs to be translated into terms which allow the formulation of questions of an empirical nature. In this thesis culture will be described in terms of person-perception, or rather, how the members define or perceive the other members in the department. Although this procedure does not encompass the totality of the phenomena "culture," it can be considered a crucial aspect which influences and is influenced by interaction.

In all social units (society, formal organizations, dyads, groups, etc.) interactions lead to the formation of common definitions of those objects with which the social unit deals. Just as we create structure in the inanimate world by categorizing stimuli into objects and their attributes, so we create order in the world of people by

categorizing them and their behavior. It is true that people, as visual stimuli or objects in and of themselves, require the same psychological processes as any other class of physical objects. But, at the same time, this process is far more complex in that we attribute more emotional significance to this class of stimuli. As Tajfel (1964, p. 323 states: "The social world may be less predictable than the physical, but what predictability there is in the social world is achieved by the same processes that are involved in the perception of the physical world."

Whether we are making judgments based on actual behavior, or inferential leaps of logic, we attribute to other people psychological traits such as, intentions, purposes, attitudes, motives etc. Additionally, when viewing interactions we perceive psychological qualities which we use to describe relationships between people--friendship, love, hate, power, etc. Tagiuri (Handbook of Social Psychology, 1969:396) further adds that:

. . . We attribute to a person properties of consciousness and self-determination, and the capacity for representation of his environment, which in turn mediates his/her actions. Granted the perceiver may, through his/her own presence and behavior in the phenomenal world of the other, cause changes in the way in which the person whose state he/she is trying to judge presents himself/herself. This of course is much different from the way in which a rock is a source of cues for a perceiver

One other unique characteristic of person perception is worth noting. Because the perceiver and the perceived

object (a person) are similar, the perceiver can rely on past experiences in inferring or judging intentions. In practice this accelerates the perception process and allows the perceiver to make judgments with greater confidence.

In this thesis, the Communication Department is the social unit to be analyzed, using the Network as a measure of interaction, and the department members as the perceptual objects with which the social unit deals. It should be the case that persons who interact in the communication department will form common definitions of those persons, and other objects, insofar as they interact about them. Also, people who interact frequently will form similar ideas and be perceived as similar by other members in the department.

C. INTERDEPENDENCE OF CULTURE AND SOCIAL STRUCTURE

Because when individuals communicate they share information and experiences, it should be the case that the culture (collective representation) will correspond with the networks of communication behavior. Durkheim (Simpson 1963:17) supports this contention when he states that " . . . systems (collective representations) . . . vary according to . . . the nature and number of channels of communication" In other words, an accurate description of any social unit must look at the interdependence between the social structure and the cultural structure. It should also be restated that we can talk about structure only in terms of the psychological and behavioral interrelationships

within the aggregate.

Major Premise - This means that persons are not the key variable understudy, but rather, locations in a common network; i.e., persons or groups in the same or equivalent locations in a communication network will develop equivalent conceptions of the collective representation.

Minor Premise - Persons who are equivalent (i.e., hold equivalent conceptions of the collective representation) will be seen as similar by others (insofar as those others have contact with them).

Following from this, there will be a general correspondence between the pattern of similarities perceived among members of an organization and their position in the communication network; i.e., persons close to each other in a communication network will be seen as similar to each other, and persons far apart in the communication network will be perceived as dissimilar. In other words, the patterned similarities of people as perceived by the cultural aggregate will correspond to the pattern of intercommunication found in the network.

III. PREVIOUS RESEARCH

As stated earlier, the purpose of this thesis is to investigate the interrelationship between the culture (or cognitive belief system) and the social structure of a social organization. In order to be amenable to empirical test a

theory of this degree of generality must be transposed. Following the work of Durkheim (Simpson 1963:17-19) social structure will be described in terms of networks or "channels of communication." Because Durkheim (The Division of Labor 1947:14) contends that groups display unique sub-cultures of their own (which are modified versions of the larger culture) the literature review shall deal with the group level of analysis.

Due to the encompassing nature of the term culture, the more specific relationship of person perception shall be the focus of research and the subject matter of the literature review. It should be noted that we are dealing with the process by which individuals perceive others in slightly different terms than the literature in this field generally focuses. In other words, we are not concerned with person perception as a phenomenon in and of itself, but rather, its interrelationship with the social structure that evolves along with it.

A. NETWORKS

To say that the parts of a system are mutually dependent is to say that the behavior of each element is predictable in some degree from the behavior of the others, and that the degree of structure in a situation could be measured if the interdependence among the variables could be quantified. Despite the widespread concern with the structure of social behavior, there has not emerged a standardized measurement

instrument.

This notion of interdependence among parts of a system has received particular attention in the study of small groups. In a review of definitions of "group" Cartwright and Zander (1968:48) suggest that the most crucial determiner of group composition is "the collection of individuals who have relations to one another that make them interdependent to some significant degree." However, studies dealing with small group behavior have differed in their selection of the type of interdependence which is examined.

In recent years we have seen an upsurge of studies focusing upon interdependence in terms of communication networks. (See Glanzer and Glaser 1959, 1961; Collins and Raven 1969 for an extensive review of the literature.) As defined by Farace and Monge (1973:2) "Communication networks arise whenever recurring patterns of interaction occur; these networks make it possible for different types of information to move throughout the system with varying rates of transmission, levels of distortion and degree of impact." The significance of such networks can not be underestimated, for such a system coordinates activities, allows for a method of checks and balances, and often is the ingredient which determines the success or demise of a group.

There has been much criticism of small group research in that the results found in carefully restricted experimental settings may not be applicable to on-going groups found in

non-artificial settings (Guetzkow 1965). For example, the variable group size has been shown to effect: (1) the number of direct (one step) communication links between members (Rome and Rome 1961; Weick 1969); (2) Requirement of a leader (Weick 1969); (3) Frequency and duration of communication on an individual basis (Weick 1969); (4) composition of the group e.g. as group size increases from three to twelve members it is more likely that members may need to reform into smaller groups.

One of the major factors which restricts the utility of small group research in constructing valid, empirically rigorous theory, is the pragmatic question of time. Do groups which work together over a long period of time display different behavior patterns than groups assembled randomly for a specific task requiring a limited involvement of time? Both Lorge et al. (1958) and Burgess (1969) found behavior differences which were directly related to the length of time groups existed. The types of networks (e.g. circle, wheel etc.) which differentiated effective communication patterns on a short term-basis disappeared by the 500th trial.

Scientists in the field of organizational communication have found contradictory results when replicating small group studies in organizational settings (Cohen, Robinson and Edwards 1969). One reason for this discrepancy could be that artificial groups generally engage in less complex and less meaningful tasks than groups in actual organizations.

When we move away from the small group research and deal directly with organizational studies, many new problems arise which hamper theory construction. For example, rather than look at the total organization as a process in which groups interact to accomplish set goals, studies have focused on isolated events employing zero-order correlations (e.g. rate of communication initiated correlated with rank; upward, lateral, downward communication correlated with rank). As Danowski (1974:14) points out, from the research in this field we have formulated "a large number of unintegrated and perhaps unintegratable two-variable propositions."

First attempts to study organizations in terms of an on-going process generally relied upon the formal organizational chart for defining interaction patterns and group formation. Thompson (1956); Berlo et al. (1972) and Danowski (1974) found that informal communication patterns (which do not always follow the formal organizational chart) were more accurate in describing how organizations process information and coordinate activities.

In order to advance the study of group processes in formal organizations many sociometric techniques have been developed. (See Farace et al. 1973, for an extensive review of these techniques and their limitations.) Two major problems have hindered the utility of these techniques: (1) due to the excessive computer memory required, organizations under study must be limited in size; and (2) it is difficult

to isolate effectively sub-groups in large organizations.

Richards (1971), Richards, Farace and Danowski (1973) have developed a computerized program that exceeds any previous techniques by minimizing computer cost and clearly defining what constitutes group formation: (Richards 1974a:21).

1. There must be at least three members
2. Each member must have at least 50% of his/her communication with other members of the same group
3. There must be some path, lying entirely within the group, from each member to each other member
4. There must be no single node (or small set of nodes) which, when removed from the group, causes the rest of the group to fail to meet any of the above criteria
5. There must be no single communication link (or subset of links) which, if cut, causes * the group to fail to meet the above criteria.

What makes the NEGOPY program such a useful tool in developing sound theory, is that once a system is accurately described the structural properties that emerge may be related to other non-structural variables. The researcher may also transcend the minimal level of analysis, the individual, up to the system as a whole.

* For a discussion of "Centrality and Leadership see Johnson (1975); Farace, Richards, Monge and Jacobsen (1971); Shaw (1971); Schreiman (1975).

B. PERSON PERCEPTION

Person perception refers to the "process by which one comes to know and to think about other persons, their characteristics, qualities, and inner states" (Tagiuri 1969:395). The research in this field of inquiry can be categorized into the following content areas: (1) the accuracy of our perceptions of the emotions and personality characteristics of others; and, (2) how information about another is processed. The latter is more closely related to the focus of the present research and thus will be briefly summarized. Extensive reviews of the former may be found in *The Handbook of Social Psychology*, 1969 (Tagiuri) and *Person Perception* by Hastorf et al., 1970.

While the question of how an individual comes to "know" anything at all has been pondered by the great thinkers of all time, the field of person-perception did not develop until the later part of the Nineteenth Century. As physical objects a person displays primarily the same characteristics and require the same mental processes as any other physical stimuli. But person perception is also a unique phenomenon in that we additionally perceive or infer psychological properties for that person. I shall first briefly describe those characteristics of perception that pertain to all classes of stimuli, and later deal with some working conceptualizations about person perception.

One's experience of the world is dominated by objects which stand out in space and which have attributes of size, color, depth, weight, shape, etc. Although we are frequently unconscious of our interpretation and inferential leaps of logic about such objects, we do participate in the ordering or creation of our experiences. In fact, a causal analysis of the process of perception indicates that our perceptions are both structured and organized (Leeper 1935), resulting from the organism's active processing of information (Hastorf 1970).

One of the most predominant aspects of a person's participation in the structuring of his/her empirical world is the process by which objects are placed into categories (Hastorf et al., 1970). These categories are the accumulation of one's past experiences and present purposes, and are restricted to some extent by the language codes and cultural background of the individual (Dornbusch et al., 1965; Passini and Norman 1966). Experience plays a vital role in our process of perception because we rely upon that which is familiar to us, and because our past gives us a sense of orderliness or sequence.

Heider (1944; 1958) describes the process by which we develop organized perceptions of others in the following way. First we perceive others as causal agents, that is, capable of controlling or manipulating their behavior to achieve an intended effect. We then make value judgments about the

intentions of an individual based on their behavior. Second, because we perceive others as being similar to ourselves, we look for a parallel situation in our life in order to judge the behavior of another. Finally, when we have coded a person's behavior the same way a number of times, we then tend to assume that a person displays stable personality characteristics. Such a process increases the predictability of our interpersonal world so that knowing some things about a person permits us to deduce other characteristics. Without this process, all events would be perceived as unique with no apparent causal relationship.

There is a considerable body of literature dealing with the issue of how we form first impressions of another person based on minimal information. Asch (1946), Anderson (1968), and Byrne (1961; 1969) found that most people, given some trait information about another person, generally go on to make inferences about a great variety of other traits not included in the data given, and that within sets of traits, certain ones seem to be more "central" to the set than others. Asch (1968) and Anderson (1968) presented subjects with a hypothetical person, along with a set of personality trait adjectives describing that person, and asked the respondents to rate the person on a scale of likeableness. Byrne (1961; 1969) varied this approach by presenting subjects with a hypothetical person, and the person's attitudes on various issues. Two different models are posited to interpret the variation in attractiveness.

Anderson (1962;1965) developed the weighted-average model which "assumes that the subject begins with a neutral impression, which is averaged upward by positive stimuli, and downward by negative stimuli. The greater the number of consistently positive or negative stimuli, the larger the average would be" (Hastorf et al., 1970:55). Byrne and Nelson (1965) suggest that attraction is a linear function of the proportion of positive "reinforcement" a view receives.

The similarity between these two theories have often been noted (e.g. Anderson 1967; Byrne, Lambreth, Palmer and London 1969, p. 70; Griffit, Byrne and Bond 1971; Kaplan, 1972; Posavac and Pasko, 1971). The two models differ in their theoretical base, particularly in the conceptualization of the stimuli. Byrne uses reinforcement theory and treats the stimuli as reinforcers. Anderson uses information integration theory and treats the stimuli as informers.

Bruner and Tagiuri (1954) attempted to explain individual differences in person perception with their Implicit Theory of Personality. They suggested that we all have assumptions about the nature of other persons and that these assumptions affect the way we perceive and understand others. Cronbach (1955) had judges rate various stimulus persons and then performed a zero order correlation comparing the traits indicated. He found that judges were indicating different underlying dimensions and thus reflecting their own

assumptions rather than objective reality. Similar results were found by Norman (1963), Passini and Norman (1966), and Hakel (1969) whether the perceiver knew the stimulus person or not. Kelley (1955) argues that we are actually revealing personality characteristics of the perceiver when we analyze how they judge others. Walters and Jackson (1966, Messick and Kogan (1966), Shapiro and Taguiri (1959) and Wiggins et al. (1969) contend that individual differences support the Implicit Personality Theory by showing a stronger relationship to the perceivers' personality than to the stimulus individual.

Many investigators have been interested in how perceivers interpret inconsistent information in order to arrive at an impression about another individual. Kaplan (1972) found that when stimulus inconsistency exists (e.g. using the adjectives loyal, humorous, unkind, and vulgar to describe a person) individuals will differ in the importance assigned to various stimulus depending upon the predisposition of the subject toward the person being described. Positive or negative disposition subjects rated likableness or persons described by highly likable and dislikable traits under conditions either favoring or discouraging, discounting the inconsistent stimuli. Gallob (1973) found that the greater the degree of change in the overall impression of another that is needed for a perceiver to view as consistent some new information, the lower the probability that the perceiver

will believe this new information.

