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COMMUNICATION AND PERCEPTIONS OF ORGANIZATIONAL CLIMATE: AN EMPIRICAL ANALYSIS

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# COMMUNICATION AND PERCEPTIONS OF ORGANIZATIONAL CLIMATE: AN EMPIRICAL ANALYSIS

Ву

Terrance Lynn Albrecht

## A DISSERTATION

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

## DOCTOR OF PHILOSOPHY

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#### ABSTRACT

#### COMMUNICATION AND PERCEPTIONS OF ORGANIZATIONAL CLIMATE: AN EMPIRICAL ANALYSIS

Ву

#### Terrance Lynn Albrecht

This dissertation reports a study of communication and members' perceptions of the environmental "climate" of the organization. Specifically, the study investigated differences in perceptions based on aspects of involvement in the informal communication system of the organization.

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The research questions pursued in the study were developed after an extensive review of previous climate research in the fields of communication and organizational behavior. Prior studies in both fields had not fully examined climate perceptions from a communication perspective. That is, neither body of work had conceptualized the nature of perceptions based on communication theory with constructs concerning aspects of the information flow in the organization.

The present study sought to overcome these inadequacies by developing an approach to the study of climate, based on a theory which specifies how attitudes are shaped by the nature of information flow. Since Durkheim (1938), organizational theorists have recommended the utility of studying cognitive processes in conjunction with social

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structure. This conceptual approach followed the recommendation by combining force aggregation theory with the constructs of communication structure, information needs, and communication rules. The results of the study conducted in a unionized manufacturing plant show that such a framework of attitudes and information flow is particularly useful for explaining the nature of environmental perceptions.

Specifically, the study found several significant differences in perceptions between "key" communicators and "non-key" communicators (those often isolated from informal message flow). Support was found for hypotheses asserting that key communicators tend to perceive themselves psychologically "closer" to managers, as well as more central to their cognitive environments. In addition, overall properties (e.g., size and shape) of the cognitive spaces for the two groups tended to differ, with the space for the key communicators showing somewhat less variability. The report of the study concludes with directions for future research. This dissertation is dedicated to my parents, . William H. and Lorraine Bowers Albrecht, in gratitude for their love and support the past twenty-five years.

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## CHAPTER I

#### CONCEPTUAL DEVELOPMENT OF "ORGANIZATIONAL CLIMATE"

## Overview

A frequent concern of individuals in modern society is the quality of their social as well as their physical environment. The concept of the "quality of the work environment" is a common theme in arguments advanced by industrial unionists and managers. The federal government has spent millions of dollars for research on the "quality of work life." Observers of the private sector have written extensively on the importance of a "healthy" work setting (Davis and Cherns, 1975).

"Quality of work life" is generally referred to as the overall decency of the working conditions, with maximum protection against health and safety hazards, the equal opportunity for creative and rewarding work, fair and equitable treatment, and the chance to participate in decisionmaking processes affecting the work place (Danz, 1976).

The thinking of several well-known researchers (Mayo, 1949; Simon, 1957; McGregor, 1960; and Likert, 1967) of the post-machine model era has fostered this view. Researchers have begun to consider the factor of human relations in the

organizational setting, and its effect on morale and motivation to work (Greiner, Leitch, and Barnes, 1968). This view contrasts with earlier work by Weber (1947) and others who conceived of workers in the organization as replaceable parts in an efficient machine.

Consideration of the quality of the work environment has been discussed most recently by several researchers in the fields of organizational behavior. As Tagiuri and Litwin (1968) note:

> We are in a period of special concern with our environment. More than ever before man feels he cannot affect the ecology--human and physical--without giving serious thought to the consequences. With such concern goes the effort to understand what environmental variables are important to man, and how they interact. Where the environment is human-attitudes, responses, values, rewards--the problem is subtle and ephemeral. Yet there is little question that these aspects of the setting in which a man carries out a particular task strongly affect his conduct (p. 1).

Communication researchers have also been interested in the concept of climate, arguing that perceptions of the workplace are affected by aspects of the organization's communication system. Some of these aspects include managerial style, informal communication patterns, type of decisionmaking process, morale of members, etc. (Farace, Monge and Russell, 1977).

This chapter provides a selective review of representative studies from the fields of organizational behavior and communication. Literature cited spans two decades, and

was accumulated by means of a computer-based search of journals. The journals contained studies from the fields of communication, organizational behavior, sociology, psychology and education.

#### Development of the Construct: Previous Research

This section reviews key conceptual and empirical work on organizational climate. The large body of research literature has been summarized by several authors (Campbell, Dunnette, Lawler and Weick, 1970; Hellriegel and Slocum, 1974; James and Jones, 1974; Payne and Pugh, 1975). The present review identifies key studies and provides a critique of the methodological and conceptual limitations associated with them.

The presentation is organized as follows: (1) a review of the conceptual development of the construct is presented, including definitions and dimensions traditionally used as referents for climate; (2) major operationalizations of the construct are provided; and (3) specific empirical findings are reported.

#### Conceptual Development

Researchers have made numerous attempts to define the concept of climate. Definitions posited by organizational behaviorists have principally involved a description of the "environment" as perceived by members of the organization. Many investigators have adopted Tagiuri's (1968) definition

of climate which posits that climate is:

the relatively enduring quality of the internal environment of an organization that (a) is experienced by its members; (b) influences their behavior; and (c) can be described in terms of the values of a particular set of characteristics (or attributes) of the organization (p. 27).

Expanding on Tagiuri's definition, Pritchard and Karasick (1973) refer to climate as:

> a relatively enduring quality of an organization's internal environment distinguishing it from other organizations: (a) which results from the behavior and policies of members of organizations, especially top management; (b) which is perceived by members of the organization; (c) which serves as a basis for interpreting the situation; and (d) acts as a source of pressure for directing activity (p. 126).

Others, such as Evan (1968) postulate that climate is the "multidimensional perception" of the essential attributes or character of an organizational system. Hellriegel and Slocum (1974) define climate as a set of attributes which can be perceived about a particular organization and/or its subsystems and that may be induced from the way that organization and/or its subsystems deal with their members and environment.

Schneider (1975) defines climate as perceptions that are meaningful "molar" descriptions people can agree characterize a system's practices and procedures. Schneider posits that a system may exhibit many climates, according to the type of practices and procedures its member adopt. He argues that people who agree on the organization's practices and procedures have similar perceptions of the climate, and generally behave similarly. However, if the climate is one which rewards and supports the display of individual differences, people in the same system will not behave similarly.

<u>Communication researchers have conceptualized climate</u> <u>in terms of communication variables</u>. Johnson (1977) referred to climate as the result of interaction modes in an organization, i.e., "the quality of integration among group members, their intentions and their actions." Schneider, Donaghy and Newman (1976) consider "communication climate" to be the degree to which individuals perceive (1) empathy; (2) encouragement for participation; and (3) a communication structure which adequately fulfills their information needs.

Dennis (1975) defined climate as "a subjectively experienced quality of the internal environment of an organization; the concept embraces a general cluster of inferred predispositions, identifiable through reports of members' perceptions of messages and message-related events occurring in the organization." He posited that perceptions may be a product of singular or multiple organizational events, which could include experiences with superordinates, peers and subordinates, experiences with work groups, experiences with top management and/or experiences with organizational media.

In summary, most researchers refer to climate as a set of perceptions, attitudes, and assumptions which members of an organization hold about their overall job environment, and/or their relationships with members of that environment.

In addition to the formal conceptual definitions, researchers have operationalized the construct by developing sets of perceptual dimensions to further clarify the generalized notion of "environmental quality."

## Operational Development

Investigators have identified components of dimensions of climate which they have used as referents for the construct. Generally they have constructed taxonomies of climate dimensions by first measuring individual perceptions of a series of organizational properties, and subsequently using factor analysis to discover which items load on different factors. The dimensions reported in the literature generally refer to two categories of perceptions: (1) <u>behaviors</u> in the organization (e.g., amount of upward communication); and (2) "<u>feelings</u>" of members in the organization (e.g., amount of warmth, intimacy, openness, etc.). The following describes a representative set of operational definitions from studies conducted by several researchers in the climate area.

One of the earliest studies was conducted by Halpin and Croft (1963) of various climates in elementary schools. They developed the "Organizational Climate Description Questionnaire" (OCDQ), comprised of 64 items. Using factor analysis, they found the items clustered on eight dimensions, four of which referred to characteristics of groups in the organization, and four of which referred to behaviors of leaders:

- 1. Characteristics of the Group
  - 1. Disengagement: describes a group which is
     "going through the motions"; a group that
     is "not in gear" with respect to the task
     at hand.
  - 2. <u>Hindrance</u>: those feelings by members that they they are burdened by routine duties and other requirements deemed trivial, busy work; their work is not facilitated.
  - 3. Esprit: refers to general feelings of morale.
  - 4. Intimacy: members' opportunities for and enjoyment of social relationships.
- 2. Behaviors of Leaders
  - 1. <u>Aloofness</u>: management behavior is characterized as formal and impersonal; describes an "emotional" distance between the manager and subordinates.
  - 2. <u>Production Emphasis</u>: refers to management behavior characterized by close supervision; management is highly directive and insensitive to communication feedback.
  - 3. <u>Thrust</u>: refers to management behavior to "get the organization moving," and behavior is viewed as highly task-oriented.
  - 4. <u>Consideration</u>: the inclination to be concerned with employees as human beings.

Revising an earlier work, Litwin and Stringer (1968) developed a questionnaire to measure organizational members' perceptions of aspects of their jobs and the organization. Using factor analysis, the authors found eight dimensions which they labeled as:

- <u>Structure</u>: perceptions of the extent of organizational constraints, rules, regulations, etc.
- 2. <u>Individual Responsibility</u>: extent to which one perceives he is autonomous in the organization.
- Rewards: perceptions related to feeling confident of adequate and appropriate rewards --pay, praise, special dispensations.
- 4. <u>Risk and Risk Taking</u>: perceptions of the degree of challenge and risk in the work environment.

- 5. <u>Warmth</u>: the feeling of general good fellowship that prevails in the work group atomosphere.
- 6. <u>Support</u>: the perceived helpfulness of the managers and other employees in the group; emphasis on mutual support from above and below.
- 7. <u>Standards</u>: the perceived importance of implicit and explicit goals and performance standards.
- 8. <u>Identity</u>: the feeling that you belong to a company and you are a valuable member of a working team.

Sells (1968) emphasized the potential value of a social systems model of organizations. He identified eight components of systems which he argued were determinants of the system's overall climate. They include the following: (1) objectives and goals of the organization (which provide direction and constraints on behavior); (2) the governing philosophy and value system of the organization; (3) the composition of personnel; (4) structural aspects (e.g., size, differentiation, autonomy, modes of control, role structure); (5) the influence of technology on the system's operation; (6) the physical environment; (7) the socio-cultural environment (language, communication, living standards, social stratification, etc.) and (8) temporal characteristics (i.e., the overall duration of the system, the duration of individual performance, and the remoteness of goals which sustain participation of organizational members).

Pritchard and Karasick (1973) generated their factors by reviewing the literature and interviewing managers. The results of their search produced the following climate scales:

- <u>Autonomy</u>: degree of freedom managers have in day-to-day operations.
   <u>Conflict vs. Cooperation</u>: degree to which managers either compete with each other or work together in accomplishing tasks.
   <u>Social Relation</u>s: degree to which the organization has a friendly, warm atmosphere.
- 4. <u>Structure</u>: degree to which the organization specifies the methods of procedures used to accomplish tasks.
- 5. <u>Level of Rewards</u>: degree to which managers are well rewarded.
- 6. <u>Performance-Reward Dependency</u>: extent to which the reward system is fair and appropriate.
- 7. <u>Motivation to Achieve</u>: degree to which the organization attempts to excel.
- 8. <u>Status Polarization</u>: degree to which there are definite physical and psychological distinctions between managerial levels.
- 9. <u>Flexibility and Innovation</u>: willingness to try new procedures and experiment with change.
- 10. Decision Centralization: extent to which the organization delegates the responsibility for making decisions either as widely as possible or centralizes it as much as possible.
- 11. <u>Supportiveness</u>: degree to which the organization is interested in and willing to support its managers in both job-related and non-job-related matters.

Waters, Roach and Batlis (1974) adapted five scales constructed by House and Rizzo (1971) on organizational practices. These include:

- 1. <u>Conflict and Inconsistency</u>: the degree to which policies, procedures, standards of performance and directions are inconsistent or inconsistently applied.
- 2. Formalization: the degree to which standard practices are formalized explicitly.
- 3. <u>Adequacy of Planning</u>: the degree to which plans are viewed as adequate to accomplish job objectives.
- 4. <u>Selection Based on Ability and Performance</u>: the degree to which selection is based on ability and performance, rather than

politics, personality, or educational credentials.
5. <u>Tolerance of Error</u>: the degree to which errors are dealt with in a supportive, learning manner rather than in a threatening, punitive, blame-oriented manner.

These authors combined the House and Rizzo scales with an adaptation of the Halpin and Croft dimensions and the dimensions of Litwin and Stringer (1968). They used factor analysis to identify five underlying factors of the combined scales. The factors they found include the following:

- 1. Factor I: formalization, structure, disengagement, adequacy of planning, conflict and inconsistency, reward, selection on ability and performance, identity, and esprit. This dimension was labeled "Effective Organization Structure."
- 2. Factor II: responsibility, and hindrance. This factor was labeled "Work Autonomy Vs. Encumbered by Nonproductive Activities."
- 3. <u>Factor III</u>: production emphasis and aloofness. This factor was named "Close Impersonal Supervision."
- 4. <u>Factor IV</u>: standards, conflict, and risk. This factor was named "Open Challenging Environment."
- 5. Factor V: intimacy, support, warmth, consideration, thrust, esprit, identity, tolerance of error, and reward. They identified this factor as "Management and Peer Support."

Lawler, Hall, and Oldham (1974) asked a sample of respondents to rate their organization's climate on a number of bipolar adjective scales. The five factors they found are:

> 1. <u>Factor I</u>: <u>Competent/Potent</u> Inhibited-Uninhibited Shallow-Deep Unscientific-Scientific

Impersonal-Personal Uncreative-Creative

- 2. <u>Factor 2</u>: <u>Responsible</u> <u>Irresponsible-Responsible</u> Moral-Amoral
- 3. <u>Factor 3</u>: <u>Practical</u> <u>Realistic-Idealistic</u> <u>Unconventional-Conventional</u>
- 4. <u>Factor 4</u>: <u>Risk-Oriented</u> Daring-Cautious Aggressive-Unaggressive Cold-Warm Weak-Strong
- 5. Factor 5: Impulsive Active-Passive Objective-Subjective

As this review demonstrates, there are many dimensions which have been generated by previous research. Similar results have been found by Schneider and Snyder (1975); LaFollette and Sims (1975); Proctor, Lassiter, and Soyars (1976); and Churchill, Ford and Walker (1976).<sup>1</sup>

However, it is important to note that several researchers have included communication in their study of organizational climate. Among the best known is Likert (1967) who developed several dimensions of climate which involved communication. The include the following: (1) understanding between superior and subordinate on job responsibilities, goals, etc.; (2) the motivation to communicate fully and accurately, combined with the avoidance of irrelevant issues in order to

<sup>1</sup>For longer review of previous work in this area, the reader is referred to Albrecht, 1978.

combat overload; (3) responsiveness to downward-directed com-

munication; (4) the willingness and ability to maintain accurate upward-directed communication; and (5) the adequacy and accuracy of "lateral" communication.

Dennis (1975), following Redding (1972) postulated that "communication" climate contained the following seven components:

- 1. <u>Supportiveness</u>: the subordinate's sense of personal worth and importance is increased with his communication relationship with his supervisor.
- 2. <u>Participative Decision-Making</u>: the perception that upward communication is such that influence processes are potentially reciprocal.
- 3. <u>Trust, Confidence, Credibility</u>: the extent to which message sources and/or communication events are judged believable.
- 4. Openness and Candor: the underlying nature of the candid type of message can be viewed as "task-oriented" or "non-task-oriented," "personal" or "impersonal," and "about ideas" or "about feelings."
- 5. <u>High Performance Goals</u>: the emphasis and clarity on high performance goals which includes the assumption that communication is the principal means by which most organizations secure commitments from their members to the achievement of organizational objectives.
- 6. Information Adequacy/Communication Satisfaction: the perceptions about the quantity and/or quality of information received and the satisfaction one experiences when exposed to communication (or communication-related) stimuli in the organization.
- 7. <u>Semantic-Information Distance</u>: the extent to which two parties experience a "perceptual" disparity in their orientation toward the same issue.

Using factor analysis, Dennis found the following five

factors:

- 1. Factor I: related to the supportiveness from a superior perceived by a subordinate.
- 2. Factor II: perceived quality and accuracy of downward communication.
- 3. <u>Factor III</u>: superior's perceptions of communication relationships with subordinates such as openness and empathy.
- 4. Factor IV: perceptions of upward communication opportunities and the degree of influence.
- 5. <u>Factor V</u>: perceptions of reliability of information received from subordinates and colleagues.

In summary, this discussion has provided a review of major sets of operationalizations of the climate construct. Researchers have typically constructed scales to measure individual perceptions of various organizational practices and procedures. Using factor analytic techniques, they have generated many dimensions with different samples to refer to the overall construct.

There are, however, several similarities among these dimensions. Most of the dimensions which refer to behaviors in the organization refer to one of four major areas of perceptions. These include aspects of the job, management, relations with coworkers, and the organization as a whole.

These dimensions, culled from prior literature, can be grouped in the following manner:

#### The Job

Employee Independence Individual Responsibility Influence in Standards Innovativeness of Employee Role Ambiguity Role Conflict Time in Position Job Standards Work Autonomy Management

Managerial Aloofness Close Impersonal Supervision Frequency of Communication Managerial Structure Status Polarization

#### Relations with Coworkers

Conflict vs. Cooperation Social Relations/Morale

#### The Organization

Hindrance
New Employee Concern
Number of Departments (affecting
 employee)
Organizational Innovation
Participative Decision-Making
Policy and Promotion Clarity
Rewards
Organizational Structure

These dimensions of climate have been found to be related to several organizational variables. The following section identifies those correlates and provides a brief explanation of each.

## Organizational and Individual Variables Used as Correlates

The importance of the previous research on climate is demonstrated in the general pattern of significant relationships found between climate dimensions and several organizational variables. The preceding categories of dimensions have been related to a number of other variables present in the work setting. The accumulated body of knowledge about climate shows that it is related principally to several satisfaction and performance variables. A review of the major correlates follows; the overall set of relationships is summarized in Table 1.

Job Satisfaction: Typically, researchers have examined relationships involving job satisfaction components. They have typically used such scales as the Job Description Index (JDI); (Smith, Kendall and Hulin, 1969), which assesses five dimensions of job satisfaction: satisfaction with work, pay, promotion opportunities, supervision, and co-workers.

Churchill, Ford and Walker (1976) adapted the JDI to measure satisfaction with: (1) the job itself (e.g., satisfaction with the general nature of the job, opportunities for accomplishment and growth, etc.); (2) fellow workers; (3) supervision; (4) company policies and support (e.g., company benefits, sales training, promotional support, competence of management, etc.); (5) pay; (6) promotion and advancement; and (7) customers.

Pritchard and Karasick (1973) measured satisfaction from a global index of job satisfaction items. The items included measures of aspects of the job such as security, working conditions, and advancement opportunities.

Job Facets: In contrast to measuring overall satisfaction, Lyon and Ivancevich (1974) preferred to focus on specific aspects (termed "facets") of the job in assessing the level of employee job satisfaction. Their job facets included: (1) self-actualization; (2) autonomy; and (3) esteem.

Table l

Summary of Empirical Results Between Climate Dimensions and Selected Correlates

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<u>Job-Related Attitudes</u>: Waters, Roach and Batlis (1974) compiled a set of questions designed to assess "jobrelated attitudes." These combined measures of satisfaction ratings, general individual attitudes, and job behavior variables.

<u>Absenteeism</u>: This construct referred to the average absenteeism rate for a plant for a four week period (Dennis, 1975).

Organizational Structure: Lawler, Hall and Oldham (1974) related climate dimensions to a set of specific structural properties of the organization. These were: (1) span of control (the ratio of operating level employees to first line supervisors); (2) size (number of persons in the organization); (3) levels (the total number of levels in the organization as measured by the longest chain in the hierarchy); (4) tall/flat (the ratio of organization size to number of levels); and (5) levels from top (the number of levels the member is removed from the parent organization's top level, i.e., president, board of directors).

Organizational Process Variables: Lawler, Hall and Oldham (1974) correlated climate with measures of the degree to which certain policies were in existence. These included:

- 1. <u>Performance reviews</u>: the frequency with which performance reviews are conducted.
- 2. <u>Performance reviews-relation to compensation</u> <u>program</u>: the perception of employees of the degree to which performance reviews are linked closely with administration of compensation programs.

3.	<u>Professional autonomy</u> : the perceptions of direc-
	tors of the employee's freedom and auton-
	omy to engage in work projects.
4.	Assignment generality: the directors' perceptions
	of the frequency of general vs. specific
	assignments for a given employee.
5.	Collaboration support: the directors' perceptions
	of the degree to which employee collabora-
	tion is encouraged in the work place.
6.	Informal budget account: the perceptions of the
	existence (or nonexistence) of an informal
	research budget for use by employees.

Managerial Performance Evaluations: This construct was operationalized by Dennis (1975) as the rating of managers by subordinates on human relations effectiveness, administrative effectiveness, technical competence, and assessment of promotability.

Individual Performance: Lawler, Hall and Oldham (1974) measured directors' perceptions of the performance of different types of employees in the organization. The measures of performance were (1) technical performance ratings and (2) administrative performance ratings.

Individual performance has also been measured by managers' ratings of employees (LaFollette and Sims, 1975; Pritchard and Karasick, 1973).

Organizational Performance: Several researchers measured overall organizational performance by the use of objective measures. These were obtained from several sources; e.g., a composite of the net change in the budget during the year, the number of new outside contracts, the percentage of projects meeting time schedules, the number of new internally funded projects, the number of contracts renewed, and the percentage of projects meeting initial budgets (Pritchard and Karasick, 1973; LaFollette and Sims, 1975).

<u>Work-Unit Effectiveness</u>: Hitt (1975) measured effectiveness using a 7-point scale asking participants to rate their perceptions of the overall effectiveness of their organization.

Effectiveness of Management-By-Objectives (MBO) Program: Hollmann (1976) measured managers' assessments of MBO (management-by-objectives) effectiveness in terms of several benefits of the program. These included (1) planning and organizing work, (2) evaluating work performance by objective methods, (3) motivating of the best job performance, (4) coordinating individual and work group objectives, (5) improving in superior-subordinate communication, (6) improving in superior-subordinate cooperation, and (7) overall satisfaction with MBO as it relates to job.

In addition, Hollmann examined the climate-MBO effectiveness relationship when moderated by three variables: (1) type of work (as line or staff); (2) organization level (middle and lower management); and (3) need for independence (frequency with which individual engages in independent behavior and the satisfaction accrued from such behavior).

Type of Technology: Hitt (1975) distinguished between three types of technologies used in organizations. The
distinction is based on the amount of discretion permitted by the workers involved in performing the task. The "longlinked" technology is characterized by a single, prescribed, and serially interdependent set of tasks, activities, or processes with discretion allowed only in the timing or speed of the process. The "mediating" technology involves several standardized operating procedures forming the repertoire of the unit. Discretion exists in the selection of the most appropriate strategy for a task from the given set of standardized alternatives. Finally, the "intensive" technology lacks standardized procedures with discretionary behavior predominant. The discretionary behavior involves sequential decision-making based on the analysis of previous decisions.

Leader Behavior Dimensions: Kavanagh (1975) measured expected supervisory behavior by asking respondents what they "felt an ideal leader ought to do" in supervising a group. The scales used were: (1) consideration (concern for member welfare and comfort, listens to member suggestions); (2) initiation of structure (asserts rules and regulations for appropriate behavior, low tolerance for flexibility, task-oriented); (3) tolerance of freedom (tolerates member freedom for decision and action; encourages initiative); (4) production emphasis (pushes for high level of output; attempts to motivate productivity).

