The Ohio State University
Disaster Research Center

MISCELLANEOUS REPORT #6

THE DISASTER RESEARCH CENTER
SIMULATION STUDIES OF
ORGANIZATIONAL BEHAVIOR UNDER STRESS

DRC STAFF REPORT

1967

FOREWORD

From 1964 through 1967 a series of related studies were carried on by the Disaster Research Center (DRC) in the Behavioral Sciences Laboratory at The Ohio State University. This report summarizes that research and the conclusion of one phase of the work effort undertaken under U. S. Air Force Office of Scientific Research Grant #AF-AFOSR-572-64, -65, -66 and -67. The report also indicates the new direction of research suggested by the earlier studies, some of the pilot work, and new investigations projected.

While practically every member of the DRC staff, at one time or another, participated in different phases of the research conducted, the core of the actual laboratory work was carried on primarily by certain members of the professional staff. These are listed in Appendix I. Furthermore, while Professor Eugene Haas (now at the University of Colorado) and I (only in the last stage) had overall supervision of the studies, the day-to-day activities were initially under the direction of Professor Thomas E. Drabek (now at the University of Denver), then under Professor Robert Muzzy (now at Florida State University), and for the last study, under Professor Robert Roth, the current DRC Laboratory Director and a member of the sociology faculty.

Chapter I briefly describes the general research projected in the original technical proposal to the Air Force Office of Scientific Research. The initial theoretical model advanced is set forth, as well as a description of the laboratory facilities being used. This chapter draws heavily from an internal DRC staff memorandum by Drabek, a theoretical article by Drabek, Haas, Quarantelli and Dynes, and a descriptive brochure by Roth.

The original pilot study conducted by DRC in the laboratory is discussed in Chapter II. Observations made of behavioral changes in small groups in high demand situations are reported. This chapter is based on a much longer draft report prepared by Mrs. Elaine Hobart, a DRC research assistant, which is intended to be the basis for an article in a professional journal.

Chapter III describes the major laboratory research conducted during the whole course of the project, a realistic simulation of an actual police dispatching room. Emphasis is given to the methodology of this unique study, although some substantive findings are also noted. This discussion primarily although selectively summarizes the writings of Drabek on the study, including his dissertation, a monograph, several papers and two articles.

The next chapter discusses the highlights of a second major laboratory simulation conducted by DRC. Undertaken by Muzzy as part of his dissertation work, the experiment attempted a quantitative test of some hypotheses drawn from a refined version of the original theoretical model used. Preliminary findings are presented.

Chapter V describes an "analogue" study conducted as a result of certain questions generated by the two major laboratory simulations. Quantitative data were again generated. The chapter condenses the findings set forth in a draft article prepared for a professional journal by Thomas Cree, a DRC research assistant.

Next, there is a brief discussion of a new line of research suggested by the earlier studies. In an attempt to zero in on the interactional aspects of groups under stress, laboratory work was initiated on communication patterns, especially those involving cross-cultural elements. Chapter VI describes this phase of the research, summarizing an internal DRC staff memorandum by Roth.

The last chapter of this report very briefly projects the studies contemplated if the current line of research is developed. The report concludes with two appendices: one, a list of DRC staff members who have participated in the research, and two, a list of of papers and publications, completed or in progress, derived during the four years of the studies from January, 1964 to December, 1967.

E. L. Quarantelli

Principal Investigator
Co-Director, Disaster Research Center
Professor of Sociology

TABLE OF CONTENTS

Chapter I

RESEARCH FRAMEWORK, MODEL AND FACILITIES

In 1963, a Disaster Research Center was established at Ohio State University

for the purpose of studying organizational behavior under stress. Two different

settings for this research were selected which resulted in two sponsorships:

(a) The field phase, where emphasis was on sending a team into communities

immediately after they had experienced a major disaster (this research was

supported by the U. S. Office of Civil Defense),[1] and (b) The laboratory phase,

where the intent was to bring groups and units of organizations into a laboratory

setting under more controlled conditions where stress situations could be mani-

pulated. It was felt that work in both of these settings simultaneously would serve

to strengthen each approach.

This chapter first summarizes the original research proposed,[2] i. e., the

research framework initially used in the laboratory work. The overall theoretical

model developed in the first year of the work is then described. The chapter con-

cludes with a description of the physical facilities in which most of this research

was conducted.

The Research Framework

Complex organizations constitute one of the most important elements in the

social web of modern societies. Most citizens of modern societies are born in

a hospital, educated in a school, work in one organization or another; to the

degree that they participate in religious and political activity, these, too, fre-

quently take place in complex organizations. In short, members of modern

societies obtain a large part of their psychological, social, and cultural satis-
factions in large-scale organizations. The understanding of modern man and the
society in which he lives is, therefore, critically dependent on the study of com-
plex organizations.

One of the most important ways of understanding organizations is to study how
they react to stress situations. The essential social structure and functions of
an organization are most clearly exposed under conditions of extreme stress and
crisis. Crises reveal, as few situations can, how organizations are structured,
how organizations change and how organizations fulfill their functions.

There are many kinds of stress situations. From a sociological viewpoint
perhaps the most useful ones to study are natural and man-made disasters. They
provide a convenient setting for testing hypotheses about group behavior under
realistic conditions of severe strain. Although large-scale disasters provide a
kind of maximal test of community functioning, other lesser crisis and stress
situations if approached correctly also provide an opportunity to obtain useful and
basic knowledge about the behavior of organizational systems.

It occurred to us at DRC in 1963 that a particularly good way of approaching
the problem was to develop a series of laboratory simulation studies of organi-
zational behavior under stress. Few contrived experiments of such a kind in the
social sciences had ever been conducted up to that time.[3] As it happened, a year
or so earlier, in 1962, someone had actually urged that an attempt ought to be
made to move some aspects of disaster research in this direction also.[4] No one,
given the ethics of science, of course, had seriously taken the position that
persons or groups should be subjected to the kinds of direct threats and losses

that are common to disasters. However, it was suggested that laboratory simu-
lation experiments would be feasible and should be attempted. Guetzkow, for
instance, noted that:

> . . . it would be possible to link the experiment to very
> fundamental life patterns by importing individuals and
> groups with previous histories appropriate for the special
> purposes of the research. Thus, for example, if one is
> interested in the processes of leadership succession from
> non-crises to crisis, it would seem possible to use com-
> munity groups with long histories of stable leadership
> patterns in crisis situations in the laboratory. [5]

We thus set as our task the studying of the effects of stress on organizational
structure and functioning in a laboratory setting. The focus was to be not the
response of people to crises but on the reactions of organizations to stress.
This is important, for a group's structure and function can be disrupted without
any direct or indirect threat to the personnel involved. The failure of a college
professor to arrive at his class at the appointed time disrupts and prevents the
functioning of that group, but in the experiences of most classroom teachers, is
never a traumatic event for the students involved. In fact, even a few disasters
are often much more community disrupting than they are personally threatening.
For example, the 26-inch snowfall in a 12-hour period which unexpectedly tied
up New York City about a decade ago badly disrupted community life, but the
reaction of the population was far more one of amusement than anxiety. In short,
social disorganization and personal disorganization while often highly correlated
are not necessarily opposite sides of the same coin.

While we thought the generation of stress in a laboratory setting would be a
complex operational task, we did not deem it impossible. Other investigators
with different research objectives had in varying degrees been able to induce

personal and group disruption of activities for limited periods of time.[6] We

foresaw a number of ways in which stress for the organizational segment could

be induced -- in fact, anything which would disintegrate or block the usual on-

going social pattern would accomplish this. However, so as to attempt to attain

at least a measurable degree of stress, we intended to try such tactics as (a) re-

moving key group members, (b) making useless necessary facilities for group

tasks, (c) interfering with existing group communication patterns and networks,

and (d) giving the group an abnormal overload of work.

While we were going to use some ad hoc groups, our intent was to utilize

already existing units. We particularly hoped that it would be possible to use a

comparable group in the laboratory as we may earlier have studied in the field

research. It was accepted as a limitation that only segments or parts of organi-

zations could ever be used in the laboratory, rather than total units.

The eventual goal was to be the testing of specific hypotheses about organi-

zational behavior under stress. Some of these were to be drawn from the theo-

retical literature, some were to be derived from field observations. However,

we did not want a series of isolated and discrete hypotheses. Consequently, we

set about developing an overall theoretical model about organizational stress.

How we went about this, and what we produced is discussed in the next section.

The Research Model

To formulate a theory of organizational stress, we surveyed a large body of

"stress" literature and related research studies, e.g., crisis, disaster, and

psychological investigations, as well as organizational theory and research.

Among the major findings obtained from this literature review completed in 1964 were:

1. There was a lack of consensus on a definition of stress. In the psychological literature, for example, stress is frequently defined as ". . . a <u>class of</u> <u>stimuli</u> which are most <u>likely</u> to produce disturbance in most individuals."[7] However, many psychologists contend that the term stress most meaningfully <u>describes</u> the state of a system affected and cannot be defined simply as a set of conditions or stimuli.

2. There were very few efforts to view stress from a sociological vantage point.[8] While some organizational theorists utilize the concepts of stress and strain, seldom do they present a theoretical analysis of the concepts.

3. The concept of adaptation as a response to stress, and the degree of integration of the system as an indication of how it will react to stress, were basic ideas appearing in most of the research literature, whether psychological, physiological, psychiatric, or sociological studies were examined.

Drawing from a variety of sources, some definitions and conceptual distinctions were tentatively advanced. An overall model was formulated. During the course of the actual research, a number of modifications were made in the concepts, and eventually the whole model had to be revised. However, what follows is the general model and basic concepts used in most of the research discussed in this report.