Hastorf et al., (1970) summarized the ways subjects handle inconsistent information in the following way:

- (1) Relational Tendency, in which either the inconsistent information is changed in meaning or new traits are inferred to relate the inconsistencies (Asch, 1946; Luchins, 1957)
- (2) Discounting Tendency, in which part of the stimulus information is either ignored or reduced in importance (Dailey, 1952; Anderson and Jacobsen, 1965; Anderson and Herbert, 1963; Stewart, 1965; Luchin, 1958; Rosenkrantz and Crockett, 1965; Zazonc, 1960; Cohen, 1961; Leventhal, 1962)
- (3) Linear Combination, in which the impression is some additive combination of the properties of the stimuli (Osgood et al., 1957; Warr and Knapper, 1968; Frijda, 1969; Triandis and Fishbein, 1963; Anderson, 1968; Saltiel and Woelfel, 1975).

Attribution Theory, developed by Heider (1944, 1958) focused on "how we infer dispositional properties of another person from our observation of his/her behavior in social situations" (Hastorf et al., 1970:61). Informational salience (Kanouse, 1972) and perceivers focus of attention (Jones and Nisbett, 1972; Duval and Wickland (1972) are two conditions hypothesized to relate to the process of forming causal attribution. If a perceiver is faced with a number of alternative explanations for an event, he/she will generally adopt the one which is most salient.

Duval and Wickland (1972) have specified that the different conclusions a person reaches will depend on whether his/her attention is directed outward to the environment or inward to oneself as a stimulus. Jones and Nisbett (1972) proposed that a person performing a behavior and an observer looking at the behavior will interpret it in different terms. Specifically, they suggested that an actor usually attributes his/her own behavior to situational factors, whereas an observer attributes the behavior to qualities or dispositions of the actor. Jones and Nisbett further suggested that this difference in the interpretation of behavior stems from a basic difference in perceptual orientation. The participant's attention is focused on the situation in which he/she is behaving and does not see the performance or action. The observer's attention, on the other hand, is directed to the actor's behavior, which is figural and dynamic against a situational ground. When asked to explain the reasons for the behavior, each will utilize the information that is salient to him/her while the behavior was being performed.

Slightly divergent from the general research in person perception, is the body of literature dealing with the social perception of one's relative standing in the group in which one holds membership. Here the focus is not on how we develop perceptions of others, but rather, how we develop perceptions of ourselves.

Cartwright (1951) and Zander (1958) provide evidence that the fundamental part of the individual's perceptual base is to be found in his/her assessment of the perceptions of his/her group. Before an individual acts, one first imagines oneself carrying out the act, then imagines the response of another person to the action. If the imagined response is favorable, one will proceed with the overt act, but if the imagined response is unfavorable, one will modify one's intended action before actually carrying it out (Cooley, 1902; Cottrell, 1942; Mead, 1950; Blumer, 1953; Turner, 1956). In either event, the actual behavior of the other person serves as a check on one's perceptions. The perceptions of the "self" and "other person" are then modified to correspond to the new evidence presented by the actual behavior (Sullivan, 1938).

Another group of scientists concerned themselves with the influence of the group on individual judgment (e.g. Asch, 1946; Sherif, 1953; Kelley, 1950; Schachter, 1951). Morris (1956) found that the self concept of men living in a dormitory in four-man living units was influenced by others' perceptions of them over a period of months spent living together. Similar results were found by Miyamoto and Dornbush (1956) in comparing self-perception on four personality traits with actual feelings of others in the group, with their perceptions of others' attitudes, and with their perception of the attitudes of the members of most groups.

There is also considerable evidence to support the contention that the group's perception of an individual will have more influence on his/her self-perception when one is highly attracted to the group and when the other group members place a high value on that member's participation (Festinger, 1954; Stotland, 1959). Under these conditions the individual will pay more attention to the opinions of the group, and the group members in turn will be more explicit in their evaluation of the individual.

Undoubtedly, the most prominent assertion in group research is that people like and interact with those who are most similar to them (e.g., Festinger, 1954; Homans, 1961; Riecken and Homans 1954; Lott and Lott, 1960; Newcomb, 1956). Quite often though we are not dealing with necessarily true similarities but perceived similarities. Tagiuri (1958) found that if one subject likes another, he/she tends to think that liking is returned, and if a subject likes two other subjects, he/she will perceive them as liking each other (Kogan and Tagiuri, 1958).

Up to this point, research in person perception has generally dealt with the single attribute of one's "liking" of another. There are two major weaknesses in this approach. First, two people may be equally liked but for quite different reasons, one because he/she is friendly, for example, and the other because he/she is responsible. If one

assumes evaluations to be a unidimensional continuum and attends to only the level of the manifest response, then these evaluations would be considered equivalent, when in fact they are not. Second, the use of the single attribute "liking" does not encompass all of the criteria used to judge the similarity/dissimilarity of another individual or groups of individuals. For example, I may decide to work with another individual because he/she is dependable, articulate and efficient, whereas, socially I may prefer someone diverse and congenial. We must go beyond unidimensional scaling techniques in order to discern the multidimensional structure of our perceptual discriminations.

A system which enables us to describe the multidimensional structure of our person perceptions has recently been developed. It says: The process of relating objects of thought to each other is the process of definition. The definition of any concept may be taken to be that term's relationship to all other concepts which are used to differentiate that referent as a unique object (Fillenbaum and Rapoport, 1971). "Fundamentally this involves taking note of similarities and differences between objects, or identifying the attributes of an object with similar attributes of different objects, and differentiating the attributes of the object from those attributes of the objects which are different." Woelfel (1972:5; Chapter 4), Woelfel (1972:11; Chapter 4) states that:

Dissimilarities among objects (whatever those objects may be) may be represented by a continuous numbering system such that two objects considered to be completely identical are assigned a paired dissimilarity score or distance score of zero (0), and objects of increasing dissimilarity are represented by numbers of increasing value. Assuming that the definition of an object or concept is constituted by the pattern of its relationship to other objects, the definition of any object or concept is constituted by the pattern of its relationship to other objects, the definition of any object may be represented by a $1 \times n$ vector, $d_{11}, d_{12}, d_{13}, \dots, d_{1n}$, where d_{11} represents the distance or dissimilarity of object 1 from itself (thus $d_{11} = 0$ by definition), d_{12} represents the distance or dissimilarity between objects 1 and 2, and d_{1n} represents the distance between the 1st and the nth objects. Similarly, the second object may be represented by a second vector, $d_{21}, d_{22}, d_{23}, \dots, d_{2n}$, and the definition of any set of concepts or objects may therefore be represented in terms of the matrix

$$\begin{array}{cccc} d_{11}, & d_{12}, & \dots & d_{1n} \\ d_{21}, & d_{22}, & \dots & d_{2n} \\ d_{n1}, & d_{n2}, & \dots & d_{nn} \end{array}$$

where any entry d_{ij} represents the dissimilarity or distance between i and j.

The distance matrix D describes the static structure of the interrelationships among a set of N objects (persons) at any one point in time for a single individual.

This view can be generalized to aggregate or collective meaning quite simply. The collective consciousness, that aggregate psychological configuration which constitutes the culture, or a sub-culture, may be represented accurately as

the average matrix $\bar{D}$, where any entry $\bar{d}_{ij}$ is the arithmetic mean conception of the distances or dissimilarities between object i and j as seen by all members of the culture.

While the matrix is an accurate representation of a set of cultural definitions, it may be cumbersome due to its size, especially when the number of objects or persons is large. The matrix is of order N , where N equals the number of concepts. Matrix $\bar{D}$ describes an implicit vector space V_k , where k (the dimensionality of the space) $\leq n-1$. K equals the number of independent dimensions which are needed to reproduce the pattern underlying $\bar{D}$. The value k is easily found by factor analysis of the scalar product (s) of D and its transpose, i.e., $D \bar{D} = S$.

V_k is a spatial coordinate system defined by the distance relation among the cognitive objects which are its contents. It has the property that objects defined as similar by any culture will be located close to each other in the space, or more precisely, that the distance between any pair of objects in the space is directly proportional to their perceived dissimilarity. The precise definition of any object, therefore, is given by its location in V_k .

Matrix $\bar{D}$ may thus be collapsed to vector space V_k . This has the advantage of reducing the data to usable proportions and revealing the uniquely shared underlying cultural dimensions. This space V_k , therefore, may be seen to provide a reference coordinate system within which

patterns of individual or cultured information may be represented with considerable accuracy.

In terms of person perception, this technique which is known as the Galileo Configuration, has two distinct advantages. First, it allows us to describe not only individual perceptions or similarity/dissimilarity judgments of one other individual but groups of individuals. Second, we can represent the structure of perception shared by the aggregate. Future references to the aggregate (cultural) belief system will always refer to the results of these operational measures unless otherwise noted.

Gillham (1972) and Gillham and Woelfel (1974) in a similar study in which respondents were asked to rate pairs of faculty members on the attributes of political position and style of professional research found reliable and valid results using the Galileo procedure. Several of the procedures they suggest for assessing the validity of the configuration will be used in this research, and will be discussed later.

FORMULATION OF HYPOTHESES

In conclusion, we now have the methodological and theoretical tools to accurately describe: (1) the organized networks of systematic interaction, or rather, how information passes through a system (NEGOPY Program); and, (2) the organized structure of our person perceptions, or rather, the "culture" of a system (Galileo Configuration). The advances

in both of these fields now allows us to progress at levels beyond the minimal unit of analysis and describe the patterns of observable regularities within a system. What is needed now is an analysis of the relationship between communication behavior and the "culture" of a system.

In general, the theoretical hypothesis this thesis is designed to test is that persons "close" to each other in terms of social structural location will be perceived as similar to each other by others in the system. We are now in position to make this hypothesis specific in terms of the operational measures available to us. Given the measure of "closeness" among people in social structure made available by the NEGOPY program and the measures of culturally perceived dissimilarities among people made available by the Galileo instruments, three specific hypotheses may be stated:

- H₁: The greater the frequency of interaction between individuals or groups of individuals, the smaller the perceived distance between those individuals in the aggregate (cultural) belief system.

Additionally, individuals who have direct communication links with each other should develop similar information, and should be perceived as similar by the aggregate.

- H₂: The greater the number of links necessary to connect any pair of individuals in the communication network, the greater the perceived distance between those individuals in the aggregate (cultural) belief system.

Both of these hypotheses are correlaries of the main hypothesis of the thesis, i.e., those who are "close" to each other in the social structure will be perceived as similar by those around them. They differ from each other in that "closeness" in social structure is measured in two alternative ways: first, by frequency of communication, and second, by number of links between members of the department.

It also follows from the theory presented above, that perceived similarity will vary with interaction, but because respondents are indicating only a small proportion of their total lifetime interaction, findings should be in the direction anticipated but not necessarily large.

As noted above, after determining the patterns of interactions the structural properties that emerge are also of theoretical significance. Of particular interest in this case is the degree to which shared channels of communication contribute to perceptual similarities. It should be the case that the more integrated an individual is in the network (the degree to which individual links exist between a particular person and his/her set of contactees) the greater the perceived similarity to other members of the system.

H₃: The more integrated an individual is in the communication network, the smaller the total perceived distance of that individual from all other persons in the aggregate (cultural) belief system.

This is really another variation of the first two hypotheses, but differs slightly. The first two hypotheses

relate pairwise similarities to pairwise interactions. This hypothesis, however, deals with the relationship between any individual and the rest of the group as a whole. Thus the more an individual interacts with the group as an entity, the more similar he/she should become to the group.

CHAPTER II

PROCEDURES AND METHODS

This section will attempt to develop conceptual and operational definitions for the five key variables presented in the previous hypotheses: (1) frequency of communication; (2) distance or links between pairs of individuals; (3) network integration; (4) culturally perceived distance between pairs of members of the network; and, (5) total culturally perceived difference of any individual in the network from all other persons in the network.

The sample consisted of all faculty and funded graduate students in the Department of Communication at Michigan State University yielding an N of sixty-seven (67). Sixty-one questionnaires were returned by approximately 91% of the sample. This sample was itself a subset of a larger study of the College of Communication Arts and Sciences at Michigan State University. Whenever consequences of this subsampling procedure effect the procedure used they will be discussed in that context.

Frequency of communication was determined by the "Personal Communication Contact" questionnaire (see Appendix 1

A), in which the names of the faculty and funded graduate students in the Department of Communication were provided (along with the names of the faculty and funded graduate students in the College but not in the Department. Only those responses by and regarding members of the Department were included in the analysis). Respondents were requested to estimate their frequency of communication with each individual concerning teaching and research. The following ordinal frequency levels were provided:

Once or twice a <u>term</u>	coded as	(1)
Several times a <u>term</u>	coded as	(2)
Once or twice a <u>month</u>	coded as	(3)
Several times a <u>month</u>	coded as	(4)
Once or twice a <u>week</u>	coded as	(5)
Several times a <u>week</u>	coded as	(6)
Once or twice a <u>day</u>	coded as	(7)
Several times a <u>day</u>	coded as	(8)

Responses for the content areas of research and teaching were collapsed into a single content category for each respondent.

These data were input into the "NEGOPY" network analysis program as described by Richards, Farace, and Danowski (1973). This is a computerized procedure for determining the communication groups in a social system, and the nodes (persons) who link the groups together. Groups are identified according to a standard set criteria as specified in the previous chapter. Various other structural variables are also determined based on the results of group

formation and communication frequency.

For this analysis, two additional network properties are of interest: (1) the distance matrix or link analysis; and, (2) the network integration scores. Both variables shall be briefly defined.

The distance matrix represents the number of links necessary to connect any pair of individuals in the group. In this n by n matrix (n is the number of members for each group) the element in row i , column j gives the number of steps needed to get from individual i to individual j in the group. If there is some finite number in each element of the matrix, the group will be connected. This means that there will be some path from each individual in the group to every other individual in the group. The longest any path could ever be is $n-1$ steps.

The way the distance matrix is constructed is as follows (Richards, 1974b:14).

A matrix is constructed in which there is a row and a column for each node in the group. All the elements are initialized to zero. Whenever there is a link from node i to node j we enter a 1 in row i , column j . If the link is reciprocated we also enter a 1 in row j , column i .

We then repeatedly perform a Boolean logic operation which is analogous to raising the matrix to successively higher and higher powers. Instead of entering the cross product of the i th row and j th column as the i, j element in the product matrix, however, we enter the first power on which this value becomes non-zero.

(This operation is performed with a series of nested DO-Loops and IF statements in FORTRAN. With careful organization, the process can be optimized to take significantly less time to compute than a standard algebraic multiplication of matrices).