Project Performance Correlates: Thamhain and Gemmill (1974) identified a set of four project performance variables which included:

- 1. Degree of support: the frequency which personnel report they meet requests of managers with maximum effort.
- 2. <u>Willingness to disagree</u>: how freely personnel feel they can disagree with their managers, how frequently they do disagree about policies or work procedures, and how frequently they have expressed disagreement on a face-to-face basis.
- 3. Degree of project involvement: how often personnel feel time drags on the job, the extent to which they perceive they are involved in the job, versus other interests, how often they do extra work not required, and how hard they perceive they work in comparison with peers performing the same type of work.
- 4. Effectiveness ratings of project managers: ratings by managers' superiors of their overall effectiveness in carrying out assigned projects.

<u>Career Decisions</u>: Proctor, Lassiter, and Soyars (1976) operationalized the making of a career decision as the decision of the individual whether to stay or leave a unit of organization.

Length of Time in the Organization: This construct was operationalized by Johnston (1976). He divided members of the organization into two groups: (1) those who had been with the organization for over three years; and (2) those who had been employed six months to two years.

Influence Processes Down the Hierarchy: Franklin (1975) noted three factors of influence processes from a supervisor level in the hierarchy to the next subordinate level. These were:

- 1. <u>Group process</u>: the characteristics of interactions among group members.
- 2. <u>Managerial leadership</u>: the extent to which the supervisor is perceived by his subordinates as supportive, goal-oriented, facilitative, and encourages team building.
- 3. <u>Peer leadership</u>: the extent to which individuals perceive their peers in the same work group are supportive, emphasize goals, facilitate others' work and facilitate interaction.

Organizational Practices: LaFollette and Sims (1975)

identified fourteen practices. These were:

- 1. <u>Timeliness of decision-making</u>: consistent guidelines for work are communicated, decisions are made quickly, clearly, accurately.
- 2. Upward information requirements: the amount of detailed technical and administrative information required by superiors in the organization.
- 3. <u>Top management receptiveness</u>: the interest in and evaluation top management gives to ideas from subordinates.
- 4. Induction and/or promotion of those outside the organization: the propensity with which management fills positions with people outside the organization rather than promoting to those positions people from inside.
- 5. Formalization: the extent to which job descriptions, standards of performance, and performance appraisals are established in writing and made readily available.
- 6. <u>Selection criteria based on ability</u>: promotions based on performance rather than "playing politics" or having attended certain schools.
- 7. Job pressure: the amount of work assigned and time required to complete it.
- 8. <u>Subordinate development</u>: the expectations of top management regarding subordinate instruction and career development by supervisors and the rewards supervisors are given for carrying out these expectations.

- 9. <u>Teamwork</u>: the manner in which an individual's group works together and accepts changes in directions.
- 10. <u>Intergroup cooperation</u>: provision for and cooperation among work groups in performance of work.
- 11. <u>Chain of command</u>: the degree to which direct orders come from only one's immediate supervisor.
- 12. Information distortion and suppression: the degree to which information regarding the necessity of proposed work or regarding work in progress is distorted or withheld.
- 13. <u>General communication</u>: the general state of communication the the organization (e.g., availability, accuracy, timeliness, channels of information).
- 14. Definition of work: the degree to which work is defined, interrelated jobs are coordinated, and progress and performance of work is fed back to individuals or work groups.

Personality Variables: Downey, Hellriegel and Slocum (1975) measured two personality variables: (1) self-confidence (the degree to which one is well-adjusted to his environment), and (2) sociability (the degree to which one is sociable and gregarious).

Need Satisfaction: Schneider and Snyder (1975) identified the following three needs and measured individuals' satisfaction of them: (1) existence (feeling of not having to worry about the basics of life); (2) relatedness (feeling that relationships with others are characterized by mutual trust and respect); and (3) growth (feeling that one is a creative and productive person who is using his skills and abilities).

In summary, the findings show that relationships between climate dimensions and numerous types of organizational



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variables have been tested by a variety of authors. In particular, almost all the dimensions have been related to variables involving job satisfaction or other job-centered variables. Other noteworthy relationships have been found with several different types of organizational processes and practices.

In addition, relationships have been found between perceptions of climate and several communication-related variables in the organization. Such variables include interpersonal relationships in the organization, the extent of cooperation among work-group members, various leadership behaviors, the general accuracy level of available information and the nature of the information flow in the organization.

#### Additional Issues

The area of organizational climate has been subject to much controversy regarding conceptual clarity and directions for research. This section identifies three of those key issues in the literature. It is important to mention these because the theoretical perspective presented in Chapter II addresses some of the problems cited. The issues in this discussion include (1) the possible redundancy of climate with the job satisfaction construct (also referred to as the "Redundancy Hypothesis"); (2) level of analysis; and (3) the role of consensus in examining the concept of climate.

The Redundancy Hypothesis: A number of researchers in the organizational behavior area have attempted to distinguish between organizational climate and job satisfaction. Investigators have typically asked whether the two are operationally the same, and whether measures of climate and satisfaction are descriptive or affective (Payne, Fineman and Wall, 1976; Johannesson, 1973; Guion, 1973; James and Jones, 1974; Payne and Pugh, 1976; Schneider, 1975).

Johannesson (1973) was one of the first to criticize the climate construct for its overlap with satisfaction. He asserted that many of the climate measures were culled from satisfaction scales and that an individual could not refrain from allowing his personal feelings to affect his perceptions of the environment. In effect, measures of climate were really unintended measures of job satisfaction.

Payne, Fineman, and Wall (1976), however, argued that Johannesson's claim was not warranted. In their view, the median correlations were not large enough to conclude the two were the same. In addition, Hellriegel and Slocum (1974), Downey, Hellriegel, Phelps and Slocum (1975), LaFollette and Sims (1975) and Schneider and Snyder (1975) have all shown that climate and satisfaction relate differently to other indices of organizational effectiveness.

In addition, researchers have argued whether measures of climate and job satisfaction are descriptive or affective. Climate is conceptually a descriptive measure (Payne,

Fineman and Wall, 1976) and most often used as one. For example, Schneider and Snyder (1975) argued that a logical and empirical distinction between the two concepts is possible if: (1) organizational climate is conceptualized as a characteristic of organizations reflected in the descriptions employees make of the policies, practices, and conditions which exist in the work environment; and (2) job satisfaction is conceptualized as an affective response of individuals reflected in the evaluations they make of the salient aspects of their jobs and the organization.

In conclusion, many studies have demonstrated that the indivudual's perception of organizational climate is related to his job satisfaction but that the two are conceptually distinct. The problem with the climate-satisfaction relationship is that it is difficult to know the direction of causality. They probably affect each other, though experimental studies on organizational climate tend to show that manipulations of climate variables lead to changes in job satisfaction (Litwin and Stringer, 1968; Dieterly and Schneider, 1974).

Unit of Analysis: The second major issue is whether organizational climate is a concept relevant to explaining the behavior of organizations, or of individuals. Payne, Fineman and Wall (1976) argue the unit of analysis is the organization. However, from reviews of several studies (Hellriegel and Slocum, 1974; James and Jones, 1974;

Campbell, Dunnette, Lawler and Weick, 1970), the majority of studies have used the individual as the unit of analysis, not the organization; i.e., they have collected individual descriptions of organizational practices and procedures and subsequently inferred to overall "climate," from an aggregate result.

The issue has been to determine the appropriate level to begin research. James and Jones (1974) argue that investigations of climate ought to first isolate natural groups of people, and then assess the perceptions of individuals within those groups. Just as it is possible to look at differences between organizations, one can also examine differences between group "cultures" within the organization.

Level of Consensus: Recent literature has noted that a key question is the extent to which people agree on their perceptions. Schneider (1975) suggests that the perceptions of organizational members may be a useful representation of an organization's climate, but the level of inter-rater agreement is important in interpretation of results.

Most researchers argue that a high level of consensus is evidence for validating climate measures. That is, the reasoning is that if there is high consensus, then they must be identifying the key dimensions of the organization's "environment."

However, these researchers do not address the issue that findings at a low level of consensus also provide a

description of the nature of the environment. That is, the extent to which individuals perceive aspects of their work environment differently implies they have different types and/or amount of information about it. Low agreement on the part of management vs. employees or groups within each level may mean the existence of schisms, or inefficient communication systems, detachment from the job or the work group, etc. In short, knowledge of the level of consensus can provide the investigator with information regarding the level of systemic information which individuals commonly share.

#### Summary

The preceding discussion has presented a review of key areas of research on the climate construct. The findings suggest that the area is robust; however, previous research has not fully developed the role of communication in shaping the nature of perceptions of climate. The concluding section of this chapter identifies major conceptual inadequices which provided the basis for the research problem addressed in this dissertation study.

# Statement of the Problem

Research on the climate construct provides evidence for relationships between numerous dimensions of climate and several important variables and processes in systems. In addition, the accumulated body of findings provides persons in different levels of an organization a way of evaluating

the effects of their behaviors on the perceptions of others.

However, the studies reviewed share two general inadequacies which lend themselves to communication study. First, previous research efforts lack an explicit theoretical framework for explaining and assessing how communication affects people's perceptions toward their environment. Previous work has included measurement of only a few variables related to managerial communication and general communication. In general, therefore, research is needed which has a strong theoretical framework, based on aspects of the information, which explains perceptions of climate from a communication perspective. Such a framework should provide a way of conceptualizing attitudes towards the environment, and suggest how those attitudes are shaped by informal structural relations among members of the system.

Second, the previous work has not accounted for informal structure among members of the system. Studies have been limited to examining formal relationships between supervisors and subordinates; they have not considered the presence and strength of informal relationships among all members across levels of the organization.

Informal relationships are important in that they represent patterned, repetitive linkages among members based on the type and rate of information they exchange. That is, people in a system are regularly linked together in a series of communication relationships called networks. Advantages

of identifying such networks include the ability (1) to determine the extent to which members of the system are integrated and (2) the location of individuals who function as key communicators in the system.

In short, findings in the literature show that referents for climate are based on various perceptions of the job, management, coworkers, and the organization. The problem posed for this dissertation study was to investigate the role of communication in determining the nature of those perceptions. The study examined climate from a communication perspective. It primarily assessed the relationship between communication structure (informal networks of information flow), and the aggregate cognitive structure of perceptions held by various members of the organization. Chapter II describes the theoretical framework and the research hypotheses used to guide the research.

#### CHAPTER II

#### THEORETICAL FRAMEWORK AND HYPOTHESES

The purpose of the present study was to evaluate the role of communication in perceptions of organizational climate. Implicit in the review presented in Chapter I is the notion that climate dimensions are based on perceptions of several "objects" in the psychological environment of the organization--relating to the job, managers, coworkers, and the overall organization.

The type of information provided by previous research is important because it provides a basis for using force aggregation theory in the present study (Woelfel, 1972; Gillham and Woelfel, 1977; Taylor, 1977). Force aggregation theory posits that attitudes are based on the amount of weighted information organization members receive about objects they perceive to be <u>salient</u> in the organization. Information is weighted by (a) the <u>number</u> of messages received; (b) whether the message asserts a positive or negative <u>direc-</u> tion; and (c) the <u>significance</u> of the source.

Force aggregation theory developed almost a decade ago from concepts relating to symbolic interactionism and attitude formation theory (Woelfel and Haller, 1971). Work on

the development of force aggregation theory primarily incorporated the writings of Kuhn and Mead, two noted symbolic interactionists. In describing force aggregation theory, Woelfel and Haller (1971) note:

> The theory . . . assumes that attitudes are relationships between a person and an object or set of objects . . . but following from the interactionist postulate that man's perceptions of objects is always mediated by some symbolic structure (Kuhn, 1964), that relationship is assumed to be a conceptual one, that is, it is the relationship a person sees between his conception of himself and his conception of the objects in question. The process of forming a conception on a most general level, can be seen as a process of categorization . . . then, an attitude may be defined as a person's conception of the relationship between the . . . categories he sees himself to be a member and the . . . categories which he sees the object to be a member . . . classification is thus a cognitive act based on the 'information' one has about objects and self (pp. 75-76).

Hence, when applied to members of an organization, this theory means that individuals are able to acquire information about objects through their interactions with others (Taylor, Farace, and Monge, 1976). By accumulating knowledge members define attributes of objects; through this process, objects develop meaning which is then shared among members. In considering climate within this context, organization members are likely to come to share similar sets of perceptions toward objects they perceive salient, such as aspects of the job, management, coworkers, or the organization as a whole (its policies and practices).



The central assumption in the application of force aggregation theory to climate is that individuals' perceptions of the organization's environment <u>will be positive to the extent salient objects are perceived to possess attributes con-</u> gruent with major attributes involved in their perceptions of themselves.<sup>1</sup> That is, to the extent an individual characterizes most salient objects (e.g., working relations with managers, or aspects of the work environment) in terms consistent with their perceptions of themselves, they will be more "positive" in their perception of the climate; they will have a more favorable set of attitudes towards the job, the boss, and the overall work place.

Asserts above, force aggregation theory assets that an attitude is based on perceptions; it is the sum of weighted effects of a set of messages. The resultant attitude  $\underline{a}$ , at a given point in time, is the linear sum of the messages  $X_1, X_2, X_3, \ldots, X_n$ , weighted for their magnitude, directionality, context, source, and divided by the total number  $\underline{n}$  of the messages. Each incoming message has a "force" of its own, and can move an individual's attitude in a specified

<sup>&</sup>lt;sup>1</sup>This has been the central assumption of most force aggregation studies. When an individual perceives that salient objects (e.g., a political candidate, a product, or an innovation) possess attributes similar to those he uses to define himself, the prediction has been that his perceptions will be positive. Hence, "positive" here means the individual will "vote" for the candidate, "buy" the particular product, or "adopt" the innovation (Barnett, Serota, and Taylor, 1976; Taylor, Farace and Monge, 1976; Taylor, 1977).

direction (Woelfel, 1972; 1974).

An attitude, then, is determined by four main independent factors. These are: (1) the number of messages; (2) the number of messages comprising the individual's initial balance point; (3) the salience of the message context; and (4) the significance of the source (Taylor, Farace, and Monge, 1976).

An attitude is thus defined as the result of prior message inputs received about a topic, dependent on the extent to which incoming messages are numerous, salient, and from significant sources. Hence, an attitude with a weak initial balance point is more likely to be affected by messages with large amounts of these characteristics than one with a considerably stronger prior history.

For individuals in a work environment, attitudes towards the concept of "self" and the "job" are concepts that have been strengthened by numerous messages over a lengthy period of time. One comes to conceive of oneself based on years of incoming messages from significant others. Similarly, one may come to conceive of his or her job as the aggregate of many message inputs, making it a characteristically "massive" concept. In short, its existing balance point of message inputs is strong, such that succeeding ones have limited effects (Woelfel, 1972).

Therefore, an initial task in operationalizing this framework is to determine the attributes people use in conceiving of themselves and their jobs. The information is then summarized across members in the system. When the concepts and attributes are identified, a methodological technique can be used to represent their interrelationships in a multidimensional configuration. Its form is a spatial "map" which represents the self and the job relative to one another as well as to other key elements identified in the environment. The distance between these objects on the map provides predictions about the amount and nature of information different people in the system have about objects they consider salient in the environment (Barnett, Serota and Taylor, 1976).

The map-building process involves integrating the set of key environmental objects, attributes used to characterize the objects, and individuals, into a multivariate data framework. Multidimensional scaling (MDS) offers a method for analyzing sets of such complex data. (A broader discussion of this methodological technique is provided in Chapter III.)

An important aspect of force aggregation theory is that members of the study population, not the researcher, determine the objects salient in perceptions of the organization's climate. Previous methods for conceptualizing climate have imposed sets of concepts and attributes on the

respondents. However, these concepts may or may not be perceived by members as important or salient. Subjects identify these concepts through their own descriptions of aspects of the environment.

In summary, force aggregation theory provides a framework suitable for explaining the nature of attitudes; in particular, the attitudes of organization members towards their work place. The theory is appropriate because it is based on information exchange, and thus fits well for guiding this study of the role of communication in climate perceptions.

However, force aggregation theory alone is insufficient in explaining the role of communication in perceptions of climate; the concept of <u>communication structure</u> is also important. "Structure" refers to the pattern of linkages that exist among members and thus provide "pathways" for information flow in the organization.

The concept is incorporated in the force aggregation framework by (1) assessing the extent of structural relations among members; and (2) identifying content areas of messages which form the basis for communication relationships. Once such relations are found, those who function in certain capacities (roles) in the communication system may be identified. In organizations, certain people often occupy roles as "key" communicators for some topics. That is, they serve as links between larger groups of people

(Taylor, Farace and Monge, 1976; Taylor, 1977). These individuals are those through whom all or most of the system's members can be reached through interpersonal channels.

Key communicators have the greatest potential for affecting the speed of information flow and the level of message distortion, since they reduce the number of links otherwise involved. In addition, they may be considered opinion leaders in the organization, and thus significant others for members on some topics (Kaye, 1976; Taylor, 1977).

Several researchers (Farace, Monge and Russell, 1977; and Taylor, 1977) have suggested two roles for key communicators: liaisons and bridges. <u>Liaisons</u> are individuals who link groups but are not themselves group members. <u>Bridges</u> are group members who have linkages to one or more other groups.

Hence, the concept of social structure--the linkage patterns among people--is useful for further developing this framework for studying communication and climate perceptions. The force aggregation theory assumes that perceptions of climate are based on the amount of information possessed by different people in the organization. An important issue, then, is the nature of the information flow among members, i.e., their pattern of communication. While these linkages may be formal or informal, they determine the means by which people in the organization receive information that shapes their attitudes.

For the past forty years, authors have noted the importance of this relationship between social structure and cognitive processes (Durkheim, 1938; Gillham and Woelfel, 1977). Taylor (1977) used the relationship between communication linkages and perceptions to develop message strategies for creating successful attitude change among members of a system.

The concept of linkage patterns, while important, is also incomplete without consideration of the "rules" in the system. These rules govern <u>how</u> those linkages take place. Hence, the rules for interaction in an organization, particularly between a manager and an employee, can determine the number and nature of the messages which are exchanged.

The concept of rules refers to formal and informal norms in the organization that guide and limit the communication relationship between a manager and his subordinates. Communication rules specify conditions under which it is appropriate to initiate contact with the manager, in suitable topics of discussion, the control of the conversation, and the setting and length of interaction (Farace, Monge, and Russell, 1977).

In short, the nature of the rule structure can determine the number, and rate of messages which an individual receives about certain objects. The number and nature of messages received can, in turn, affect his perceptions of objects relative to how he sees himself and his job.

In addition to the structure of interactions, perceptions of objects may be affected by the extent to which information needs are met. Perceptions, particularly of the job, are largely contingent on the availability of useful information about the task. MacDonald (1970), in assessing satisfaction with the organization's communication system, noted that climate satisfaction was related to perceptions of incoming information from managers as adequate, accurate, believable, useful, and timely.

Hence, given the assumption that individuals' perceptions of climate will be more favorable given that they perceive objects in terms of attributes similar to themselves, their perceptions of the information contained in the messages also becomes important.

# Hypotheses

Force aggregation theory specifies that perceptions towards climate are based on attitudes towards objects relative to one's perception of self (Farace, Taylor and Monge, 1976; Gillham and Woelfel, 1977). Taylor (1977) found evidence supporting the hypothesis that successful change campaigns in organizations are those that decrease the dissimiliarity between an innovation, objects in the work environment, and those attributes of the objects, which are also close to self. Similarly, Barnett, Serota and Taylor (1976) predicted voting behavior, based on distances people perceived between their conceptions of themselves and political

candidates. Concepts and attributes similar in meaning have minimum distance between them in a configuration. Conversely, concepts and attributes perceived different in meaning have relatively large distances between them.

Hence, following the assumption stated earlier, to the extent that one perceives most salient objects in the work environment to be similar to one's definition of oneself, the more favorable one's perception of the overall climate is likely to be. That is, the objects are perceived as congruent, not conflicting, with the attributes one perceives of oneself.

Following this reasoning and the climate literature, we would expect that perceptions of the job and other objects in the organization, unlike perceptions of the self, might be studied more directly in terms of the nature of one's access to the information flow in the system and hence the number and types of messages one receives about those objects.

The amount of information people in the system have varies with the frequency of their communication behaviors; some people are active communicators, others are more isolated from the flow of information. People who share common characteristics in their communication behaviors occupy similar communication "roles." They are designated those roles based on the nature of their linkages (their communication relationships) to others in the system, on certain

communication topics. A series of linkages based on communication content is a "network" (Farace, Monge and Russell, 1977). The network represents a type of social structure present in the system. Such structures are more or less integrated depending on the extent of linkages among members.

Communication roles in the organization are differentiated according to their range of communication linkages. Certain roles are particularly "key" since they serve to link large groups of people. As Likert(1961) notes, they have the potential to exert influence over the nature and rate of message flow in the system. He concluded (in his "linking pin" notion) that individuals who connect large groups have authority independent of their formal roles in the organization.

McDonald (1970) studied the role of liaisons in a large governmental bureaucracy. He found that they had more access to production-related information and were perceived as influential in the organization. He concluded that:

> The liaison concept appears to be important to the study of communication systems in that the nature, location, and frequency of "linking" roles has many implications for uncertainty absorption in the systems, organizational design, and communication climate (p. 46).

Schwartz and Jacobson (1977) analyzed responses from members of academic organizations with relatively horizontal formal structures. Evidence from their research supports the view that desire for personal autonomy is higher in such

organizations than in other settings, and may affect the types of communication roles members can hold.

Taylor (1977) studied the role of key communicators in a network of state special education administrators. He found some support for the hypothesis that such individuals have initial access to new information about innovations, and may influence the attitudes of non-key communicators.

Given previous findings about such individuals, it is likely that they have more information about most elements of the system. Further, we would expect that they perceive a more direct involvement with their jobs, given that they have access to a wider variety of message inputs. Hence, we would hypothesize:

H1: The mean interpoint distance between the concepts of "the self" and "the job" will be less for key communicators than for non-key communicators.

A major aspect of previous climate study has concerned the perceptions of relationships with managers. As cited in Chapter I, the nature of "managerial climate" has been examined at length. The dimensions found in that body of work include (1) closeness of supervision; (2) managerial aloofness; (3) close impersonal supervision; and (4) managerial structure. Implicit in these dimensions is the perception that communication with management is or is not frequent, with sufficient direction and guidance provided. For example, Churchill, Ford and Walker (1976) found that in hierarchical

organizations, employee satisfaction with climate was based on the extent of supervision provided by managers.

Therefore, we would expect that key linkers would behave in such a way that their perceptions of the distance between themselves and their supervisors in management would be minimized. It is likely that non-key linkers, in contrast, would not have as many informal contacts with managers, thus maintaining the distance. Given this, the hypothesis becomes:

H<sub>2</sub>: The mean interpoint distance between the concepts of "the job" and "management" will be less for key communicators than for non-key communicators.

In analyzing climate perceptions by communication role, it is important to note that key linkers are likely to perceive themselves more central in the environment than nonkey communicators. That is, in possessing more information about objects, they should perceive that their jobs have an integral part in the operations of the organization. As MacDonald (1970) found, key communicators perceive themselves and are perceived by others in the organization to have greater influence, have a broader range of communication contacts, and to have more production, and social-related information than others in the organization.

Within the context of force aggregation theory, this means that key linkers are likely to perceive more similarity between their jobs and other objects than non-key communicators

because of the number of messages they have. In contrast, non-key communicators probably encounter fewer messages to form their perceptions, and hence perceive fewer concepts in the environment in terms they would view themselves and their jobs.

Hence, the hypothesis that liaisons have more information about concepts in the environment and are likely to see their jobs as more integrated in the work environment becomes:

# H<sub>3</sub>: The concept of "the job" for key communicators will be closer to the center of the space than for non-key communicators.

The center of the space refers to the zero point at which all dimensions in the space originate. For example, in a two-dimensional space, it is the point at which the axes cross (see Figure 1).

It is the expectation in this study that not only do specific conceptual configurations differ, but that the overall <u>size</u> of the spaces also differs for key and non-key communicators. "Size" in this context refers to the amount of variability in their spaces. Key communicators are likely to have less variability, since the concepts will be closer together. Conversely, people who have less information about a salient set of objects are likely to report larger distances resulting in more variability.

This hypothesis follows previous findings in the climate literature. Many of the dimensions imply a "dissimilarity" perception between different variables in the



Figure 1. Illustration of the origin in a two-dimensional space.

organization. These include "employee independence," "work autonomy," "managerial aloofness," "close impersonal supervision," "status polarization," and "participative decisionmaking."