1. An organization: A relatively permanent and relatively complex discernible interaction system.

This definition emphasizes three major elements.[9] First, an organization is conceived of as a set of clustered interactions and hence has those characteristics

generally associated with a social system , e. g., interdependence of parts.

This interaction system is relatively complex, both horizontally and vertically.

Likewise, the system is relatively permanent, i. e., it exists over an extended

period of time.

2. Patterned interactions (or performance structure)[10]: The overt be-
havioral patterns of organizational participants.

If we observe organizational incumbents over a prolonged period of time,

certain recurrent sequences or similarities in interaction can be seen. These

similarities,which can be directly observed, are referred to as the interaction

patterns of the organization.

3. Normative structure: The norms which make up the roles and positions
of the organization.

The normative structure is a conceptual tool utilized to answer the question,

"Why do certain interaction patterns recur over time?" These patterns can be

viewed as the result, in part, of the operation of the normative structure. This

consists of the various social norms which influencing organizational personnel

help to produce the observable patterning in behavior.

4. Interpersonal structure: The patterned kinds of particular relationships
that develop among organizational members.

Members of an organization respond to each other not only as position incum-

bents but also as specific persons. Their interaction reflects a modus operandi

which changes, sometimes drastically, with turnover in organizational member-

ship, but is otherwise relatively stable. This kind of repetitiveness in interaction,

we conceptualize as the interpersonal structure of the organization.

5. Internal Resources: All intraorganizational resources currently
used or known to be available for use by organizational personnel.

Communication equipment, alternate power equipment, skills of personnel, etc., are included in this category. The ecological placement of all such items likewise constitutes a crucial aspect of this concept. Internal resources can be subclassified as: (1) equipment, material or buildings, (2) information and records, and (3) personnel.

6. **External Resources:** All extra-organizational resources currently used or known to be available for use by organizational personnel.

Extra-organizational equipment or personnel, an excess labor supply in the general community, etc., are among the multitude of items that are designated by this concept. Again, the ecological placement of such items is crucial. The same three general subcategories are used: (1) equipment, material or buildings, (2) information and records, and (3) personnel.

7. **Organizational Capability:** The range of possible organization actions.

On any given day organizational incumbents engage in a large number of actions which, when viewed collectively, constitute the patterned interactions of the organization. But given the resources of the organization, many other additional activities could be undertaken. In other words, the organization is capable of carrying out not only what is already being done, but many other actions as well. Organizational capability, therefore, refers to the entire range of actions which the organization could, in fact, perform if the appropriate conditions were present.

8. **Organizational Demands:** Requests or commands for organizational action received by members of the organization.

Organizational demands may come from the general community as is frequently the case in a widespread disaster. Demands may also have as their source

an external group such as city, state, or national governments, or any other

organization with which the focal organization has a relationship. Often demands

are self-imposed by organizational members who, after receiving certain cues,

proceed to act without waiting for a specific request from outside organizations.

For example, a telephone or electric company may immediately dispatch crews

to stricken sections of the city before any requests from the community are

received. Hence, the normative structure includes a series of "if-then" pro-

positions. Thus, "if" a certain external event occurs (e. g., a tornado which has

probably disabled power lines), "then" a certain set of prescribed actions should

take place.

Demands on all organizations obviously vary from day to day and in some

organizations may change considerably from season to season. Such variation

may be both quantitative and/or qualitative. For example, with the first snowfall

of each year local police are usually confronted with a marked increase in accident

reports. This quantitative change in demands usually lasts only a few days as

motorists become accustomed to the new driving conditions. Similarly, highway

departments experience a qualitative change in demands since they have snow

removal responsibilities but no experience since the previous winter.

In addition to quantitative or qualitative fluctuations in demands, variation in

priorities attached to demands may also occur. Certain demands, if not fulfilled,

have more serious consequences, i. e., some are more important than others, for

either the welfare of the organization or the total community. High priority

values of the organization are threatened by some demands. Hence, a decision

to order or not order evacuation of a city in light of an approaching hurricane may

be the most important decision a mayor might make while in his term of office.

Closely related to the degree of seriousness attached to a demand is the variable of time, i. e., how much time is available before organizational action is required. These two variables, considered jointly, determine the priority of the demand. Thus, organizational demands may change along at least three separate axes: quantity of demands, actual qualitative changes in demands, and changes in priorities attached to demands.

     9.   Organizational Strain: Inconsistencies or discrepancies between structural elements of the organization.

Many types of organizational strain have been analyzed by previous researchers. What is frequently labeled role conflict is a good example. When various role requirements are of such a nature that an individual is faced with concurrent and conflicting expectations, role conflict is said to exist. At another level, normative dissensus may be focalized between two structural units of the organization (e. g., departments). Illustrations of the several dimensions along which dissensus may exist are the legitimacy and priority of certain demands. For example, following an earthquake first aid units attached to a fire department may want to render all the help they can in searching for victims, even to the point of utilizing additional men from other units, e. g., a pumper. However, if there is danger of numerous fires developing, fire officials may choose to place highest priority on maintaining a "state of readiness" for fire suppression.

     10. Organizational Stress: The organizational state or condition when organizational demands exceed organizational capability.

It is assumed that organizational capability and demand represent a dynamic equilibrium, where under normal circumstances a relatively stable relationship

exists with capability exceeding demands. Organizational stress is not viewed

as a set of external conditions, but rather is a term used to refer to the state

of an organization when certain (i. e., stress producing) conditions are present.

Organizational stress is not viewed as a discrete variable, but rather constitutes

a continuum. The degree of stress is determined by the change in the relation-

ships between two major variables: (a) a change in the demands made on the

organization and (b) a change in the capability of the organization. The com-

plexity of this relationship is apparent. For example, a maximum stress situ-

ation such as might be initially produced by a disaster would be characterized by:

    A. change in demands made on the organization
        1) quantity
           a. sharp increase
           b. increase is unanticipated
        2) priority
           a. consequences of organizational action threaten central
               values of organization or society, i. e., organizational
               actions are viewed with increased seriousness
           b. immediate organizational action is required
        3) qualitative changes
           a. demands previously met, but not currently being met are
               made on the organization
           b. new demands not previously made on the organization are
               made and temporarily accepted by the organization

    B. change in capability of the organization
        1) intra-organizational
           a. absence of personnel, especially key personnel
           b. absence of important equipment, material, or buildings
           c. absence of crucial information or records
        2) extra-organizational
           a. absence of personnel, especially key personnel
           b. absence of important equipment, material or buildings
           c. absence of crucial information or records

In this model the concept of stress is relegated to a position similar to the

physician's use of the concept of illness. Illness refers to the state or condition

of the organism and is said to exist when certain indicators are present, i. e.,

symptoms.   Thus, when changes in the normal functioning of the organism occur,

for example, the presence of a rash, marked change in rate of breathing, etc.,

illness is said to be present or the organism is said to be ill.   The word "ill" is

used as a descriptive adjective, i. e., describing the state of the organism.

When used, however, as a noun, for example, "illness is present," confusion

results as this implies that "a thing" is present.   The connotation of the presence

of a "thing" is unfortunate, as the concept clearly implies only a description of

the state of the organism which is known only by certain observable indicators

which reflect changes in the normal functioning of the organism.   Similarly,

organizational stress can be identified by certain observable indicators, i. e.,

changes in the interaction patterns, which occur as the organization attempts to

cope with the changed relationship between organizational capability and demands.

From these formulations, general as well as specific hypotheses were drawn.[11]

The general hypothesis was that the greater the degree of organizational stress,

the greater the change in the interaction patterns of the organization.   A com-

munity disaster occurs and immediately the demands placed on the community

emergency organizations are increased.   Certain of these demands will be seen

by organizational incumbents who have developed a particular set of interaction

patterns as legitimate responsibilities of the organization.   Certain organizational

equipment or personnel may have been rendered inoperable by the disaster.   Thus,

as the organization attempts to cope with the sudden changes in demands and

organizational capability brought about by the disaster, certain changes in the

interaction patterns of the organization may be anticipated.   By comparing the

interaction patterns of an organization before a disaster (Time one) with the

interaction patterns during the emergency response period (Time two), the

degree of change can be obtained.

Hence, by utilizing the characteristics of a maximum stress condition, a

series of related hypotheses were developed, all of which partially dealt with the

question, "When will change in the interaction patterns occur?" For example:

Change in demands:
1. The more that the increase in demands is unanticipated, the greater the degree of change in the interaction patterns.

2. The sooner organizational action is required to respond to the demands, the greater the degree of change in the interaction patterns.

Change in capability:
1. The greater the absence of key intraorganizational personnel, the greater the degree of change in the interaction patterns.

2. The greater the absence of important extra-organizational equipment, material, or buildings, the greater the degree of change in the interaction patterns.

Assuming that changes in the interaction patterns do occur, the next logical

question was "When an organization is in a stress state, what in the interaction

patterns of the organization will change?" Illustrative hypotheses developed were:

1. As the degree of organizational stress increases, organizational incumbents will increasingly limit their activities to those tasks of highest priority.

2. As the degree of organizational stress increases, the rate of unofficial decision making will increase.

3. As the degree of organizational stress increases, the modes of communication will shift so as to increasingly maximize speed.

"Why does the interaction pattern change the way it does?" Two major vari-

ables, both related to the internal structure of the organization, might explain

much of the variation in changes in organizational interaction patterns. These are the plans made prior to the emergency and the degree and nature of organizational strain that existed within the organization before the emergency.