We stop raising the matrix to higher powers when one of the two conditions obtains: either (a) all off-diagonal elements become non-zero, which implies the group is connected; or (b) when going from any power k to the next power $k+1$ no entries change value, which implies the group is not connected at value k and will never be connected at any level.

Network integration scores represent the number of persons with whom an individual is linked and who are also connected to each other. The formula for computing the integration score is as follows:

$$I_i = \frac{(\sum wf) - L}{L(L-1)}$$

Where: wf is the "weighting factor"* for each link which is equal to the number of two-step links connecting individual i and all persons with whom he/she is linked + 1.
 L = the number of persons with whom person i is linked.

Ordinarily, the procedures defined by the Galileo technique for the measurement of the aggregate perceptions of dissimilarities among the 14 faculty would require each

*Formula obtained from a personal communication with William Richards 7/23/76, Stanford University, Stanford, California.

sample respondent to estimate pairwise dissimilarities for each of the $14(13)/2 = 91$ possible pairs of individuals. Since this study is reduced from a larger study of the entire College of Communication, modifications in these procedures were required. First, all 1176 possible pairs of the 49 college faculty were created, then randomly split into five subgroups of 235 pair-comparisons. From these pair comparisons, only those pair comparisons involving pairs of the 14 departmental faculty were included in this analysis. Exact cell frequencies for each of these relevant pair comparisons are provided in Appendix 2A. Overall, there were 67 respondents within the communication department, since funded graduate students were included as sample respondents (and included in the network analysis) even though they were not included as objects of scaling in the Galileo questionnaire (Appendix 1B).

Respondents (once again faculty members from outside the department were included in the questionnaire but excluded from analysis) based their estimates of dissimilarity as a ratio of a standard distance provided by the investigator in the following way:

"If red and white are 50 Galileos apart:

How far apart are Professor A and Professor B?"

This technique has several advantages: First and foremost, no restrictions are placed upon the respondent, who may report any positive real value whatever for any pair.

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Thus the scale is unbounded at the high end and continuous across its entire range. Secondly, because the unit of measure is always the same (i.e., the unit is provided by the investigator in the conditional, "If red and white are 50 units apart"), and thus every scale unit is $\frac{1}{50}$ of the distance from red to white as perceived by each respondent. Because the condition of zero distance represents identity between faculty and is hence a true zero, not at all arbitrary, this scale is a ratio scale.

For each distance we then average the estimates across respondents to produce a symmetric matrix of the same order as the number of objects scaled. This matrix tell us the average distance from what is known about any given professor in the set to what is known about any other. Although respondents individually used many different criteria in estimating a distance for each pair, the law of large numbers assures that the scores obtained will be normally distributed about a sample mean score, and that sample mean will converge on the population true score as n becomes large. This population true score, that is the true mean dissimilarities estimates for all the members of a culture, is exactly the theoretical definition of culture suggested earlier.

Operationally, culture is defined as the matrix D where any entry $d_{ij} = \sum_{k=1}^n \frac{d_{ijk}}{n}$ = the distance or dissimilarity between the i th object and the j th object as estimated by the k th person using the method of direct paired

distance estimates, and n = the number of persons making such an estimate.

Several qualifications must be made, of course. First, clearly the matrix D , to be exhaustive, would be a $c \times c$ matrix where c = the number of objects defined by the culture, which is a very large, but finite number. What is at issue, of course, is the measurement of subsets of the matrix D corresponding to segments of the culture under investigation. (In this case this subset includes members of the faculty of the Department of Communication). Secondly, the boundaries of the culture itself need not be so clearly drawn as is implicit in this discussion, and the investigation of subcultures is simply a matter of appropriate sampling. Third, the matrix D represents a static picture of the state of a culture at a given point in time.

These techniques provide us with measures of all the variables required by the hypotheses. Frequency of communication is measured by the ordinal scale ranging from one to eight, corresponding to categories "once or twice a term" through "several times a day." In this 14×14 matrix pairwise communication frequency scores are reported. Pairwise distance among people in the social structure is estimated by the NEGOPY distance matrix which is itself based on the number of links required to connect any two faculty members through the total network of 67 faculty and funded graduate students in the department. Integration

into the social structure is estimated by the network integration scores, which again is based on information of the total network of 67 faculty and graduate students. Finally, perceived similarity and dissimilarity of members of the department is measured by the Galileo procedures, which provide both a pairwise dissimilarities score for all pairs of faculty in the department and overall perceived "Alienation" score, or measure of the total distance of any professor from all others. (This measure is therefore reverse-scored; i.e., a low score represents high alienation.) Several additional variables (Appendix 1C) were also measured to establish reliability and validity measures for the principle instruments. These variables will be discussed as they become relevant.

CHAPTER III

RESULTS

In Chapter I three final hypotheses were derived to test the major theoretical propositions set forth there. The first two represent a dyadic test of conditions under which networks of interaction vary with the similarity/dissimilarity judgments or "culture" of the system: (1) with frequency of communication; and (2) the distance or number of links between any pair of individuals. Hypothesis 3 deals with the frequency of interaction of an individual with the group as a whole and the perceived relation of that individual to the group as a whole.

In this chapter the findings of statistical tests of the hypotheses are set forth. Hypotheses 1 and 2 shall be discussed conjointly since both are concerned with a dyadic test of the theory rather than the individual focus of Hypothesis 3. Reporting an analysis of results are organized within the following format. First, preliminary statistical data (means and standard deviations) are presented in tabular form. Second, each hypothesis is repeated and the statistical procedures (correlation coefficients) and relevant findings are indicated and analyzed. Third, evidence about the

reliability and validity of the principal measures is presented along with a discussion of the results. Finally, results are summarized at the conclusion of the chapter.

TABLE 1
Descriptive Statistics For The Variables
Referred To In Hypotheses 1 and 2
(N=61)*

VARIABLES	MEANS	STANDARD DEVIATIONS
FREQUENCY OF INTERACTION	4.3187	4.3815
DISTANCE OR NUMBER OF LINKS	1.2747	.4730
CULTURALLY PERCEIVED PAIRWISE DISTANCES (GALILEO)	62.8897	33.4611

* The sample size question is complicated with these kinds of measurements. In Table 1, the N=61 refers to the total number of faculty and funded graduate students in the department who responded to the questionnaire, since information from all respondents is utilized to generate these aggregate variables. Particularly for the distance or link analysis, the appropriate analysis-and the one performed here-requires an examination of all linkages based on the 67 faculty and students present in the department, rather than the linkages present among only the 14 faculty. Deletion of any members of the department (either faculty or funded graduate students) from this particular analysis may result in an inaccurate description of the overall communication network; e.g. two faculty members who share a common channel of communication via a graduate student, would be considered unlinked. For this reason I utilized the option of the NEGOPY program which forces reciprocation, meaning, if faculty member A reports a link with member B and B did not fill out the questionnaire, I accepted the report of member A as being accurate (resulting in an N of 67). This is not always an advisable practice, but because of my membership in the network, I felt more confident in making such a decision. For the individual pairwise measures, however, the sample size is variable. In the case of pairwise frequency of communication scores in the Network

analysis, each pairwise frequency is the average of the frequency of communication reported by the two people involved. Hence all network pairwise frequencies are based on $N=2$. Pairwise number of links between any two members of the network is based on information drawn from a larger subset of members of the network which is roughly proportional to the number of links required, but in no case specifically determinable without considerable difficulty. Sample size for the pairwise differences in the Galileo Configuration is also variable (see Table 2), depending on how many sample members actually completed estimates of the differences between any two faculty members. These pairwise cell counts, along with other descriptive information, are provided in Appendix 2A. column 6.

Table 1 presents the means and standard deviations of variables referred to in Hypotheses 1 and 2. It shows that the average frequency of Interaction is about 4.3 or several times a month and the standard deviation of 4.4 indicates that about two-thirds of the cases lie between several times a week and several times a term. Table 1 also indicates that there are on the average 1.27 steps between any two persons in the department and the standard deviation of .473 indicates that about two-thirds of the cases are linked by either a direct link or a two step indirect link. As Table 1 shows, the average dissimilarity between any two members of the department, as seen by the aggregate, is 62 units. Since these Galileo scores (or culturally perceived pairwise distances) are approximately normally distributed (see Appendix 2C Table 1) these data show that about two-thirds of the possible pairs of faculty are seen as being within 30 or 90 units of each other.

Table 2 describes the means and standard deviations of **Network Integration** and Galileo Alienation measures of

TABLE 2

Descriptive Statistics For The Variables
Referred To In Hypothesis 3 (N=14**)

VARIABLES	MEANS	STANDARD DEVIATIONS
NETWORK INTEGRATION	.6106	.1745
GALILEO ALIENATION	825.090	123.1134
GALILEO FACTOR 1	-.0000	41.1142
GALILEO FACTOR 2	-.0001	39.7374
GALILEO FACTOR 3	-.0000	33.2930
GALILEO FACTOR 4	.0000	20.3123
GALILEO FACTOR 5	2.2714	15.3145
GALILEO FACTOR 6	-.1805	10.8505
GALILEO FACTOR 7	.1098	8.9950
GALILEO FACTOR 8	-.1467	.5844
GALILEO FACTOR 9	1.8929	-5.3817
GALILEO FACTOR 10	-.2051	-3.9497
GALILEO FACTOR 11	.0001	-9.0445
GALILEO FACTOR 12	.0001	-18.3275
GALILEO FACTOR 13	0.0000	-32.5860
GALILEO FACTOR 14	5.3508	-33.6010

* See footnote below Table 1 regarding N for Galileo Factors.

** Each individual or faculty Network Integration score is computed from the total N of 67. Reported here is the mean for the 14 faculty members based on the judgments of 67 sample members.

Hypothesis 3 along with the means and standard deviations of the Galileo Factors (dimensions). Since a Network Integration score of 1.0 represents complete Integration, and 0.0 complete isolation, the mean .61 and standard deviation of .17 indicates, with small exception, most members are relatively integrated into the department. The Galileo Alienation mean of 825.0 represents, of course, the total distance between a person and all others and so corresponds to $(N-1) \times$ the average Galileo distance within rounding error ($63.47 \times 13 = 825$). More importantly however, the large standard deviation of 123.11 indicates substantial variance in how similar the faculty members are perceived.

Since the Galileo Configuration is centered at the centroid of all concepts, the mean of all Galileo factors is normalized to zero. The actual numbers in Table 2 therefore represent a useful check of rounding error in the intermediate step of key punching (these errors are small enough to be considered insignificant). The standard deviations of the factors, however, represent the relative contribution of each of the factors to the overall Galileo Configuration. Factor 8, for example, represents the NULL vector since a complete factorization of the 14×14 distance matrix should yield $n-1$ or 13 factors. Again this is a useful check of the rounding error which is again very small. Factors 9-14 are negative and represent non-euclidianism in the Galileo space. These negative roots have been interpreted as uncertainties on the

part of the respondents. In this case these uncertainties are fairly small relative to the positive dimensions of the space.

Additionally, Appendix 2 contains the Distance Matrix or link analysis computed from the NEGOPY program along with the Galileo Configuration, coordinate dimensions, and the Aggregate Means matrix. Several tentative conclusions can be drawn from these data. First, there is little variance in the number of links between any two faculty members. This hinders any statistical relationships. Second, the Galileo Factor Matrix and Configuration is multidimensional indicating that respondents are discriminating across a number of factors. Though factors vary in their contribution to the total variance, recent evidence supports the use of all factors in analysis (Barnett 1976; Barnett and Woelfel, 1976).

In order to test the linear relationship between interaction and perceived similarity, zero order correlation coefficients were computed. These correlation coefficients will provide an estimate of the deviation of scores from a straight regression line. Table 3 reports the intercorrelations among the variables referred to in Hypotheses 1 and 2, and Table 4 reports the intercorrelations among the variables in Hypothesis 3.

TABLE 3

Correlation Coefficients Among The
Variables Referred To In Hypotheses 1 and 2

VARIABLES	1	2	3
1. FREQUENCY OF INTERACTION	1.000		
2. DISTANCE	-.6861	1.000	
3. CULTURALLY PER- CEIVED PAIRWISE DISTANCES (GALILEO CONFIGURATION)	-.0614	.0482	1.000

HYPOTHESES TESTS

Hypothesis 1

The greater the frequency of interaction between individuals or groups of individuals, the smaller the perceived distance between those individuals in the aggregate (cultural) belief system.

Hypothesis 2

The greater the number of links necessary to connect any pair of individuals in the communication network, the greater the perceived distance between those individuals in the aggregate (cultural) belief system.

As Table 3 indicates, the correlation coefficients for frequency of interaction and distance or links between individuals with perceived similarity are $-.0614$ and $.0482$ respectively. Based on the conceptualization developed in Chapter I we would expect the correlations to be low since respondents are reporting only a small proportion of their total lifetime communication, but such correlations fail to provide strong enough evidence to accept the proposed

TABLE 4

Correlation Coefficients Among The Variables Referred To In Hypothesis 3

Variables	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈
X ₁ NETWORK INT.	1.00000							
X ₂ FACTOR 1	-.40483	1.00000						
X ₃ FACTOR 2	-.23412	-.00001	1.00000					
X ₄ FACTOR 3	-.01424	-.00001	-.00000	1.00000				
X ₅ FACTOR 4	-.17713	.00001	.00000	.00000	1.00000			
X ₆ FACTOR 5	.23669	.01557	.09081	.19232	.23298	1.00000		
X ₇ FACTOR 6	.53728	.00322	-.01604	-.04044	.03082	.27653	1.00000	
X ₈ FACTOR 7	-.01530	-.00350	-.01724	-.01731	-.06010	.19437	.08623	1.00000
X ₉ FACTOR 8	-.66221	.01729	.30780	.07743	.29175	-.15532	-.55459	.00785
X ₁₀ FACTOR 9	.37016	.01013	-.16555	-.33075	.00901	.16103	.39610	-.24051
X ₁₁ FACTOR 10	-.04410	.03201	-.02776	-.16909	.40717	-.23004	-.45233	-.00256
X ₁₂ FACTOR 11	.38710	-.00001	.00001	.00002	-.00000	.42215	.02943	.01759
X ₁₃ FACTOR 12	.30471	.00000	.00001	-.00001	.00003	-.24468	.04477	-.01749
X ₁₄ FACTOR 13	-.20469	.00001	.00000	.00009	-.00000	.03946	-.00604	-.00979
X ₁₅ FACTOR 14	.14689	.01979	-.09886	.24858	.18948	.08109	-.00444	-.22103
X ₁₆ Galileo Alienation	-.29171	.22646	.45769	.49392	-.10911	.11954	-.02923	-.07014

TABLE 4

Variables	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄	X ₁₅	X ₁₆
X ₉	FACTOR 8	1.00000						
X ₁₀	FACTOR 9	-.50598	1.00000					
X ₁₁	FACTOR 10	-.01766	.14407	1.00000				
X ₁₂	FACTOR 11	-.07947	.25683	.10450	1.00000			
X ₁₃	FACTOR 12	.08989	.24449	.32625	-.00002	1.00000		
X ₁₄	FACTOR 13	.04587	-.07313	.00213	.00002	.00000	1.00000	
X ₁₅	FACTOR 14	.18191	-.05458	.06996	.18088	-.03706	1.00000	
X ₁₆	Galileo Alienation	.32344	-.28611	-.18031	-.10620	.26495	.42653	.23083
								1.00000

hypotheses.