Therefore, one would expect that

H<sub>4</sub>: The overall size of the cognitive space perceived by key communicators will be smaller than the size of the space for non-key communicators.

In addition to size of the space, the <u>shape</u> of the spaces should also differ. This is particularly true in the case of an organization which encompasses more than one formal structure. For example, a private sector industrial organization is usually comprised of a company structure and a union structure. The two are natural adversaries and hence often perceived as highly dissimilar in their goals, objectives, and policies (Chamberlain and Kuhn, 1965). We would expect that when two concepts are incorporated in the space that represents policies which are clearly antithetical, the shape of the space would be somewhat elongated with these concepts appearing at the most opposite ends. Thus, the hypothesis is:

H<sub>5</sub>: The key communicators will have a spherical space, while the non-key communicators will have an elliposoidal space.

Overall, we can generally expect that the two spaces will differ. That is, differences between the overall spaces will be most clearly shown in differences between perceptions for the major climate areas of the job, the management, and concepts relating to organizational policy (in this case, the concept was "overtime"). We can also include in this the presence of the formal structure of the union. That is, it presents a highly dissimilar force to management and while its presence has not been acknowledged in other studies, it will be included here. Therefore:

> H<sub>6</sub>: When the spaces for the key communicators and non-key communicators are examined together, the largest differences will be found between perceptions of the job, management, organizational policies, and the union.

The force aggregation framework is expanded here to include aspects of the communication system that affect the type of messages received by members. The framework basically considers two factors which can affect perceptions of the rate and quality of messages. These factors are the nature of the informal rule structure and satisfaction of information needs.

The rules construct is particularly important because it concerns the nature of information interactions with the key "other" to a person in a working environment--the "boss." That is, informal rules guide the structure of the interaction --and hence the type of messages communicated. For example, rule governed interactions with the manager which are highly structured would mean that such matters as the selection of topics, the length of discussion, and the number of disturbances would all be decided by the boss. Consequences of this are that matters of key importance to the subordinate may never be discussed, and the guidance provided may be inadequate and inappropriate.

The rules construct is closely related to the managerial climate dimension of managerial structure. This dimension refers to the extent to which managers are formal, highly directive, and insensitive to feedback (i.e., operate in an authoritative manner).

The expectation in this study is that key communicators exert a greater influence on the rule structure. In effect, the determination of the rules is more equitably distributed between the boss and the subordinate. We would

expect this of key communicators, given their behavior characteristics and their perceived influence in the system. Therefore, the hypothesis becomes:

H7: Key communicators will perceive that they exert more influence in the determination of rules than non-key communicators.

Similarly, the degree to which messages are perceived to meet information needs affects overall perceptions. Particularly critical is the extent to which members of the system perceive the information to be accurate. That is, given that the theory specifies that attitudes are determined by numerous, salient messages from significant sources, we would expect key communicators to evaluate the information as more accurate, timely, believable, adequate and useful. In short, they would judge the information from management to meet their information needs better than would non-key communicators. The hypothesis is:

> H<sub>8</sub>: Key communicators will perceive downwarddirected messages as more accurate than will non-key communicators.

In the next chapter, procedures are presented which were used to test these eight hypotheses.

# CHAPTER III

# PROCEDURES

Tests for the hypotheses presented in Chapter II primarily require methods for assessing (1) individual position in the information flow; (2) cognitive structure based on dissimilarities between attributes of self, job, and salient objects in the environment; and (3) relationships between roles, communication rules, and satisfaction of information needs.

The first task involved the use of network analysis (NA) to determine communication role. Second, multidimensional scaling (MDS) was used to measure object/attribute dissimilarities. Third, a variation of Mosteller and Tukey's (1977) "jackknife" method was used to obtain sample means in order to test for differences among MDS spaces. Finally, <u>t</u>-tests were used to assess hypotheses concerning relationships among network role, communication rules, and information needs.

The purpose of this chapter is to discuss these methods used in operationalizing the conceptual framework. First, a general discussion is provided of network analysis and multidimensional scaling. Second, the chapter provides

a description of the research site where the study was conducted. Finally, specific procedures used in the study are reviewed.

### Network Analysis

The concept of an organization as comprised of informal communication systems has been noted in the literature for over three decades. The early machine-theory perspectives argued that efficiency would be maximized by prescribing the amount of access to information for each position or formal role. Hence, extraneous data that hindered the functioning of persons in their roles would be eliminated (Farace, Monge, Russell, 1977; Taylor, 1977).

Sometime later, however, in the wake of the "human relations" perspective, theorists began to observe the tendency for communication within bureaucracies to follow pathways not formally prescribed by the organization's formal hierarchical chart. Downs (1969) developed several propositions about the informal nature of information flow in bureaus (bureaucracies). Researchers have noted that such informal flow of information occurs for a number of purposes (Farace, Monge and Russell, 1977). For example, information which travels regarding about work-related topics functions for task accomplishment-production purposes. Information about non-job related matters such as gossip and social events functions to main the "health" or satisfaction of the system's members. An organization's communication network is defined as a system of overlapping dyadic linkages, both formal and informal, which together comprise all possible communication pathways between members within a system's boundary (Richards, 1974a). Dyadic linkages represent a communication relationship between two persons. Two individuals have a relationship when:

- a) they communicate directly, or
- b) a set of communications exist between person
  A and person B such that information may still
  flow between A and B.

Network analysis techniques have been used for the past 20 years. The original work by Jacobson and Seashore (1951) used sociometric techniques for studying small group behavior. Only recently have computer-based techniques been developed to analyze linkages among persons in large-scale organizations (Richards, 1975). The present study utilized Richards' methodology.

Richards' technique measures the position of individuals in the overall information flow by using a data base of reported frequencies of dyadic interaction. The technique identifies the types of roles people occupy - as well as the volume of overall informal interaction. It requires subjects to report the number of times they communicated with other system members during a specified time period. The data are then arrayed into an N x N matrix of the number of their reported contacts (Richards, 1975). Cluster analytic techniques are used to decompose the data and assign a communication role based on one's pattern of one's linkages. Thus, one's position in the information flow--one's network role--is based on the extensiveness and frequency of his communication behavior (MacDonald, 1970; Taylor, 1977).

Richards (1975) categorizes each member of the organization (managers and employees) into one of five communication roles. These are:

> 1. <u>Group member</u>: a node with more than some minimal percentage of his total number of likages with members of one group (in this study the percentage [an "alpha"percentage] is equal to 50.1%).

Of note, to be a group, a set of nodes must satisfy each of five criteria:

- a. there must be at least three members;
- b. each member must meet the same minimum alphapercentage criterion with members of the group;
- c. each member must have a link to every other member of the group (this is known as the connectiveness criterion);
- d. no single node or nodes may exist which, when removed from the group, causes the rest of the group to fail to meet any of the above criteria (this is the critical node criterion);
- e. no single link (or subset of links) may exist which, if terminated, causes the group to fail to meet any of the above criteria (this is the critical link criterion).
- 2. <u>Bridges</u>: nodes which are members of groups, but which have one or more links to another group. They link two or more groups.

- 3) Liaisons: nodes which link two or more groups but are not themselves members of any group.
- 4) Type one isolate: nodes which have no links.
- 5) <u>Type two isolates</u>: nodes connected to only one other node.
- 6) <u>Other</u>: nodes which fail to meet criteria for any of the above roles types.

An example of a communication network and the communication roles which may exist within that network is illustrated in Figure 2.

The bridge and liaison roles are of particular importance in this study. Bridges and liaisons are important in a communication system because they enable information exchange between clusters of people. A bridge can serve as the source and receiver of information for a group because he or she has connections to the outside network. A liaison connects groups without being a group member. As a result, a liaison may control the rate and nature of information flow in the large network. By virtue of their control over the message inputs to others, both have potentially significant influence over the nature of information flow in the entire network. Hence, the identification of such roles is crucial, given that the theory defines perceptions in relation to the amount of information people have about the environment.

Communication networks were constructed in this study according to the content of interaction. Research has


Figure 2. Types of communication network roles (from Farace, Monge, and Russell, p. 192).

shown that key communicators may vary across content networks; hence, the extent of influence exerted on perceptions of climate may vary as well. It is also important to specify the content of communication because the salience of the message context is an important part of the individual's attitude toward an object.

A sample of 20 managers and employees was interviewed prior to the main study. They were asked to identify (1) the topics they most frequently communicated about; and (2) of those topics, the ones they felt were particularly important to discuss. They agreed that the most important topics involved aspects of the job (the business of the company); personal or social matters; and the union. Most indicated that these were important because business had to be conducted to maintain operations, personal matters were needed to ease boredom and conflict in the plant, and that union matters were critical since company-union relations were tense. Based on this information, three networks were studied:

- a network based on discussions among members of the day-to-day work involved in the plant;
- a network based on discussion of personal topics such as problems, family activities; and
- 3) a network based on discussions about aspects of union-related activities, such as contract negotiations, meetings, grievances, etc.

Analysis of these networks identified individuals occupying key communication roles. Key communicators were

operationalized in this study as those occupying either bridge or liaison positions in two or more of the networks.

### Multidimensional Scaling

Multidimensional scaling provides a methodological framework for assessing the nature of perceived images. It makes no <u>a priori</u> assumptions regarding salient perceptual dimensions and is particularly useful in situations where the attributes used by respondents to judge objects are not fully known (Leister and MacLachlan, 1975).

Multidimensional scaling generates a picture or map which represents relationships among a set of objects  $0_1$ ,  $0_2$ , . . ,  $0_n$  (Taylor, 1977). The technique uses judgments of the extent of similarity or dissimilarity between pairs of objects. Such judgments allow the spatial representation of objects in a space of two, three, or more dimensions.

The method uses a symmetrical data matrix where rows and columns correspond to objects  $0_1$ ,  $0_2$ ,  $\ldots$   $0_n$ . The ij<sup>th</sup> cell contains the dissimilarity (the observed difference) between object  $0_j$  and object  $0_j$ . Hence, the less the dissimilarity, or difference, between objects  $0_j$  and  $0_j$  the greater the perceived association (or similarity) between the two objects.

Data in this method are aggregated across respondents and averaged into a distance matrix which is transformed into a scalar products matrix. This matrix is factored using a direct iterative unstandardized procedure. Factoring yields a coordinate matrix consisting of orthogonal axes, with rows as the projections of concept locations on the dimension (Taylor, 1977).

Essentially, procedures for an MDS analysis include the following. Subjects are given a complete set of paired comparisons. That is, each object to be included in the space is paired with every other object in the space; the result is an  $[(N) \times (N-1)]/2$  set of paired comparisons. A criterion pair, not included in the space, is utilized as an example for the respondents. The example objects are those appropriate to the system of the respondents. Subjects are then asked to make judgemnts of the general form:

If the difference between concept X and concept Y is U units, how different are [concept A] and [concept B]?

The number of different types of studies utilizing the multidimensional scaling technique has increased in recent years. Leister and MacLachlan (1975) used a nonmetric version to measure differences in organizational "environmental images" perceived by members of academic institutions. They measured perceived similarity and dissimilarity of several colleges in a region on several attributes. The metric method has been used in studies of

organizational change (Taylor, 1977); political attitude formation (Barnett, Serota and Taylor, 1976); and cognitive complexity in language development (Barnett, 1975).

Specifically in the area of organizational research, Taylor (1977) showed that the distances between concepts in the resulting factor space can be used to predict the extent of adoption of an innovation among educational administrators. His technique involved summing the distances for a concept representing the average position for the perception of "my job" and the concepts representing the attributes of the job and the innovation. He then used the technique to develop message strategies to increase the perception of educational change as congruent with the administrators' perceptions of the scope of their job.

The researcher is thus able to use the spatial map generated by the method to evaluate the position of the points representing the self, the job, and the other concepts, relative to one another. By examining the relationships between the points, it is possible to determine which concepts and attributes are important to the individual's perception of self and which are not. That is, those concepts and attributes which are minimally discrepant with the individual's perception of self and the work. Those which are maximally discrepant (judged most dissimilar) are less congruent with the perception of self and work. Objects perceived close to positively-oriented attributes

are perceived positive in nature, while concepts close to negative attributes are perceived more negative.

#### Research Site

The organization used for the research was a unionized, drop forge manufacturing plant. Members of the study population included salaried, hourly, and piece-rate incentive wage workers on the first shift. All respondents were located in one large building encompassing offices, computer rooms, first-aid station, and the machine shop. The number of managers and first shift personnel located in this building totaled 128 at the time of the study.

The firm has been a family-owned business for more than 40 years. Members of the extended family occupy many executive level positions. The formal organizational chart is presented in Figure 3.

The plant employs workers on three shifts, totalling about 250 workers. The production schedule is 24 hours per day, five and one-half days per week. Turnover of personnel is low (3-4% each year). Daily absenteeism runs about eight percent.

#### Study Procedures

The procedures used in the study were directed towards the measurement of the differences in climate perceptions based on differing communication roles. Procedures necessary for the analysis included the following: first,







the author obtained permission to conduct the study from both the vice-president for manufacturing and the union bargaining unit chairman. The author met separately with both individuals and assured them that all data obtained from respondents would be kept confidential. In addition, both men indicated that they wanted to approve the specific questionnaires used in the study.

The second stage of the planning process involved construction of the final study instrument. Two pieces of information were necessary: (1) for the network instrument: names of all individuals (managers and employees) on the first shift and a set of topics for the communication networks; and (2) for the MDS instrument: a set of concepts for analysis.

The company vice-president provided the list of names, telephone numbers, and a chart of the formal hierarchy. The topics for the network instrument and the concepts for the MDS instrument were obtained in a separate interviewing procedure. The instrument (see Appendix E) consisted of a series of open-ended questions and probes asking respondents about aspects of their jobs, the plant, their bosses, and plant policies which they liked and did not like. In addition, respondents were asked to identify important topics of communication in the plant.

The trained interviewers included two male college seniors and one female college junior. They conducted the

interviews by telephone with a random sample of 20 percent of the members of the system. Management personnel and employees were included in the sample. A total of twenty interviews were completed, each averaging 40 minutes in length. Respondents were assured at the beginning of the interview that permission had been granted for the study by the company and the union. The interviews occurred in the evenings over a span of five days in May, 1978.

The interview data were analyzed to generate network topics and MDS concepts. Unanimous responses were provided for three topics of importance for the network instrument. The concepts and attributes were tallied to determine the number of times they appeared across responses. Those with the highest frequencies were chosen for the final instrument.

Concepts selected from the interview data were:

- 1) management
- 2) the union
- 3) the foremen
- 4) hard work
- 5) easy
- 6) good
- 7) overtime
- 8) pushy
- 9) better machinery
- 10) the heat
- 11) helpful

Two additional concepts were included as part of the research effort. These were:

12) me 13) my job A rationale for the selection of each concept appears in Table 2. Analyses performed were based only on this set of concepts.

The third stage of procedures involved distribution of the final questionnaire which included: (1) the network instrument (see Appendix G); (2) the MDS instrument (Appendix F); and (3) the rules and information needs instrument (Appendix H).

Data collection was held on the plant premises. Verbal instructions were given to separate groups of managers and employees. Management personnel received the questionnaire on their morning breaks in the coffee lounge. Employees were scheduled in a conference room during their lunch breaks and production down time. The vice-president for manufacturing and the union unit chairman assisted with scheduling and retrieval of questionnaires from employees who took the instrument home overnight.

Four days during June, 1978, were used for administration of the study instruments to all respondents present for work. Identical instruments were administered to management personnel and employees. Because of expressed hostility and suspicion between the management and union, all those who participated in the study were informed that the questionnaire was approved by both the vice-president and the bargaining unit chairman. Respondents were told that all information provided would be kept confidential

### Table 2

Rationale for Concept Selection\*

CONCEPT		RATIONALE			
1.	Me	The concept is need to identify respondents' self-perceptions. The self concept percep- tion was used to compare the interrelation- ships of all other concepts.			
2.	My job	To provide a baseline for determining commitment to job, congruency between self and type of work performed.			
3.	Management	To provide an understanding of how managers perceived their positions relative to the rest of the system of concepts. In addition this followed the literature which noted the psychological distance perceived by employees between themselves and top manage- ment. Generally, the further the distance, the more dissatisfaction and lack of con- structive direction perceived.			
4.	The union	As a separate entity, this concept repre- sented the important organization for most employees. It was also compatible with the network topic of union business.			
5.	The foremen	This concept represents the "boss" for many employees. Some employees had more than one foreman; hence, they felt confusion regard- ing whom to follow.			
6.	Hard work	Represented the nature of the work per- formed, some felt their tasks at the drop forge shop were "easy"; others, difficult.			
7.	Easy	Referred to not only the nature of the work but the interpersonal nature of coworkers, demands of foremen, management.			
8.	Good	A positive attribute (descriptor) for other concepts.			
9.	Overtime	An important policy issue affecting percep- tions of job. Would provide data as to how related overtime is to a manager's and employee's job. An important area of negotiations.			

Table 2 (cont'd.)

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CONCEPT		RATIONALE		
10.	Pushy	A negative attribute for other concepts.		
11.	Better machinery	Represents improvements in plant working conditions over time.		
12.	The heat	A negative attribute of the plant's phys- ical environment. Inhibits job perform- ance, task completion.		
13.	Helpful	A positive attribute for other concepts.		

\* Also appears in Kaye (1976), p. 219, and Taylor (1977), pp. 81-82.

and that the author would furnish the company and the union with copies of the same final report of results.

In general, the hourly employees were most resistant and suspicious of the study. Most, however, complied after the author informed them of previous work she had done with their union.

Difficulties occurred with collecting data from production workers who did not have scheduled down time because of increased production that week. These workers were on an incentive wage program; they were paid only on a piecerate basis. Hence, workers whose payment depended on their completion rate (and who did not have down time breaks during the eight hour shifts) did not receive the instrument.

## Operationalization of Variables

The rules and information needs constructs were operationalized by scales taken from previous research. The scales were measured this way in order to rely on prior experience with the measures reported in the literature.

The <u>rules</u> construct was operationalized using a scale of five items used in previous organizational communication research (Farace, Monge, and Russell, 1977). These items consisted of the following:

When just you and your boss talk . . .

Who decides <u>when</u> the two of you will talk? Who <u>starts</u> the conversation? Who decides what <u>topics</u>, or problems, you talk about? Who <u>ends</u> or stops the conversation? Which one of you usually <u>interrupts</u> to move to a new topic?

Seven choice points were provided for each item: <u>boss almost</u> <u>always</u>, <u>boss usually</u>, <u>boss more often than me</u>, <u>both of us</u> <u>about the same</u>, <u>me more often than my boss</u>, <u>me usually</u>, and <u>me almost always</u>. Responses to these items were summed across the scale to obtain a composite score for each individual on the variable.

Information needs was operationalized by a series of five statements, each concerning a different aspect of the communication system. The scale was adapted from a study of satisfaction with the work-related communication system by MacDonald (1970).

The information we get from management about work is usually accurate.

When management puts out information to employees, you can <u>believe</u> it, <u>completely</u>.

The information we get from management about doing the job is usually <u>on time</u>--it gets to us when we need it.

The information we get from management about doing the job is usually <u>complete</u>--we are told all we need to know.

The information we get from management is usually in very useful form--easy to use.

Five choice-points were provided for each item: <u>strongly</u> <u>agree</u>, <u>agree</u>, <u>neither agree nor disagree</u>, <u>disagree</u>, and strongly disagree.

Responses to these items were summed across the scale to obtain a composite score for each individual on the variable.

#### Data Analysis

The network analysis was first performed to identify key communicators among the respondents. The network role code was subsequently inserted in each respondent's identification code in the MDS data file, and in the rules, information needs, and demographic variables file. All the data were subsequently sorted by network role for analysis.

Computer programs used to perform the analyses were the following: (1) Program NEGOPY (Richards, 1975) for the network analysis; (2) Program GALILEO (Woelfel, <u>et al</u>., 1976) for the multidimensional scaling analysis; and (3) the Statistical Package for the Social Sciences (SPSS) (Nie, <u>et al</u>., 1976).

In order to perform the appropriate tests for the differences in MDS spaces (Hypotheses 3, 4, 5, and 6) a variation of the jackknife procedure was used (Mosteller and Tukey, 1968, 1977). Essentially, the procedure is useful when appropriate statistical tests have not been developed to test for differences between groups. The procedure allows the researcher to sample random subsets of the data in order to obtain "pseudo" means and standard deviations. These values are subsequently amenable to further parametric statistical tests.

As Mosteller and Tukey (1977) note:

The name 'jackknife' is intended to suggest the broad usefulness of a technique as a substitutute for specialized tools that may not be available, just as the Boy Scout's trusty tool serves so variedly. The jackknife offers ways to set sensible confidence limits in complex situations. The basic idea is to assess the effect of each of the groups into which the data have been divided, not by the result for that group alone, but rather through the effect upon the body of data that results from omitting that group (p. 133).

The modified jackknife procedure was incorporated into the present study in the following manner (Fink, 1978):<sup>1</sup>

(1) First, the entire sample was divided into the key and non-key communicator groups. Three random sub-samples were drawn from each group, using a random number generator from a calculator. Each subsample consisted of two-thirds of the total number of cases in each group. The number of cases for each was the following:

Key Communicators (n = 53)Non-Key Communicators (n = 43) $K_1 = 36$  $NK_1 = 29$  $K_2 = 36$  $NK_2 = 29$  $K_3 = 36$  $NK_3 = 29$ 

(2) Second, each sub-sample was analyzed through the

<sup>&</sup>lt;sup>1</sup>Dr. Edward L. Fink, personal communication, July 31, August 2, 1978 (Assistant Professor, Department of Communication, Michigan State University).

Galileo program such that six separate sets of factor coordinates were obtained, six sets of dissimilarity matrices were computed, and six "traces" (the total variance explained by all dimensions) were obtained for subsequent analysis.

(3) From the results of analyses for each subsample, further statistical analyses were performed. Differences between groups were tested by <u>t</u>-tests. According to the jackknife procedure, this was accomplished by finding the "pseudo means," "pseudo variances" and "pseudo standard deviations" for each group based on its n of "3."

(4) Tukey<sup>2</sup> specifies that the pseudo values are obtained by the following method: (a) using the average values for the entire group and the average value for each sub-sample of that group, the values are obtained by the formula:

3 (average value for entire group) - 2 (average value for sub-sample<sub>1</sub>) = pseudo-value<sub>1</sub> 3 (average value for entire group) - 2 (average value for sub-sample<sub>2</sub>) = pseudo-value<sub>2</sub> 3 (average value for entire group) - 2 (average value for sub-sample<sub>3</sub>) = pseudo-value<sub>3</sub>

<sup>&</sup>lt;sup>2</sup>This procedure was verified as correct for the present study during personal communication with Professor John W. Tukey, August 2, 1978. Professor Tukey (of Princeton University and Bell Telephone Laboratories) developed the jackknife procedure.

(b) subsequently, the mean and standard deviation
for each group are then calculated using the pseudo
values. Thus, these figures are referred to as
"pseudo means" and "pseudo standard deviations."
(5) For the present study, pseudo values were
obtained for each group and set of sub-samples
using the formula:

3 (average value) - 2 (average value) =  $K_1^{\star}$  pseudo-value for key communicators key communicators 3 ( $\frac{\text{average value}}{K_{all}}$ ) - 2 ( $\frac{\text{average value}}{K_{2}}$ ) = K<sup>\*</sup><sub>2</sub> pseudo-value<sub>1</sub> for key communicators 3 ( $\frac{\text{average value}}{K_{all}}$ ) - 2 ( $\frac{\text{average value}}{K_{3}}$ ) = K<sup>\*</sup><sub>3</sub> pseudo-value<sub>3</sub> for key communicators  $3 \left( \frac{\text{average value}}{NK_{all}} \right) - 2 \left( \frac{\text{average value}}{NK_{l}} \right) = NK_{1}^{*} \text{ pseudo-value}_{1} \text{ for}$ key communicators 3  $\binom{\text{average value}}{NK_{all}}$  - 2  $\binom{\text{average value}}{NK_2}$  = NK\* pseudo-value<sub>2</sub> for key communicators  $3 \left( \frac{\text{average value}}{\text{NK}_{311}} \right) - 2 \left( \frac{\text{average value}}{\text{NK}_{3}} \right) = \text{NK}_{3}^{*} \text{ pseudo-value}_{3} \text{ for}$ key communicators (6) The means and standard deviations for the pseudo-values were calculated by these formulae:<sup>3</sup> Standard deviation:  $\sqrt{\frac{3}{1/3}} \sum_{i=1}^{3} (\overline{K}^* - K_i^*)^2$ 

<sup>&</sup>lt;sup>3</sup>After consulting with Professor Tukey (personal communication, August 8, 1978) all pseudo variances were multiplied by 5/2. Tukey recommended this to correct for the sampling procedure used in this study (which was a variation of Tukey's original jackknife method).