Certain organizations have "disaster plans" which specify in varying degrees of completeness the nature of an emergency organizational response, " i. e. , an official policy as to what the interaction patterns of the organization is supposed to be at Time two. Such plans may play an important part in determining the nature of the interaction patterns at Time two. Illustrative hypotheses in this area were:

1. The more disaster plans are in written form, the greater the influence of such plans on the interaction patterns at Time two.

2. The more frequently disaster plans are rehearsed, the greater the influence of such plans on the interaction patterns at Time two.

3. The greater the proportion of organizational incumbents who participate in rehearsals of disaster plans, the greater the influence of such plans on the interaction patterns at Time two.

The second area of investigation which attempts to answer the question, "Why do the interaction patterns of an organization change the way they do" can be stated as follows: The greater the degree of organizational strain between elements of an organization at Time one, the greater the amount of change in the interaction patterns at Time two.

Organizational strain was previously defined simply as "discrepancies or inconsistencies between the internal structural elements of the organization. " Such inconsistencies may exist at various levels. The location of such change within the structure of the organization is thus clearly implied, i. e. , the following

illustrative hypotheses are related to the question, "Why does change occur at this point in the organizational structure rather than at some other point?"

1. The greater the degree of role conflict experienced by a particular position incumbent at Time one, the greater the degree of change in the interaction patterns at Time two.

2. The higher the location of organizational strain in the organizational structure at Time one, the greater the degree of change in the interaction patterns at Time two.

3. The greater the degree of dissensus as to priorities of organizational demands between any two position incumbents (or structural units such as departments) at Time one, the greater the degree of change in the interaction patterns at Time two.

In very general terms, what we have just discussed, constituted the major elements of the theoretical model developed at DRC during the course of the first year of the research effort. The model defined key terms, postulated certain concepts and attempted to indicate the nature of the relationship between certain key elements. The model also allowed the generation of hypotheses in connection with three central questions: When will changes in the interaction patterns of an organization occur? What in the interaction patterns will change? And why do the interaction patterns change the way they do?

In the next section we discuss the physical setting of the laboratory in which we attempted to carry out simulation studies of organizations under stress, and where we made an effort to test certain hypotheses drawn from the theoretical model we had developed.

The Physical Facilities

The laboratory work was all carried on at one location. This has been at the Behavioral Sciences Laboratory (BSL) on the campus of Ohio State University.

Until December of 1967, the field staff of DRC was also housed in the same

building, allowing an exceptional degree of integration of all DRC research.

The Behavioral Sciences Laboratory, covering 5,655 sq. ft. of space, is one

of the most flexible laboratories in the country, and at the time of its completion

in 1964, almost unique in its facilities. The basic complex, surrounded by

offices for faculty members, research assistants and transcribers, is composed

of a conference room, a large central laboratory area, an L-shaped observation

area, and four test cubicles. The diagram at the end of the chapter illustrates

the complex.

The regular equipment of the BSL includes two television cameras. One of

the cameras is a standard G. E. studio camera which is generally used in the

observation area behind the one window of clear glass. The other camera was

especially designed and built for the BSL and is used at ceiling height on a rack

which encircles the laboratory. Three television monitors are located in one

part of the observation deck. Provisions for videotaping can be arranged with

WOSU-TV since the laboratory is connected by cable with the campus television

station located about one mile away. Complete closed circuit television operation

is also available throughout the BSL.

All video and audio facilities are interconnected throughout the complex. This

means that the central laboratory can be connected with any or all of the test

cubicles and/or the conference room. A wide variety of combinations of inter-

connections are thus possible.

The central laboratory is designed in quadrants. Microphone and telephone

inputs as well as light controls are specific to each of the four quarters of the

large room. Walnut panels can be utilized to divide the laboratory into smaller rooms. There are 16 microphone and 16 telephone inputs -- four of each in every one of the quadrants. Overhead lighting is extremely flexible as well -- each quadrant is equipped with four incandescent spot light and four fluorescent panels. The fluorescent panels have two illumination levels -- the higher level being particularly appropriate for television recording.

A total of 24 separate inputs can be accommodated on the large 24-track tape recorder built especially for the BSL. The recorder is housed in a separate room which serves as an office for transcribers. An extra long carriage typewriter is used to type the parallel recordings.

The four test cubicles are arranged in pairs with one-way glass between them. The conference room can be divided in half as well. Each of the test cubicles as well as each half of the conference room is equipped with a television receiver. Microphone and telephone inputs are provided in all of the ancillary rooms in addition to overhead speakers which provide audio reception from any other room or area of the complex.
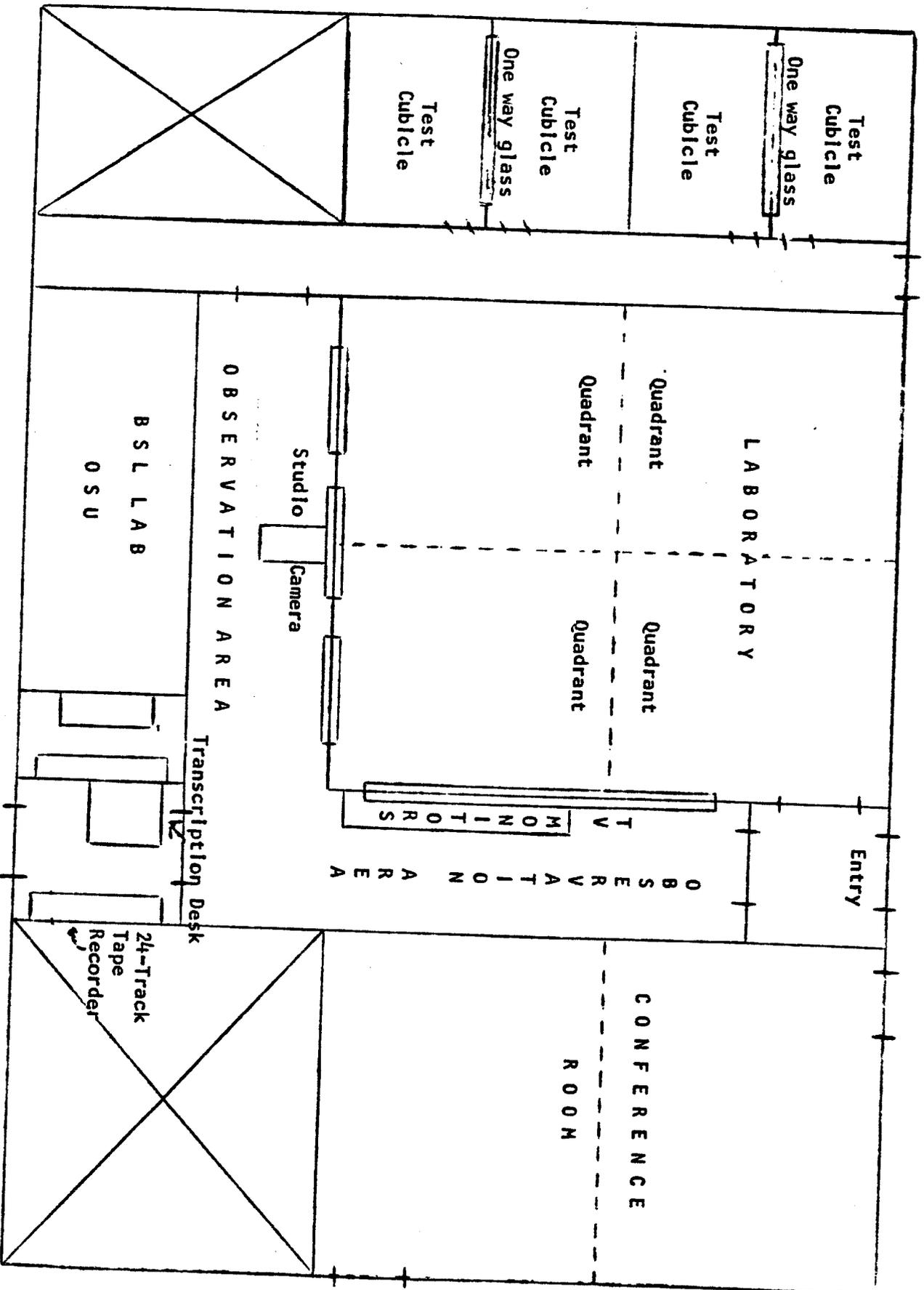
DIAGRAM OF THE BEHAVIORAL SCIENCES LABORATORY OF THE OHIO STATE UNIVERSITY

Test Cubicle

One way glass

Test Cubicle

Test Cubicle

One way glass

Test Cubicle

LABORATORY

Quadrant

Quadrant

Quadrant

Quadrant

OBSERVATION AREA

BSL LAB

OSU

Studio Camera

Transcription Desk

24-Track Tape Recorder

OBSERVATION BY TV MONITORS AREA

Entry

CONFERENCE ROOM

FOOTNOTES

1. A list of reports and monographs on the field studies is available upon request from the Disaster Research Center.

2. For the actual original proposal see, Laboratory Simulation Studies of Organizational Behavior Under Stress: A Research Proposal Submitted to Air Force Office of Scientific Research, October 1963, (mimeographed).