Hypothesis 3 The more integrated an individual is in the communication network, the smaller the total perceived distance of that individual from all other persons in the aggregate (cultural) belief system.

The two variables referred to in Hypothesis 3 are (1) Network Integration (computed directly from the NEGOPY program) which indicates the degree to which individual links exist between a particular person and his/her set of contactees; and (2) the perceived similarity/dissimilarity of an individual from all other individuals in the cultural aggregate. The latter variable, referred to as Galileo Alienation, is determined by taking the sum of all the entities in that individual's row in the Galileo distance matrix. Since any cell d_{ij} of the distance matrix represents the distance of the i^{th} person from the j^{th} person, then the sum of the i^{th} row will represent the total distance, dissimilarity, of the i^{th} person from all other persons.

As Table 4 indicates, the correlation coefficient between Network Integration and Galileo Alienation is $-.2917$, sig. $.156$.* While apparently small this means that nearly 10% of

* These significance levels, as all others derived from the Galileo Configuration, are substantial underestimates of the true statistical significance. This is so since the number of persons rated in Galileo ($n=14$) is considered by the program to be the number of observations (see footnote page 41). The Galileo Configuration however, is itself an aggregate derived in this case from $(n(n-1)/2)$ paired comparisons times 61 (sample size) observations. In any event,

the individual differences perceived among members of the department can be accounted for by their integration in the communication network alone. This correlation does not take into account the length of time that individuals have been in the network and should therefore be an underestimate of the effect of intra-departmental communication on individual differences. This is born out by the correlation coefficient of $-.3009$ between Galileo Alienation and the number of years in the Department (Table 7). Consequently, we might suspect an interaction effect between Network Integration and Years with the Department. Table 5 indicates that when Years with the Department is multiplied by Network Integration its correlation with Galileo Alienation is $-.37957$. This is a very substantial correlation since it indicates that nearly 15% of the individual differences perceived among department members can be accounted for by their communication history in the department.

Finally, some additional evidence germane to this hypothesis is available in the form of the correlation coefficients of Network Integration with individual Galileo Factors. This information is summarized in Table 4.

Inasmuch as the correlation between Network Integration and Galileo Alienation is lower than the correlations between

significance tests in this analysis are not appropriate since the members of the department represent the complete population of interest and no inferences to a more general population are required.

TABLE 5

Correlation Coefficients For Years
With The Department x Network Integration
And Galileo Alienation

VARIABLES	X_1	X_2
X_1 Years x Network Integration	1.00000	
X_2 Galileo Alienation	-.37957	1.00000

Network Integration and several of the Galileo Factors, there is reason to believe that there is more to the relationship than a simple correlation. It may be the case that integrativeness in the communication network is an attribute which people recognize when comparing individuals. The test for this is a straightforward regression analysis. The regression equation is as follows:

$$Y_i = b_0 + b_{i1}X_{i1} + b_{i2}X_{i2} + b_{i3}X_{i3} + b_{i4}X_{i4} + b_{i5}X_{i5} + b_{i6}X_{i6} + e$$

where:

Y_i = The Network Integration score of the i^{th} individual

b_{ij} = the set of unstandardized regression coefficients or partial slopes of the six unidimensional scales

X_{ij} = is known as a constant, namely the value of the independent variable, or rather, the six highest correlated factor loadings

e = stochastic (error) terms

As Table 6 indicates, the Multiple Correlation between Network Integration and the six Galileo factor loadings is

TABLE 6

Standardized Partial Regression Coefficients,
Multiple Correlation Coefficients, Tests of
Significance, and Coefficients of Determination
Of Network Integration On Galileo Coordinate
Dimension Values

Multiple R	.95330			
R Square	.90879			
Degrees of Freedom	6,7			
F	11.62393			
Significance	.002			
	F	Accumulated R	Significance	Beta
Factor 1	11.761512	.40483	.011	-.3916862
Factor 12	11.522152	.50669	.012	.4155880
Factor 11	10.974002	.63764	.013	.3940481
Factor 6	3.1442338	.81920	.119	.2473755
Factor 9	3.0672969	.81923	.123	-.2580013
Factor 8	18.238496	.95330	.004	-.6548335

.95330 and is significant at the .002 level. Additionally, the Beta weights of Factors 1, 8, 11, 12 are below the .05 level of significance. Not only does this coefficient indicate a high degree of correspondence between the variables, but it also signifies that the measurement in instruments for the aggregate cultural system (Galileo) and Network Integration

have no more than a small unreliability component. Furthermore, the notion that department members take into account the degree to which an individual is integrated into the network when making evaluations provides additional evidence of the validity of the measurement instruments.

RELIABILITY AND VALIDITY OF THE INSTRUMENTS

The substantial multiple correlations between Network Integration and the Galileo factors, along with the theoretically sensible relationship between the interaction of years with the department and Network Integration correlated with Galileo Alienation provide fairly strong evidence that both instruments (i.e., the NEGOPY program and the Galileo) are reliably and validly measuring the variables of interest. Nevertheless, the near-zero correlations among pairwise distances among the faculty, number of links, and Network distance require a more careful analysis before we are willing to accept the results at their face value.

Reliability and validity are best assessed by looking at the pattern of correlations among the Network and Galileo measures and additional variables whose relations to these measures are predicted or known. Accordingly, we made measures of several other variables whose reliability and validity are not suspect, and whose relationship to the other Network and Galileo measures could reasonably be predicted. The variables are: (1) Years with the department; (2) Academic rank (e.g., Associate professor); (3) the number of

Ph.D. committees one chairs; (4) the number of memberships one holds on Ph.D. committees; (5) the number of M.A. committees one chairs; and, (6) the number of memberships one holds on M.A. committees. It is reasonable to assume that the members of the department consider the preceding attributes when making evaluations of the other members,* and thus should reasonably be expected to be represented in the aggregate cultural perceptions measured by the Galileo procedure.

Table 7 summarizes the correlation coefficients for the unidimensional scales, Network Integration scores, Galileo Factor loadings, and the Galileo Alienation scores. As indicated, both Network Integration and Galileo Alienation fail to correlate highly with any of the unidimensional scales, and thus provide little evidence of measurement reliability or validity. However, Network Integration and a number of Galileo Factor loadings do correlate significantly with each other (Factor 8, $r = -.6622$ sig. = .005; Factor 6, $r = .5373$ sig. = .025). Moreover, there are additional correlations which are large but not significant (Factor 1, $r = -.4048$; Factor 9, $r = .3702$; Factor 11, $r = .3871$; Factor 12, $r = .3043$). The lack of significance may be due to the small sample size, but since we are dealing with the whole population and not generalizing to another, the significance levels

*Other ethical and technical reasons prohibit measuring all possible attributes.

TABLE 7

Correlation Coefficients For The Unidimensional Scales,
Network Integration Scores, Galileo Factor
Loadings And The Galileo Alienation Scores

	NetInt	Yrs	Posi	Phoc	Phdm	Mac	Mam	Galileo I	Fac 1	Fac 2	Fac 3	Fac 4
YRS	-.43174											
POSI	-.07213	.16157										
PHDC	-.16837	-.30822	.40411									
PHDM	-.22905	-.01975	-.55238	.09986								
MAC	.07765	-.45754	-.20781	.59181	.59214							
MAM	-.38793	.06157	-.30462	.01210	.69718	.37063						
GALILEO I	-.29171	-.30094	-.33100	-.09113	.22199	.13872	.09167					
FAC 1	-.40483	.36488	.26556	-.08131	-.22349	-.37841	.07845	.22646				
FAC 2	-.23412	-.17185	-.34735	.40877	.44203	.49399	.16114	.45769	-.00001			
FAC 3	-.01424	-.15179	-.29339	-.08629	.38715	.22960	-.03329	.49392	-.00001	-.00000		
FAC 4	-.17713	.22090	.13968	.26405	.12425	-.17194	.00316	-.10911	.00001	-.00000	.00000	
FAC 5	.23669	.37665	-.32880	-.50068	.04488	-.40936	-.36563	.11954	.01557	.09081	.19232	.23298
FAC 6	.53728	-.42388	-.33437	-.16469	.14878	-.05698	.06540	-.02923	.00322	-.01604	-.04044	.03082
FAC 7	-.01530	-.00520	.08509	-.07422	-.37656	-.52885	-.47521	-.07014	-.00350	-.01724	-.01731	-.06010
FAC 8	-.66221	.06803	.21948	.30217	.11184	.03939	-.03481	.32344	.01729	.30780	.07743	.29175
FAC 9	.37016	.09938	-.03931	-.31593	.09186	-.10727	.42569	-.28611	.01013	-.16555	-.33075	.00901
FAC10	-.04410	.19484	.44117	.34765	-.28200	-.01772	-.01140	-.18031	.03201	-.02776	-.16909	.40717
FAC11	.38710	.14723	.50614	.09142	-.18237	-.03131	-.40853	-.10620	-.00001	.00001	.00002	-.00000
FAC12	.30471	-.50434	.13880	-.05760	-.27599	-.04605	-.05729	.26495	.00000	.00001	-.00001	.00003
FAC13	-.20469	.07915	-.02092	-.25060	.15175	-.13284	.21918	.42653	.00001	.00000	.00009	-.00000
FAC14	.14689	-.25436	.25286	.07215	-.53690	-.15723	-.42372	.23083	.01979	-.09866	-.24858	.18948

TABLE 7

	Fac 5	Fac 6	Fac 7	Fac 8	Fac 9	Fac 10	Fac 11	Fac 12	Fac 13
FAC 6	.27653								
FAC 7	.19437	.08623							
FAC 8	-.15532	-.55459	.00785						
FAC 9	.16103	.39610	-.24051	-.50598					
FAC10	-.23004	-.45233	-.00256	-.01766	.14407				
FAC11	.42215	.02943	.01759	-.07947	.25683	.10450			
FAC12	-.24468	.04477	-.01749	.08989	.24449	.32625	-.00002		
FAC13	.03946	-.00604	-.00979	.04587	-.07313	.00213	.00002	.00000	
FAC14	.08109	-.00444	-.22103	.18191	-.05458	.06996	.18088	.27516	-.03706

may be eliminated as a criteria for acceptance.

Since all Galileo Factors are orthogonal by definition,* the correlations are not redundant and indicate a substantial interrelatedness between Network Integration and perceived similarity. Thus there would seem to be ample evidence to rule out the possibility of unreliability for these two measurement instruments.

Additional evidence of the reliability and validity of the cultural aggregate as measured by the Galileo instruments can be generated by regressing the unidimensional measures on Galileo Coordinate values. This follows from the "equivalence hypothesis" proposed by Gillham and Woelfel (1975:4) which states:

. . . the scaling theory on which Galileo rests must assume that the Matrix D will represent the pattern of differences among the stimuli across whatever attributes the respondent perceives them to differ at the time and under the circumstances that the measurements are made. . . .

If the "equivalence hypothesis" is correct, the space D should be the space within which the attribute vectors used by the respondents to differentiate the faculty are arrayed. Gillham and Woelfel (1975:14) further state that finding the projection of a vector or a set of vectors on a unidimensional regression model. So an optimal test of the hypothesis in

* Deviations from orthogonality due to rounding errors are negligible except for the smallest of the Galileo factors.

this instance consists in the goodness of fit of the six regression equations to the data:

$$Y_i = b_{i1}X_1 + b_{i2}X_2 + b_{i3}X_3 + b_{i4}X_4 + b_{i5}X_5 + b_{i6}X_6 + e$$

where:

Y_i = 14 x 1 vector of scores on the i^{th} unidimensional scale

b_{ij} = The set of unstandardized regression coefficients or partial slopes of the six unidimensional scales

x_i = is a known constant, namely the value of the independent variable, or rather, the six highest correlated factor loadings

e = stochastic (error) terms

Based on the correlation coefficients summarized in Table 7, each unidimensional scale was regressed on these six factors which correlated most highly.*

The results of this analysis (Tables 8-13) show that the six attributes are clearly represented in the matrix of factor loadings. The Multiple Correlations among the six factor loadings and, (1) Years with the Department (Multiple R .88207 sig. .044); (2) Academic rank in the Department (Multiple R .88922 sig. .036); (3) Ph.D. Chairmanship (Multiple R .81858 sig. .142); (4) Ph.D. Committee Membership (Multiple R .81858 sig. .041); (5) M.A. Chairmanship (Multiple R .94032

* Only six factors were chosen since regression of the 14 x 1 vector on a 14 x 13 matrix of coefficients will always result in 100% of the variance explained. Since the factors are constrained to be orthogonal, no redundancy results from this procedure.