(7) The <u>t</u>-test (for separate variance estimates) was performed using the pseudo values. The formula (Hays, 1973, pp. 405-406) used was of the form:

$$\underline{t} = \frac{(M_1 - M_2)}{est.\sigma_{diff}}$$

Of note, use of the <u>t</u>-test assumes normality and homogeneity of population variances (Hays, 1973). The assumptions are particularly important to take into account for a procedure such as the jackknife.

The judgment that most of the critical variables were normally distributed was made for the present study after examination of the descriptive statistics for the major variables (see Appendix A). Variables which were not normally distributed were the paired comparison variables which associated two concepts from different cognitive "domains" (a set of terms with similar perceived meanings). In addition, as Hays (1973) recommends, the sample sizes were probably sufficiently large.

However, homogeneity of variances is a more difficult assumption to address. In earlier work, an <u>F</u> test for homogeneity of variances was used to determine whether the <u>t</u>test for pooled estimates or the <u>t</u>-test for separate estimates should be used. Hays (1973) notes that modern authorities suggest this is not "worth the trouble involved" (p.

410). He states that in circumstances where the information is needed most, (small samples) the tests for homogeneity are poorest.

However, he recommends that for studies where one cannot assume equal population variances, and samples are of different sizes (as in the present study), separate standard errors are computed from each sample (using the <u>t</u>-formula above) and a correction for the degrees of freedom is used, where:

$$v = \frac{(\text{est.}\sigma_{M_1}^2 + \text{est.}\sigma_{M_2}^2)^2}{(\text{est.}\sigma_{M_1}^2)^2/(N_1+1) + (\text{est.}\sigma_{M_2}^2)^2/(N_2+1)} - 2$$

Hence, the above correction for calculation of degrees of freedom was used because (a) the author could not assume equal population variances and (b) the samples were of unequal size. This correction was used for each of the hypotheses in which the jackknife procedure was employed.

While many statistical experts agree that the jackknife procedure is a standard, respectable procedure,<sup>4</sup> the results from its use in this dissertation will be interpreted

<sup>&</sup>lt;sup>4</sup>Dorian Feldman, Associate Professor, personal communication, July 24, 1978 (Department of Statistics and Probability, Michigan State University).

cautiously.<sup>5</sup> Discussion of the conclusion from the results will take a broader stance by describing general trends in the data, rather than focusing on specific outcomes from individual tests.

The evaluation of Hypotheses 1, 2, 7 and 8 used  $\underline{t}$ tests to assess differences between the <u>overall</u> groups. The calculations were performed by the SPSS computer program.

<sup>&</sup>lt;sup>5</sup>Experts note that an appropriate check on the distribution for pseudo values is an examination of the results of random sampling the entire data set (in this study, 96 cases) for every possible combination of 53 cases and 43 cases. Such a random distribution would provide a comparison for the two groups of key communicators (n = 53) and non-key communicators (n = 43) chosen on theoretical criteria (Dennis Gilliland, Professor, personal communication, August 2, 1978 Department of Statistics and Probability, Michigan State University). The examination was not made for the present study given its laborious and expensive nature.

## CHAPTER IV

### RESULTS

This chapter presents a summary of the results of the analyses. The first portion of the chapter describes demographic characteristics of the respondents. The second portion reports the tests and evaluations for the hypotheses.

## Respondents

There were 96 respondents who participated in the study, out of a possible 128 persons (75%). The network instrument listed 183 names. However, the employee names furnished by the vice-president for manufacturing was not current; it contained names of persons who were retired, on other shifts, on extended sick leave, and were employed in the plant's second shop (referred to as the "new" shop). Table 3 presents the breakdown of those who did not participate in the study. Consequently, there were 128 people who were actually eligible for the study.

## Description of the Sample

The majority of the respondents (83%) were hourly workers; 17% were salaried personnel. Ninety-four percent were male. In terms of educational level, 24% had less than

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Resp	onse	Rate
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Categories	Number
Sick leave	11
Vacation leave	11
Retired	4
On other shifts	9
New shop	25
No down time	10
Refused	17
Participants in study	96
TOTAL	183
Less	55
ACTUAL TOTAL	128
Final Respondents	96

12 years of school, 44% had completed high school, and 33% had 1-4 years of college.

Half of the respondents (47%) had been employed at the firm for at least 15 years; 29% had worked there for 5-15 years and 19% had worked less than five years.

## Hypotheses

H<sub>1</sub>: The magnitude of the mean interpoint distance between the concepts of "self" and "the job" will be less for key communicators than for non-key communicators.

This hypothesis asserts that the sample mean for the key communicators (as an estimate of the population mean) will



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be less than the sample mean for the non-key communicators. The statistical hypothesis for this expectation takes the following symbolic form:

$$H_0 : \mu_K \stackrel{>}{=} \mu_{NK}$$
$$H_1 : \mu_K < \mu_{NK}$$

The entire groups of key communicators and non-key communicators were used in the analysis of this hypothesis. The means and variances for each set of data were obtained and analyzed by the SPSS computer program.

The results of the <u>t</u>-tests used to evaluate differences between the key and non-key communicators are reported in Table 4. The difference between the groups was found to be significant at p < .05. The results were in the hypothesized direction; the mean for the key communicator group was 37.74 and the non-key group, 59.3. On that basis, we can reject the null hypothesis.

The test indicates that key communicators were likely to perceive their concept of their jobs more similar to that which they held of themselves. In short, it would appear that they may possibly have more commitment and ego-involvement in their work. This is in contrast to the perceptions of nonkey communicators in the same organization who possibly do not have the same degree of identification with the job.

### Table 4

Means, Standard Deviations, and Results of t-Tests for Differences Between Paired Comparisons (One-Tailed Test)

Pair	Mean	S (n) D	tandard eviation	<u>t</u> value	Degrees of Freedom	Computed Sig- nificance Level*
MY JOB and ME Keys Non-Keys	37.74 59.30	(53) (43)	29.33 34.11	-3.33	94	.000
MY JOB and MANAGEMENT Keys Non-Keys	52.12 76.28	(53) (43)	36.53 24.98	-3.81*	* 90.03	.000

(Hypotheses 1-2)

\*The significance level displayed was computed by SPSS; my chosen alpha level was p < .05.

\*\*

Separate variance estimates were used because the population variance estimates differed significantly.

H<sub>2</sub>: The magnitude of the mean interpoint distance between the perception of the concepts of "the job" and "management" will be less for key communicators than for non-key communicators.

This hypothesis asserts that the sample mean (as an estimate of the population mean) for the key communicators will be less than the sample mean (the estimate of the population mean) for the non-key communicators. The statistical hypothesis is:

 $H_0 : \mu_K \ge \mu_{NK}$  $H_1 : \mu_K < \mu_{NK}$ 

This hypothesis was also analyzed by the SPSS computer program for <u>t</u>-tests, using the entire data sets for the two groups. Table 4 reports the results of the test. The difference between the groups was significant at the .05 level.

The results were also in the hypothesized direction, with the mean for the key group (52.12) being less than that for the non-key group (76.28).

The results tend to indicate that key communicators perceive their jobs closer to management than the non-key communicators. Of note, however, 30% of the key communicators were managers. A <u>t</u>-test was also computed for the difference between perceptions of the pair "my job and the foremen" for the keys and non-keys. There were six foremen in the key group. Differences between the two groups were still significant, however, in the hypothesized direction (the mean for the key group was 56.79 and for the non-key group, 71.86).

Hence, these results tend to show that key communicators have more information about managers in the organization and, according to force aggregation theory, do not perceive as large a difference between their jobs and management.

> H<sub>3</sub>: The concept of "the job" for key communicators will be closer to the center of the space<sup>1</sup> than for non-key communicators.

<sup>&</sup>lt;sup>1</sup>Unless otherwise indicated, the term "space" will refer to "real" space (as opposed to "imaginary" space).

This hypothesis asserts that the mean for the key communicators will be less than the mean for the non-key communicators. Hence, the sample means will be an estimate for the population means. The statistical hypothesis is, therefore:

 $H_0 : \mu_K \ge \mu_{NK}$  $H_1 : \mu_K < \mu_{NK}$ 

Hypothesis 3 was the first of four hypotheses evaluated with the Mosteller and Tukey's (1977) jackknife method. The problem posed in testing the hypothesis was to measure whether "the job" was closer to the origin of the space for key rather than non-key communicators. That is, the discrepancy between the concept of "the job" and the other twelve concepts would be less for the key than the non-key group.

Operationally, this means that the projection of the concept "my job" on each dimension in the space for the keys should be less than the projection on each dimension in the space for the non-keys.

Projections on dimensions begin from the origin, or zero point, in the space. To the extent the value of the projection for a concept is less than the values for projections of the concepts on the same dimension, the concept is closer to the zero point.

This example is illustrated in Figure 4 below:





# Dimension 1

Concept	Х	3
Concept	Y	5
Concept	Z	7

Figure 4. Concepts on one dimension

As the figure shows, dimension 1 begins from the center of the space, or the zero point. Concept "X" is closer to the centroid than the other two concepts given the value of its projection (also called "loading") on the dimension.

If we add more dimensions, picture the following:



Figure 5. Concepts on three dimensions

Hence, loadings would be given for each of the concepts on each of the dimensions. In order to do a centroid analysis (to test a hypothesis similar to H<sub>3</sub> above) the formula is:



distance from centroid = 
$$\sqrt{\Sigma}$$
 (projections)<sup>2</sup><sub>i</sub>  
i = dimensions

The formula requires one to square the value for each loading on each dimension, sum them, and then find the square root of that total.

In this study, the random sub-sampling method was used to obtain coordinates (dimensions) and the loadings for each concept on each dimension. Table 5 reports the loading of the "my job" concept on each of the thirteen dimensions when analysis by the GALILEO<sup>TM</sup> program was performed on (a) both keys and non-keys combined; (b) all key communicators; (c) each of the sub-samples from the key group; (d) all non-key communicators; and (e) each of the sub-samples from the nonkey group.

In order to perform the hand-calculated  $\underline{t}$ -test, the following operations were carried out on the three sub-samples for each group:

- 1) each projection value was squared;
- 2) the sum of the squared projections, across twelve dimensions, was found for each group or sub-sample (it should be noted that dimension thirteen is an "imaginary dimension" --it shows the extent to which the space is non-Euclidean or "warped"--and hence the squared value is always negative);
- 3) the square root was found for each sum;
- 4) the pseudo mean and standard deviation were calculated for each group using the square roots found for the three sub-samples;
- 5) <u>t</u>-test calculations were performed using the pseudo values.






		-	ı	(Hvpothe	esis 3)	I		I		
Dimension	Both Groups	All Keys (n = 53)	$K_{\rm l}$ (N = 36)	$K_2$ (n = 36)	K <sub>3</sub> (n = 36)	All Non-Keys (n = 43)	$\frac{NK_{\rm l}}{(n = 29)}$	NK <sub>2</sub> (n = 29)	NK <sub>3</sub> (n = 29)	
	.15 -18.5 -18.1	-2.2 -9.2 20.8	-5.1 -13.0 -20.2	-2.0 -3.0 19.8	-5.2 -13.1 -19.7	8 32.4 -9.1	-5.2 28.8 -6.0	-2.1 27.5 9.5	1.5 -32.0 8.5	
NI VI	6.9 -6.9	-10.6 -13.6 -5.5	19.2 4.3 16.9	-9.2 -18.5 -8.4	-11.1 -7.0 15.9	24.7 4.8 -1.7	-10.5 25.1 -2.8	7.9 27.6 -8.2	32.3 .9 -2.4	
	5.	2.5 10.7 8.5 .0		13.6 3.2 -7.9 -3.2 -0.0	-7.7 -11.4 2.3 2.6 2.6	-11.5 -2.9 2.3 -3.7 .1	10.7 2.9 1.7 0.0	-6.1 -2.5 - 1.7	-5.9 -2.8 -2.8	
formus	-7.1i	-7.7i	-6.5i	6.7i	-7.8i	-8.51	-8.9i	13.5i	-6.3i	
projections	867.0 29 4	987.4 31.4	1267.8 35.6	1125.5 33.5	1157.0 34.0	1933.7 44.0	1696.4 41.2	1606.6 40.1	2163.2 46.5	
induite tool	F • / 7		<b>D</b>							

Projection Values, Sum of Squared Projections, and Square Roots of Sums of Squares for Centrality Analysis of My Job Concept

\* Imaginary dimension-squared projection negative.



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Table 6 presents the results of the <u>t</u>-test calculations. The table shows that the <u>t</u> value obtained from calculations exceeded the critical (tabled)<u>t</u>-value. Hence the differences between the pseudo group means is significant at the .05 value with three degrees of freedom.

# Table 6

Means, Standard Deviations, and Results of t-Test Calculation for Centroid Analysis of "My Job" (One-Tailed Test)

Group	Means <sup>a</sup> (n)	Standard Deviations <sup>a</sup>	Degrees of Freedom	Obtained <u>t</u> value	Table $\frac{t}{\alpha}$ value $\frac{1}{\alpha}$ = .05
Key Communi- cators	25.47 (36)	2.83	3	4.01	2.353
Non-Key Communi- cators	45.80 (29)	8.31			

(Hypothesis 3)

<sup>a</sup>jackknifed pseudo values.

The values for the pseudo means were in the hypothesized direction, with the mean for the key group (25.47) less than the mean for the non-key group (45.80).

The results of this analysis indicate that the key communicators in the organization tend to perceive their jobs as more central in their cognitive environment; the dissimilarity between their jobs and other salient concepts is lessened because they tend to view their jobs and the other concepts in similar terms.



H<sub>4</sub> The overall size of the cognitive space perceived by key communicators will be smaller than the size of the space for non-key communicators.

Hypothesis 4 means that the sample mean for the key communicators will be less than the sample mean for the nonkey communicators. Hence, they are estimates of the differences for the population means. The statistical hypothesis is:

 $H_0 : \mu_K \ge \mu_{NK}$ 

 $H_{1} : \mu_{K} < \mu_{NK}$ 

This was the second hypothesis analyzed using the jackknife method. The procedures for the analysis and <u>t</u>-test were similar to those used for Hypothesis 3.

The trace value was used to test for differences in the relative sizes of the spaces for the two groups. The trace is the sum of the total real<sup>2</sup> variance in the space (the imaginary dimension variance is subtracted out). That is, the trace is a measure of the "variability" of the space. The hypothesis, therefore, implies that the space for the key communicators will be less in size because of less variability in the dissimilarity judgments.

The traces for each sub-sample are provided in Table 7. The results of t-tests performed on the pseudo means and

<sup>2</sup>Vs. imaginary variance

Trace Values for Key and Non-Key Groups

		(ing po chesic	5 - 1)	
	All Key $(\underline{n} = 53)$	$(\underline{n} = 136)$	$(\underline{n} = 236)$	$(\underline{n}^{K_{3}}_{-336})$
Trace	25.932	26.312	26.744	26.116
	All Non-Key $(\underline{n} = 43)$	$(\underline{n} = 129)$	$(\underline{n} = 229)$	$(\underline{n} = {}^{3}29)$
Trace	28.325	27.778	28.068	28.524

(Hypothesis 4)

standard deviations are reported in Table 8. The  $\underline{t}$ -test values were obtained by computing the pseudo values for the trace values of the sub-samples.

The results indicate that there are likely significant differences between the sizes of the spaces for the two groups. The pseudo means are also in the hypothesized direction since the pseudo mean trace value for the key group is 26.39 compared to 28.12 for the non-key group (1.73 units less).

While the interpretation of these results should be made with a certain amount of caution, the general trends appear to indicate that key communicators see objects in the space as more similar than non-key communicators. In light of force aggregation theory, this suggests that key communicators probably tend to have more information about salient



Means, Standard Deviations, and Results of t-Test Calculation for Differences Between Traces for Key and Non-Key Groups (One-Tailed Test)

Group	Means <sup>a</sup> (n)	Standard Deviations <sup>a</sup>	Degrees of Freedom	Obtained <u>t</u> value	Table $\frac{t}{\alpha} = .05$
Key Communi- cators	26.39 (36)	.83	3	2.84	2.353
Non-Key Communi- cators	28.12 (29)	1.01			

(Hy	pot	hes	is	4)
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<sup>a</sup>jackknifed pseudo values

objects in the environment and hence do not perceive differences as large in magnitude. That is, while a non-key communicator may have less information about some concepts (and hence report large differences, key communicators are probably more sensitive to interrelationships among concepts in the environment.

H<sub>5</sub>: The key communicators will have a spherical space, while the non-key communicators will have an ellipsoidal space.

This hypothesis was also evaluated using the jackknife. Specifically, ratios were found of the eigenvalues for the dimensions of each sub-sample. <u>t</u>-Tests were subsequently performed for differences between the overall groups. The





eigenvalues were obtained by the GALILEO program for all coordinates in each sub-sample

An eigenvalue is the total variance explained for each of the thirteen concepts on a dimension. The largest amount of real variance is accounted for by the first dimension. Thus, it is reasonable to assume that the first eigenvalue represents the "length" of the space. The second eigenvalue, which accounts for the second most amount of variance, we will label "width." Finally, the third dimension will be labeled the "height" of the space. In the present study, the first three dimensions accounted for approximately two-thirds of the variance in the space. Hence, succeeding dimensions did not represent a sufficient amount of variance to affect the nature of the shape.

In order to calculate <u>t</u>-tests for the shape, particularly for sphericity vs. ellipsoidality, the ratio of the eigenvalue of the first dimension to the second dimension was computed. This represented:

$$\frac{\lambda_1}{\lambda_2} = \frac{\text{"length"}}{\text{"width"}}$$

The expectation in this study was for the length value of the non-key communicator samples to be larger than that of the width. Hence, the ratio would provide a measure for the extent to which the shape was oblong. In contrast, the expectation of the eigenvalues for the key communicator samples was that they would show more equivalence in the ratio, making



the shape more circular. The statistical hypotheses for each test are of the form:

$$H_0: \mu_K \ge \mu_{NK}$$
$$H_1: \mu_K < \mu_{NK}$$

Table 9 provides the ratios for each set of eigenvalues for the two sets of sub-samples. The pseudo means and standard deviations for each set of ratios were subsequently computed and used for the <u>t</u>-tests. Results of the tests for each of the three ratios are reported in Table 10.

<u></u>		(Hypothesis 5)	I	
Ratio*	$\begin{array}{l} \text{All} \\ \text{Key} \\ (\underline{n} = 53) \end{array}$	$(\underline{n} = 1^{K_1} 36)$	$(\underline{n} = 236)$	$(\underline{n} = 3^{K_3} 36)$
$\lambda_1 / \lambda_2$	1.64	1.57	1.57	1.67
$\frac{\lambda}{2}/\frac{\lambda}{3}$	1.22	1.34	1.21	1.12
$^{\lambda}_{3}/^{\lambda}_{4}$	1.38	1.47	1.20	1.48
Ratio*	All Non-Key ( <u>n</u> = 43)	$(\underline{n} = 129)$	$(\underline{n} = 229)$	$(\underline{n} = 329)$
$\lambda_1/\lambda_2$	1.77	1.84	1.54	1.48
$\lambda_2/\lambda_3$	1.60	1.76	1.79	1.57
$\lambda_3/\lambda_4$	1.31	1.24	1.23	1.26
$\star \lambda_1 = E$	igenvalue for	r first dimension		

Ta	b]	.e	9
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Ratio of Eigenvalues for Dimensions 1-3 (Hypothesis 5)

 $\lambda_2$  = Eigenvalue for second dimension

 $\lambda_3$  = Eigenvalue for third dimension

 $\lambda_A$  = Eigenvalue for fourth dimension



Means, Standard Deviations, and Results of t-Tests<sup>a</sup> for Eigenvalue Ratios (One-Tailed Test)

Group	Means <sup>b</sup> (n)	Standard Deviations <sup>b</sup>	Degrees of Freedom	Obtained <u>t</u> value	Table $\frac{t}{\alpha}$ = .05
$\lambda_1/\lambda_2$					
I Z Kev	1.713				
Communi- cators	(36)	.15			
Non-Key	2.07		3	1.19	2.353
Communi- cators	(29)	.50		(n.s.)	
$\lambda_2/\lambda_3$					
Кеу	1.213				
Communi- cators	(36)	.29	2	0.4	2 252
Non-Key	1.387		3	.94	2.353
Communi- cators	(29)	.31		(n.s.)	
$\lambda_3/\lambda_4$					
Key	1.373				
Communi- cators	(36)	.41	2		0 252
Non-Key	1.443		3	• 1 /	2.353
-	(29)	.04		(n.s.)	

(Hypothesis 5)

<sup>a</sup>The reader should note that the numerator in one test appears as the denominator in the subsequent test. The amount of statistical independence of these tests may be in question. However, as Fuguitt and Lieberson (1973-1974) note, if a set of ratios are "theoretically meaningful as ratios, and hypotheses are stated as ratios, the results of a ratio correlation need not be considered as spurious" (p. 140).

<sup>b</sup>jackknifed pseudo values.

As the table shows, the difference between the first ratios for the two groups was nonsignificant. Hence, the hypothesis that the spaces for the two groups differed in terms of shape is rejected. However, it should be noted that the values for the means are in the hypothesized direction. That is, the mean ratio for the non-key communicator group is greater than the one for the key communicator group.

In addition, subsequent ratios for the two groups did not differ significantly. However, the ratio of the second to the third dimension (which represents a measure for "length" to "height") was in the hypothesized direction. The results show that the pseudo mean for the pseudo mean ratio for the key communicators (1.213) is less than for the non-key communicators (1.387). This implies that the key group has a "flatter" shape than the non-keys, which is possible because there is less variability in their space.

Finally, the table shows that the third set of ratios (height to a fourth dimension) also did not differ significantly.

> H<sub>6</sub>: When the spaces for the key communicators and non-key communicators are examined together, the largest differences will be found between perceptions of the job, management, organizational policies, and the union.

This hypothesis asserts that there are absolute differences between the locations of the concepts in the two spaces. That is, if the space of the keys is placed above the space

of the non-keys, the concepts of the key group will not be located directly below those of the non-keys.

Hence, each set of two spaces were rotated together using a subroutine of the GALILEO program. The sets rotated were: (a) sub-sample  $K_1$  with sub-sample NK<sub>1</sub>; (b) subsample  $K_2$  with sub-sample NK<sub>2</sub>; and (c) sub-sample  $K_3$  with sub-sample NK<sub>3</sub>. The program rotates the dimensions of the spaces to a least squares best fit, following the recommendation of Torgerson (1958, Chapter 11). Hence, the differences provided for each concept ( $S_c$ ) equal the sum of the squared differences across dimensions, with the final value being the square root of the sum. The formula for this is:

Sc =  $\sqrt{\Sigma} (K_c - NK_c)^2$ where S = difference c = individual concept K = key communicators NK = non-key communicators

The results of the differences taken across sub-samples are reported in Table 11. Hence, the pseudo average differences for each concept are provided in the last column of the table. The pseudo averages for all concepts were obtained by following a computation of the form:

3 (C ) - 2 (C ) = C \* Pseudo-value for concept i all keys to all non-keys 3 (C ) - 2 (C ) = C \* Pseudo-value for concept i all keys to all non-keys 3 (C ) - 2 (C ) = C \* Pseudo-value for concept i all keys to all non-keys 3 (C ) - 2 (C ) = C \* Pseudo-value for concept i all keys to all non-keys 3 (C ) - 2 (C ) = C \* Pseudo-value for concept i where C = Concept i



Differences I	3etween Concept	Spaces of Ke	ys and Non-F	Keys after R	otation <sup>a</sup>
· ·		(Hypothesis	6)		
Concept	All Keys to All Non-Keys	$\mathbf{K}_{1}$ to $\mathbf{NK}_{1}$	$\mathbf{K}_2$ to $\mathbf{NK}_2$	$k_3$ to $Nk_3$	Average Difference <sup>b</sup>
My Job	27.4	28.02	27.76	43.74	15.85
Hard Work	20.9	27.75	19.94	28.51	11.90
The Foremen	34.5	35.10	34.25	27.40	45.67
Easy	27.0	30.36	39.20	38.12	36.21
Overtime	22.3	24.72	18.12	45.15	8.24
Pushy	20.5	25.52	32.48	38.85	-3.07
The Heat	24.7	27.86	23.86	24.61	23.21
The Union	41.5	31.91	34.14	61.58	39.41
Management	34.3	25.72	26.69	39.32	41.74
Better Machinery	23.1	46.95	44.20	37.34	-16.36
Good	17.9	20.05	29.26	35.51	-2.85
Helpful	8.7	9.15	22.80	46.30	-17.37
Me	19.1	11.77	24.95	25.17	16.04
<sup>a</sup> In this rotation,	, all concepts v	vere set to a	un equal weig	jht of "1."	The program

option used was "Operations - Comparison of Spaces."