3. Among the few laboratory studies of organizations conducted were Morris Zelditch and Terrence K. Hopkins, "Laboratory Experiments with Organizations," in Amitai Etzioni, (Ed.) Complex Organizations: A Sociological Reader, (New York: Holt, Rinehart and Winston, 1961) pp. 464-478; Morris Zelditch and William M. Evan, "Simulated Bureaucracies: A Methodological Analysis," in Harold Guetzkow, (Ed), Simulation in Social Science, (New York: Prentice-Hall, 1962) pp. 48-60; Ernest G. Palola, "Organizational Types and Role Strain: A Laboratory Study of Complex Organizations," Unpublished Ph. D. Dissertation, University of Washington, 1962; Oscar Grusky and Lindsey Churchill, "Experimental Studies of the Effects of Succession and Effectiveness: A Research Proposal" unpublished research proposal, Department of Sociology, University of California, Los Angeles, November 1962; and E. Euke, "On Economic Management of Large Organizations: A Laboratory Study," Journal of Business of the University of Chicago, V-31 (1958), pp. 280-292.

4. Harold Guetzkow, "Joining Field and Laboratory Work in Disaster Research," in G. Baker and D. Chapman (eds.), Man and Society in Disaster (New York: Basic Books, 1962, pp. 337-354.

5. Ibid, p. 353.

6. J. R. P. French, "Organized and Unorganized Groups Under Fear and Frustration," Authority and Frustration, V-20 (1944), pp. 229-308; Bradford Hudson, et. al., An Experimental Study of Mass Fear (Houston: Rice Institute, 1954); S. Putney and M. Cadwallader, "An Experiment in Crisis Interaction," Research Studies of the State College of Washington, V-22 (1954), 94-102; and A. F. Zander, Group Conditions and Reactions to Threat (Research Center for Group Dynamics, 1955).

7. H. Basowitz, H. Penshy, S. J. Korchin and R. R. Grinker, Anxiety and Stress, (New York: McGraw Hill, 1955) p. 7.

8. An exception is Alvin Bertrand, "The Stress-Strain Element of Social Systems: A Micro Theory of Conflict and Change," Social Forces, 42 (1963), 1-10.

9. Many of the following ideas and concepts about organizations are presented in more detail in J. Eugene Haas, Role Conception and Group Consensus (Columbus, Ohio: The Ohio State University Bureau of Business Research, 1964) pp. 25-31. See also Elaine S. Hobart, "The Comparative Utility of the Rational and Natural System Models in Organizational Analysis," unpublished Master's Thesis, Department of Sociology, The Ohio State University, June 1964, pp. 5-11.

10. Initially the term "performance structure" was used and to some extent it continued to be used in some of the later research. However, the awkwardness of talking about a structure resulting from other structure led slowly to a substitution of the term "interaction patterns." This had the additional advantage of better suggesting the fluid nature of the phenomena being analyzed and avoided the implicit reification in the word "structure."

11. Because of space limitations, examples of rather than all the hypotheses derived are presented.

Chapter II

THE AD HOC SMALL GROUP STUDY

The first laboratory study conducted was a pilot study. It had two basic

objectives. One was to give the DRC staff experience in using the facilities.

This was readily accomplished and will not be further discussed in this report.[1]

The second objective was to gather preliminary data on behavioral changes

in small groups under high demand conditions. The research design for this

purpose is first described below. This is followed by a presentation of some of

the major findings and the chapter ends with a general summary. Since none of

this study has ever been presented in either published or unpublished form before,

the discussion is more detailed than otherwise would be the case.

The Research Design

The design of this exploratory study was based upon the research model dis-

cussed in the previous chapter. An operational problem was to translate the

dimensions set forth in the model so that they were applicable to small groups.

For this purpose, a rather simple design was conceived.

It involved the formation of subgroups from a university class, with the

membership of each group remaining the same throughout the academic quarter.

Each subgroup (including from four to eight members) met once a week in the

laboratory room to compose a critique of an assigned article pertinent to the

subject matter of the course. All subjects were initially informed that one-third

of each student's grade for the course would be determined by the quality of each

group's collective product, but the instructor gave no feedback as to the quality

during the first six weeks of meetings. In the seventh week, the class was confronted by a seemingly highly irate professor. He severely tongue-lashed the quality of the previous six weeks of critiques, but then gave each group the opportunity to atone for its shortcomings. This involved reading a very extensive work and writing a three or four page critique in contrast to the suggested one page critique in earlier sessions. The students were told this final critique would weigh much more heavily than all the others in the determination of each group grade for the course. This critique was written during the seventh meeting of each group.

One additional meeting of each group was held after the high demand session, at which members of the DRC laboratory staff and the course instructor were present. The nature and rationale for the study was outlined and the students were generally debriefed. Students were assured that while their academic work in the laboratory sessions would be used for grade purposes, it would not be weighed as heavily as they had been previously led to believe. Information also was obtained regarding the perception of group members about the "reality" of the situation, how they saw group interaction had proceeded, and to what extent there had been extra-laboratory interaction by the members of each group. The same study was rerun during two succeeding academic quarters allowing the gathering of data from 18 separate groups.

A basic assumption of the design was that it is possible to conceive of all social groupings from a dyad to total societies, as being arranged on a continuum of structural complexity. The latter term refers to the extent of vertical and horizontal differentiation among the positions within the grouping. Dyads, small

groups, complex organizations, communities and societies would fall in that order on an ascending scale of complexity. On this basis, all social groupings would have some general characteristics in common, and thus findings at one point, theoretically might be extrapolated to other groupings at different points on the scale.

Certain crucial properties were incorporated into the research design in an attempt to raise the possibility of extrapolating the findings. These properties, as will be seen, are also important in themselves. They can be set forth in terms of three questions.

1. Did we have real groups? According to Golembiewski, "Designation I" of the term small group has reference to the following: a small number of persons in relative interdependent status and role relations who "have an indigenous set of values or norms which regulate the behavior of members at least in matters of concern to the group."[2] Apart from bringing already existing groups into a laboratory, Designation I characteristics most likely will be found in laboratory settings when ad hoc collectivities "are allowed to develop . . . in the course of extended interaction."[3] The weekly meetings over a period of six weeks we assumed and found to be sufficient for the development of such characteristics. Documentation of this point we shall discuss later in another context.

2. Did we have real tasks? In addition to having real small groups, an attempt was made to face the groups with a "real" task, relevant to that particular part of the world significant to all the members. By making the task part of an actual, on-going university course and tying the group goal (grade on the reports)

to individual goals (grade in the course), a high degree of relevance was obtained. Even the most blasé student who saw the whole thing as an experiment could not ignore the threat to his own goals. This was particularly important as the setting up of the high demand situation stretched the bounds of credibility for the more perceptive subjects, as expressed by one of them (speaking to the course instructor):

> On Wednesday I turned to the fellow beside me and
> said, 'What's the matter with this guy?' I said that
> about you. Because I didn't, I thought that you were
> wrong. I thought you were incorrect. Your logic,
> your conclusion that we were doing lousy, I thought you
> were wrong about that, and it didn't make sense. And
> then I began to question this activity and then I decided
> right then and there after that class that this probably was
> an experiment.

However, the task could not be discounted. Another student in the same class expressed the typical reaction:

> But, what I'm saying is that the, the dumb part of it was,
> you know, even with the group influence for one thing, even
> knowing, you know. Here again I knew it was an experiment
> but how much can you assume is an experiment? Like there
> still is a basic grade factor in there. Well, this was the big
> thing in my mind, you know. Is it going to be completely
> experiment or is it really going to be -- since we did lose
> a lot of the value otherwise, you know. It boiled down to your
> grade value being the paramount factor in your mind.

3. Did we have a high demand situation? Creation of a high demand situation is closely related to relevance. If a task is not relevant to the group members, a demand for different behavior is not likely to elicit an adaptive response. In this case furthermore, the instructor's demand for a longer report of better quality on a much larger assignment was considered legitimate, although largely illogical and unjustified. Legitimacy, of course, was based upon the

instructor's authority to conduct his course as he wanted and the power inherent in the grading process. Having the instructor give no feedback as to quality during the earlier sessions was intended to avoid problems in connection with the blanket negative evaluation of all the previous reports as "less than mediocre," and to justify giving the groups an opportunity to redeem themselves by an all out performance on a larger assignment.

This did have the effect of creating varying levels of anxiety among the students as they tried to evaluate their reports during the earlier sessions. The presentation of the final assignment also generated considerable anxiety as might be expected of a maximum high demand situation. This procedure did raise serious ethical problems, for it is difficult to defend creating very high levels of anxiety for laboratory purposes without the subjects' permission but such permission, of course, would seriously hamper the creation of high levels of anxiety. [4] However, it can be said and will also be further documented later in another context, that we did create a high demand situation.

The data gathered consisted primarily of transcripts of the recorded verbal interaction of the series of initially leaderless small groups meeting in the laboratory. In addition there were copies of the weekly group "product," a set of completed questionnaires which were designed to tap perceptions of the interaction process in each group and transcripts of the final "debriefing" sessions with the laboratory staff. Some observational notes were made, but they were not obtained in a systematic fashion and at best were anecdotal items.

The Findings

The exploratory nature of this study precluded the formation of hypotheses other than a very general one: if a group is confronted with a sudden, unprecedented high demand situation, there will be adaptive changes in its patterned interactions. No attempt was made to predict direction or types of changes.

There are two major assumptions regarding patterned interactions that were basic to our analysis. One is based on extensive research on small groups and is the view that over time a group will develop particular norms governing certain aspects of the behavior of group members. The work of Bales, Strodtbeck, Sherif, Hare and others, all indicate there is a tendency for group structure (usually the status relationships) to develop in phases. We assumed that our groups went through certain phases or stages with an eventual relative stabilization of the patterned interactions.[5]

How soon stability is reached and how stable it is will depend upon the degree of group consensus on the status relationships. Moreover, as Hare points out, "Some groups never solve the problem to everyone's satisfaction, i. e., never develop perfect consensus with respect to the ranking system. Groups with low consensus go through repeated crises."[6] It might be suggested here that what some researchers see as a continuing unstable situation might be viewed simply as the group's stable method of operation. Perhaps an equalitarian, "everyone-has-a-right-to-contribute" structure is normative for that group. At any rate, the basic assumption we used was the fairly well empirically grounded one that phase development over time results in relatively stable patterned interactions by about the fourth meeting of an initially leaderless discussion group.