TABLE 8

Standardized Partial Regression Coefficients, Multiple
Correlation Coefficients, Tests of Significance, and
Coefficients of Determination of Ph.D. Committee
Membership on Galileo Coordinate Dimension Values

MULTIPLE R	.88504			
R SQUARE	.78329			
DEGREES OF FREEDOM	6,7			
F	4.21692			
SIGNIFICANCE	.041			

	F	R	Signifi- cance	Beta
FACTOR 2	4.5515931	.44203	.070	.3781628
FACTOR 3	1.4181148	.58761	.273	.2218817
FACTOR 12	.19810053	.64919	.670	-.0869670
FACTOR 7	7.0606974	.74586	.033	-.4820060
FACTOR 10	.80959214	.75593	.398	-.1708147
FACTOR 14	6.8433890	.88504	.035	-.5150953

TABLE 9

Standardized Partial Regression Coefficients, Multiple
Correlation Coefficients, Tests of Significance, and
Coefficients of Determination of M.A. Chairmanship
on Galileo Coordinate Dimension Values

MULTIPLE R	.94032			
R SQUARE	.88420			
DEGREES OF FREEDOM	6,7			
F	8.90801			
SIGNIFICANCE	.005			

	F	R	Signifi- cance	Beta
FACTOR 1	8.4424202	.37841	.023	-.3737772
FACTOR 4	.63438366	.41564	.452	-.1061842
FACTOR 3	5.1442290	.47484	.058	.2982521
FACTOR 2	16.318769	.68519	.005	.5223654
FACTOR 7	11.324239	.86572	.012	-.4451895
FACTOR 5	8.1439816	.94032	.025	-.3970637

TABLE 10

Standardized Partial Regression Coefficients, Multiple
Correlation Coefficients, Tests of Significance, and
Coefficients of Determination of Academic Rank on
Galileo Coordinate Dimension Values

MULTIPLE R	.88922			
R SQUARE	.79071			
DEGREES OF FREEDOM	6,7			
F	4.40783			
SIGNIFICANCE	.036			

	F	R	Signifi- cance	Beta
FACTOR 2	3.0173980	.34735	.126	-.3024111
FACTOR 3	1.0331866	.45467	.343	-.1838125
FACTOR 11	12.682675	.68037	.009	.6999421
FACTOR 6	.71765942	.77314	.425	-.1703576
FACTOR 10	.48040372	.79475	.510	.1406098
FACTOR 5	5.3207440	.88922	.054	-.4820076

TABLE 11

Standardized Partial Regression Coefficients, Multiple
Correlation Coefficients, Tests of Significance, and
Coefficients of Determination of Ph.D. Chairmanship
on Galileo Coordinate Dimension Values

MULTIPLE R	.81858			
R SQUARE	.67008			
DEGREES OF FREEDOM	6,7			
F	2.36954			
SIGNIFICANCE	.142			

	F	R	Signifi- cance	Beta
FACTOR 2	4.2928558	.40877	.077	.4865606
FACTOR 4	2.3279503	.48664	.171	.4392694
FACTOR 9	.93263074	.54901	.366	-.2494383
FACTOR 10	.71556501	.80545	.797	.0718694
FACTOR 8	.45264891	.81858	.523	-.1971641

TABLE 12

Standardized Partial Regression Coefficients, Multiple
Correlation Coefficients, Tests of Significance, and
Coefficients of Determination of M.A. Committee
Membership on Galileo Coordinate Dimension Values

MULTIPLE R	.90766			
R SQUARE	.82384			
DEGREES OF FREEDOM	6,7			
F	5.45623			
SIGNIFICANCE	.021			

	F	R	Signifi- cance	Beta
FACTOR 5	.97565776	.36563	.356	-.1787767
FACTOR 13	2.2561258	.43399	.177	.2398993
FACTOR 14	5.6225845	.58097	.050	-.4008541
FACTOR 9	6.4993874	.75669	.038	.4451928
FACTOR 7	5.5382313	.84933	.051	-.4131719
FACTOR 11	4.0721593	.90766	.083	-.367314

TABLE 13

Standardized Partial Regression Coefficients, Multiple
Correlation Coefficients, Tests of Significance, and
Coefficients of Determination of Years with the
Department on Galileo Coordinate Dimension Values

MULTIPLE R	.88207			
R SQUARE	.77804			
DEGREES OF FREEDOM	6,7			
F	4.08956			
SIGNIFICANCE	.044			

	F	R	Signifi- cance	Beta
FACTOR 1	4.1983922	.36488	.080	.3649795
FACTOR 12	2.5274387	.62250	.156	-.3094874
FACTOR 4	1.0055487	.66053	.349	.1866364
FACTOR 6	8.1396905	.77738	.025	-.5340847
FACTOR 14	1.6946022	.88207	.234	-.2482798
FACTOR 5	4.4033730		.074	.4195786

sig. .005); (6) M.A. Membership (Multiple R .90766 sig. .021) provide support for the "equivalence hypothesis." In other words, respondents are clearly considering these attributes when differentiating among faculty members.

Given the pattern of findings presented above, it seems reasonable to conclude, under the conditions of the present research, that the Galileo procedures produce a stable and precise measurement system which is equivalent to very extensive applications of the best of conventional measurement systems.

SUMMARY

The results indicate that Hypotheses 1 and 2 are not supported. Evidence of support for Hypothesis 3 and the reliability and validity tests indicate that the Galileo measures of the cultural aggregate and Network Integration scores are reliable. Validity checks of network distance, or number of links between pairs of individuals, and frequency of communication are not amenable to straightforward tests with the data at hand. We must at least entertain the suspicion that the failure to find support for Hypotheses 1 and 2 may be attributable to certain characteristics of these two variables. In the next chapter we will discuss this possibility and provide a more generalized interpretation of the results along with suggestions for future research.

CHAPTER IV

CONCLUSION

In Chapter I theoretical support was presented concerning the interrelationship between the social structure and the cognitive belief system or "culture" of a social unit. Out of the ongoing pattern of intercommunication there arises a cultural belief system or rather, common definitions of those objects with which the social unit deals. The general acceptance of this premise can be found throughout many fields of inquiry, such as sociology, psychology, and anthropology.

While many theorists have discussed this relationship, this thesis has been based largely on the work of Emile Durkheim who specifies that the cognitive belief system of any social unit varies with "the nature and number of channels of communication." He further states that we can only accurately describe social and cognitive structure by considering "the aggregate in its totality." In other words, we are concerned with how individuals fit into the system, how they are related to the other elements or members, and also, how the aggregate social structure is related to the cultural system. Following from this general reasoning we should find that:

Persons or groups in the same or equivalent locations in a communication network will develop equivalent conceptions of the collective representation.

Although the major premise is of theoretical significance in that it applies to all social units, this degree of generality is not amenable to empirical test. Any empirical test would require the specification of some concrete subset of cultural objects which may be observed in some setting. Thus the following minor premise was derived:

Persons who are equivalent (i.e. hold equivalent conceptions of the collective representation) will be seen as similar by others (insofar as those others have contact with them).

It should be the case that the patterned similarities of people as perceived by the cultural aggregate will correspond to the social structure of that system. In other words, there will be a general correspondence between the pattern of similarities perceived among members of a social unit and their position in the communication network. From this general reasoning three hypotheses were derived:

- H₁: The greater the frequency of interaction between individuals or groups of individuals, the smaller the perceived distance between those individuals in the aggregate (cultural) belief system.
- H₂: The greater the number of links necessary to connect any pair of individuals in the communication network, the greater the perceived distance between those individuals in the aggregate (cultural) belief system.

- H₃: The more integrated an individual is in the communication network, the smaller the total perceived distance of that individual from all other persons in the aggregate (cultural) belief system.

The results of the statistical tests presented in Chapter III clearly indicate a high degree of correspondence between the integrativeness of an individual in the communication network and the perceived similarity of that individual from all other members of the social unit. In fact, 10% of the perceived differences among the members can be accounted for solely on the basis of this relationship. Additionally, when the interaction effect of years in the department with Network Integration is considered, 15% of the variance in the Galileo Alienation Index can be accounted for. And finally, based on the Multiple Correlation of Network Integration and the Galileo Coordinate values we can conclude that the degree to which an individual is integrated into the communication network is an attribute which people recognize when comparing individuals. Given this pattern of findings, it is reasonable to conclude that the more integrated an individual is in the communication network the smaller the perceived distance of that individual from all other members of the social unit. Thus, Hypothesis 3 is supported.

The statistical tests of Hypotheses 1 and 2 fail to indicate any significant relationship between communication frequency, distance or links separating the members of the

social unit, and perceived distance in the aggregate (cultural) belief system. These two hypotheses, in a theoretical sense, are concerned with differences in location in the social structure as related to differences in perception among the members of the system. The extent to which persons are perceived as different from each other is measured by the Galileo Means matrix, whose validity in this case seems well supported by its interrelationship with the six unidimensional attributes and with the Network Integration scores.

Hypotheses 1 and 2 differ from each other in that each utilizes a different measure of the theoretical concept "distance apart" or "discrepancy of position" in the communication network. Although each of these may well be a reliable and valid indicator of some aspect of the overall "distance" in the network, there seems reason to suspect, due to the low correlations, that these characteristics--Network distance and frequency of communication--are not themselves a complete measure of overall communication "distance" between persons.

In fact, a more appropriate concept of "network distance" might well be the inverse of the exact "volume of flow" of information between pairs of individuals. Such a variable would include not only number of links between persons, but also frequency of interaction, duration of average interaction, and "average information content" of

an interaction. Such a measure, across time, might be construed as a "communication history" for every dyad in the network, and it is probably to this variable that perceived differences among persons is related.

CONCLUSION

Though we failed to find a significant relationship between "distance apart" or "discrepancy of position" in the communication network and perceived similarity, there is reason to believe that the operationalization of this variable was not of sufficient scope to accurately describe the complexity of this interrelationship. Considering the more substantial findings in terms of Hypothesis 3, that the more integrated an individual is in the communication network the smaller the perceived distance of that individual from all other persons in the aggregate (cultural) belief system, we can not reject the theory based on this analysis.

APPENDIX I: QUESTIONNAIRES

- 1-a Personal Communication
Contact Questionnaire
- 1-b Galileo Questionnaire
- 1-c Unidimensional Scaling
Questions

MICHIGAN STATE UNIVERSITY

College of Communication Arts
Department of Communication

EAST LANSING • MICHIGAN • 48824

June 24, 1974

Dear College Member:

With the College's Communication Arts Building becoming more of a reality, it seems appropriate to include information about the communication networks in the College as the architectural design proceeds. The project I am conducting has been discussed with Dean Oyer, with the Department Chairman, with some faculty groups, and, I believe, in departmental faculty meetings.

In the enclosed questionnaire, you will find a list of the faculty and selected graduate students in the College, from Spring Term. The first few questions ask for some brief background information about yourself. Then, you are asked to indicate how often you communicated with other members of the College about teaching and research topics during Spring Term. I am asking for approximations, because I recognize that this is a difficult question to answer precisely. You are also asked to indicate some other features of your communication patterns in the College.

In particular, you are asked to indicate the frequency with which you would prefer to talk with other College members. While the first set of questions gives information on communication networks as they presently exist, the additional information on preference is of importance for planning the new facilities.

The second half of the questionnaire asks for you to make some comparisons of College members in terms of the similarity or distance between them. This information provides another form of network that is also representative of the types of interaction taking place in the College.

I ask you to place your name on the questionnaire only for the purpose of enabling me to construct the overall communication networks. Your name will be immediately transferred to a code number and no one in the College will have access to the list of names and numbers. Also, the questionnaires themselves will not be made available to anyone else in the College in any way that allows the identification of specific individuals. Nevertheless, initially your name is needed so that the communication network can be constructed.

Thank you very much for your assistance in this project. It is important to me, and I believe the results (even in a general form) will be of help in planning for the future College facilities.

Please return the questionnaires to your departmental secretary for pickup. A manila envelope is provided for your convenience. Thank you again for your help.

Margaret Brophy
517 S. Kedzie Hall
Communication Department

In this section we are concerned with the frequency of your communication about TEACHING and RESEARCH. On the following pages we are providing you with a list of names of your colleagues in the College. We would like you to indicate for TEACHING and separately for RESEARCH: 1) the average frequency of communication (if any) with each person, and 2) the mode or means by which you and the person communicate, and, 3) which of you initiates the communication, and 4) the frequency you would have preferred to communicate with the person.

Please use the following scale to indicate the approximate number of times in the past term, you communicated with each individual on the list. First, describe your communication about RESEARCH (including your own work, the research of others in the college, and research being conducted outside the college, etc.). Second, use the same scale to indicate the frequency of your communication about Teaching (i.e., discussing course content, course materials, teaching styles and strategies, problems and successes, etc.).

IF YOU COMMUNICATED: Once or twice during the term.....Write a 1
 Several times during the term.....Write a 2
 Once or twice during the month....Write a 3
 Several times during the month....Write a 4
 Once or twice during the week.....Write a 5
 Several times during the week.....Write a 6
 Once or twice during the day.....Write a 7
 Several times during the day.....Write a 8

When you and the other person communicate, who generally began or INITIATED the contact?

IF: You did, almost always.....Write a 1
 You did, usually.....Write a 2
 Both of you did about equally.....Write a 3
 The other person did, usually.....Write a 4
 The other person did, almost always....Write a 5

Please indicate the usual mode of communication: either ORAL (face to face, telephone, in meetings, etc.), or WRITTEN (proposals, reports, distribution of papers, memos, letters, etc.).

IF IT WAS: Always oral.....Write a 1
 Usually oral.....Write a 2
 Equally oral and written.....Write a 3
 Usually written.....Write a 4
 Always written.....Write a 5

Next we would like to find out some things about the communication contacts you would like to have had during the term. This information will become part of an abstract "network" (without specific names) that may be useful in designing the future College building layout. Suppose You and all other college personnel were free to do as much communicating about RESEARCH and TEACHING as each person wanted. How often would you PREFER to talk with each person?

IF YOU WOULD HAVE PREFERRED TO COMMUNICATE:

Once or twice during the term.....Write a 1
 Several times during the term.....Write a 2
 Once or twice during the month.....Write a 3
 Several times during the month.....Write a 4
 Once or twice during the week.....Write a 5
 Several times during the week.....Write a 6
 Once or twice during the day.....Write a 7
 Several times during the day.....Write a 8

Note: After you have made these four decisions about a person, move on to the next name and make the decisions again.

FREQUENCY OF COMMUNICATION
& PREFERRED COMMUNICATION

Once or twice a term.....1
 Several times a term.....2
 Once or twice a month....3
 Several times a month....4
 Once or twice a week.....5
 Several times a week.....6
 Once or twice a day.....7
 Several times a day.....8

Who INITIATES the COMMUNICATION?