 $^{\mathrm{b}}$ Computed using jackknife method to obtain pseudo mean difference.



Table 12 provides a rank ordered list of the concepts with the greatest to the least average differences. The rank ordering shows that of the hypothesized concepts, "management" and the "union" are among those with the largest differences. However, "overtime" and "my job" are not among the largest; hence, we reject the hypothesis.

## Table 12

Rank Ordered Pseudo Average Differences Between Concepts<sup>a</sup> (Hypothesis 6)

Pseudo Average Difference
45.67
41.74
39.41
36.21
23.21
16.04
15.85
11.90
8.24
-2.85
-3.07
-16.36
-17.37

<sup>a</sup>All concepts equal weight.

However, the data show several general trends. Within the context of force aggregation theory, the difference in perceptions held by key communicators versus non-key communicators. On the average, the least amount of difference



between the two groups occurs in perceptions of "helpful," "better machinery," "pushy" and "good." The largest difference occurs with the concept of the "foremen." Overall, it appears that the two groups likely share similar perceptions of some positive and negative attributes. However, their perceptions become more disparate over concepts relating to the union, management, plant conditions, self, and the job.

> H<sub>7</sub>: Key communicators will perceive that they exert more influence in the determination of rules than non-key communicators.

The expectation of this hypothesis is that the sample mean of the key communicators will be greater than that for the non-key communicators (based on the scale values). The statistical hypothesis for reference to the population becomes:

 $H_0 : \mu_K \geq \mu_{NK}$  $H_1 : \mu_K < \mu_{NK}$ 

The entire data sets for the key communicators and non-key communicators were used to test Hypothesis 7. The analysis was performed by SPSS.

The results of the  $\underline{t}$ -test for this hypothesis are reported in Table 13. The results show a significant difference at the .05 level between the means for the key and nonkey communicator groups.

However, the direction of the results is not in the hypothesized direction. The means show that the value for

1.0

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Means, Standard Deviations, and Results of t-Tests for Communication Rules and Satisfaction of Information Needs Variables (One-Tailed Tests)

Variable	Mean	(N)	Standard Deviation	<u>t</u> value	Degrees of Freedom	Signifi- cance* Level
RULES	10 70		4 07			
Keys Non-	19.78	\$(53)	4.27	-2.32	87	.01
Keys	21.95	5(43)	4.47			
INFO NEE	DS					
Keys	13.90	)(53)	4.12	-2 21	9.0	012
Non-				-2.21	20	• 0 12
Keys	15.71	L(43)	3.58			

(Hypc	theses	7-8)
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 $\alpha = .05$ 

the non-key group (21.95) is larger than the value for the key group (19.78). Thus, the general trend for the non-key communicators is that they perceive they exert more influence over the rules for interaction than the key communicator group.

Reliability of the scale was evaluated using Cronbach's alpha coefficient. The result was a reliability of .56 for the measure.

H<sub>8</sub>: Key communicators will perceive downward-directed messages as more accurate than will non-key communicators.

This hypothesis was also tested using the entire data sets for the key communicators and non-key communicators. The t-test was performed by SPSS. The results of the



evaluation for this hypothesis are reported in Table 13. The two groups differ significantly at the .05 level.

The difference is also in the expected direction. The mean for the key communicators (13.90) is less than for the non-key communicators (15.71). This suggests that the key communicators more often perceived downward-directed information as timely, accurate, believable, useful and adequate than did non-key communicators.

Cronbach's alpha was used to assess the reliability of the scale. The result was .85.

This chapter has presented results of analyses of the study population and the hypotheses. Chapter V provides a discussion of the results and implications of the study.

#### CHAPTER V

## SUMMARY AND RECOMMENDED RESEARCH

The purpose of this study was to evaluate the role of communication in forming members' perceptions of their organizational climate. The research questions developed after a selective review of the literature showed the relationship between communication and climate perceptions had not been fully investigated. This chapter provides: (1) major limitations of the study; (2) conclusions; and (3) implication of the study for future research.

## Limitations of the Study

The major weakness of the work reported here was the lack of overtime data. The one-shot nature of the design meant it was impossible to assess the stability of the respondents' perceptions and their interaction patterns. A reliability estimate was not obtained given that the data were not collected during at least three points in time.

A second limitation of the study concerned the scaling procedure used for the MDS instrument. The scale used was bounded from 0-100. However, the descriptive statistics (Appendix A) for the paired comparisons show many responses were 85-100. Hence, it is likely that respondents'

perceptions of dissimilarity between objects were constrained by the nature of the scale. Direct magnitude estimation would therefore have been a more precise type of measure.

### Conclusions

Several conclusions may be drawn from the results of the study. First, at the theoretical level, basing the conceptual framework on a theory of cognitive process and communication structure was useful for guiding research. Evidence obtained for the hypotheses derived from this framework was helpful in explaining differences in perceptions based on communication patterns. This framework was also important because it provided a way of studying climate perceptions based on an explicit communication perspective. Previous research has measured the nature of perceptions; few studies have explained the relationship between those perceptions and one's access to information in the system.

Second, the framework was useful for extending much of the previous work on organizational climate. That is, this schema accounted for and developed the measurement of many of the previous dimensions of climate (outlined in Chapter I). The dimensions included the following:

> (1) The dimensions of "managerial aloofness," "close impersonal supervision," and "closeness of supervision," implied a sense of perceived distance from management. The present study incorporated these by the MDS



technique of assessing perceived dissimilarity between the "job" and "management" concepts.

- (2) Previous studies have included a dimension of "frequency of communication." By measuring patterns of information flow (which included frequency measures) this study provided a more comprehensive assessment of communication frequency among all members of the organization.
- (3)Several previous studies found that two referents for climate include "role ambiguity" and "role conflict." This research provided an alternative way of conceiving of these variables by measuring the difference between the "self" and the "the job," (i.e., "role"). The research showed that dissimilarities between the two could be considered in terms of amount of information about the job, reflected (a) in one's favorability toward the job; and (b) in one's knowledge level of the work. That is, results obtained from the present work showed that key communicators tended to perceive less "difference" between themselves and their roles. Within the context of the force aggregation assumption, this means that

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key communicators probably liked their jobs more and experienced less conflict than nonkey communicators. In addition, they likely experienced less ambiguity toward their jobs, because they had access to more direct information about the work than non-key communicators.

(4) Finally, previous climate research has included the dimension of "status polarization." This also implies the notion of psychological distance between those occupying different formal positions. The present study included this perception of differentiation by measuring the perceived dissimilarity between the "job" and "management." In addition, however, status polarization may result between pairs of other types of concepts, as well, such as the "union" and "management," "management" and "foremen," and "my job" and "foremen." This research was able to account for all of these specific types of polarization, thus increasing the precision of the research. In general, this research found that key communicators tended to see less polarization overall than non-key communicators. A third major conclusion concerns the utility of the methodology used for the study. The variation of the Tukey jackknife procedure provided a method for statistically

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testing group differences when few values were known (as in the case of only two "traces" for the groups' overall variabilities). This method of sampling one's own data in order to obtain a sufficient number of values amenable to further parametric tests was helpful not only for this particular study, but for organizational communication research in general. A common problem in organizational research has been the lack of known tests for such types of differences when only one organization was under study. Hence, this technique enables the researcher to test for differences in behavior within one organization, rather than obtaining grouped data from a number of organizations (research which is often prohibitive due to physical and financial constraints).

Fourth, the results of the study have several pragmatic implications. First, the findings are useful for designing organizational intervention strategies. That is, the results show that different strategies may be needed by interventionists in the introduction and an implementation of change or development programs. Strategies for such programs may be better designed by being more specifically targeted for the special perceptions of each group. Such programs may ultimately be more successful in their adoption if professionals know <u>a priori</u> of the nature of differing perceptions based on the access to messages in the organization.



In addition, the methods used in this study may be particularly useful for identifying the nature of members' information needs in an organization. For example, in a unionized organization, the results provide both managers and union officials with an indication of people's communication behavior, and the effects of their lack of information about certain "objects" perceived salient in the organization. Managers may then identify employees who need more attention, clarify ambiguous concepts (e.g., the "foremen" in the present study) or provide more information about such issues as plant policies, etc. In addition, they may also use the information in designing task groups. For example, they may want to include specific key communicators in the group who can possibly increase the knowledge level of those less active communicators.

Union leaders, may also find this information helpful in meeting the information needs of their constituents. They may find they need to communicate more frequently with certain workers who are less informed about such issues as grievance handling or pension plans. In addition, a common concern of union leaders has been that they are not "in touch" with the rank and file. This method may enable them to identify workers who possibly feel alienated from the leadership.

Finally, a general conclusion from this research concerns the utility overall concept of "climate." The





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concept has been difficult for researchers to conceptually and operationally define with precision. However, the previous work has demonstrated by numerous robust findings that members of an organization do have perceptions of the non-physical, social environment, and that such perceptions do affect the areas of morale, job satisfaction, and job performance. In addition, the set of results suggest that rigorous work in the area remains useful and worthy of interest by researchers and practitioners alike.

In conclusion, the term "climate" is probably a confusing label for the body of research. Future research should consider the work as the investigation of "environmental perceptions," a term probably more accurate and specific for this type of research.

## Future Research

The results of the work have implications for two major directions of future research. The first direction involves developing the study conceptually; the second, improving the methodology.

The study could be developed conceptually by examining more differences among respondents and perceptions. First, differences in perceptions of respondents could be investigated with the use of the demographic data. For example, differences could be tested among members based on their age groups, educational levels, job status (management, foremen, hourly workers, or piece-rate incentive workers).



In addition, differences among respondents could be tested based on their length of time in the organization. This particular relationship has been evaluated in previous climate research by Johnston (1976). He found that the longer workers had been employed in an organization, the more their perceptions tended to be favorable toward the organization.

Differences among perceptions based on demographic data could provide communication managers with information regarding the patterns of perceptions of "typical" organization members. For example, if differences among respondents appear to occur regularly, by age, education, and job status, this may provide information about what type of employee is likely to be an "active" communicator, it is also useful in designing task groups, etc.

In addition to the demographic variables, future research should focus on the analysis of differences in perceptions based on several other structural variables. These variables include reciprocity (of communication links), connectedness (in the network), and network volume, magnitude, and disparity. <u>Reciprocity</u> refers to the agreement individuals have about their link. That is, a reciprocated link is one where two individuals perceive and report that they have a communication link between them (i.e., they "agree" about their link). An unreciprocated link is one where only one individual perceives and reports a link



(Farace, Monge, Russell, 1977).

The reciprocity construct is important because it is a measure of the level of perceived agreement among communicators in the system regarding their communication. The extent to which members of an organization agree about their links may be indicative of the quality of information that is perceived to be shared among those individuals. If members report a number of links but only a few of those individuals perceive communication with him or her, it may indicate (1) his impact on others as a communicator; and (2) the nature to which his information is shared with others in the system.

In addition, the level of <u>connectedness</u> of members in the system is an interesting construct for perception research. Connectedness refers to the extent to which individual communicators are located at the "crossroads" of the communication flow (Farace, Monge, Russell, 1977). This measure enables the researcher to determine the relative embeddedness of respondents in the message network. It is a more precise assessment of the amount of information individuals have potential access to in the system.

By including both variables in the research, a  $3 \times 2$  matrix for key communicators and non-key communicators could be developed of the form shown in Figure 6.

Such a matrix would enable a better way of measuring relative differences between key and non-key communicators.

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Figure 6. Matrix of communicator reciprocity and integrativeness.

It would be expected that those with high reciprocation levels and high connectedness would have the most favorable climate perceptions; in contrast, communicators with low reciprocation and low connectedness would likely have the least favorable perceptions.

Other network variables would be useful to include in an investigation are magnitude and disparity (Edwards and Monge, 1977). Network magnitude refers to the <u>size</u> of the network (the number of group members), and <u>volume</u> (the number of linkages). Network disparity refers to the <u>distribution</u> of the linkages, either in terms of their <u>concentration</u> (the degree to which most linkages involve one or a few individuals rather than more equitable distribution), or <u>diameter</u> (the length of the shortest chain linking the two most distant members of the network).

These variables would provide information about the nature of the overall network. A large network, for example,

with relatively few linkages may indicate only minimal communication behavior among members. Further, to the extent linkages exist among a few individuals with a relatively lengthy diameter, it may indicate a limited degree of message exchange. This in turn may contribute to increased psychological "size" and more unfavorable perceptions.

Future research should also develop the methodology of the present study. First, the scaling procedures for the MDS instrument should be changed to direct magnitude estimation methods. Second, the study design should be extended to a time-series model, where stability of perceptions could be tested. Third, with the addition of the constructs mentioned above, a structural equation model could be developed for predicting the nature of perceptions among members in the system.

and

APPENDIX A

Descriptive Statistics for All Variables



## DESCRIPTIVE STATISTICS

Variables	Mean	Standard Deviation	Median	Mode	Skewness	Kurtosis
MY JOB and HARD WORK	42.92	28.02	43.57	50.00	. 29	92
MY JOB and THE FOREMEN	63.54	33.53	75.56	100.00	55	-1.05
MY JOB and EASY	60.52	29.54	62.14	80.00	35	99
MY JOB and OVERTIME	53.75	30.31	53.13	50.00	08	-1.20
MY JOB and PUSHY	59.68	32.50	60.63	100.00	35	-1.12
MY JOB and THE HEAT	60.42	33.56	61.67	100.00	37	-1.11
MY JOB and THE UNION	62.08	33.02	71.25	100.00	60	88
MY JOB and MANAGEMENT	63.05	33.90	73.33	100.00	48	-1.14
MY JOB and BETTER MACHINERY	57.19	32.89	58.33	100.00	21	-1.25
MY JOB and GOOD	45.42	29.56	46.18	50.00	.22	-1.06
MY JOB and HELPFUL	42.53	31.25	35.83	20.00	.39	-1.10
MY JOB and ME	47.40	33.19	46.82	20.00	.21	-1.37
HARD WORK and THE FOREMEN	58.44	34.16	55.00	100.00	-2.2	-1.38
HARD WORK and EASY	68.96	29.65	78.13	100.00	65	68
HARD WORK and OVERTIME	51.88	32.55	50.26	50.00	.08	-1.33
HARD WORK and PUSHY	57.26	32.17	54.00	80.00	24	-1.17
HARD WORK and THE HEAT	47.55	35.06	39.29	20.00	.25	-1.43
HARD WORK and THE UNION	62.47	30.28	65.63	100.00	47	82

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Standard 113											
Variables	Mean	Deviation	Median	Mode	Skewness	Kurtosis					
HARD WORK and MANAGEMENT	59.79	33.38	63.33	100.00	38	-1.17					
HARD WORK and BETTER MACHINERY	66.60	28.23	72.27	100.00	59	66					
HARD WORK and GOOD	56.74	28.17	52.00	50.00	.08	-1.13					
HARD WORK and HELPFUL	51.51	26.25	49.20	50.00	.39	59					
HARD WORK and ME	43.63	28.38	38.57	50.00	.60	50					
THE FOREMEN and EASY	57.34	32.67	55.00	100.00	16	-1.34					
THE FOREMEN and OVERTIME	56.67	32.72	53.33	100.00	01	-1.37					
THE FOREMEN and PUSHY	54.30	32.65	53.64	100.00	15	-1.25					
THE FOREMEN and THE HEAT	54.24	32.93	76.67	100.00	59	99					
THE FOREMEN and THE UNION	69.57	31.07	80.00	100.00	90	29					
THE FOREMEN and MANAGEMENT	39.57	35.23	29.38	0	.48	-1.26					
THE FOREMEN and BETTER MACHINERY	58.48	30.88	60.71	100.00	25	-1.11					
THE FOREMEN and GOOD	45.38	28.76	44.44	50.00	.31	81					
THE FOREMEN and HELPFUL	41.96	29.10	35.00	30.00	.41	86					
THE FOREMEN and ME	51.70	32.88	51.15	10.00	.06	-1.34					
EASY and OVERTIME	63.30	32.18	75.00	100.00	51	-1.07					
EASY and PUSHY	74.78	27.03	82.50	100.00	-1.15	.35					
EASY and THE HEAT	73.87	28.17	82.81	100.00	-1.16	.33					
EASY and THE UNION	54.26	28.38	53.18	50.00	19	63					
EASY and MANAGEMENT	66.13	30.00	75.31	100.00	58	84					

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114												
Variables	Mean	Standard Deviation	Median	Mode	Skewness	Kurtosis						
EASY and BETTER MACHINERY	51.17	31.07	48.33	30.00	.12	-1.16						
EASY and GOOD	40.32	28.60	35.00	50.00	.61	39						
EASY and HELPFUL	41.81	26.23	42.27	50.00	.41	38						
EASY and ME	44.68	26.71	47.22	50.00	.30	51						
OVERTIME and PUSHY	54.62	33.38	54.50	100.00	10	-1.34						
OVERTIME and THE HEAT	61.38	31.81	67.73	100.00	38	-1.06						
OVERTIME and THE UNION	61.17	29.76	66.33	100.00	37	91						
OVERTIME and MANAGEMENT	44.04	33.06	36.43	10.00	.34	-1.25						
OVERTIME and BETTER MACHINERY	68.82	27.10	75.33	100.00	49	87						
OVERTIME and GOOD	60.00	29.23	59.17	50.00	25	-1.00						
OVERTIME and HELPFUL	51.28	33.00	47.63	50.00	1.30	4.28						
OVERTIME and ME	55.38	30.95	52.50	50.00	06	-1.25						
PUSHY and THE HEAT	58.94	32.87	66.43	100.00	22	-1.36						
PUSHY and THE UNION	64.10	29.99	71.39	100.00	48	96						
PUSHY and MANAGEMENT	44.09	33.24	40.00	0	.28	-1.26						
PUSHY and BETTER MACHINERY	70.00	26.96	78.00	100.00	75	26						
PUSHY and GOOD	72.77	26.04	80.63	100.00	82	26						
PUSHY and HELPFUL	68.83	27.39	74.00	100.00	56	73						
PUSHY and ME	73.19	27.37	81.11	100.00	-1.04	.25						
THE HEAT and THE UNION	65.16	31.12	71.88	100.00	47	-1.09						



115											
Variables	Mean	Standard Deviation	Median	Mode	Skewness	<u>Kurtosis</u>					
THE HEAT and MANAGEMENT	56.60	35.00	60.00	100.00	15	-1.48					
THE HEAT and BETTER MACHINERY	69.89	26.82	77.78	100.00	69	52					
THE HEAT and GOOD	76.17	26.52	84.44	100.00	-1.17	.41					
THE HEAT and HELPFUL	73.62	28.05	84.09	100.00	94	26					
THE HEAT and ME	68.09	28.45	72.00	100.00	70	44					
THE UNION and MANAGEMENT	73.55	26.07	80.91	100.00	76	32					
THE UNION and BETTER MACHINERY	56.04	30.21	53.57	50.00	15	-1.02					
THE UNION and GOOD	48.21	27.64	48.70	50.00	.05	79					
THE UNION and HELPFUL	46.47	28.29	47.94	50.00	.26	82					
THE UNION and ME	55.10	31.95	53.24	50.00	13	-1.13					
MANAGEMENT and BETTER MACHINERY	59.06	31.12	59.29	100.00	17	-1.20					
MANAGEMENT and GOOD	55.52	29.84	42.78	50.00	03	-1.23					
MANAGEMENT and HELPFUL	56.15	30.31	51.92	100.00	.06	-1.39					
MANAGEMENT and ME	54.17	31.41	51.67	50.00	.01	-1.27					
BETTER MACHINERY and GOOD	40.94	30.06	33.57	30.00	.41	98					
BETTER MACHINERY and HELPFUL	36.25	28.29	29.71	30.00	.67	46					
BETTER MACHINERY and ME	45.00	31.34	38.33	30.00	.40	-1.02					
GOOD and HELPFUL	33.13	28.00	26.54	10.00	.96	12					
GOOD and ME	33.65	24.84	29.00	20.00	.89	.35					
HELPFUL and ME	35.52	25.42	30.88	10.00	.70	25					

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	. 116												
Variables	Mean	Standard Deviation	Median	Mode	Skewness	Kurtosis							
RULES	20.71	4.47	20.40	20.00	.15	1.26							
INFORMATION NEEDS	14.71	3.97	15.00	17.00	.22	64							

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APPENDIX B

Pair-Wise MDS Sample Sizes

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Pair-Wise MDS Response Sizes: COMPLETE SAMPLE

13													0
12												0	96
=											0	96	96
2										0	96	96	94
6									0	96	96	96	96
8								0	63	96	95	95	96
7							0	63	94	94	94	94	94
9						0	94	94	63	94	94	94	94
5					0	63	94	94	94	63	63	94	93
4				0	94	92	93	94	63	94	94	94	94
ε			0	94	93	93	92	93	63	92	63	92	94
2		0	96	96	96	95	94	63	94	94	92	63	16
-	0	96	96	96	96	95	96	96	95	96	96	95	96
	-	2	e	4	5	9	7	ω	6	10	11	12	13



Pair-Wise MDS Response Sizes: ALL KEY COMMUNICATORS

13													0
12												0	53
=											0	53	53
01										0	53	53	52
6									0	53	53	53	53
ω								0	51	53	53	53	53
7							0	51	51	51	51	51	51
9						0	51	51	50	51	51	51	51
اى					0	52	52	52	52	52	51	51	51
4				0	52	51	51	52	52	52	52	52	52
m			0	53	53	53	53	53	53	53	53	52	52
5		0	53	53	53	52	53	52	53	53	53	52	51
-	0	53	53	53	53	53	53	53	52	53	53	53	53
	-	2	m	4	5	9	7	ω	6	10	Π	12	13



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es:
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Respons
MDS
Pair-Wise

13													0
12												0	26
=											0	26	26
01										0	26	26	26
6									0	26	26	26	26
ωļ								0	26	26	26	26	26
~							0	26	26	26	26	26	26
9						0	26	26	25	26	26	26	26
2					0	25	25	25	25	25	25	26	26
4				0	25	25	24	25	25	25	25	25	25
m			0	26	26	26	26	26	26	26	26	26	25
2		0	26	26	26	26	26	25	26	26	25	26	26
-	0	27	27	27	27	27	27	27	26	26	26	26	26
	-	~	m	4	S	9	7	8	б	10	Ξ	12	13

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13													0
12												0	32
=											0	32	32
01										0	32	32	32
6									0	32	32	32	32
8								0	31	32	32	32	32
7							0	31	31	31	31	31	31
9						0	31	31	30	31	31	31	31
2					0	32	32	32	32	32	31	31	31
4				0	32	31	31	32	32	32	32	32	32
က			0	32	32	32	32	32	32	32	32	31	32
5		0	32	32	32	31	32	31	32	32	31	31	30
-	0	33	33	33	33	33	33	33	33	32	32	32	32
	-	2	с	4	5	9	7	8	6	10	11	12	13

Pair-Wise MDS Response Sizes: K<sub>2</sub> SAMPLE




	13													0
	12												0	31
	=											0	31	31
	미										0	31	31	30
n	6									0	31	31	31	31
	∞								0	29	31	31	31	31
	7							0	29	29	29	29	29	29
	9						0	29	29	28	29	29	29	29
	2					0	30	30	30	30	30	29	29	29
	4				0	30	29	30	30	30	30	30	30	30
	m			0	31	31	31	31	31	31	31	31	30	30
	5		0	31	31	31	30	31	30	31	31	31	30	29
	-1	0	32	32	32	32	32	32	32	31	31	31	31	31
		-	2	e	4	5	9	7	8	6	0	-	2	e