Therefore, for our "normal" session, we took the latest of the group meetings at which all of the members were present and the task was comparable to the others. Whether this was the fourth, fifth, or sixth session, decisions regarding identification of established patterns were checked against the other two of the last three sessions to increase validity.

The second major assumption regarding patterned interactions is that the element of task is central to the characteristics of that pattern. This assumption is based on a less systematic set of findings, but findings which seem strongly supportive, nevertheless.[7] The failure of early research on personal leadership traits led to attempts to identify differences among situations which result in differences in traits necessary for leadership in those situations. Task represented a convenient dimension of the total situation upon which to focus. Although this approach did little to advance the efforts to identify leadership traits, it did lead to studies of task-leadership relations and from the results of these, it seems that "there may be 'families' of tasks (and situations) with independent leadership requirements."[8] If this is so, then it seems plausible to assume that the structural characteristics of a task-oriented group will be strongly tied to the requirements of task performance. It would be expected, for example, that the status structure in our groups would tend to elevate to prominence members having resources pertinent to task accomplishment, e. g., knowledge of the subject matter, verbal ability, maturity, etc. Elements of the patterned interactions specific to task accomplishment, i. e., status relationships, communication chains, lines of authority, etc., were grouped in our analysis under the rubric, style of task performance. Because it is necessary for our analysis to

order or categorize the groups according to their differing patterned interactions and since style of task performance by definition is a crucial component of those interactions, we focused on such styles to attempt to provide a basis for categorization.

Categorization or ordering of groups

Style of task performance. Style refers to a particular, distinctive, or characteristic manner of action. In this analysis we attached labels to styles of task performance in an attempt to capture the essence of the "manner of action" of a group as it worked to produce the final product, i. e., a written critique of a particular assigned article. For our purposes, then, we constructed two ideal types which represented the extremes in style. On the one hand was a style which we labeled autocratic, conveying the notion of unlimited one-person influence. The other extreme we labeled egalitarian, conveying the notion that all group members shared equally in influence upon the product. An autocratic group style had all of the following characteristics:

1. One member contribution of ideas.
2. The same member selecting ideas to be included in the report.
3. The same member composing the report.
4. No group normative requirement of group consensus on report content or composition.

A completely egalitarian group style was characterized by:

1. Each member equally contributing ideas.
2. Each member having some of his ideas incorporated into the report.
3. Group composition of the wording of the report.
4. A strong group normative requirement that consensus on both content and composition must be reached among all members.

In ranking the group style of task performance, a number of knotty problems arose. We had real groups, not ideal type ones. Consequently, certain arbitrary decisions as to categorization had to be made.

Keeping this in mind, we could list the 18 groups in rank order on the basis of their style of task performance, moving from the most autocratic to the most egalitarian. It is beyond the scope of this report to discuss the configuration of characteristics which determined the placement of each group. Although there could be considerable debate as to the specific rank of one group above one or two others, the total ranking should represent an order against which other variables can be compared.

Effectiveness in task performance. One such variable particularly pertinent to our overall research effort is that of effectiveness in task performance. We assume that the varying effectiveness of the patterned interactions in accomplishing tasks in normal times certainly is crucial to effectiveness of performance under high demand. In addition, considerable research on effectiveness in task performance of cooperative vs. competitive groups has resulted in varying (and often opposite) findings. The autocratic-egalitarian dimension thus seemed to be an important intervening variable in the relation between cooperation and effectiveness.

For purposes of this analysis, effectiveness was defined very narrowly: it referred to the group's ability to produce a finished product. It did not include ability to discuss fruitfully, any value judgment as to quality of final product nor any evaluation of length of that product. Operationally, effectiveness was measured by the relative amount of time spent in activity specific to the task;

activity which resulted in a sheet of paper with a report and the names of the group members affixed. To the group this represented a task accomplished and for the purposes of this analysis the group's definition was used.

Table 1 shows the 18 groups ranked with relation to their relative autocratic-egalitarian characteristics.

TABLE 1

RANKING OF GROUPS ACCORDING TO AUTOCRATIC
STYLE AND EFFECTIVENESS

Group	Auto-Egal Style	Effectiveness
Spring 1	1	7
Summer 7	2	13
Summer 6	3	5
Autumn 5	4	4
Spring 2	5	1
Summer 2	6	2
Autumn 2	7	3
Summer 3	8	12
Spring 4	9	11
Autumn 7	10	16
Autumn 4	11	10
Autumn 1	12	9
Autumn 6	13	18
Autumn 3	14	17
Summer 5	15	6
Summer 4	16	8
Spring 3	17	15
Summer 1	18	14

The most autocratic is ranked as No. 1; the most egalitarian as No. 18. Also shown is the group ranking as to effectiveness; the relative proportion of time spent in activity specific to accomplishment of the task. The most effective group (spent least time on task) is ranked No. 1; the least effective No. 18.

The Spearman rank correlation coefficient for the two group characteristics (style and effectiveness) was .51, which is significant at the .025 level. Thus, effectiveness showed a low, but significant correlation with style of task performance as we defined the terms.

The high demand situation

Changes in the patterned interactions.   With the introduction of the high demand situation, numerous changes in the interaction patterns of most of the groups did occur.   In terms of style of task performance, the general trend was in the direction of increased autocratic control, although there are exceptions. Table 2 indicates the direction of changes according to autocratic-egalitarian (A-E) ranking.

TABLE 2

CHANGES IN STYLE OF TASK PERFORMANCE
(ACCORDING TO AUTO-EGAL RANK)

Group	A-E Rank	Effectiveness Rank	A-E Change	Effectiveness Change
Spring 1	1	7	--	--
Summer 7	2	13	0	0
Summer 6	3	5	? (divided)	0
Autumn 5	4	4	0	0
Spring 2	5	1	-	--
Summer 2	6	2	+	0
Autumn 2	7	3	++	-
Summer 3	8	12	++	++
Spring 4	9	11	+	0
Autumn 5	10	16	-	--
Autumn 4	11	10	++	+
Autumn 1	12	9	-	--
Autumn 6	13	18	+	+
Autumn 3	14	17	++	0
Summer 5	15	6	? (divided)	--
Summer 4	16	8	? (divided)	+
Spring 3	17	15	+	0
Summer 1	18	14	0 (met outside)	0

The patterns of Auto-Egal change become clearer when the groups are listed according to effectiveness ranking, as in Table 3. As in all situations, groups in a high demand situation draw on prior experience in adapting ongoing patterned interactions to meet the changed demands. Concerning disasters, Dynes has noted:

> . . . Such events present both the individual and the community with new and unfamiliar tasks to accomplish under difficult and threatening conditions. What people have learned about social life previously is not suddenly discarded as a result of such events. [9]

With the demand for greater quantity, effectiveness became of prime importance. Evaluation of previous effectiveness and identification of those factors in performance style which inhibited effectiveness led to the reduction in priority value of such factors. Dynes also points out that behavior in disaster situations is related to a system of value priorities specific to the demands of the changed situation:

> . . . certain norms become more crucial in that behavior which is directly related to high priority values is positively sanctioned, while behavior related to lower priority values is considered inappropriate. [10]

TABLE 3

CHANGES IN STYLE OF TASK PERFORMANCE
(ACCORDING TO EFFECTIVENESS RANK)

Group	Effectiveness Rank	A-E Rank	A-E Change	Effectiveness Change
Spring 2	1	5	-	--
Summer 2	2	6	+	0
Autumn 2	3	7	++	-
Autumn 5	4	4	0	0
Summer 6	5	3	? (divided)	0
Summer 5	6	15	? (divided)	--

TABLE 3 - Continued

Group	Effectiveness Rank	A-E Rank	A-E Change	Effectiveness Change
Spring 1	7	1	--	-
Summer 4	8	16	? (divided)	+
Autumn 1	9	12	-	--
Autumn 4	10	11	++	+
Spring 4	11	9	+	0
Summer 3	12	8	++	++
Summer 7	13	2	0	0
Summer 1	14	18	0 (met outside)	0
Spring 3	15	17	+	0
Autumn 7	16	10	-	--
Autumn 3	17	14	++	0
Autumn 6	18	13	+	+

That the demand for a more lengthy product assumed top priority in most groups appears evident from Table 3. Four groups abandoned all pretense with relation to the product being the result of group discussion, and entered the final session with products written outside the session in accordance with an agreed upon plan (Summer nos. 4, 5, 6, 7). Of the others, the general trend toward auto-cratic control holds within it the lower priority attached to values with regard to discussion, conflict and consensus. In the debriefing sessions subjects repeatedly expressed their frustration at the muzzling of discussion and disagreement in the interests of turning out the longer product. Where dyadic conflict existed, either one-half of the dyad became almost nonparticipant, or as in one case: "We just sat them in a corner to argue while we went on with getting the ideas written down." Where the consensus norm was perceived as endangering group pro-duction, communication of the content of the product was frequently curtailed by

those in control, and in some cases the group itself avoided exposure to such communication in order to avoid disagreement.