You do, almost always.....1
 You do usually.....2
 Both of you do about equally....3
 The other person does usually...4
 The other person, almost always.5

MODE OF COMMUNICATION:

Always oral.....1
 Usually oral.....2
 Equally oral & written...3
 Usually written.....4
 Always written.....5

	RESEARCH				TEACHING			
	F R E Q U E N C Y	I N I T I A T E S	M O D E	P R E F E R R E D	F R E Q U E N C Y	I N I T I A T E S	M O D E	P R E F E R R E D
Individual A*								
Individual B								
Individual C								
Individual D								
Individual E								
Individual F								
Individual G								
Individual H								
Individual I								
Individual J								
Individual K								
Individual L								
Individual M								
Individual N								

* Actual names were provided in the distributed questionnaire.

Just as we can measure the difference between a pair of physical objects (in terms of inches, feet, miles, or other units) we can also measure the distance between pairs of concepts, ideas, or people. We will call this unit a "GALILEO." In the following questions we want you to estimate the differences or distances between the members of each pair. As you will see at the top of each page we have provided you with an example of the differences or distances between two concepts: RED and WHITE are 50 Galileos apart. Now, consider each pair carefully, and then estimate the number of Galileos you feel separate the pair. If you feel they are closer together than the pair of concepts in the guide, write a number less than 50. If they are further apart than the pair of concepts in the guide, write a number more than 50.

Remember: Red and White are 50 Galileos apart.

HOW FAR APART ARE:	Galileos
Professor* A and B	_____
Professor A and C	_____
Professor A and D	_____
Professor A and E	_____
Professor A and F	_____
Professor A and G	_____
Professor A and H	_____
Professor A and I	_____
Professor A and J	_____
Professor A and K	_____
Professor A and L	_____
Professor A and M	_____
Professor A and N	_____
Professor A and O	_____
Professor A and P	_____
Professor A and Q	_____
Professor A and R	_____
Professor A and S	_____
Professor A and T	_____
Professor A and U	_____
Professor A and V	_____
Professor A and W	_____
Professor A and X	_____
Professor A and Y	_____
Professor A and Z	_____

* Actual names were provided in the distributed questionnaire.

Name _____

2. Age _____

3. Years With the Department _____

4. Position: a. _____ Full Professor
 b. _____ Associate Professor
 c. _____ Assistant Professor
 d. _____ Instructor
 e. _____ Assistant Instructor
 f. _____ Lecturer
 g. _____ Other (please specify) _____

If Graduate Student:

- h. _____ 1st year Graduate Student
 i. _____ 2nd year Graduate Student
 j. _____ 3rd year Graduate Student
 k. _____ 4th year Graduate Student
 l. _____ more than 4 years as a Graduate Student
 m. _____ Other (please specify) _____

5. Please describe your main academic and/or research areas of interest:

- a. _____
 b. _____
 c. _____

6. Approximately how many M.A. and Ph.D. DEGREE committees in the College do you serve on, as:

Ph.D. Chairman _____ OR Member only _____
 M.A. Chairman _____ OR Member only _____

7. How many UNIVERSITY committees do you serve on?

(Number)

8. How many COLLEGE committees do you serve on?

(Number)

9. How many PROFESSIONAL ASSOCIATIONS do you belong to?

(Number)

10. How many PROFESSIONAL CONVENTIONS did you attend since June 1 of last year?

(Number)

11. Approximately how many PUBLICATIONS did you have since June 1 of last year (including books, journal articles, convention papers, reports/monographs)?

(Number)

APPENDIX 2: STATISTICS

- 2-a Galileo Means, Standard Deviations,
Variances, Skewness, Kurtoses, Counts,
Minimum-Maximum Values, Range
- 2-b Network Distance Matrix For Faculty
- 2-c Aggregate Means Matrix of Faculty Members
- 2-d Coordinate Dimension Values For Faculty

APPENDIX 2-a*

12	3	39.300	6.633	44.300	.370	1.617	5	30.0	50.0	20.0
12	4	47.500	4.350	14.750	-1.155	1.583	4	40.0	50.0	10.0
12	5	54.875	57.364	3290.609	1.864	4.875	4	1.0	200.0	199.0
12	6	61.600	73.104	5344.243	1.154	2.122	5	.0	200.0	200.0
12	7	45.667	19.508	340.556	.624	1.398	6	25.0	80.0	55.0
12	8	40.667	21.642	470.556	.517	1.099	6	20.0	75.0	55.0
12	9	31.250	19.486	379.649	.156	.911	8	10.0	60.0	50.0
12	10	59.167	19.239	370.139	.162	1.574	6	40.0	100.0	60.0
12	11	77.500	126.863	214.750	.435	1.096	4	60.0	100.0	40.0
13	1	148.250	38.483	16094.187	.930	1.370	4	90.0	400.0	310.0
13	2	78.200	19.477	1480.950	1.034	2.056	5	41.0	150.0	109.0
13	3	57.800	17.493	379.350	-.313	.807	5	30.0	80.0	50.0
13	4	28.000	17.493	306.000	.363	1.024	5	10.0	55.0	45.0
13	5	16.875	30.097	905.859	.436	2.336	8	5.0	100.0	95.0
13	6	108.000	150.372	22611.600	1.301	2.355	5	.0	400.0	400.0
13	7	75.000	5.000	25.000	.000	.250	4	70.0	80.0	10.0
13	8	39.000	21.541	464.000	.002	1.051	5	10.0	70.0	60.0
13	9	16.667	16.997	238.899	-.247	1.320	6	10.0	60.0	50.0
13	10	60.833	24.566	603.472	.692	1.116	6	40.0	100.0	60.0
13	11	60.000	28.577	815.667	.643	.500	3	35.0	100.0	65.0
13	12	21.667	8.498	72.222	-.528	.500	3	10.0	30.0	20.0
14	1	33.750	56.830	3229.647	.559	1.953	8	15.0	200.0	185.0
14	2	46.000	45.064	2030.750	-.606	1.907	8	5.0	150.0	145.0
14	3	65.833	28.492	811.806	-.217	.970	6	25.0	100.0	75.0
14	4	76.571	54.725	2994.816	1.467	3.422	7	25.0	200.0	175.0
14	5	53.125	28.055	747.109	-.192	1.337	8	10.0	95.0	85.0
14	6	133.889	158.881	25243.218	1.234	3.022	9	.0	500.0	500.0
14	7	45.000	31.848	1014.246	.206	1.589	7	5.0	100.0	95.0
14	8	69.875	47.118	2270.109	.965	2.517	8	14.0	170.0	156.0
14	9	40.000	18.484	341.667	.831	1.972	6	20.0	75.0	55.0
14	10	35.000	12.649	168.000	.222	.670	5	20.0	50.0	30.0
14	11	40.875	16.351	267.359	.627	1.877	8	25.0	73.0	48.0
14	12	73.875	43.933	1930.109	.061	1.811	8	1.0	150.0	149.0
14	13	50.857	33.901	1149.265	.549	1.479	7	2.0	100.0	98.0

AVERAGE OBSERVATIONS PER CELL 6.5024

* Galileo Means, Standard Deviations, Variances, Skewness, Kurtoses, Counts, Minimum-Maximum Values, Range.

SET NUMBER 1

STATISTICS FOR COM DEPT I

ROW	COL	MEAN	STAN. DEV.	VARIANCE	SKEWNESS	KURTOSIS	COUNT	MIN. VAL	MAX. VAL	RANGE
2	1	15.714	4.949	24.490	-.249	.655	7	10.0	20.0	10.0
3	1	30.000	26.300	691.667	-.392	.939	6	45.0	110.0	65.0
3	2	77.167	51.117	2611.472	.626	2.095	6	10.0	173.0	163.0
4	1	57.200	17.927	321.360	-.258	1.397	5	30.0	80.0	50.0
4	2	142.857	156.567	24511.265	1.532	3.555	7	20.0	500.0	480.0
4	3	79.266	16.568	274.490	-.228	1.073	7	.0	55.0	55.0
5	1	53.200	15.587	243.760	-.855	1.898	5	25.0	71.0	46.0
5	2	115.857	162.472	26307.265	1.779	4.099	7	10.0	500.0	490.0
5	3	54.000	15.937	254.000	.627	1.121	5	40.0	80.0	40.0
5	4	20.714	9.035	81.633	-.649	1.494	7	5.0	30.0	25.0
6	1	46.809	56.379	3178.543	.565	2.305	9	2.0	200.0	198.0
6	2	45.030	75.593	5714.246	1.206	3.083	9	5.0	250.0	245.0
6	3	35.000	24.202	585.714	.945	1.076	7	5.0	70.0	65.0
6	4	14.167	10.172	103.472	.345	1.334	6	.0	30.0	30.0
6	5	28.000	21.673	469.714	1.140	3.100	7	1.0	75.0	74.0
7	1	54.286	28.714	824.490	.074	1.484	7	10.0	100.0	90.0
7	2	104.167	91.032	8296.806	1.497	3.190	6	30.0	300.0	270.0
7	3	63.000	28.566	816.000	.556	1.287	5	30.0	110.0	80.0
7	4	52.000	16.000	256.000	.844	1.478	5	40.0	80.0	40.0
7	5	47.857	23.733	563.265	-.125	1.153	7	10.0	75.0	65.0
7	6	198.500	181.699	33014.583	.399	1.208	6	1.0	500.0	499.0
8	1	55.143	36.333	1320.122	-.624	1.414	7	.0	100.0	100.0
8	2	118.167	104.905	11005.139	.722	1.413	6	10.0	300.0	290.0
8	3	20.250	15.122	228.687	.466	2.161	8	.0	50.0	50.0
8	4	38.000	19.131	366.000	-.078	1.145	5	10.0	65.0	55.0
8	5	35.375	29.996	899.734	.954	2.619	8	3.0	100.0	97.0
8	6	34.000	21.290	453.250	.421	2.041	8	5.0	75.0	70.0
8	7	44.167	26.207	686.906	1.428	3.083	6	20.0	100.0	80.0
9	1	128.000	168.785	28488.333	1.674	3.501	6	3.0	500.0	497.0
9	2	56.000	23.104	534.000	1.161	2.212	5	35.0	100.0	65.0
9	3	48.333	22.298	497.222	-.246	1.641	6	10.0	75.0	65.0
9	4	45.000	13.463	181.250	.576	1.732	8	30.0	70.0	40.0
9	5	33.750	14.737	217.148	1.710	4.332	8	20.0	70.0	50.0
9	6	48.750	24.590	604.698	.406	2.199	8	20.0	100.0	80.0
9	7	47.857	19.974	398.980	-.383	2.417	7	10.0	80.0	70.0
9	8	49.500	31.432	488.000	.667	1.707	8	10.0	100.0	90.0
10	1	55.000	32.404	1050.000	-.037	.952	9	10.0	95.0	85.0
10	2	32.000	25.085	629.250	.562	1.838	8	1.0	80.0	79.0
10	3	45.833	33.344	1111.906	-.580	1.956	6	25.0	125.0	100.0
10	4	74.286	27.312	745.918	-.254	1.098	7	35.0	110.0	75.0
10	5	57.143	26.707	713.265	-.249	1.146	7	15.0	90.0	75.0
10	6	47.857	70.905	5027.551	1.526	3.616	7	30.0	250.0	220.0
10	7	49.375	68.849	4740.214	.709	1.619	8	10.0	200.0	190.0
10	8	65.000	26.458	700.000	.041	.850	5	30.0	100.0	70.0
10	9	57.500	21.937	481.250	.160	.914	6	30.0	90.0	60.0
11	1	15.125	13.327	177.639	.345	1.971	8	1.0	40.0	39.0
11	2	44.286	43.295	1874.490	1.341	3.181	7	10.0	150.0	140.0
11	3	80.889	56.967	3245.210	1.113	2.443	9	20.0	200.0	180.0
11	4	55.167	24.836	616.806	.632	1.039	6	41.0	100.0	59.0
11	5	46.424	124.472	14505.132	2.011	4.672	7	20.0	400.0	380.0
11	6	42.500	19.203	369.750	-1.099	2.938	8	40.0	100.0	60.0
11	7	74.125	89.466	8084.109	1.918	4.704	8	10.0	300.0	290.0
11	8	90.714	53.079	2817.147	1.031	2.431	7	40.0	200.0	160.0
11	9	46.667	67.247	4522.222	1.313	2.336	6	20.0	220.0	200.0
11	10	41.625	27.541	748.494	.435	2.503	8	10.0	100.0	90.0
12	1	70.500	50.520	2552.250	1.472	4.237	10	20.0	200.0	180.0
12	2	90.625	58.760	3452.714	.849	2.197	8	30.0	210.0	180.0

TABLE 2-b*

Network Distance Matrix For Faculty

1.	PERSON A	0	1	1	1	2	2	1	1	1	2	2	2	2	2
2.	PERSON B	1	0	1	1	2	2	1	1	1	1	1	2	2	2
3.	PERSON C	1	1	0	2	1	1	1	1	1	2	2	2	1	2
4.	PERSON D	1	1	2	0	2	1	1	1	1	1	2	2	1	2
5.	PERSON E	2	2	1	2	0	2	2	2	1	1	1	1	2	1
6.	PERSON F	2	2	1	1	2	0	2	2	2	2	3	3	1	2
7.	PERSON G	1	1	1	1	2	2	0	1	1	1	2	1	2	2
8.	PERSON H	1	1	1	1	2	2	1	0	1	1	2	2	2	2
9.	PERSON I	1	1	1	1	1	2	1	1	0	1	1	1	2	1
10.	PERSON J	2	1	2	1	1	2	1	1	1	0	1	2	2	1
11.	PERSON K	2	1	2	2	1	3	2	2	1	1	0	1	3	1
12.	PERSON L	2	2	2	2	1	3	1	2	1	2	1	0	2	2
13.	PERSON M	2	2	1	1	2	1	2	2	2	2	3	2	0	2
14.	PERSON N	2	2	2	2	1	2	2	2	1	1	1	2	2	0

* Actual distance matrix would be 67 x 67, only the upper left section is represented here, giving the scores of faculty members. Scores referred to in the text are based on the total 67 x 67 matrix.