Pair-Wise MDS Response Sizes:  $K_3$  SAMPLE

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Pair-Wise MDS Response Sizes: ALL NON-KEY COMMUNICATORS

13													0
12												0	43
=											0	43	43
01										0	43	43	42
6									0	43	43	43	43
8								0	42	43	42	42	43
<u>-</u>							0	42	43	43	43	43	43
9						0	43	43	43	43	43	43	43
5					0	41	42	42	42	41	42	43	42
4				0	42	41	42	42	41	42	42	42	42
۳  ۳			0	41	40	40	39	40	40	39	40	40	42
~		0	43	43	43	43	41	41	41	41	39	41	40
-1	0	43	43	43	43	42	43	43	43	43	43	42	43
	-	5	e	4	5	9	7	8	6	10	1	12	13

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13													0
12												0	27
											0	27	27
01										0	27	27	27
6									0	27	27	27	27
8								0	27	27	27	27	27
7							0	26	27	27	27	27	27
٥						0	27	27	27	27	27	27	27
വ					0	27	27	27	27	26	27	27	26
4				0	27	27	27	27	27	27	27	27	27
m			0	25	24	24	23	24	24	23	24	24	27
7		0	27	27	27	27	25	25	25	25	25	25	24
	0	28	28	28	28	27	28	28	28	27	27	26	27
	-	2	с	4	5	9	7	ω	6	10	Ξ	12	13

Pair-Wise MDS Response Sizes: NK<sub>1</sub> SAMPLE

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NK <sub>2</sub> SAMPLE
Response Sizes:
MDS
Pair-Wise

13													0
12												0	26
											0	26	26
01										0	26	26	25
6									0	26	26	26	26
8								0	25	26	25	25	26
7							0	26	26	26	26	26	26
9						0	26	26	26	26	26	26	26
2					0	24	25	25	25	24	25	26	26
4				0	25	25	25	25	24	25	25	25	25
<del>ر</del> ا			0	25	24	24	23	24	24	23	24	24	25
7		0	26	26	26	26	25	25	25	25	24	25	25
-	0	27	27	27	27	26	27	27	27	26	26	25	26
	-	2	с	4	5	9	٢	ω	6	10	Ξ	12	13



13													0
12												0	25
=											0	25	25
10										0	25	25	24
6									0	25	25	25	25
8								0	24	25	24	24	25
<u></u>							0	25	25	25	25	25	25
9						0	25	25	25	25	25	25	25
2					0	23	24	24	24	23	24	25	25
4				0	24	24	24	24	23	24	24	24	24
m			0	24	23	23	22	23	23	22	23	23	24
2		0	25	25	25	25	24	24	24	24	22	24	24
-1	0	27	27	27	27	26	27	27	27	25	25	24	25
	-	2	с	4	2	9	7	ω	6	10	Ξ	12	13

Pair-Wise MDS Response Sizes: NK<sub>3</sub> SAMPLE



APPENDIX C

Dissimilarity (Means) Matrices



DISSIMILARITY MATRIX: COMPLETE SAMPLE

Con	cept	-	2	е	4	5	9	7	8	6	10		12	13
L	My Job	00.00												
2	Hard Work	42.92	0.00											
e	Foremen	63.54	58.44	00.00										
4	Easy	60.52	68.96	57.34	00.00									
ъ	Overtime	53.75	51.88	56.67	63.30	0.00								
9	Pushy	59.68	57.26	54.30	74.78	54.62	00.00							
7	The Heat	60.42	47.55	64.24	73.87	61.38	58.94	0.00						
ω	The Union	62.08	62.47	69.57	54.26	61.17	64.10	65.16	0.00					
6	Management	63.05	59.79	39.57	56.13	44.04	44.09	56.69	73.55	00.00				
10	Better Machinery	57.19	66.60	58.48	51.17	68.82	70.00	69.89	56.04	59.06	00.00			
Ξ	Good	45.42	56.74	45.38	40.32	60.00	72.77	76.17	48.21	55.52	40.94	00.0		
12	Helpful	42.53	51.51	41.96	41.81	51.28	68.83	73.62	46.47	56.15	36.25	33.13	0.00	
13	Me	47.40	43.63	51.70	44.68	55.38	73.19	68.09	55.10	54.17	45.00	33.65	35.52	0.00



ප	ncept	-	2	m	4	5	9	7	ω	6	10	=	12	13
~	My Job	0.00												
2	Hard Work	39.06	0.00											
ŝ	Foremen	56.79	53.02	0.00										
4	Easy	59.43	65.28	55.47	00.00									
ഹ	Overtime	40.38	43.40	50.19	58.65	0.00								
9	Pushy	60.00	54.81	51.51	72.35	55.39	00.00							
7	The Heat	63.40	49.43	63.02	70.98	64.42	58.63	00.00						
8	The Union	59.06	63.08	69.06	54.81	61.15	59.90	60.98	00.00					
6	Management	52.12	54.91	38.68	60.00	43.08	45.40	58.63	70.39	00.0				
10	Better Machinery	49.43	65.28	49.81	44.04	61.54	65.69	65.86	50.38	48.49	00.00			
[]	Good	38.30	52.08	40.38	35.19	56.47	70.78	74.71	47.93	48.87	36.23	00.0		
12	Helpful	33.96	47.89	37.31	38.46	47.26	66.28	73.92	48.96	46.79	33.96	29.81	0.00	
13	Me	37.74	39.80	47.89	43.08	48.43	72.35	66.08	60.38	44.15	40.58	29.06	33.40	0.00

DISSIMILARITY MATRIX: ALL KEY COMMUNICATORS





					DISSI	MILARIT	Y MATRI	х: к <sub>1</sub>	SAMPLE					
ടി	ncept	-	5	m	4	2	9	7	8	6	10	=	12	13
-	My Job	00.00												
2	Hard Work	50.37	0.00											
m	Foremen	62.96	60.00	0.00										
4	Easy	51.48	56.15	51.54	00.00									
2	Overtime	42.96	50.00	51.92	58.00	00.00								
9	Pushy	60.37	55.77	47.69	70.00	48.40	0.00							
2	The Heat	59.26	46.54	65.77	65.83	61.20	51.92	0.00						
ω	The Union	60.00	55.60	70.77	54.80	66.80	60.00	62.31	0.00					
6	Management	62.31	58.85	40.00	58.00	41.20	38.40	51.92	68.46	00.00				
10	Better Machinery	58.08	71.54	55.77	52.40	58.80	66.15	66.15	53.85	56.54	00.00			
Π	Good	46.92	60.40	45.39	38.40	57.60	66.92	73.85	53.46	58.46	36.15	00.0		
12	Helpful	38.46	57.31	38.85	36.80	44.23	66.15	71.92	54.23	55.77	35.76	34.23	0.00	
13	Me	45.00	47.69	52,00	38.80	46.92	70.39	62.69	58.46	55.39	45.39	35.39	37.31	0.00



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					DISSI	MILARIT	Y MATRI	x: K <sub>2</sub>	SAMPLE					
ပို	ncept	-	2	m	4	പ	9	7	ω	6	10	=	12	13
-	My Job	0.00												
~	Hard Work	47.58	0.00											
m	Foremen	62.12	55.00	00.0										
4	Easy	58.18	70.31	60.63	00.00									
S	Overtime	45.76	45.31	56.88	65.00	00.0								
9	Pushy	60.91	60.32	60.63	75.16	61.25	00.00							
7	The Heat	66.36	50.31	64.69	73.23	65.63	63.23	00.00						
ω	The Union	60.00	66.13	72.19	51.25	60.31	58.39	67.42	00.00					
6	Management	54.55	59.06	47.19	61.88	51.88	45.00	57.74	77.10	00.0				
10	Better Machinery	52.50	67.50	51.56	41.88	66.88	65.48	64.52	55.63	53.13	00.00			
Ξ	Good	40.94	55.48	42.19	35.00	59.36	71.29	77.10	50.63	48.13	35.94	0.00		
12	Helpful	35.94	51.94	38.71	36.88	50.65	67.42	73.55	54.38	43.75	36.56	32.81	00.0	
13	Me	41.56	42.33	51.56	40.94	55.81	72.90	67.10	63.44	44.06	43.75	31.56	37.81	0.00

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+		-	ç	ç	DISSI	MILARIT	Y MATRI 6	X: K <sub>3</sub>	SAMPLE	c		F	¢ –	د د
ncept 1 2 3	1 2 3	2	m	•	4	2	9	7	ω	6	10		12	-1
My Job 0.00	0.00													
Hard Work 46.56 0.00	46.56 0.00	0.00												
Foremen 60.00 54.84 0.00	60.00 54.84 0.00	54.84 0.00	0.00											
Easy 55.94 63.87 56.77	55.94 63.87 56.77	63.87 56.77	56.77		0.00									
Overtime 42.50 47.10 53.55 5	42.50 47.10 53.55 5	47.10 53.55 5	53.55 5	പ	7.00	0.00								
Pushy 63.44 59.33 52.58 70	63.44 59.33 52.58 70	59.33 52.58 70	52.58 70	ž	00.00	55.33	0.00							
The Heat 62.81 54.19 62.26 69	62.81 54.19 62.26 69	54.19 62.26 69	62.26 69	69	.67	61.67	58.97	0.00						
The Union 59.69 64.33 67.42 51	59.69 64.33 67.42 51	64.33 67.42 51	67.42 51	51	.33	61.33	60.69	64.48	0.00					
Management 56.77 54.52 41.29 55	56.77 54.52 41.29 55	54.52 41.29 55	41.29 55	55	.67	45.67	46.43	56.55	66.90	0.00				
Better 51.61 67.10 50.32 46 Machinery 51.61 67.10 50.32 46	51.61 67.10 50.32 46	67.10 50.32 46	50.32 46	46	.33	59.67	66.55	70.35	51.29	52.58	0.00			
Good 40.97 60.00 40.32 37	40.97 60.00 40.32 37	60.00 40.32 37	40.32 37	37	00	56.55	68.62	70.69	48.39	50.00	39.68	0.00		
Helpful 33.55 48.33 38.67 40	33.55 48.33 38.67 40	48.33 38.67 40	38.67 40	40	. 33	44.48	66.10	70.35	50.97	42.90	37.42	32.90	0.00	
Me 42.26 42.07 49.00 43	42.26 42.07 49.00 43	42.07 49.00 43	49.00 43	43	.67	48.97	71.38	67.93	59.36	42.26	40.33	29.03	35.16	0.00



DISSIMILARITY MATRIX: ALL NON-KEY COMMUNICATORS

ပိ	ncept	-	2	б	4	5	9	7	ω	6	10	11	12	13
-	My Job	00.00												
2	Hard Work	47.67	0.00											
m	Foremen	71.86	65.12	0.00										
4	Easy	61.86	73.49	59.76	00.00									
ß	Overtime	70.23	62.33	65.25	69.05	0.00								
9	Pushy	59.29	60.23	58.00	77.81	53.66	0.00							
7	The Heat	56.74	45.12	65.90	77.38	57.62	59.30	00.00						
8	The Union	65.81	61.71	70.25	53.57	61.19	69.07	70.24	00.00					
6	Management	76.28	66.10	40.75	73.90	45.24	42.56	54.19	77.38	00.0				
10	Better Machinery	66.74	68.29	70.26	60.00	78.05	75.12	73.49	63.02	72.09	00.00			
Ξ	Good	54.19	63.08	52.00	46.67	64.29	75.12	10.77	48.57	63.72	46.74	00.0		
12	Helpful	53.33	56.10	48.00	45.95	56.05	71.86	73.26	43.33	67.67	39.07	37.21	00.00	
13	Me	59.30	48.50	56.43	46.67	63.81	74.19	70.47	48.61	66.51	50.48	39.30	38.14	00.00



								_						
පි	ncept	-	2	ε	4	ы	9	2	8	6	10	=	12	13
_	My Job	0.00												
2	Hard Work	47.86	0.00											
m	Foremen	70.71	66.67	0.00										
4	Easy	59.64	75.93	53.60	0.00									
2	Overtime	71.07	57.41	68.33	65.93	00.00								
9	Pushy	62.96	57.04	50.83	78.15	48.89	0.00							
7	The Heat	49.64	35.60	56.96	75.56	58.15	59.63	00.00						
ω	The Union	56.07	52.40	62.92	49.26	55.19	70.37	67.31	00.00					
6	Management	75.36	66.00	38.75	75.93	42.22	38.15	48.52	75.93	0.00				
10	Better Machinery	64.07	65.60	74.78	55.93	77.69	75.19	75.19	56.67	78.15	00.0			
11	Good	52.59	64.00	52.92	37.78	61.11	76.67	78.15	42.96	64.82	45.19	00.0		
12	Helpful	50.77	50.80	50.83	40.00	52.22	74.44	73.70	37.04	70.37	35.56	34.07	0.00	
13	Me	52.22	44.17	55.93	45.19	60.77	73.70	64.82	42.59	67.41	45.19	37.41	35.56	0.00

.

DISSIMILARITY MATRIX: NK<sub>1</sub> SAMPLE



ပိ	ncept	-	2	m	4	5	9	7	ω	6	10	=	12	13
-	My Job	0.00												
2	Hard Work	44.07	00.00											
n	Foremen	72.96	65.00	0.00										
4	Easy	56.67	74.62	58.80	00.00									
വ	Overtime	70.37	60.77	59.17	64.00	0.00								
9	Pushy	53.85	61.15	53.75	80.40	53.33	00.00							
7	The Heat	55.19	40.80	68.26	76.40	61.20	57.31	00.00						
ω	The Union	64.44	57.60	68.75	50.00	58.00	64.23	67.31	00.00					
6	Management	71.48	71.20	36.67	71.67	48.00	43.08	58.08	74.80	0.00				
10	Better Machinery	64.62	65.20	76.52	56.40	77.92	70.39	71.15	62.31	73.46	00.00			
11	Good	53.08	63.75	54.58	45.20	61.60	75.77	78.85	48.00	65.39	45.77	00.00		
12	Helpful	47.20	51.20	52.08	47.20	50.00	71.54	72.31	41.60	70.39	42.31	37.31	00.0	
13	Me	56.15	49.20	53.60	48.40	61.92	73.08	71.15	48.46	66.92	54.80	41.15	41.15	0.00

DISSIMILARITY MATRIX: NK<sub>2</sub> SAMPLE



					ITCCTA			счи · v	זייי וייאט					
ō	ncept	-	2	ε	4	2	9	7	ω	6	10	=	12	13
	My Job	0.00												
	Hard Work	50.74	00.00											
	Foremen	77.78	54.80	00.00										
	Easy	67.41	76.00	59.17	00.0									
	Overtime	11.17	63.20	65.65	72.08	0.00								
	Pushy	60.39	62.80	65.22	74.17	51.74	0.00							
	The Heat	62.22	46.25	67.27	75.00	59.58	60.00	0.00						
	.The Union	63.33	57.08	70.00	50.42	55.83	62.00	64.40	0.00					
	Management	72.59	74.17	40.44	70.44	44.17	44.40	54.00	71.25	00.0				
	Better Machinery	74.40	65.00	68.64	62.08	77.83	70.80	70.80	64.80	76.80	00.0			
	Good	56.80	60.91	52.17	50.00	66.25	70.40	72.80	55.83	66.00	47.20	00.0		
	Helpful	56.67	57.50	52.61	52.92	57.20	67.60	69.20	48.33	71.20	44.80	43.20	0.00	
	Me	66.00	52.08	57.50	47.50	69.60	72.00	66.40	52.00	70.00	50.42	43.20	44.40	0.00

SAMPI F DISSIMILARITY MATRIX: NK.



APPENDIX D

Factor Coordinate Matrices



	Galile	o Coordi	FAC nates of	TOR COOR 13 Vari	DINATE M ables in	ATRIX: ( a Multi	COMPLETE dimension	SAMPLE nal Space	e (Norm	al Solu	tion)		
Concept	-1	2	З	4	5	9	٢	8	6	10	11	12	13
1 My Job	.15	-18.52	-18.07	6.42	17.69	-6.91	15.35	3.49	6.72	3.58	42	00.	-7.09
2 Hard Work	15.85	-20.97	-21.17	-2.45	47	12.09	-5.86	-3.80	-7.96	-5.87	1.71	.03	-5.65
3 Fore- men	4.64	29.08	-3.49	-6.48	-2.32	19.40	1.11	9.98	1.77	1.09	-2.59	.01	-7.11
4 Easy	-27.10	3.36	11.15	84	-17.00	-1.55	22.47	-3.53	-7.15	-1.75	.98	05	-2.64
5 Over- time	16.85	2.97	-5.50	25.72	-15.34	-14.57	-5.38	6.10	08	-2.89	-2.38	•03	. 69
6 Pushy	35.91	7.81	17.29	10.60	17.97	5.52	6.47	-7.98	-6.83	.04	82	.07	8.36
7 The Heat	34.15	-19.55	7.32	-25.21	-11.93	-3.36	2.75	6.46	5.21	1.02	15	• 06	7.70
8 The Union	-12.70	-22.77	29.96	11.06	-2.47	7.79	-11.00	-1.10	4.89	2.52	.47	02	-8.09
9 Manage- ment	21.36	28.25	-1.99	-3.64	-2.39	-10.22	-5.16	7.44	5.14	1.97	3.95	.04	-6.74
Better 10 Machin- ery	-22.14	4.50	10.24	-18.29	16.24	-15.46	-8.14	2.81	-5.84	-3.77	-1.70	04	-4.08
11 Good	-26.67	5.33	-4.70	1.49	3.25	5.48	06	-6.23	15.91	-5.20	02	05	9.77
12 Help- ful	-22.06	3.23	-4.96	6.76	4.51	2.12	-4.88	14.49	-6.53	2.81	3.37	04	10.39
13 Me	-18.24	-2.70	-16.08	-5.14	-7.74	37	-7.67	-13.25	-5.24	6.45	-2.41	03	4.50
Eigen- values	6385.28	3474.41	2605.68	2043.80	1674.44	1265.31	1151.05	769.91	644.13	162.00	53.01	.02-(	520.67
Percent of Variance	31.57	48.74	12.88	10.10	8.28	6.26	5.69	3.81	3.18	. 80	.26	00.	-3.07



	Galile	o Coordi	FACTO nates of	R COORDI 13 Varia	NATE MAT ables in	RIX: AL a Multi	L KEY CO dimensio	MMUNICA nal Spa	JTORS ce (Nori	mal Sol	ution)		
Concept	Ч	2	S	4	5	9	7	8	6	10	11	12	13
1 My Job	-2.18	-9.24	20.81	-10.59	-13.58	-5.54	2.52	10.74	8.52	.91	00	1.76	-7.67
2 Hard Work	17.19	-9.74	25.61	3.05	.86	13.60	4.63	-1.17	-7.23	55	.03	-3.67	-6.83
3 Fore- men	2.16	-16.61	-21.03	6.16	3.08	17.69	-10.91	1.52	3.30	-2.61	.00	<b>1.</b> 73	-8.63
4 Easy	-24.98	12.27	-6.79	8.11	22.74	-2.96	9.84	8.77	• 38	.78	04	25	-5.24
5 Over- time	11.08	-15.04	9.10	-15.07	17.07	-14.63	-9.83	-2.41	1.34	-3.96	.02	-1.01	4.65
6 Pushy	36.20	4.04	-19.71	-18.38	-2.34	4.50	11.43	3.36	-2.64	-2.00	•06	1.20	7.99
7 The Heat	36.48	19.84	7.43	26.96	39	-2.92	-5.34	2.97	3.87	1.70	• 06	.34	7.62
8 The Union	-3.18	39.83	4.39	-15.56	11	2.33	-4.66	-9.64	24	<b>1.</b> 35	01	1.09	-8.93
9 Manage- ment	10.97	-18.68	-18.98	5.33	-4.01	-13.09	4.00	-8.91	.74	6.46	.02	-1.18	-7.80
Better 10 Machin- ery	-19.31	10.54	-13.76	5.85	-16.48	-10.04	-3.77	4.58	-5.73	-5.89	03	-2.63	-1.21
11 Good	-26.40	86	<b>.</b> 00	26	-3.43	9.18	4.87	-7.47	11.13	<b>-</b> .83	04	-2.43	11.68
12 Help- ful	-21.16	-5.28	.41	-8.08	-1.56	4.89	-8.27	5.84	-7.43	7.71	04	.28	10.69
13 Me	-16.88	-11.07	12.42	12.47	-1.76	-3.00	5.50	-8.17	-6.02	-3.06	03	4.76	3.66
Eigen- values	5625.75	3440.01	2826.61	2042.28	1314.43	1174.79	673.44	571.64	408.26	178.84	.02	-60.30	-757.26
Percent of Variance	30.82	18.84	15.48	11.19	7.20	6.44	3.69	3.13	2.24	.98	.00	33	-4.15



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SAMPLE
Ч
MATRIX:
COORDINATE
FACTOR