In addition, the conflicting requirements of high quality vs. high quantity tended to be resolved in the direction of quantity. This was rarely consciously expressed, but in the effort to produce a longer report, questions of quality appeared to be devalued. If there were doubts about previous quality, concern for high quality would demand a critical appraisal of the developing product: In group activity this would require at the least a reading of the product and, more likely, lengthy discussion of both the ideas and the manner of expression of ideas in the report. Such a procedure would be a serious hindrance in the production of a longer report. Interestingly, when questioned, those groups whose reports fell considerably short of the requested "four or five" pages indicated they felt that if the reports were "good" the professor would not be concerned about length. Such conclusions, however, were ex post facto and not observable during the high demand sessions.

Changes in effectiveness.   Effectiveness of style of task performance was defined relatively in terms of the proportion of time spent on activity specific to task accomplishment. Thus, decreased effectiveness indicates a higher proportion of group time spent on the task and increased effectiveness, a lower proportion of group time spent on the task. The definition becomes awkward in dealing with the high demand data, since it obscures effectiveness in the sense of being able (or not able) to produce higher quality or quantity in the reports. At the same time, the conflict noted above between the type of activity required to fulfill the request for quality and the type of activity required to fulfill

the request for quantity increases the problem of measurement and is an additional argument for not including these factors in the definition of effectiveness.

Analysis of the data in Table 3 indicates that, on the whole, changes in style of task performance in the direction of increased autocracy correspond to the group's ability to maintain or increase effectiveness of task performance. At the same time changes toward a more egalitarian style correspond to decreased effectiveness. This finding relates logically with that from Table 1 regarding the correlation between autocratic style and effectiveness. To elaborate: If we assume that the more autocratic the style of task performance, the more effective it will be in terms of task accomplishment, then we may also assume that the group will perceive that those norms which tend toward egalitarianism interfere with effectiveness. Based upon such an evaluation, adaptation to a high demand situation will result in the assigning of lower priorities to egalitarian norms, bringing about a more autocratic structure, thus holding stable or increasing the effectiveness of task performance.

General Summary[11]

Small groups in general

Development of patterned interaction. As was expected from numerous other studies, each of the 18 groups developed over time patterned interactions specific to that group. General societal norms and subgroup norms are brought into the group situation by the members of the group. These are the primary bases for interaction during the early, tentative contacts. With increased contact, new patterns of interaction begin to evolve which become normative for that group, and which account for the stability and reliability in the structures of anticipation

that in this study, recording of verbal behavior in the developing stages of the

spring and summer groups was in a form which rendered it unusable for a detailed

study of phase development. However, several comments may be made:

1. Phase development over time tended to follow the general
   pattern previously outlined, with each group varying as expected
   in the length of time or number of meetings before a stable
   pattern of behavior was established. Also there were groups
   which exemplified Hare's point regarding groups which do not
   complete all phases of development and which never develop
   sufficient consensus for a stable structure.

2. It appears necessary to be more specific as to the nature of
   the "stable patterns of interaction" which are the final outcome
   of phase development. To regard all phase development in
   terms of status struggle would seem to reflect an unfortunate
   bias on the part of some students of small groups. An illus-
   tration from the DRC study of cross-cultural interaction re-
   ported in a later chapter, may aid understanding of the point.
   A four man discussion group of one American and three
   persons from cultures other than the U.S. evidenced a
   dyadic interaction relationship between the American and
   an Indian which appeared to involve status conflict of a
   nature bordering on personal aggression. That the American's
   perception of the relationship agreed with this view was
   revealed in a post session interview. However, the interview
   with the Indian participant revealed that his perception of his
   interaction with the American was that of a friendly, lively
   discussion marked by considerable agreement between the
   two.

   The cultural bias evident in interpretation of the above rela-
   tionship is also evident in those studies which view the phases
   of development of small groups as stages in the establish-
   ment of a hierarchical status structure. There are strong
   values and norms in the general society and certain subgroups
   that play against those involved in the seeking of dominance
   and power. In addition, the assumption that absence of a
   hierarchical status structure constitutes absence of a stable
   interaction pattern (and therefore a continuing struggle for
   status) compounds the myopia originally induced by the bias.
   It would seem more fruitful to consider status struggle as one
   of the possible explanatory factors in the developing relation-
   ship with alternate and concomitant factors studied for a more
   complete analysis of phase development. If so, a stable inter-
   action pattern would be defined in terms of the predictability

of the pattern rather than the emergence of a hierarchical status structure.

3. In light of the above arguments, perhaps studies of phase development should focus on the group's "method of operation": How it goes about doing what it is supposed to do, and more importantly, a more generalized conception of phases with regard to the development of that method of operation. Although such an approach may prove of value primarily for task-oriented groups, it might also aid development of a basis for categorization of groups in general. In addition, focus on the developed method of operation could form the basis for orderly studies of group change: The probability, extent, direction and relative permanence of mutations in the patterned interactions.

Group response to high demand

Adaptations in patterned interactions. Just as each group develops a unique pattern of interaction, the specific adaptive response to a high demand situation was unique to each group. Even the three groups that divided the assignment evidenced quite different approaches to the compilation of the segments of the report. The essence of the general trends, however, can be related in large part to the conceptualization of style of task performance and effectiveness presented earlier.

1. Trend toward more autocratic style: Under high demand, the groups showed a strong tendency to accept greater one-person control of the group product.

2. The less effective the style of task performance under normal conditions, the more likely a group is to become more autocratic under high demand.

3. The bases for these trends appeared to include:
   (a) Group assessment of effectiveness in normal conditions.
   (b) The assignment of priorities to the norms and values which determine the group's normal performance, with high priority given to those which facilitate effectiveness, and conversely lower priority to those which inhibit effectiveness.

(c) The priority system itself is normative, therefore group sanctions will become operative when there is violation of the priority system.

The decisive individual. The trend toward more autocratic control appeared to focus on the decisive individual; where and whether individual decisiveness will occur will be relatively unique to the group, task and total situation. Our analysis suggests that:

1. Where there is more than one decisive person, previous status will usually determine which one will take over.

2. Where previous autocratic status is based primarily on characteristics other than task expertise, autocratic control is more likely to be lost in high demand situations.

3. When the anticipated decisive person fails to assume this position, the group tends to "disintegrate" as a functioning group.

Adaptations and effectiveness. Those groups which become more autocratic under high demand have the highest probability of maintaining or increasing effectiveness of task performance in that situation.

Given the fact that this piece of research was primarily conceived of as a pilot study, considerable more substantive results and implications were obtained than were anticipated. Nevertheless, however value this research turned out to be -- and it must be remembered the systematic analysis of the data reported above took place after several other studies had been conducted -- the study focused on ad hoc small groups. It did not center on functioning organizations, our major interest, although the findings clearly have implications for the functioning of larger entities. The first DRC realistic simulation study of an organizational entity was the next undertaking and is reported on in the next chapter.

FOOTNOTES

1. However, it is our hope one day to codify certain aspects of the learning process the DRC staff underwent, since such a compilation would provide many insights and useful suggestions for anyone initiating laboratory research of the kind we undertook.

2. Robert Golembiewski, The Small Group (Chicago: University of Chicago, 1962), p. 35.

3. Ibid, p. 47.

4. For a discussion of some of the ethical questions involved that concerned the DRC staff, see Thomas E. Drabek and J. Eugene Haas, "Realism in Laboratory Simulation: Myth or Method?", Social Forces, Vol. 45, No. 3, March 1967.

5. For a discussion of small group research dealing with this point, see A. Paul Hare, Handbook of Small Group Research (New York: The Free Press, 1962), p. 106.

6. Ibid.

7. For an extensive discussion of this point, see Golembiewski, op. cit., pp. 181-193 and pp. 200-204.

8. Ibid., p. 202.

9. Russell R. Dynes, Organized Behavior in Disaster: Analysis and Conceptualization (Columbus, Ohio: The Ohio State University, College of Administrative Science) Chapter 3, (in press).

10. Ibid.

11. The summary here goes somewhat beyond the more selected findings reported in the previous section. Instead this is a summary of all the findings of the ad hoc small group study.

Chapter III

THE REALISTIC SIMULATION GROUP STUDY

The major laboratory research conducted during the whole course of the project was a simulation of an already functioning group. Actually, three different groups were involved since the social units studied were the different work shifts in the radio dispatching room of a metropolitan police department. Consequently, this was an examination of actual organizational components differing both in complexity and established structure from the small ad hoc groups initially studied, and discussed in the previous chapter. These parts of an existing organization were also subjected to a high demand situation. However, this research dealt not only with the patterned interactions looked at in the small group study but utilized most of the dimensions of the theoretical model of organizational stress described earlier.

The initial part of this chapter describes the methodology used in simulating an actual, functioning group. The chapter concludes with a selective presentation of findings from this particular study. A more detailed analysis of the data is still in process and will eventually be reported elsewhere.[1]

The Methodology

After the pilot study described earlier and in combination with an intensive search of the relevant literature, a laboratory method was devised which appeared to possess considerable potential for organizational research. This was designated by the DRC laboratory staff as "realistic simulation." While not a totally new method, it did differ substantially from many simulation studies by other researchers.[2]

In essence, the method requires that: (1) a functioning group, (2) whose members are not aware that they are in a controlled situation, be (3) assigned tasks identical to those normally encountered, (4) in a familiar physical setting, as well as (5) a social context similar to that with which the organization or one of its major components normally interacts.

Selection of an organizational unit for simulation was not an easy decision to make. After reviewing and rejecting a number of possibilities the DRC staff chose the communication system of a metropolitan police department. In actual fact, this meant the three work shifts of four persons each that operated the radio dispatching room of the department. The following were among the more positive reasons for this choice:

1. The dispatching unit occupies a crucial position in any police organization, and in the event of a community stress situation, the functions performed by this group are highly significant, not only for the organization, but for the entire community as an information processing center.