TABLE 2-c
Aggregate Means Matrix of Faculty Members

	1	2	3	4	5	6	7
1 PERSON A	.000						
2 PERSON B	15.714	.000					
3 PERSON C	80.000	77.167					
4 PERSON D	57.200	142.857	.000				
5 PERSON E	53.200	115.857	29.286	.000			
6 PERSON F	86.889	85.000	54.000	20.714	.000		
7 PERSON G	54.286	104.167	35.000	14.167	28.000	.000	
8 PERSON H	55.143	118.167	63.000	52.000	47.857	198.500	.000
9 PERSON I	128.000	56.000	20.250	38.000	35.375	34.000	44.167
10 PERSON J	55.000	32.000	48.333	45.000	33.750	48.750	47.857
11 PERSON K	15.125	54.286	85.833	74.286	57.143	87.857	89.375
12 PERSON L	70.500	90.625	80.889	65.167	86.429	82.500	74.125
13 PERSON M	188.250	78.200	39.000	47.500	54.875	61.600	46.667
14 PERSON N	93.750	86.000	57.800	28.000	36.875	108.000	75.000
			65.833	76.571	53.125	133.889	45.000
8		9	10	11	12	13	14
8 PERSON H	.000						
9 PERSON I	49.500	.000					
10 PERSON J	65.000	57.500	.000				
11 PERSON K	90.714	86.667	41.625	.000			
12 PERSON L	40.667	31.250	69.167	77.500	.000		
13 PERSON M	39.000	36.667	60.833	60.000	21.667	.000	
14 PERSON N	69.875	40.000	35.000	40.875	73.875	50.857	.000

TABLE 2-d
Coordinate Dimension Values For Faculty

	1	2	3	4	5	6	7
1 PERSON A	35.841	89.579	-30.141	-1.979	-1.134	1.322	-1.734
2 PERSON B	17.452	38.432	71.802	-24.506	1.1892	-.110	-.547
3 PERSON C	8.762	-13.227	-11.709	-27.172	17.500	-20.704	8.392
4 PERSON D	4.745	-22.854	-48.268	22.443	12.916	-1.994	-9.500
5 PERSON E	2.887	-13.941	-29.365	9.003	-25.866	-1.549	-6.454
6 PERSON F	98.531	-36.513	.360	1.728	-.809	-1.689	-1.250
7 PERSON G	-84.661	34.737	-26.449	-14.460	3.415	2.497	-2.959
8 PERSON H	3.563	-14.998	-34.528	-9.350	-7.050	6.205	22.814
9 PERSON I	-9.389	-32.245	16.004	-21.244	-17.672	-6.258	-15.880
10 PERSON J	3.007	16.948	30.073	22.226	-21.412	13.366	6.710
11 PERSON K	2.745	28.336	24.300	35.611	27.893	-1.981	-2.698
12 PERSON L	-2.507	-11.929	-10.050	-21.271	13.126	22.381	-6.831
13 PERSON M	-40.363	-70.884	31.790	9.431	11.024	6.513	5.253
14 PERSON N	-40.613	8.558	16.181	19.540	-13.823	-18.001	3.683
EIGENROOTS	21974.779	20527.949	14409.368	5363.712	3242.740	1573.467	1126.289
	8	9	10	11	12	13	14
1 PERSON A	.300	.185	.298	-.331	9.376	-46.355	59.794
2 PERSON B	.129	2.617	-2.848	-.910	28.929	5.536	-42.808
3 PERSON C	-.044	1.981	.647	14.121	-22.520	-13.499	-7.165
4 PERSON D	-.076	-2.999	-5.623	9.540	29.406	-7.042	-37.456
5 PERSON E	-.047	10.189	2.695	-3.503	-5.656	-10.180	-30.182
6 PERSON F	-.122	-.381	.793	-3.089	1.655	66.055	36.782
7 PERSON G	.116	1.386	-4.222	-1.303	-3.221	68.719	22.994
8 PERSON H	-.050	-2.956	-2.980	-13.889	2.800	-9.849	-29.896
9 PERSON I	-.108	-5.698	-5.021	-7.820	-17.289	-30.951	9.827
10 PERSON J	.057	-2.095	-3.551	17.932	-21.062	6.037	-4.445
11 PERSON K	.095	.524	-.705	-12.835	-27.693	-3.585	-20.771
12 PERSON L	-.040	-2.125	11.189	2.756	-5.581	-5.551	-19.213
13 PERSON M	-.237	3.863	-1.299	.113	14.960	-30.662	60.055
14 PERSON N	.029	-4.493	10.626	-.781	15.897	11.327	2.483
EIGENROOTS	.230	-211.173	-352.927	-1063.443	-4366.699	-13803.929	-15078.162

APPENDIX 3: GALILEO PLOTS

3-a X - Y Plane

3-b Y - Z Plane

3-c Plot of First Through
Real Dimensions

APPENDIX 3

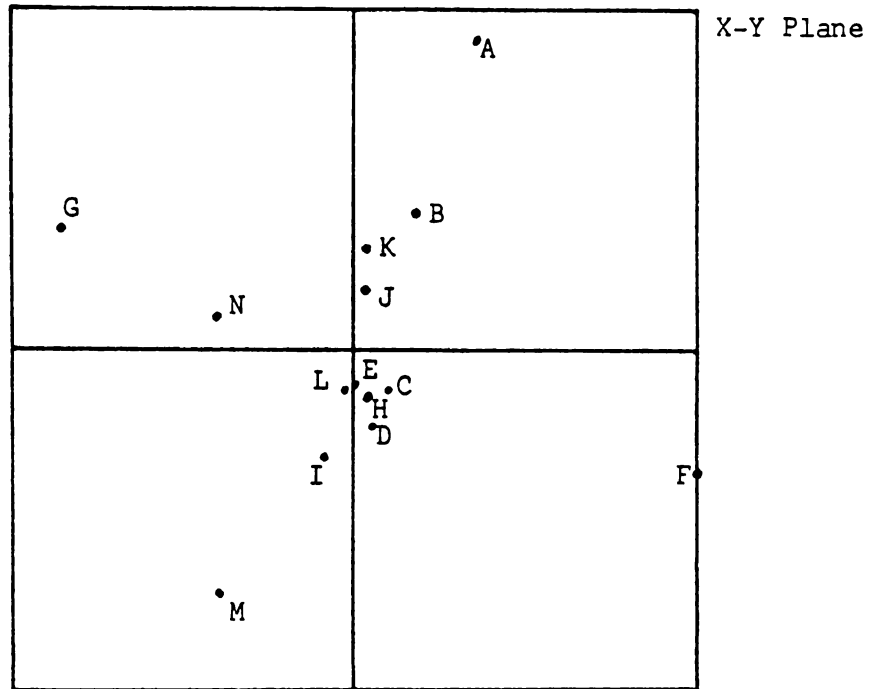


Figure 3-a Galileo Plots.

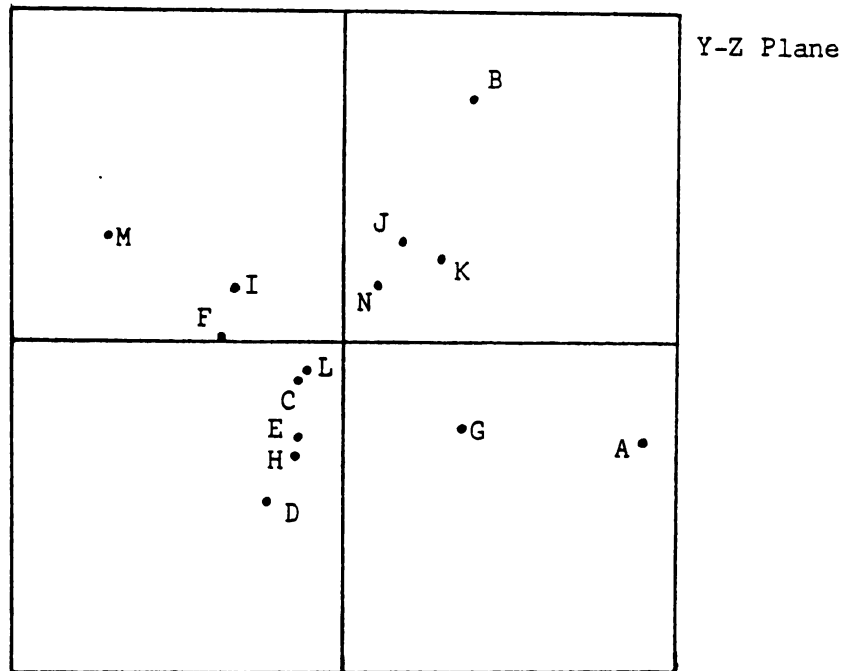


Figure 3-b X - Y Plane.

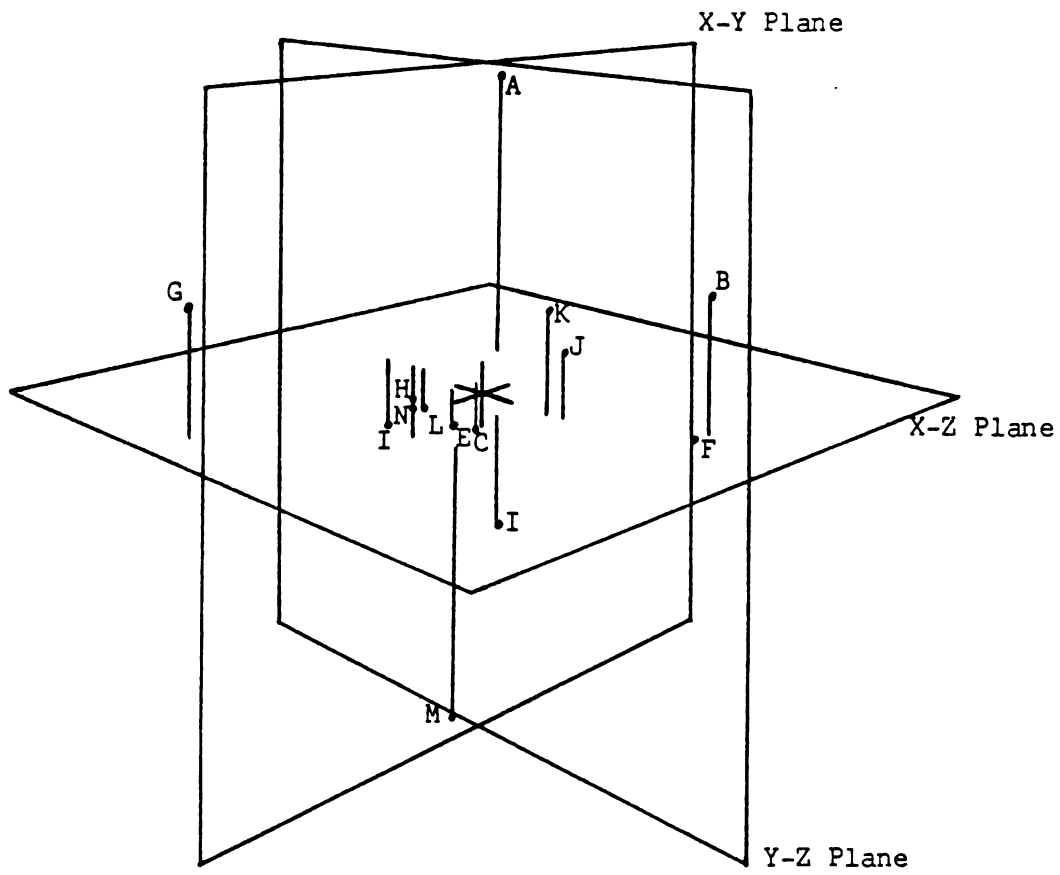


Figure 3-c First Through Real Dimensions.

REFERENCES

REFERENCES

- Anderson, N. H. "Application of an Additive Model to Impression Formation," Science, 138 (1962), 817-818.
- Anderson, N. H., and S. Herbert. "Effects of Concomitant Verbal Recall on Order Effects in Personality Formation," Journal of Verbal Learning and Verbal Behavior, (February 1963), 379-391.
- Anderson, N. H. "Averaging Versus Adding as a Stimulus - Combination Rule in Impression Formation," Journal of Experimental Psychology, 70 (1965), 394-400.
- Anderson, N. H., and A. Jacobsen. "Effects of Stimulus Inconsistency and Discounting Instructions in Personality Impression Formation," Journal of Personality and Social Psychology, 2 (1965), 531-539.
- Anderson, N. H. "Averaging Model Analysis of Set-size Effect in Impression Formation," Journal of Experimental Psychology, 75 (1967), 158-165.
- Anderson, N. H. "Likableness Ratings of 555 Personality Trait Words," Journal of Personality and Social Psychology, 9 (1968), 272-279.
- Asch, S. E. "Forming Impressions of Personality," Journal of Abnormal and Social Psychology, 41 (1946), 258-290.
- Asch, S. E. Review of "A Theory of Cognitive Dissonance by Festinger," Contemporary Psychology, 3 (1968), 194-195.
- Barnett, G. and J. Woelfel. "On the Dimensionality of Psychological Processes," paper presented at the Annual Meeting of the Psychometric Society, Bell Laboratories, Murray Hill, New Jersey, (April 1976).
- Barnett, G. Bilingual Information Processing: The Effects of Communication on Semantic Structure. Ph.D. dissertation, East Lansing: Department of Communication, Michigan State University, (1976).

- Berlo, D. K., R. V. Farace, P. R. Monge, S. A. Betty, and J. A. Danowski. "An Analysis of Communication Structure of the Office of Civil Defense," East Lansing, Michigan: Department of Communication, Michigan State University, (1972). (Report to the Office of Civil Defense.)
- Blumer, H. "Collective Behavior," New Outline of the Principles of Sociology, ed. A. M. Lee. New York: Barnes and Noble, (1946).
- Bruner, J. S., and R. Taguiri. "Person Perception," The Handbook of Social Psychology, ed. G. Lindzey. Vol 2, Reading, Mass.: Addison Wesley, (1954).
- Burgess, R. L. "Communication Networks and Behavioral Consequences," Human Relations, 22 (1969), 137-159.
- Brunswick, E. Perception and the Representative Design of Psychological Experiments, Berkley and Los Angeles: University of California Press, (1956).
- Byrne, D. "Interpersonal Attraction and Attitude Similarity," Journal of Abnormal and Social Psychology, 62 (1961), 713-715.
- Byrne, D. and D. Nelson. "Attraction as a Linear Function of Proportion of Positive Reinforcement," Journal of Social Psychology, 1 (1965), 659-663.
- Byrne, D., J. Lambreth, J. Palmer, and O. London. "Sequential Effects as a Function of Explicit and Implicit Interpolated Attraction Responses," Journal of Personality and Social Psychology, 13 (1969), 70-78.
- Cartwright, D. "Achieving Change in People: Some Applications of Group Dynamics Theory," Human Relations, 4 (1951), 381-392.
- Cartwright, D. and H. Zander. Group Dynamics, New York: Harper and Row, (1968).
- Cohen, A. "Cognitive Tuning as a Factor Affecting Impression Formation," Journal of Personality, 29 (1961), 235-245.
- Cohen, A., E. L. Robinson, and J. L. Edwards. "Experiments in Organizational Embeddedness," Administrative Science Quarterly, 14 (1969), 208-221.