Ieo Coordinates of 13 Variables in a Multidimensi $2$ $3$ $4$ $5$ $6$ $7$ $-13.03$ $-20.19$ $19.23$ $4.27$ $16.88$ $1.05$ $-22.44$ $-16.26$ $-10.24$ $-12.25$ $-6.67$ $-10.48$ $-22.44$ $-16.26$ $-10.24$ $-12.25$ $-6.07$ $-10.48$ $29.92$ $1.42$ $-12.41$ $-12.45$ $7.45$ $-7.90$ $-4.80$ $-2.23$ $-17.62$ $-6.12$ $7.45$ $-7.90$ $-4.80$ $-2.23$ $-17.62$ $-6.12$ $7.45$ $-7.90$ $-4.80$ $-2.23$ $-17.62$ $-6.12$ $7.45$ $-7.90$ $-4.80$ $-2.23$ $-17.62$ $-6.12$ $7.45$ $-7.90$ $-11.17$ $12.54$ $12.35$ $-11.37$ $4.42$ $-1.19$ $10.126$ $-20.28$ $16.91$ $3.30$ $-13.54$ $6.03$ $11.17$ $12.54$ $12.35$ $-11.37$ $4.42$ $-1.19$ $11.17$ $12.54$ $12.35$ $-12.95$ $9.39$ $-6.02$ $-18.31$ $5.22$ $-13.18$ $19.69$ $9.39$ $-6.23$ $-28.74$ $27.52$ $8.83$ $-12.95$ $9.39$ $-7.52$ $-28.74$ $27.52$ $8.83$ $-7.52$ $-2.39$ $-5.70$ $-28.74$ $27.52$ $-13.16$ $-2.33$ $-7.52$ $-9.02$ $-1.19$ $5.03$ $-1.36$ $-1.462$ $3.86$ $-9.02$ $-1.10$ $-5.09$ $6.91$ $-3.42$ $-11.48$ $-6$	Ieo Coordinates of 13 Variables in a Multidimensional Spa $2$ $3$ $4$ $5$ $6$ $7$ $8$ $-13.03$ $-20.19$ $19.23$ $4.27$ $16.88$ $1.05$ $-4.52$ $-22.44$ $-16.26$ $-10.24$ $-12.42$ $7.45$ $-7.90$ $7.30$ $-4.80$ $-2.23$ $-17.62$ $-6.12$ $5.06$ $20.50$ $-1.80$ $-4.80$ $-2.23$ $-17.62$ $-6.12$ $5.06$ $20.50$ $-1.80$ $10.26$ $-20.28$ $16.91$ $3.30$ $-13.54$ $6.03$ $2.43$ $10.26$ $-20.28$ $16.91$ $3.30$ $-13.54$ $6.03$ $2.43$ $10.26$ $-20.28$ $16.91$ $3.30$ $-13.54$ $6.03$ $2.43$ $10.26$ $-20.28$ $16.91$ $3.30$ $-13.54$ $6.03$ $2.43$ $10.26$ $-20.28$ $16.91$ $3.30$ $-13.54$ $6.03$ $2.43$ $10.26$ $-20.28$ $12.35$ $-11.37$ $4.42$ $-1.19$ $-6.48$ $21.31$ $5.22$ $-13.18$ $19.69$ $9.39$ $-6.28$ $4.14$ $-18.31$ $5.22$ $-13.18$ $19.69$ $-7.52$ $8.39$ $-6.48$ $23.58$ $3.75$ $-5.43$ $6.93$ $-7.52$ $8.39$ $-6.48$ $6.20$ $21.67$ $6.44$ $20.52$ $-2.39$ $-5.70$ $4.13$ $4.19$ $5.03$ $-1.36$ $-3.86$ $-9.02$ $-14.39$ $4.19$ $5.03$ $-1.36$ $-3.46$ $1.148$ <th>Ieo Coordinates of 13 Variables in a Multidimensional Space (Norm<math>2</math><math>3</math><math>4</math><math>5</math><math>6</math><math>7</math><math>8</math><math>9</math><math>-13.03</math><math>-20.19</math><math>19.23</math><math>4.27</math><math>16.88</math><math>1.05</math><math>-4.52</math><math>3.23</math><math>-22.44</math><math>-16.26</math><math>-10.24</math><math>-12.25</math><math>-6.67</math><math>-10.48</math><math>3.05</math><math>.42</math><math>29.92</math><math>1.42</math><math>-12.41</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>29.92</math><math>1.42</math><math>-12.41</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>29.92</math><math>1.42</math><math>-12.41</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>29.92</math><math>1.42</math><math>-12.41</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>29.92</math><math>-12.41</math><math>-12.42</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>10.26</math><math>-20.28</math><math>16.91</math><math>3.30</math><math>-13.54</math><math>6.03</math><math>2.43</math><math>-4.79</math><math>11.17</math><math>12.54</math><math>12.35</math><math>-11.37</math><math>4.42</math><math>-1.19</math><math>-6.49</math><math>-6.69</math><math>10.26</math><math>-20.28</math><math>16.91</math><math>3.30</math><math>-13.54</math><math>6.03</math><math>2.43</math><math>-6.79</math><math>11.17</math><math>12.54</math><math>12.35</math><math>-12.35</math><math>-12.29</math><math>-12.19</math><math>-1.29</math><math>-6.12</math><math>10.28</math><math>-20.28</math><math>10.93</math><math>-12.59</math><math>-12.19</math><math>-1.29</math><math>-2.63</math><math>-1.99</math><math>11.17</math><math>12.55</math><math>-5.43</math><math>-5.43</math><math>-6.93</math><math>-6.41</math><math>-6.48</math><math>23.58</math><math>3.75</math><math>-5.43</math><math>-5.29</math><math>-7.52</math></th> <th>lee Coordinates of 13 Variables in a Multidimensional Space (Normal 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th=""><th>lee Coordinates of 13 Variables in a Multidimensional Space (Normal 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Solution)<math>\frac{5}{1.27}</math><math>\frac{6}{1.088}</math><math>\frac{7}{1.05}</math><math>\frac{8}{-4.52}</math><math>\frac{9}{1.51}</math><math>\frac{11}{71}</math><math>4.27</math><math>16.88</math><math>1.05</math><math>-4.52</math><math>3.23</math><math>11.51</math><math>71</math><math>-12.25</math><math>-6.67</math><math>-10.48</math><math>3.05</math><math>.42</math><math>-6.53</math><math>-1.59</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>3.47</math><math>1.50</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>-1.58</math><math>84</math><math>-12.42</math><math>5.06</math><math>20.50</math><math>-1.80</math><math>-4.59</math><math>-1.58</math><math>84</math><math>3.30</math><math>-13.54</math><math>6.03</math><math>2.43</math><math>-4.79</math><math>-1.12</math><math>2.81</math><math>1.069</math><math>9.39</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>11.37</math><math>4.42</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>12.95</math><math>-8.08</math><math>3.96</math><math>1.89</math><math>3.00</math><math>3.30</math><math>1.39</math><math>-12.95</math><math>-8.08</math><math>3.96</math><math>1.89</math><math>3.00</math><math>3.30</math><math>1.39</math><math>-12.95</math><math>-8.08</math><math>3.96</math><math>1.89</math><math>3.00</math><math>3.30</math><math>1.39</math><math>-12.95</math><math>-8.08</math><math>3.96</math><math>1.89</math><math>3.00</math><math>3.30</math><math>1.39</math><math>-12.95</math><math>-8.08</math><math>3.96</math><math>1.89</math><math>-3.08</math><math>-2.48</math><math>-12.95</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-12.95</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-12.92</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><math>-1.13</math><td< td=""><td>i.i.dolles in a Multidimensional Space (Normal Space (Normal 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Solution)<math>\frac{5}{100}</math><math>\frac{6}{1.05}</math><math>\frac{7}{1.05}</math><math>\frac{8}{2.23}</math><math>\frac{9}{1.01}</math><math>\frac{11}{1.01}</math><math>12.25</math><math>-6.67</math><math>-10.48</math><math>3.05</math><math>.42</math><math>-6.53</math><math>-1.59</math><math>.02</math><math>-12.42</math><math>7.45</math><math>-7.90</math><math>7.30</math><math>35</math><math>3.47</math><math>1.50</math><math>.00</math><math>-6.12</math><math>5.06</math><math>20.50</math><math>-1.80</math><math>-4.59</math><math>-1.58</math><math>-1.64</math><math>.00</math><math>-6.12</math><math>5.06</math><math>20.50</math><math>-1.80</math><math>-4.59</math><math>-1.58</math><math>-2.84</math><math>.00</math><math>-6.12</math><math>5.06</math><math>20.50</math><math>-1.80</math><math>-4.79</math><math>-1.12</math><math>2.81</math><math>.01</math><math>-11.37</math><math>4.42</math><math>-1.19</math><math>-5.40</math><math>-4.79</math><math>-1.12</math><math>2.81</math><math>.01</math><math>-11.37</math><math>4.42</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-11.37</math><math>4.42</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.61</math><math>.01</math><math>-11.37</math><math>4.42</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-11.37</math><math>4.42</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-12.95</math><math>-8.08</math><math>3.96</math><math>1.89</math><math>3.00</math><math>3.30</math><math>1.39</math><math>76</math><math>.03</math><math>-12.95</math><math>-8.08</math><math>3.96</math><math>1.89</math><math>3.00</math><math>3.30</math><math>1.39</math><math>-1.79</math><math>-03</math><math>-12.95</math><math>-7.52</math><math>8.39</math><math>-1.48</math><math>-2.48</math><math>-2.46</math><math>-03</math><math>-12.42</math><math>-12.38</math><math>-9.02</math><math>-14.39</math>&lt;</td></td<>	i.i.dolles 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<pre>in a Multidimensi</pre>	In a Multidimensional Spa $6$ 78 $16.88$ $1.05$ $-4.52$ $-6.67$ $-10.48$ $3.05$ $-6.67$ $-10.48$ $3.05$ $7.45$ $-7.90$ $7.30$ $7.45$ $-7.90$ $7.30$ $7.45$ $-7.90$ $7.30$ $7.45$ $-7.90$ $7.30$ $7.45$ $-7.90$ $7.30$ $7.45$ $-7.90$ $7.30$ $-13.54$ $6.03$ $2.43$ $-13.54$ $6.03$ $2.43$ $-13.54$ $-6.03$ $-6.48$ $-2.39$ $62$ $4.14$ $-7.52$ $8.39$ $-6.48$ $-7.52$ $8.39$ $-6.43$ $-2.39$ $-5.70$ $4.13$ $3.86$ $-9.02$ $-14.39$ $3.86$ $-9.02$ $-14.36$ $2.63$ $1.33$ $14.95$ $-11.48$ $-6.35$ $-5.35$	In a Multidimensional Space (Norm678916.881.05 $-4.52$ $3.23$ $-6.67$ $-10.48$ $3.05$ $.42$ $-6.67$ $-10.48$ $3.05$ $.42$ $-6.67$ $-10.48$ $3.05$ $.42$ $7.45$ $-7.90$ $7.30$ $35$ $7.45$ $-7.90$ $7.30$ $35$ $7.45$ $-7.90$ $7.30$ $35$ $7.45$ $-7.90$ $7.30$ $35$ $7.45$ $-7.90$ $7.30$ $35$ $7.45$ $-7.90$ $7.30$ $35$ $9.39$ $-6.43$ $4.42$ $-1.80$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-13.54$ $-1.19$ $-5.40$ $-4.96$ $-2.39$ $-6.48$ $8.84$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-2.39$ $-5.70$ $4.13$ $-3.93$ $-11.48$ $-6.35$ $-5.35$ $-76$	67891016.881.05 $-4.52$ 3.231.5116.881.05 $-4.52$ 3.231.51 $-6.67$ $-10.48$ 3.05 $-42$ $-6.53$ $7.45$ $-7.90$ $7.30$ $-35$ $3.47$ $7.45$ $-7.90$ $7.30$ $-35$ $3.47$ $7.45$ $-7.90$ $7.30$ $-35$ $3.47$ $7.45$ $-7.90$ $7.30$ $-35$ $3.47$ $7.45$ $-7.90$ $7.30$ $-35$ $3.47$ $7.45$ $-7.90$ $7.30$ $-4.79$ $-1.12$ $9.30$ $20.43$ $-4.79$ $-1.12$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-1.12$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-1.12$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-1.12$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-1.12$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-1.12$ $-13.54$ $6.03$ $2.43$ $-4.79$ $-1.12$ $-12.52$ $8.39$ $-6.48$ $8.84$ $-2.05$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-3.98$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-3.08$ $-2.39$ $-5.70$ $4.13$ $-3.48$ $-3.10$ $-2.39$ $-5.70$ $-14.39$ $-12.2$ $-4.14$ $-2.63$ $-1.43$ $-14.39$ $-14.39$ $-11.48$ $-6.35$ $-5.35$ $-7.76$ $8.72$	In a Multidimensional Space (Normal Solution) $\begin{array}{c c c c c c c c c c c c c c c c c c c $	In a Multidimensional Space (Normal Solution) $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
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Solution)<math>7</math>89101112<math>1.05</math><math>-4.52</math><math>3.233</math><math>1.51</math><math>71</math><math>01</math><math>-10.48</math><math>3.05</math><math>.42</math><math>-6.53</math><math>-1.59</math><math>.02</math><math>-7.90</math><math>7.30</math><math>35</math><math>3.47</math><math>1.50</math><math>.00</math><math>20.50</math><math>-1.80</math><math>-4.59</math><math>-1.58</math><math>84</math><math>03</math><math>20.50</math><math>-1.80</math><math>-4.59</math><math>-1.12</math><math>2.81</math><math>.01</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-1.19</math><math>-5.40</math><math>-4.96</math><math>1.94</math><math>-2.46</math><math>.04</math><math>-5.70</math><math>4.14</math><math>63</math><math>.330</math><math>1.39</math><math>76</math><math>.03</math><math>8.39</math><math>-6.48</math><math>8.84</math><math>-2.05</math><math>76</math><math>-03</math><math>-03</math><math>-5.70</math><math>4.13</math><math>-3.48</math><math>-3.98</math><math>-1.79</math><math>-03</math><math>-5.02</math><math>-14.39</math><math>-12</math><math>-4.10</math><math>2.56</math><math>-03</math><math>-5.35</math><math>-5.35</math><math>-76</math><math>8.72</math><math>-1.48</math><math>-03</math><math>-6.35</math><math>-5.35</math><math>-776</math><math>8.72</math><math>-1.48</math><math>-03</math></td>	idimensional 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	onal Spa -4.52 -4.52 3.05 -1.80 -1.80 -1.80 4.14 4.13 4.13 -14.39 -14.39 -14.35 -5.35	and Space (Norm         8       9         -4.52       3.23         3.05       .42         7.30      35         -1.80       -4.59         -1.80       -4.59         -1.80       -4.59         -5.40       -4.96         4.14      63         4.13       -3.48         4.13       -3.48         -14.39       .12         -14.95       3.93         -5.35      76	B       9       10         -4.52       3.23       1.51         -4.52       3.23       1.51         3.05       .42       -6.53         7.30      35       3.47         -1.80       -4.59       -1.58         -1.80       -4.59       -1.12         -5.40       -4.96       1.94         4.14      63       .87         -5.40       -3.00       3.30         1.89       3.00       3.30         -1.89       -3.48       -3.98         -5.40       -4.96       1.94         -5.40       -4.96       1.94         -5.40       -4.96       1.94         -5.40       -4.96       1.94         -5.33       -3.00       3.30         -14.3       -3.48       -3.98         -14.3       -3.48       -3.98         -14.3       -3.48       -3.98         -14.3       -12       -4.10         -14.3       -12       -4.10         -14.3       -3.93       -4.70         -14.3       -3.93       -4.70         -5.35      76       8.72	Ontal Space (Normal Space (Normal Solution) $8$ $9$ $10$ $11$ $-4.52$ $3.23$ $1.51$ $71$ $-4.52$ $3.23$ $1.51$ $71$ $3.05$ $.42$ $-6.53$ $-1.59$ $7.30$ $35$ $3.47$ $1.50$ $-1.80$ $-4.59$ $-1.58$ $84$ $-1.80$ $-4.59$ $-1.12$ $2.81$ $-1.80$ $-4.59$ $-1.12$ $2.81$ $-5.40$ $-4.96$ $1.94$ $-2.46$ $4.14$ $63$ $.87$ $2.11$ $1.89$ $3.00$ $3.30$ $1.39$ $-6.48$ $8.84$ $-2.05$ $76$ $-14.39$ $-3.98$ $-3.98$ $-1.79$ $-14.39$ $-3.48$ $-3.98$ $-1.79$ $-14.39$ $-12$ $-4.10$ $2.56$ $-14.39$ $-12$ $-4.10$ $2.56$ $14.95$ $3.93$ $-47$ $-73$ $-5.35$ $76$ $8.72$ $-1.48$	anal Space (Normal Solution) $8$ 9101112 $-4.52$ $3.23$ $1.51$ $71$ $01$ $-4.52$ $3.23$ $1.51$ $71$ $01$ $3.05$ $.42$ $-6.53$ $-1.59$ $.02$ $7.30$ $35$ $3.47$ $1.50$ $.00$ $-1.80$ $-4.59$ $-1.58$ $84$ $03$ $-1.80$ $-4.79$ $-1.12$ $2.81$ $.01$ $-1.80$ $-4.79$ $-1.12$ $2.81$ $.01$ $-1.80$ $-4.79$ $-1.12$ $2.81$ $.01$ $-1.80$ $-4.79$ $-1.12$ $2.81$ $.01$ $-1.80$ $-4.79$ $-1.12$ $2.81$ $.01$ $-1.80$ $-4.96$ $1.94$ $-2.46$ $.04$ $4.14$ $63$ $.87$ $2.11$ $.04$ $4.14$ $63$ $.87$ $2.11$ $.04$ $1.89$ $3.00$ $3.30$ $1.39$ $01$ $-6.48$ $8.84$ $-2.05$ $76$ $.03$ $1.89$ $-3.98$ $-3.98$ $-1.79$ $03$ $-14.39$ $.12$ $-4.10$ $2.56$ $03$ $-14.95$ $3.93$ $47$ $73$ $03$ $-14.95$ $76$ $8.72$ $-1.48$ $03$ $-14.95$ $76$ $73$ $03$ $-14.95$ $76$ $73$ $03$ $-5.35$ $76$ $73$ $03$ $-5.35$ $76$ $73$ $03$



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		13	6.72	7.98	6.79	4.28	-4.36	-9.72	-8.39	9.34	12.84	3.57	-11.99	-10.98	-6.09	-923.99	-4.61
		12	.26	71	.49	36	09	02	.07	.42	12	34	60	.02	.98	-2.58 -	01
	ution)	П	.04	.05	03	01	.05	04	01	.01	04	04	• 00	.00	.02	.01	00.
	mal Sol	10	-3.18	.32	-3.15	-5.63	-2.47	-3.99	1.51	5.28	6.32	-2.75	<b>1.</b> 67	7.41	-1.34	210.96	1.05
	ce (Nor	6	-7.94	5.31	-3.81	-3.03	3.12	2.05	-5.10	21	-1.73	10.58	-8.78	4.14	5.39	392.99	1.96
Щ	onal Spa	8	3.23	3.55	.64	9.59	-7.27	3.81	.36	-3.47	-2.71	-6.82	-10.02	12.27	-3.15	509.33	2.54
K <sub>2</sub> SAMPI	idimensic	7	13.57	-7.84	4.70	-9.61	4.83	-7.08	6.13	-2.91	-6.36	13.95	-5.04	8.86	-13.19	992.46	4.95
MATRIX:	n a Multi	9	-8.40	-12.88	-4.49	14.50	21.99	-8.25	5.13	-2.23	9.19	-4.54	-8.61	1.40	-2.80	238.84	6.18
RDINATE N	iables ir	S	-18.47	7.00	27.26	-1.13	6.88	-5.14	-2.08	7.82	-13.64	-6.45	3.02	3.82	-8.89	1604.21	8.00
CTOR COOI	f 13 Var:	4	-9.21	9.55	95	8.32	-15.52	-23.65	33.89	-5.36	-6.88	8.96	-3.22	-7.39	11.46	2547.61	12.70
FA	inates o	m	19.79	24.60	-16.02	-4.98	22.11	-19.86	-5.48	6.26	-19.68	-18.40	.34	1.75	9.55	3050.12	15.21
	so Coord	2	-3.04	-9.67	-20.14	12.42	-4.15	13.41	9.29	44.10	-22.16	6.20	-4.07	-7.92	-14.27	3703.32	18.47
	Galile	Ч	-2.02	21.04	.64	-30.28	15.14	32.96	35.92	-5.11	11.78	-19.03	-26.59	-19.27	-15.18	804.55	28.94
		Concept	1 My Job	2 Hard Work	3 Fore- men	4 Easy	5 Over- time	6 Pushy	7 The Heat	8 The Union	9 Manage- ment	Better 10 Machin- ery	11 Good	12 Help- ful	13 Me	Eigen- values	Percent of Variance



# and the second state of th

Concept	Galil 1	eo Coorc	linates o 3	f 13 Var	iables i	n a Mult	idimensio	onal Space	ce (Norme	al Solut 10	lon) 11	12	13
1 My Job	-5.16	-13.12	-19.72	-11.07	-7.02	15.87	-7.71	-11.35	2.32	2.55	04	2.19	-7.78
2 Hard Work	16.98	-20.52	-18.53	3.69	-8.84	-16.63	7.84	1.81	6.74	.63	06	-5.64	-2.11
3 Fore- men	3.43	-6.83	27.35	6.49	-12.52	-6.69	-12.82	7.46	.37	-3.85	02	3.24	-7.53
4 Easy	-21.50	12.11	84	6.44	21.01	-10.37	-7.55	-5.86	11.43	.21	.04	.23	-2.58
5 Over- time	10.79	-13.84	-6.84	-18.61	16.31	3.42	-5.07	11.78	-5.22	-8.82	04	-1.38	1.49
6 Pushy	35.18	14.99	15.49	-18.92	-3.95	-2.78	3.32	-10.27	5.78	-2.01	.05	1.75	6.59
7 The Heat	36.00	10.35	-12.88	27.43	2.35	10.35	-6.00	2.06	-1.35	.42	.03	. 88	4.29
8 The Union	-6.02	35.84	-16.88	-7.87	-5.05	-8.20	4.23	5.96	-8.92	2.62	.11	1.75	-5.68
9 Manage- ment	11.51	-8.52	21.72	2.71	11.97	3.93	10.03	-3.76	-8.30	10.02	03	-2.78	-6.53
Better 10 Machin- ery	-21.21	11.80	8.99	2.31	-5.37	17.18	11.93	7.95	9.63	-4.69	.04	-3.73	64
11 Good	-24.45	2.23	4.17	4.23	-6.75	-2.28	-7.57	-10.43	-10.53	-4.70	.01	-6.83	6.41
12 Help- ful	-18.13	-8.68	.96	-5.96	-3.54	27	-5.01	8.91	2.22	13.91	03	1.97	10.55
13 Me	-17.41	-15.82	-3.00	9.13	1.39	-3.54	14.38	-4.23	-4.18	-6.27	05	8.35	3.51
Eigen- values	5287.32	3136.46	2798.08	1887.85	1270.35	1202.60	954.85	789.35	618.27 4	188.06	.03-1	197.68-4	132.32
Percent of Variance	28.67	17.01	15.17	10.24	6.89	6.52	5.23	4.28	3.35	2.65	00.		-2.34

FACTOR COORDINATE MATRIX: K<sub>2</sub> SAMPLE

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	Galil	eo Coor	FACTOR linates o	COORDINA f 13 Var	JTE MATRI iables i	X: ALL n a Mult	NON-KEY idimensi	COMMUNIC onal Spa	ATORS ce (Norm	al Solut	(uoi		
Concept	Г	7	С	4	5	9	7	8	6	10	Ц	12	
1 My Job	82	32.41	-9.13	24.74	4.78	-1.72	-11.52	-2.85	2.34	-3.72	.07	2.21	.0 .0
2 Hard Work	11.54	29.21	-5.08	-9.48	-16.15	-12.83	1.83	3.78	-4.44	7.81	• 06	.64	-2.3
3 Fore- men	7.97	-29.09	-15.68	8.54	-17.01	-4.82	9.82	-11.49	-1.68	-1.09	06	-3.93	-8.3
4 Easy	-27.45	-9.25	7.03	18.94	-4.81	23.17	2.78	7.65	-7.28	4.45	02	.50	1.2
5 Over- time	22.27	-9.81	29.50	-7.25	2.26	.72	-19.90	-1.42	-4.59	.14	02	-4.07	-5.9
6 Pushy	36.14	-2.48	.43	14.15	21.31	-11.26	11.27	7.03	-5.22	.04	01	-2.64	8.7
7 The Heat	32.96	21.64	-4.25	-10.63	-6.99	22.18	4.35	-7.08	5.66	-2.39	.05	-1.81	8.4
8 The Union	-18.88	7.08	29.56	-4.08	5.18	-3.74	19.91	-4.73	8.53	92	.02	2.44	-6.1
9 Manage- ment	33.28	-27.56	-7.23	-5.75	.63	2.35	-4.01	6.32	5.90	.24	06	8.45	-2.5
Better 10 Machin- ery	-25.18	.18	-21.59	-20.06	24.97	6.46	.47	.73	-2.80	1.00	00.	-2.07	-7.6
11 Good	-26.01	-9.38	-3.83	4.04	51	-7.50	-9.93	.78	19.80	2.80	02	-2.92	8.7
12 Help- ful	-23.96	-4.25	.98	-3.91	1.28	-7.27	-5.72	-15.89	-12.05	92	01	4.17	11.8
13 Me	-21.88	1.30	71	-9.25	-14.95	-5.74	.65	17.15	-4.18	-7.43	00.	99	2.4
Eigen- values	7667.06	4322.74	2701.45	2068.16	1980.45	1550.68	1326.53	924.63	831.51	167.34	.02-	156.37-	659.5
Percent of Variance	32.57	18.36	11.48	8.79	8.41	6.59	5.64	3.93	3.53	.71	00.	66	-2.8





	Galil	eo Coord	inates o	f 13 Var	iables i	n a Mult	idimensio	onal Spa	ice (Nori	mal Solı	ution)		
loept	Ч	7	Υ	4	ß	9	7	8	6	10	11	12	13
dot yn	-5.22	28.84	-6.03	-10.54	25.12	-2.81	10.71	2.94	94	-1.69	01	2.90	-8.94
Hard Work	9.39	34.88	04	3.04	-14.69	9.73	3.95	2.35	2.56	3.14	.03	1.63	-10.43
Fore- men	14.02	-23.91	-28.18	-7.03	-7.64	11.34	-2.11	4.20	-2.70	-1.19	.03	-5.89	-13.55
Easy	-27.33	-18.44	-8.37	-15.87	11.16	-6.50	-12.84	49	8.04	2.44	02	4.25	45
Over- time	19.50	-15.74	35.65	-6.54	26	-8.89	.72	4.18	2.38	11	03	-6.14	-12.77
Pushy	38.76	-4.68	3.58	14.20	18.51	17.14	-2.67	-2.52	6.25	.34	.05	-2.82	12.77
The Heat	31.77	25.00	-8.54	-9.48	-5.87	-16.42	-10.95	-1.07	-5.31	22	05	-5.22	13.70
The Union	-18.92	4.21	16.93	-11.76	-5.14	15.93	-9.32	-10.30	-9.14	-1.26	.05	4.70	.36
Manage- ment	39.15	-21.12	-3.62	7.46	-5.93	-9.71	7.37	-2.82	-3.18	12	03	13.06	18
Better Machin- ery	-29.24	4.31	-2.49	33.93	3.49	-8.65	-9.94	-1.75	-3.50	45	<b>-</b> .03	-1.54	-9.88
good	-26.35	-14.04	-2.61	69	1.77	-2.87	17.77	-7.78	-7.87	1.78	01	-6.85	8.46
Help- ful	-25.63	-4.33	5.79	2.89	-5.30	4.27	1.18	19.04	-3.13	45	.01	2.73	15.37
Å.	-19.93	5.02	-2.08	. 39	-15.21	-2.57	6.13	-5.97	16.54	-2.20	01	80	5.55
en- Lues 6	3443.89	4578.63	2607.90	2109.68	1743.07	1371.73	1021.94	632.94	603.25	30.31	01-	386.96-1	1322.80
cent of riance	36.49	19.78	11.27	9.12	7.53	5.93	4.42	2.74	2.61	.13	.00	-1.67	-5.72

SAMPLE FACTOR COORDINATE MATRIX: NK.

er.