2. The tasks of the members of the work group are almost entirely verbal in nature; that which is not verbal assumes written form.

3. Analysis of group activity is facilitated in that a total recording of all verbal and other overt behavior could be made in the laboratory without interfering in any way with the ongoing actions of the group.

4. In terms of the physical setting, all incoming information from the outside world reaches the work group either through radio, telephone or intercom -- mechanical means readily reproduced in the laboratory.

5. Because of this kind of isolation of the social unit, variations in demands on the group could be relatively easily manipulated.

6. The communication system involved is relatively closed allowing for almost complete simulation in a laboratory setting.

7. Last, but not least, a DRC field team doing research on the Indianapolis Coliseum explosion had studied that city's police department and had

obtained a recording of all its radio communications during the disaster; the possibility of a parallel laboratory study to the field study clearly suggested itself.

All three work shifts from the police dispatching room participated in three sessions in the laboratory, during which communication activity was identical to what the groups normally experienced in their actual radio room in the downtown police headquarters. These sessions were followed by a "stress" session in which demands on the communication system were markedly changed through a simulated crash of a large jet aircraft into an apartment house complex in the city. All twelve sessions were about two hours in length. To prevent discussions of the laboratory activity between shifts, all sessions were run on the same day, i. e., shifts received identical "exposures" on the same days.

However, before such sessions could actually be run a tremendous amount of preparatory work had to be done. In essence, almost everything had to be simulated if the five characteristics of a realistic simulation noted earlier, were to be present. Some of the preparations undertaken will now be briefly discussed.
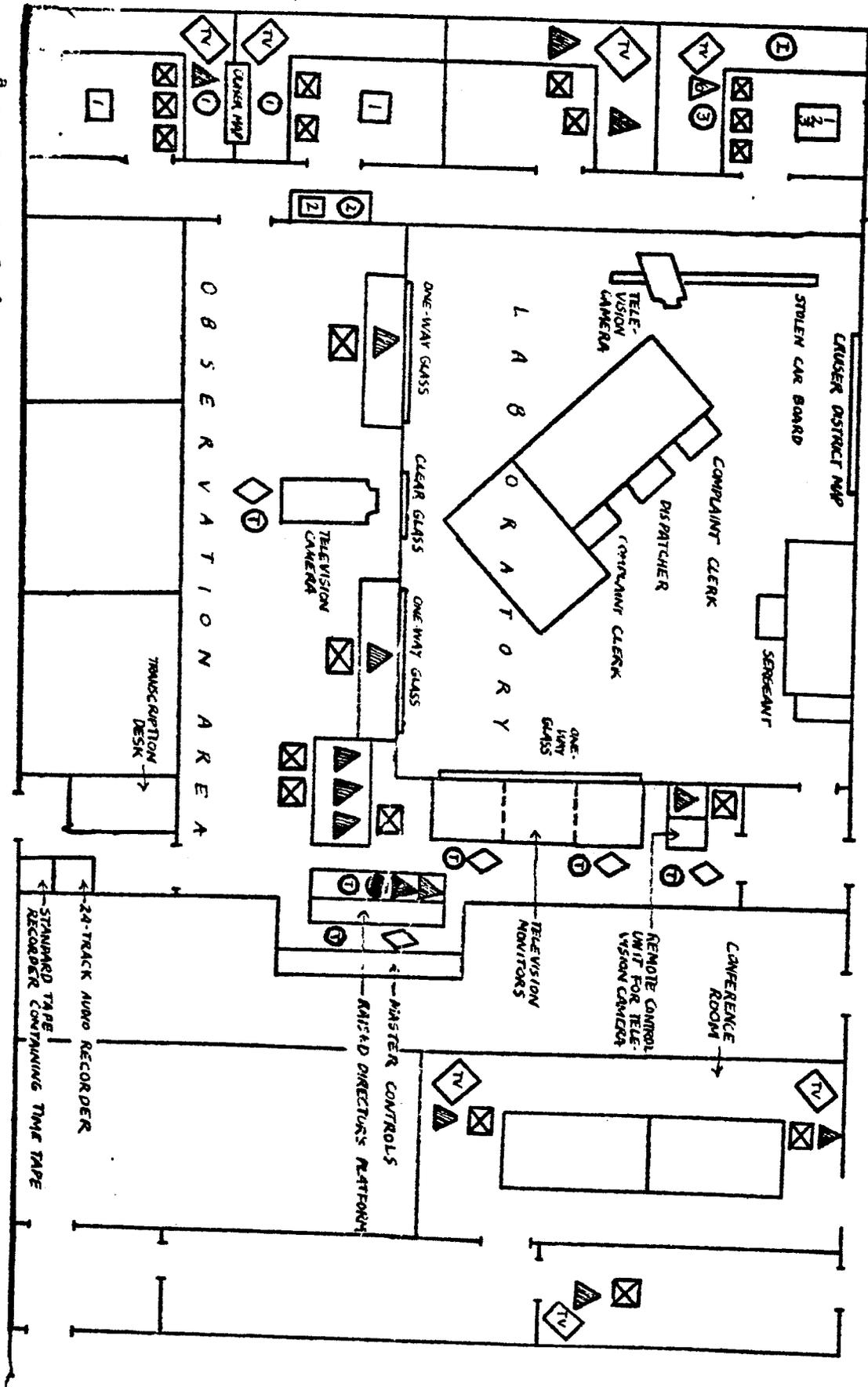
After permission and cooperation had been obtained from the local police, systematic field observations were carried on in the actual radio room of the department, and recordings were made of communications received and transmitted. These observations allowed the DRC laboratory staff to become familiar with the physical layout of the radio room, procedures followed, jargon used, records kept, and so on. Particular attention was paid to the basic communication flow between the radio room work staff (consisting of two complaint clerks, one dispatcher, and one sergeant) and the police radio cruisers, as well as the telephone calls from private citizens and others.[3]

Using these observations as a guide, as much of the actual physical layout

as possible was reproduced in the laboratory. What was set up is indicated in

Figures I and IA. The reproduction of the radio room per se was relatively

simple, but there were some major problems in simulating the communication

flow from the outside.

For this purpose, two things had to be done. One, a number of DRC staff

members were trained to play the role of various units and organizations; in all

19 simulators were trained: five to simulate police cruiser operators, eleven

to simulate telephone callers; and three to act as if they were personnel in organi-

zations other than the police department. The simulators were not only re-

hearsed but were provided with "call cards" giving information on the nature of

the calls they were to make as well as background information to allow them to

carry on "ad lib" conversations.

The second major thing done was the preparation of a master script or

scenario detailing all the calls and contacts most of the simulators were to make

with each police work group that was going to appear at a session in the laboratory.

The rates and natures of the simulated call for normal sessions were made to

correspond as closely as possible to the pattern of actual calls a radio room

work shift would receive in a given period of day on a certain day of the week

(the time selected was a Friday night from 8 to 10 p.m.). Thus, the 594 normal

session calls prepared for the simulation were adjusted to actual patterns in the

city for type of incident, day of the week, time of the day, sex of caller, and

geographical location.

TOTAL FACILITY: DESIGN AND PERSONNEL PLACEMENT[a]

Labels visible in the diagram:

- Cruiser District Map
- Stolen Car Board
- Television Camera
- Complaint Clerk
- Dispatcher
- Complaint Clerk
- Sergeant
- One-Way Glass
- Clear Glass
- One-Way Glass
- One-Way Glass
- LABORATORY
- OBSERVATION AREA
- Television Camera
- Transcription Desk
- Remote Control Unit for Television Camera
- Television Monitors
- Master Controls
- Raised Directors Platform
- Conference Room
- 24-Track Audio Recorder
- Standard Tape Recorder Containing Time Tape

a Not Drawn to Scale

LEGEND:

△ - Phone, number given for "outside" line

▲ - Phone, standard (line to WOSU-TV video tape room)

▲ - Phone, closed circuit

① - Microphone, Radio Channel 1

② - Microphone, Radio Channel 2

⑤ - Microphone, Radio Channel 3

⊕ - Microphone, Inter-organizational monitor

1 - Speaker, Radio Channel 1

2 - Speaker, Radio Channel 2

3 - Speaker, Radio Channel 3

◇ - WOSU Engineer

⊠ - Simulator

① - Television Communications System, microphone and headset

● - Microphone, master (broadcast over all speakers)

TV - Television Receivers

For the stress session 990 calls were also prepared. Sequencing of calls for this session was based on a master script which listed certain events as they were to occur, e. g., 8:15 p. m. -- a jet plane with 151 passengers and crew crashed into a large apartment house complex; 8:26 -- (cruiser at scene, excited) "This damn thing just exploded! Some of our officers and some firemen have been hurt."; 8:36 -- (Wagon at Riverside Hospital) "Riverside is full, send victims elsewhere." In this way calls were sequenced to coincide with the appropriate events. These events were to be indirectly communicated to officers in the laboratory by cruiser simulators and callers, e. g., at 8:27 several callers opened with, "I just heard on T. V. about the plane crash, do you need blood donors?"

After all these preparations, the sessions were run. There is a crucial question: Did the DRC laboratory staff have a realistic simulation? The answer is, yes.