- Collins, B. E., and B. H. Raven. "Group Structure: Attraction, Coalition, Communication and Power," The Handbook of Social Psychology, ed. G. Lindzey. Vol. 4, Reading, Mass.: Addison-Wesley, (1969).
- Cooley, C. H. Human Nature and the Social Order, New York: Scribner's, (1902).
- Cottrell, L. S. "The Analysis of Situational Fields in Social Psychology," American Sociological Review, 7 (1942), 370-382.
- Cronbach, L. J. "Processes Affecting Scores on 'Understanding of Others' and 'Assumed Similarity,'" Psychological Bulletin, 52 (1955), 177-193.
- Dailey, C. A. "The Effects of Premature Conclusion Upon the Acquisition of Understanding of a Person," Journal of Psychology, 33 (1952), 133-152.
- Danowski, J. A. Environmental Uncertainty, Group Communication Structure and Stress, M.A. thesis, East Lansing: Department of Communication, Michigan State University, (1974).
- Dornbusch, S. M., A. H. Hastorf, S. A. Richardson, R. E. Muzzy, and R. S. Vreeland. "The Perceiver and Perceived: Their Relative Influence on Categories of Interpersonal Perception," Journal of Personality and Social Psychology, 1 (1965), 434-440.
- Durkheim, E. The Rules of Sociological Method, trans. G. E. Catlin. Chicago: The University of Chicago Press, (1938).
- Durkheim, E. The Division of Labor in Society, trans. G. Simpson. Glencoe: The Free Press, (1947).
- Durkheim, E. Selections From His Work. Introduction and Commentaries by G. Simpson, Thomas Y. Crowell Company, University of New York, (1963).
- Farace, R. V., W. D. Richards, P. R. Monge, and E. Jacobson. "Analysis of Human Communication Networks in Large Social Systems," (unpublished paper). East Lansing: Michigan State University, Department of Communication, (1973).
- Farace, R. V. and P. R. Monge. "Analysis of Human Communication Networks in Large Social Systems," research proposal submitted to National Science Foundation, Department of Communication, Michigan State University, February, (1973).

- Festinger, L. "A Theory of Social Comparison Processes," Human Relations, 7 (1954), 117-140.
- Fillenbaum, S. and A. Rapaport. Structures in the Subjective Lexicon, New York: Academic Press, (1971).
- Frijda, D. H. "Recognition of Emotion," Advances in Experimental Social Psychology, ed. L. Berkowitz, New York: Academic Press, (1969).
- Gallob, H. F., and G. W. Fischer. "Some Relationships Between Social Inference, Cognitive Balance and Change in Impression," Journal of Personality and Social Psychology, 26 (1973), 16-22.
- Gillham, J. R. "The Aggregation of Shared Information in a Sociology Department," unpublished Ph.D. dissertation, Urbana: University of Illinois, (1962).
- Gillham, J. R. and J. Woelfel. "A Sociological Illustration of Construct Explication Using Multi-dimensional Scaling," Central States Sociological Association Annual Meeting, Windsor-Ontario, (1974).
- Glanzer, M. and R. Glaser. "Techniques for the Study of Group Structure and Behavior: I Analysis of Structure," Psychological Bulletin, 56 (1959), 317-332.
- Glanzer, M. and R. Glaser. "Techniques for the Study of Group Structure and Behavior: II Empirical Studies of the Effects of Structure in Small Groups," Psychological Bulletin, 58 (1961), 1-27.
- Griffitt, W. B., D. Byrne, and B. H. Bond. "Proportion of positive Adjectives and Personal Relevance of Adjectival Descriptions as Determinants of Attraction," Journal of Experimental Social Psychology, 7 (1971), 111-121.
- Guetzhow, H. "Communication in Organizations," Studies on Behavior in Organizations: A Research Symposium, ed. R. W. Bowers, Athens, Georgia: University of Georgia Press, (1965).
- Hakel, M. "Significance of Implicit Personality Theories for Personality Research and Theory," Proceedings of the Psychological Association, (1969).
- Hastorf, A. H., D. J. Schneider, and J. Polefka. Person Perception. Massachusetts: Addison-Wesley, (1970).
- Heider, F. "Social Perception and Phenomenal Causality," Psychological Review, 51 (1944), 358-374.

- Heider F. The Psychology of Interpersonal Relations, New York: Wiley, (1958).
- Homans, G. C. Social Behavior: Its Elementary Forms, New York: Harcourt, Brace, and World, (1961).
- Johnson, J. D. "The Analysis of Organizational Communication Phenomena Over Time: Some Selected Methods Applied to Communication Networks," paper contributed to International Communication Association Convention, Chicago, (1975).
- Jones, E. E. and R. E. Nisbett. The Actor and the Observer: Divergent Perceptions of the Causes of Behavior," Attribution: Perceiving the Causes of Behavior, ed. Jones et al., Morristown, New Jersey: General Learning Press, (1972).
- Kanouse, D. E. "Language, Labeling and Attribution," Attribution: Perceiving the Causes of Behavior, ed. E. E. Jones et al., Morristown, New Jersey: General Learning Press, (1972).
- Kaplan, M. F. "Interpersonal Attraction as a Function of Relatedness of Similar and Dissimilar Attitudes," Journal of Experimental Research in Personality, 6 (1972), 17-21.
- Kelley, G. A. The Psychology of Personal Constructs, New York: Norton, (1955).
- Kelley, H. "The Warm-Cold Variable in First Impressions," Journal of Personality, 18 (1950), 431-439.
- Kogan, N. and R. Tagiuri. "Interpersonal Preference and Cognitive Organization," Journal of Abnormal and Social Psychology, 56 (1958), 113-116.
- Leeper, R. "The Role of Motivation in Learning: A Study of the Phenomenon of Differential Motivation Control of the Utilization of Habits," Journal of Genetic Psychology, 46 (1935), 3-40.
- Leventhal, H. "The Effects of Set and Discrepancy on Impression Change," Journal of Personality, 30 (1962), 1-15.
- Large, I, D. Fox, J. Davitz, and M. Brenner. "A Survey of Studies Contrasting the Quality of Group Performance and Individual Performance," Psychological Bulletin 55 (1958), 337-372.

- Lott, B. E., and A. J. Lott. "The Formation of Positive Attitudes Toward Group Members," Journal of Abnormal and Social Psychology, 61 (1960), 297-300.
- Luchin, A. S. "Primacy-Recency in Impression Formation," The Order of Presentation in Persuasion, ed. C. Hovland, New Haven, Conn.: Yale University Press, (1957).
- Luchin, A. S. "Definiteness of Impression and Primacy-Recency in Communication," Journal of Social Psychology, 48 (1958), 275-290.
- Luchin, A. S. "Definiteness of Impression and Primacy-Recency Effects in Impression Formation," Journal of Abnormal and Social Psychology, 68 (1964), 335-388.
- Manis, M. S., S. C. Cornell, and J. C. Moore. "The Transmission of Attitude-Relevant Information Through a Communication Chain," Journal of Personality and Social Psychology, 30 (1974), 81-94.
- Mead, G. H. Mind, Self and Society, (posthumous) ed. C. M. Morris, Chicago: University of Chicago Press, (1934).
- Mead, G. H. The Philosophy of the Act, edited, with Introduction by, Charles W. Morris, in collaboration with J. Brewster, A. Dunham, D. Miller, Chicago, Ill: The University of Chicago Press, (1938), (1950).
- Mead, G. H. The Social Psychology of George Herbert Mead, ed. Anselm Strauss, Chicago: University of Chicago Press, (1956).
- Messick, S. and N. Kogan. "Personality Consistencies in Judgment: Dimensions of Role Constructs," Multi-variate Behavioral Research, 1 (1966), 165-175.
- Miller, D. L., and G. H. Mead. Self, Language and the World, Austin: University of Texas Press, (1973).
- Miyamoto, S. F., and S. M. Dornbusch. "A Test of Interactionist Hypotheses of Self-Conception," American Journal of Sociology, 61 (1956), 399-403.
- Monge, P. R., K. Kirste, and J. Edwards. "A Preliminary Causal Model of the Formation of Communication Structure in Large Organizations," paper presented to the International Communication Association, New Orleans, (1974).

- Morris, C. W. Varieties of Human Value, Chicago: University of Chicago Press, (1956).
- Newcomb, T. M. "The Prediction of Interpersonal Attraction," American Psychologist, 11 (1956), 575-586.
- Norman, W. T. "Toward an Adequate Taxonomy of Personality Attributes: Replicated Factor Structure in Peer Nomination Personality Ratings," Journal of Abnormal and Social Psychology, 66 (1963), 574-583.
- Osgood, C., G. J. Suci, and P. H. Tannenbaum. The Measurement of Meaning, Urbana, Illinois: University of Illinois Press, (1957).
- Parsons, T. The Social System, New York: The Free Press of Glencoe, (1951).
- Parsons, T. and E. A. Shils. Toward a General Theory of Action, Cambridge: Harvard University Press, (1951).
- Passini, F. T. and W. T. Norman. "A Universal Conception of Personality Structure?," Journal of Personality and Social Psychology, 4 (1966), 44-49.
- Posavac, E. J. and S. J. Pasko. "Interpersonal Attraction and Confidence of Attitudes and Attitude Similarity," Psychometric Science, 23 (1971), 433-435.
- Richards, W. D. "A Conceptually Based Method for the Analysis of Communication Networks in Large Complex Organizations," paper presented to the International Communication Association Conference, Phoenix, (1971).
- Richards, W. D. "Network Analysis in Large Complex Systems: Theoretical Base," paper presented to the International Communication Association Conference, New Orleans, (1974a).
- Richards, W. D. "Network Analysis in Large Complex Systems: Techniques and Methods: Tools," paper presented to the International Communication Association Convention, New Orleans, (1974b).
- Richards, W. D., R. V. Farace, and J. A. Danowski. NEGOPY: Program Description, unpublished paper, East Lansing, Mich.: Department of Communication, Michigan State University Press, (1973).

- Riecken, H. W. and G. C. Homans. "Psychological Aspects of Social Structure," Handbook of Social Psychology, ed. G. Lindzey, Cambridge Mass: Addison-Wesley, (1954), 786-832.
- Rome, S. and B. Rome. "The Leviathan Technique for Large-Group Analysis," Behavior Science, 6 (1961), 148-152.
- Rosenkrantz, P. S. and W. Crockett. "Some Factors Influencing the Assimilation of Disparate Information in Impression Formation," Journal of Personality and Social Psychology, 9 (1965), 283-294.
- Saltiel, J. and J. Woelfel. "Accumulated Information and Attitude Change," Human Communication Research, 4 (1975), 333-334.
- Schachter, S. "Deviation, Rejection, and Communication," Journal of Abnormal and Social Psychology, 46 (1951), 190-207.
- Schreiman, D. B. and J. D. Johnson. "A Model of Cognitive Complexity and Network Role," paper contributed to International Communication Association, Chicago, (1975).
- Shapiro, D. and R. Taguiri. "Sex Differences in Inferring Personality Traits," Journal of Psychology, 47 (1959), 127-136.
- Shaw, M. E. Group Dynamics: The Psychology of Small Group Behavior, New York: McGraw-Hill Book Company, (1971).
- Sherif, M. and C. Sherif. Groups in Harmony and Tension, New York: Harper, (1953).
- Simpson, G. Emile Durkheim, Selections From His Work, New York: Thomas Y. Crowell Company, University of New York, (1963).
- Stewart, R. "Effects of Continuous Responding on the Order Effects in Personality Impression Formation," Journal of Personality and Social Psychology, 1 (1965), 161-165.
- Stotland, E. "Determinants of Attraction to Groups," Journal of Social Psychology, 49 (1959), 71-80.
- Stotland, E., N. B. Cattrell, and G. Laing. "Group Interaction and Perceived Similarity of Members," Journal of Abnormal and Social Psychology, 61 (1960), 335-340.

- Tagiuri, R. and L. Petrulla. Person Perception and Interpersonal Behavior, Stanford: Stanford University Press, (1958).
- Tagiuri, R. "Person Perception," The Handbook of Social Psychology, ed. G. Lindzey and E. Aronson, Reading, Mass.: Addison-Wesley, Vol. 3' (1969), 395-449.
- Tajfel, H. and S. D. Cawasjee. "Value and the Accentuation of Judged Differences: A Confirmation," Journal of Abnormal and Social Psychology, 59 (1959), 436-439.
- Thompson, J. D. "Authority and Power in 'Identical' Organizations," American Journal of Sociology, 62 (1956), 290-301.
- Triandis, H. C. and M. Fishbein. "Cognitive Interaction in Person Perception," Journal of Obnormal and Social Psychology, 67 (1963), 446-453.
- Turner, R. H. "Role Taking, Role Standpoint, and Reference-Group Behavior," American Journal of Sociology, 61 (1956), 316-328.
- Walters, H. A. and D. N. Jackson. "Group and Individual Regularities in Trait Inference: A Multidimensional Scaling Analysis," Multidimensional Behavioral Research, 1 (1966), 145-163.
- Warr, D. B. and C. Knapper. The Perception of People and Events, New York: Wiley, (1968).
- Weick, K. E. The Social Psychology of Organizing, Reading, Mass.: Addison-Wesley, (1969).
- Wiggins, N., P. Hoffman, and T. Taber. "Types of Judges and Cue Utilization in Judgments of Intelligence," Journal of Personality and Social Psychology, 12 (1969), 52-59.
- Woelfel, J. Sociology and Science, (forthcoming) (1972).
- Zazonc, R. "The Process of Cognitive Turning in Communication," Journal of Abnormal and Social Psychology, 61 (1960), 159-167.

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