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	Concept	1 My Job	2 Hard Work	3 Fore- men	4 Easy	5 Over- time	6 Pushy	7 The Heat	8 The Union	9 Manage- ment	Better 10 Machin- ery	11 Good	12 Help- ful	13 Me	Eigen- values 7	Percent of
[i]	1	-2.09	8.33	14.13	-27.87	17.54	36.90	30.53	-16.43	33.69	-24.20	-27.40	-23.18	-19.96	328.97	
en Conro		27.52	31.54	-31.10	-13.67	-14.59	1.15	27.23	3.41	-25.86	9.15	-11.59	- 90	-2.29	4766.54	
Jinates C	3	9.53	-11.13	2.89	.45	-25.71	10.64	82	-22.23	12.68	30.01	6.09	-6.44	-5.96	2667.51	
FACTOR	4	7.91	15.80	21.18	-1.60	-13.88	-15.56	1.54	-19.40	.45	-16.74	3.01	14	17.43	2169.76	
coordinu <sup>2</sup>	1 5	27.58	-11.70	-2.44	19.96	75	8.09	-5.26	81	-3.25	-18.75	.30	-4.05	-8.93	1854.81	( ( (
une manru n a mil+	9	-8.25	-5.53	-2.43	21.86	.68	-17.67	24.36	59	5.41	2.71	-6.48	-10.78	-1.94	1687.38	
X: NK <sub>2</sub>	6	-6.12	71	8.77	2.12	-20.32	11.13	.00	21.06	-3.51	-3.40	-5.09	-11.71	7.77	346.84	
SAMPLE Onal Spa	8 8	-2.53	1.14	12.71	4.43	-3.34	1.32	1.78	92	-8.36	2.76	-11.91	15.50	-12.56	882.99	( L (
mon) en	6 (ITONI)	.37	.68	3.77	-6.15	-4.72	-5.50	5.56	6.55	1.63	-4.00	16.26	.18	-14.55	674.12	
al Solut	10	1.73	-3.08	-1.13	-2.28	-1.65	-1.75	1.10	1.73	3.16	93	-1.90	3.49	1.51	57.81	Ċ
Hion)	11	.03	03	.01	.00	07	.03	00	06	.04	. 08	.02	02	02	.02 1	Ċ
	12	19	6.17	-2.31	2.66	-1.87	-1.86	-4.85	1.64	6.08	04	-2.32	.02	-3.14	.35.82	C
	13	13.54	-2.21	12.59	-7.77	9.11	12.80	5.70	8.15	-1.56	11.03	-8.50	-13.12	-2.76	129.21	



	Galile	o Coordi	nates of	13 Vari	ables in	a Multi	dimension	nal Spac	e (Norma	l Solut:	ion)		
Concept	1	2	с	4	S	9	7	8	6	10	비	12	13
1 My Job	<b>1.</b> 53	-32.02	8.47	32.33	.92	-2.41	-5.87	1.64	2.99	-2.81	00.	.63	-6.26
2 Hard Work	3.82	-31.78	-17.00	-6.21	-9.73	-10.74	11.13	69	-2.10	8.29	.01	.54	7.55
3 Fore- men	4.34	32.23	-18.49	7.55	-11.88	-10.57	8.23	10.74	-4.92	.62	.01	.03	-9.80
4 Easy	-24.60	16.63	18.80	7.47	-14.76	18.82	-3.44	4.40	3.76	9.56	07	02	3.40
5 Over- time	27.88	5.95	18.70	-16.74	3.93	-17.17	-10.73	-6.96	5.39	6.10	.08	.08	-6.59
6 Pushy	31.06	-1.46	7.95	6.18	21.93	10.18	18.28	1.76	2.19	1.57	<b>60</b> .	98	• 33
7 The Heat	25.65	-17.92	-17.25	-10.09	-13.23	16.14	-14.74	3.49	-2.40	-2.61	.07	96	-1.58
8 The Union	-8.79	-8.76	27.13	-17.30	-7.03	3.57	8.23	2.47	-13.09	-6.96	03	.46	-1.64 <sup>c</sup>
9 Manage- ment	35.59	26.68	-4.22	6.52	16	4.23	-3.82	-5.34	.57	-5.38	.10	1.07	10.26
Better 10 Machin- ery	27.58	1.14	-17.82	-11.39	27.93	12.28	-5.41	1.05	-1.65	2.03	08	.86	-4.15
11 Good	-23.36	7.50	-2.64	12.71	4.66	-9.15	-5.37	-15.92	-12.73	. 55	07	96	3.06
12 Help- ful	-20.84	. 80	3.59	-3.93	8.35	-17.26	-6.29	16.45	6.57	-4.67	06	57	8.39
13 Me	-24.70	66.	-7.22	-7.11	-10.93	2.09	9.80	-13.09	15.41	-6.28	07	18	-2.96
Eigen- values	6734.92	4557.14	2909.95	2315.62	2166.16	1812.93	1180.83	932.72	708.05	357.91	- 05	-5.97-1	163.22
Percent of Variance	28.45	19.25	12.29	9.78	9.15	7.66	4.99	3.94	2.99	1.51	- 00	03	-1.96

FACTOR COORDINATE MATRIX: NK, SAMPLE

# APPENDIX E

Telephone Interview Instrument for Generation of MDS Concepts



TELEPHONE INTERVIEW INSTRUMENT

Terrance Lynn Albrecht Department of Communication Michigan State University

Hello, my name is from Michigan State University. We're doing a communication study of manufacturing plants, and it is for a dissertation for a graduate student, Teri Albrecht. Your name was picked at random for this first part of the study, and we just have a few questions to ask you--about the kind of communication that goes on in your plant. Your answers will be kept confidential, but we really need your help. Could I have a few minutes of your time?



- a. What are some things about your job you like? Why?
- b. What are some things about your job you don't like? Why?
- c. What are some of the easiest things about your job? Why?
- d. What are some of the hardest things about your job? Why?
- 2. What are some of the things that go on in the plant that affect your job most? Why?



3. What are some of the things you talk about with others in the plant? You know, with the people you work with? (boss, coworkers)

4. Of those things you talk about, which ones do you think are most important? Why?

- 5. What are some of the plant policies that affect you?
  - a. What is it about those policies that you like?
  - b. What is it about those policies that you don't like?

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NEXT, WE'D LIKE TO ASK YOU ABOUT THE PEOPLE YOU WORK WITH, HOW EASY IS IT TO TALK WITH PEOPLE, WHETHER YOU GET ENOUGH INFORMATION TO DO YOUR JOB, THINGS LIKE THAT...

6. What are the people you work with like? You know, what is it like everyday working with them? (How?)

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- a. What is it about them that you like?
- b. What is it about them that you don't like?

7. What's it like to work for your boss?

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- a. What is it about him that you like? Why?
- b. What is it about him you don't like as much? Why?



8. Overall, what kinds of things is it important for you to get information about in the plant? Why?

9. What things do you just not get enough information about that you really need?

10. When you do get information you need, where do you get it from?

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11. Finally, in general, what's it like to work in the plant? You know, do things change much around there, what are the general procedures like? Why do you feel that way?

THANK YOU VERY MUCH FOR YOUR HELP.



APPENDIX F

Instructions and MDS Questionnaires



Terrance Lynn Albrecht Department of Communication Michigan State University

June, 1978

# COMMUNICATION STUDY

Recently, a study of communication was announced by Tom Werner, the Unit Chairman, and Doug Lindell, Executive Vice President for Manufacturing. This is the questionnaire for that study. I am interested in learning more about the quality and quantity of communication in plants.

Instructions appear before each set of questions. Please read them before you fill in your answers.

I will come around to pick up the questionnaire after you have finished it. All your answers will be kept confidential; no one will see your answers except me.

Thank you very much for your help.



	Please do not write in these spaces:
1. What is your age?years	(1-2)
2. Are you Male Female	
3. Please circle the last grade you completed in school:	
1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 Grade School High School College	(4-5)
4. Are you Hourly Salaried	(6)
5. How long have you been employed (at any job) at Drop Forge Company? (Please check one of the following)	
Less than 1 year A year, but less than 2 years 2 years, but less than 5 years 5 years, but less than 10 years 10 years, but less than 15 years 15 years, but less than 20 years	
zu years or more	(7)
	<u>B1ank</u> (8)



## PART A

People in a plant talk about different topics. When they talk about something, they often use the same words again and again. I wanted to find out what some of those words were that people in the

plant use to discuss different topics. So, I interviewed several employees. Those words are used in the lists that are given below.

Each word is paired with the other words. What I need to know is how similar or different each pair of words are to you.

For example, some of you told me that there is a big difference between a hammer and a cold trim press. On a scale of 0 to 100, where zero means "the same" and 100 means "completely different," most of you said the two machines are about 80 units apart.

On the scale below each pair of words please mark how similar or different you think the two words are. If you think the two words are very similar, you should mark either a "10" or a "20". Or, if you think they are very different, you should place your mark closer to a "90" or a "100".

Here is an example for how to mark the scale:

A HAMMER AND A COLD TRIM PRESS

Same : : : : : : : : : : : : : : : Completely 0 10 20 30 40 50 60 70 80 90 100 Different

Now, please go through the following list of pairs and simply mark how similar or different you think they are. All your answers will be kept strictly confidential.



IF THE DIFFERENCE BETWEEN A HAMMER AND A COLD TRIM PRESS IS 80 UNITS, HOW SIMILAR OR DISSIMILAR ARE:

Please Do Not Write in These Spaces:

(01-08)

(09-17)0102 — — — — —

(18-26)0103

(27-35)0104

(36-44)0105 ----

(45-53)0106

(54-62)0107

(63-71)0108 -----(72-80)0109 -----(01-08)

(09-17)0110

(18-26)0111

(27-35)0112 -----

(36-44)0113

(**45-53**)0203

(54-62)0204

(63-71)0205

(72-80)0206

MY JOB AND HARD WORK
completely
same 0 10 20 30 40 50 60 70 80 90 100 different
MY JOB AND THE FOREMEN
completely
same:
0 10 20 30 40 50 60 70 80 90 100
MI JOB AND EAST
same::::::::::::::::::::::::::::::::::::
0 10 20 30 40 50 60 70 80 90 100 attrefent
MY JOB AND OVERTIME
same:
0 TO 20 30 40 50 60 70 80 90 TOO different
MY JOB AND PUSHY
completely
same o to 20 30 40 50 60 70 80 00 100 different
MY JOB AND THE HEAT
completely
same:
U 10 20 30 40 50 60 70 80 90 100
M JOB AND THE UNION
same: : : : : : : : : : : : : : : : : : :
0 10 20 30 40 50 60 70 80 90 100 difference
MY JOB AND MANAGEMENT
same:
0 10 20 30 40 50 60 70 80 90 100 different
MY JOB AND BETTER MACHINERY
completely
o 10 20 30 40 50 60 70 80 90 100 different
MY JOB AND GOOD
completelv
same: n to 20 30 40 50 60 70 00 00 too different
MY JOB AND HELPFUL
same:
0 10 20 30 40 50 60 70 80 90 100 0000
same: : : : : : : : : : : completely
0 10 20 30 40 50 60 70 80 90 100 attrerent
HARD WORK AND THE FOREMEN
same completely
0 TO 20 30 40 50 60 70 80 90 TOO <sup>different</sup>
HARD WORK AND EASY
completely
same 0 10 20 30 40 50 60 70 20 00 100 different
HARD WORK AND OVERTIME
completely
same:
TAKU WUKK ANU PUSHI
same: : : : : : : : : : : : : : : : : : :
0 TO 20 30 40 50 60 70 80 90 TOO attrerent


HARD WORK AND THE HEAT	(01-08)
same	(09-17)0207
0 10 20 30 40 50 60 70 80 90 100 different	(03-17/0207
HARD WORK AND THE UNION	
completely	
same: n to 20 30 40 50 60 70 90 00 toodifferent	(18-26)0208
HARD WORK AND MANAGEMENT	
same:	(27-35)0209
0 10 20 30 40 50 60 70 80 90 100 CHARTER	
HARD WORK AND BEITER MACHINERT	
same: : : : : : : : : : : : : : : : : : :	(36-44)0210
0 10 20 30 40 50 60 70 80 90 100 university	
HARD WORK AND GOOD	
same:	(45-53)0211
0 10 20 30 40 50 60 70 80 90 100 different	
HARD WORK AND HELPFUL	
completely	(54 62)0212
0 10 20 30 40 50 60 70 80 90 100 different	(34-02/0212
HARD WORK AND ME	
completely	
same: 0 10 20 30 40 50 50 70 00 00 100 different	(63-71)0213
THE FOREMEN AND EASY	
completely	(72 90)0304
same:	(72-00)0304
U 10 20 30 40 50 60 70 80 90 100	${(01-08)}$
THE FOREMENTARD OVERTIME	
same:_:_:_:_:_:_:_:_:_:_:_:_:_:_:_:_:_:_:_	(09-17)0305
0 10 20 30 40 50 60 70 80 90 100 difference	
THE FUREMEN AND PUSHY	
same: : : : : : : : : :	(18-26)0306
0 10 20 30 40 50 60 70 80 90 100 different	
THE FOREMEN AND THE HEAT	
completely	(27-35)0307
o 10 20 30 40 50 60 70 80 90 100 different	(27-33)0307
THE FOREMEN AND THE UNION	
completely	
same: n Th 20 30 An 50 Kn 70 80 on The different	(36-44)0308
THE FOREMEN AND MANAGEMENT	
completely	
same:	(45-53)0309
U 10 20 30 40 50 60 70 80 90 100	
THE FOREACH AND DEFFER PROFILER	
same: _: _: _: _: _: _: _: _: _: _: _: _: different	(54-62)0310
0 10 20 30 40 50 60 70 80 90 100 different	
ITE FUKEMEN AND GUUD	
same: : : : : : : : :	(63-71)0311
0 10 20 30 40 50 60 70 80 90 100 different	
THE FOREMEN AND HELPFUL	
same	(72-20)0212
0 10 20 30 40 50 60 70 80 90 100 different	(12-00)0312

18-26)0208 \_ \_ \_ \_ \_ (27-35)0209 \_ \_ \_ \_ \_ 36-44)0210 ----45-53)0211 - - - - -54-62)0212 \_ \_ \_ \_ \_ (63-71)0213 \_ \_ \_ \_ \_ 72-80)0304 \_ \_ \_ \_ \_ (01-08) 09-17)0305 \_\_\_\_ (18-26)0306 \_ \_ \_ \_ \_ (27-35)0307 \_ \_ \_ \_ \_ (36-44)0308 \_ \_ \_ \_ \_ (45-53)0309 \_ \_ \_ \_ \_ (54-62)0310 \_ \_ \_ \_ \_ (63-71)0311 \_ \_ \_ \_ \_



and the second se

THE FOREMEN AND ME	
same:	
EASY AND OVERTIME	
same::::::::::::::::::::::::::::::::::::	
EASY AND PUSHY	
same: : : : : : : : : : : : : : : : : : :	
same::::::::::::::::::::::::::::::::::::	
EASY AND THE UNION	
same::::::::::::::::::::::::::::::::::::	
LAST ANU MANAGEMENI	
same: : : : : : : : : : : : : : : : : : :	
completely	
same: 0 10 20 30 40 50 60 70 80 90 100 different EASY AND GOOD	
same: :	
EASY AND HELPFUL	
same::::::::::::::::::::::::::::::::::::	
same: :	
UVERTIME AND PUSHY	
same: : : : : : : : : : : : : : : : : : :	
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APPENDIX G

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Instructions and Network Analysis Questionnaire



What is communication? You communicate whenever you talk with someone face-to-face...when you use the telephone...or if you write or read something. Other examples of communication are asking or getting somebody's advice, opinions, or ideas.

On the following pages I'd like you to describe your communication contacts with other people (management and employees) in the plant.

The names of management and first shift people in all departments are included. The numbers next to each name are to help me keep things straight--a new number will be assigned to keep your answers confidential. I need to be sure that just the people listed on the form are the ones that fill it out. So, please sign your name on the first page. Again, no one but me will know your individual reply.

Three columns are next to each person's name. Each column has a different <u>topic</u> you might talk about with others in the plant. These topics were suggested to me in talking with many people in the plant. The topics you said were important are:

- (1) talk about my job, day-to-day work
- (2) talk about <u>personal things</u>, hobbies, what you do on the weekends, personal problems
- (3) talk about the union, contracts, negotiations, etc.

Please read the list of names and decide whether you communicated with each person at least once <u>last week</u>--on one or more of the topics. If you <u>did</u>, write down your estimate of how many times it was last week. <u>Estimate the number of times for each topic</u>. <u>Put that number</u> in the appropriate column.

## PART B



EXAMPLE: Here is an example of how to fill out this form. The name of each employee is listed on the left. As you look across the top of the page, there are three topics listed. These are "Talked about my job, day-to-day work," "Talked about personal things, hobbies, problems, joking around," and "Talked about the union, contracts, negotiations."

As you look down the page, there are spaces next to each name, and under each topic. These spaces show how often the person filling out the form communicated with each person listed about the topic.

For example, if you were filling out the form, you would first look at the name listed. Then you would mark in the space next to the name how often you communicated with, say, "D. Bouchard" on each communication topic.

In this example, you filled out the form in the following way:

(a) first, you looked at D. Bouchard's name. Then you filled in number "4" in the first column because you communicated with him 4 times last week about your job. You left the other columns blank because you didn't talk to him about those topics.

(b) second, you looked at J. Miller's name. You left all three rows next to his name blank because you didn't talk to him at all about those topics.

(c) third, you saw N. Richard's name. You put a number in every column--because you talked with him 40 times last week about your job, 5 times about personal things, and 2 times about the union.

	Talked about <u>my job</u> , day- to-day work	Talked about <u>personal</u> <u>things</u> , <u>hobbies</u> , problems, joking around AST WEEK	Talked about the <u>union</u> , contracts negotiations
		AST WEEK	
Name	# times	# times	# times
128	4		
037			
465	40	5	2

Communication Topic



Your Name

No.\_\_\_\_\_

.

	Talked about <u>my job</u> , day- to-day work L	Talked about <u>personal</u> <u>things</u> , hobbies, problems, joking around A S T W E E K	Talked about the <u>union</u> , contracts, negotiations	
Name	# times	# times	# times	
269				
030				
213				
043				
600				
601				
162				
033				
292				
050				
254				
256				
151				
075				
068				
111				
120				
602				

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	r		
	Talked about	Talked about	Talked about
	<u>my job</u> , day- to-day work	<u>personal</u> <u>things</u> , hobbies problems, joking around	the <u>union</u> , contracts, negotiations
	L	АЅТ ѠЕЕК	
Name	# times	# times	# times
603	• • • • • • • • • • • • • • • • • •		
058			
137			
034			
604			
605			
170			
003			
500			
155			
288			
171			
149			
077			
025			
295			
037			
195			
309			
501			

Communication Topic



Communication Topic

	·	T	
	Talked about	Talked about	Talked about
	<u>my job</u> , day- to-day work	personal things, hobbies, problems, joking around	the <u>union</u> , contracts, negotiations
	L	АЅТ ѠЕЕК	
Name	# times	# times	# times
113			
012			· · · · · · · · · · · · · · · · · · ·
135			
184			
502			· · · · · · · · · · · · · · · · · · ·
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	Talked about	Talked about	Talked about
	<u>my job</u> , day- to-day work L	personal things, hobbies, problems, joking around A S T W E E K	the <u>union</u> , contracts, negotiations
Name	# times	# times	# times
310			
173			
253			
243			
008			
055			
608			
505			
035			
294			
281			
065			
118			
064			
609			
101			
209			
610			
306			
131			

Communication Topic



Communication	Topic

	Talked about <u>my job</u> , day- to-day work	Talked about personal things,	Talked about the <u>union</u> , contracts,
		problems, joking around	negotiations
·····	L	ASI WEEK	
Name	# times	# times	# times
167			
078			
291			
067			
097			
061			
212			
188			
105			
231			
208			
115			
019			
211			
176			
070			
200			
260			-
248			
611			

Communication Topic

	(		
	Talked about	Talked about	Talked about
	<u>my job</u> , day- to-day work L	personal things, hobbies problems, joking around A S T W E E K	union, contracts, negotiations
Name	# times	# times	# times
153			
506			
013			
216			
612			
613			
614			
615			
616			
074			
081			
022			
182			
121			
160			
238			
298			
122			
203			
249			



Communication Topic

	Talked about	Talked about	Talked about
	<u>my job</u> , day- to-day work	personal things, hobbies, problems, joking around AST WEEK	<u>the union</u> , contracts, negotiations
Name	 # times	# times	# times
044	, 3 <b></b>		"
240			
218			
617			
083			
190			
126			
146			
166			
093			
080			
112			
179			
618			
072			
089	·		
619			
507			
236			
272			

Communication Topic

	Talked about	Talked about	Talked about
	to-day work	hobbies, problems, joking around A S T W E E K	contracts, negotiations
Name	# times	# times	# times
206			
268			
297			
508			
285			
154			
620			
196			
621			
228			
622			
169			
247			
091			
509			
024			
262			
623			
265			
009			

166

Talked about Talked about Talked about personal things, hobbies the union, <u>my job</u>, day-to-day work contracts, negotiations problems, joking round LAST WEEK # times # times # times Name 054 047 006 141 189 193 624 204 084 123 289 102 085 150 092 094 007 165 172 264

167 Communication Topic

Communication Topic

	Talked about	Talked about	Talked about
	<u>my job</u> , day- to-day work	personal things, hobbies, problems, joking around	<u>the union</u> , contracts, negotiations
	L	ASI WEEK	
Name	# times	# times	# times
158			
259			
183			
279			
225			
041			
104			
202			
168			
625			
278			
287			
114			·····
144			
235			
242			

APPENDIX H

Communication Rules and Information Needs Questionnaire



		PART C	1
When	just yo	u and your boss talk	Col. 1-8 <u>Dup</u>
	a. who	decides when the two of you will talk? 1 Boss almost always 2 Boss usually 3 Boss more often than me 4 Both of us about the same 5 Me more often than my boss 6 Me usually 7 Me almost always	9
	b. who	<pre>starts the conversation? 1 Boss almost always 2 Boss usually 3 Boss more often than me 4 Both of us about the same 5 Me more often than my boss 6 Me usually 7 Me almost always</pre>	10
	c. who	<pre>decides what topics, or problems, you talk</pre>	-11-
	d. who	<pre>ends or stops the conversation? 1 Boss almost always 2 Boss usually 3 Boss more often than me 4 Both of us about the same 5 Me more often than my boss 6 Me usually 7 Me almost always</pre>	12
	e. whi an	ch one of you usually interrupts to move to ew topic? 1 Boss almost always 2 Boss usually 3 Boss more often than me 4 Both of us about the same 5 Me more often than my boss 6 Me usually 7 Me almost always 8 Neither one of us interrupts to change the subject	-13-

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The information we get from management about work is 1. usually accurate. 14 Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree 2. When management puts out information to employees, you can believe it, completely. 15 Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree 3. The information we get from management about doing the job is usually on time--it gets to us when we need it. 16 Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree 4. The information we get from management about doing the job is usually complete--we are told all we need to know. 17 Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree 5. The information we get from management is usually in very useful form-easy to use. 18 Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree THANK YOU VERY MUCH FOR YOUR HELP--AS MENTIONED BEFORE, ALL

YOUR ANSWERS WILL BE KEPT CONFIDENTIAL.

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