First, and perhaps most important, existing groups with a history were used. Group behavior was guided by already established set of norms and definite interpersonal expectations. In debriefing sessions and interviews conducted after the simulation, shift members noted that they thought of themselves as a team, e. g., each knew what the others would do in a variety of situations. As one of them verbalized it:

> . . . it seems like we get more done in an emergency or a
> catastrophe like this because of it -- I'll know what T____'s
> going to do, it seems like, and he'll know what I'm going
> to do, and P____ knows what we're both doing.

Not only had all of the officers worked together for a prolonged period of time; they also expected the groups to remain intact for a relatively indefinite time. Clearly these were groups with both a collective past and future.

Second, the police officers involved did know that it was not an actual radio room operation, i. e. , that they were not receiving calls from actual citizens making real complaints, etc. However, none of the shifts knew they were participating in a simulation. They had followed the orders of supervisors who had told them little more than to report to the DRC laboratory and to "behave as if this were the real thing and you were downtown."

Debriefing sessions revealed that the group members had reached three conclusions about what they were doing in the laboratory. Many had decided that tests were being run for equipment to be used in a new radio room. Since plans for a new police facility in the city were in the "discussion stage" at the time of the study, this was a very logical possibility. Some officers decided that a new type of civil service examination was being conducted or tested. A few thought that further promotions might be based on the adequacy of their behavior in the laboratory. Other officers suspected that a new training device was being tested. The significant point is that all of the participants gave the simulation some type of social definition other than what it was. Thus, new sets of norms (i. e. , "experiment norms") were not imposed, since the subjects were not aware of the kind of controlled setting they were in.

Realistic tasks were given. The different shifts carried them out, for example, using data forms identical to those used daily. The pattern of simulated calls was quite similar to what the system normally experienced during the time simulated.

In operation, the behavior of the laboratory group was as identical to its actual counterpart as could be imagined. This conclusion was based on a variety of data: (1) direct observations of the laboratory sessions, (2) detailed review of video recordings, (3) analysis of transcripts of the 24 track audio recordings, (4) extensive group debriefing sessions and (5) direct observations of the actual police radio room in operation. The conclusion reached, similar to that of the police participants was that the behavior observed in the laboratory during normal and stress sessions was what would have been observed in the actual police radio room if the same events had been reported there.

In preparing the physical setting, only minor modifications had to be made in equipment and layout. In debriefing sessions, the group members said they could not see any crucial ways in which the simulated equipment altered their normal work patterns. The DRC laboratory staff felt that there was a very subtle relationship between the work patterns and the physical equipment, and detected slight alterations in behavior that might have been a consequence of that. In the main, however, the different shifts did appear to work in what they regarded as a familiar physical setting.

A meaningful social situation was also created. Much effort had been put into developing realistic telephone calls and radio exchanges. The police officers involved seemed to believe this was successful. As one of them said, "I think it was realistic right down the line. I mean the people at the other ends of the lines were real convincing."

The item mentioned most frequently was the simulator's ability to interact "meaningfully."

> I think what made this actually so realistic to me was, you know -- they call up and say this was Finnigan's Bar. We got, we have a fight going on here. So you know, you say, 'Well where's Finnigan's at?'-- and they say, well it's on Fourth Street, north of First or something like this. I mean they know where it is at and everything, see. Ya, I asked them where the street's at. This is something I'll do once in a while if I'm not too familiar with the street, maybe it's a new section of town or something. I'll ask them where it's at rather than get up, run over and check maps and everything. We can have a car on the way by the time you can look it up. So I'll ask some of the people where the street's at and the people on the phone even knew where the streets were.

A related factor was the larger social context in which these work groups usually operate. Every shift day, for several years in most cases, the group members continually construct mental images of the outside world using only secondary information, i. e., telephone and radio communication. They were thus able to quickly "become at home" in the laboratory. As one officer indicated: "As a rule you just get so wrapped up in it and you forget you're working. I mean that it's not actually happening. You get engrossed."

The Findings

In some respects, all the data obtained in this study were oriented to two basic questions: (1) Was there organizational stress in the groups we put into the laboratory, and (2) Did the patterned interactions of those groups change in the high demand or stress session? As already indicated, the findings presented below were selected from a larger number and do not exhaust all the analyses that have been or will be made of the data gathered.

Was there organizational stress? The theoretical model developed and presented earlier had conceptualized stress as the organizational state or condition

when demands exceed capability. The simulated plane crash was used to generate a change in demands so as to "overload" the work shifts. Demands were changed along three axes: quantity, quality, and priority. A program was constructed so that the rate of incoming calls could be raised from an average of two to three calls per minute to 21 calls per minute. The levels of incoming calls were determined by the processing rate of each shift. On this basis, it was felt that seven calls per minute per person answering would be more than adequate to overload the communications system. Since only 21% of the total 1155 calls prepared for the stress sessions were processed by the "most efficient" of the shifts, the prepared program seemed adquate.

However, to what extent did the demands exceed the capabilities of the group? What was the level of organizational stress? To obtain a measure of this, telephone caller simulators recorded the number of seconds between the time they completed dialing a number and when an officer answered. This was conceptualized as "lag time," i.e., the delay between the phone ringing (potential demand made known) and it being answered (demand met). If no answer was obtained within three minutes, the call was recorded as a demand on the group which was never met. A compilation of these lag times, thus provides a gross indicator of the degree to which the demands exceeded the capability of the group. As might be expected and as indicated in Table I, lag time (or level of stress) increased during the stress session (D).

TABLE 1

LEVEL OF ORGANIZATIONAL STRESS[a]
AS INDICATED BY "LAG TIME," IN MINUTES

Group	Session A	B	C	D
1	254.06	138.89	110.88	260.82
2	256.62	92.79	93.32	352.30
3	281.18	140.54	102.48	303.02

[a]Based on "total lag time" divided by number of minutes in each session.

Following the initial session (A), the shift members indicated that while the simulation was a faithful reproduction of their actual communication system, the call rate seemed somewhat high. As a consequence, incoming calls for sessions B and C were reduced by 20 percent. This unplanned deviation from the original research design, however, also allowed the making of a gross test.

If lag time is a good indicator of the level of organizational stress, then one should find the following variation: session $D >$ session $A >$ sessions B or C. The hypothesis was tested using the data in Table 1, and the Kruskal-Wallis one way analysis of variance by ranks test. A value of $H=6.49$ was obtained which is significant beyond the .01 level. While gross, this quantitative data clearly supports the notion that a markedly different level of organizational stress was present in session D when compared with the prior or normal sessions.

Was there a change in the patterned interactions? Given the nature of the positions in the radio room, interaction between the officers on each of the shifts

was crucial to task accomplishment. The interaction was examined to see if the general pattern might have changed from a normal to a stress session. Using only one set of the available data, and coding for directionality (i. e., initiator or receiver) the results presented in Table 2 and 3 were obtained.

TABLE 2

INITIATOR-RECEIVER PATTERN, SESSION A

Initiator[a]	Receiver W	C	V	I	Total - I	Rank I
W		17	14	9	40	2
C	27		3	12	42	1
V	26	4		3	33	3
I	9	15	3		27	4
Total-R	62	36	20	24	142	
Rank-R	1	2	4	3		

[a]Positions during session "A" were: Dispatcher-W, Complaint Clerk 1-C, Complaint Clerk 2-V, and Sergeant-L.

TABLE 3

INITIATOR-RECEIVER PATTERN, SESSION D

Initiator[a]	Receiver W	C	V	I	Total-I	Rank-I
W		3	18	23	44	4
C	7		27	32	66	3
V	9	18		70	97	2
I	17	27	92		136	1
Total-R	33	48	137	125	343	
Rank-R	4	3	1	2		

[a]Positions during Session "D" were: Dispatcher-V, Complaint Clerk I-C, Complaint Clerk 2-W, and Sergeant-L.

It is clear from this that there was considerable change in the rate of inter-
action, thus in the patterns.[4] For example, during session "A," interaction
between group members averaged 2.4 exchanges per minute, i.e., 142 exchanges
occurred during a 60 minute period. This rate more than doubled during the high
demand session when an average of 5.7 exchanges per minute occurred.

An interesting finding also appeared when the ranks of initiators and receivers
between sessions were compared. A "deviation" score was computed based on
changes in rank (e. g., in session A reported in Table 2, the sergeant ranked
fourth as initiator, but in session D reported in Table 3, he ranked first -- this
gives him a "deviation" score of 3). The overall results are presented in Table 4.

TABLE 4

CHANGE IN INTERACTION PATTERN, BY POSITION

Position	Initiator	Receiver
Complaint Clerk 1	1	0
Complaint Clerk 2	2	1
Dispatcher	0	0
Sergeant	3	1
Group Total	6	2

This data indicates that while the pattern changed, the change was highly
localized. There was primarily a change in initiators rather than receivers. The
sergeant became a major initiator of interaction during the high demand session.

This data confirms that in one sense, at least, the patterned interactions changed.

In the original theoretical model, it had been assumed that the patterned interactions could be analyzed along four dimensions: tasks, decision-making, lines of authority and communications. From the theoretical model a series of hypotheses were developed that indicated what types of changes would occur within each of these dimensions if an organization was in a stress condition. Four of these tested hypotheses are discussed below.

H_1: As the degree of organizational stress increases, the rate of task performance will increase.

Data to test this hypothesis were available for all shifts through the Time Sequence Record form kept by all telephone caller simulators. One possible index of the rate of task performance is the average number of calls answered per minute. The results are presented in Table 5.

TABLE 5

AVERAGE NUMBER OF CALLS ANSWERED PER MINUTE

| Group | Session | | | |
	A	B	C	D
1	1.73	1.55	1.47	2.40
2	1.92	1.93	2.02	3.33
3	1.72	1.66	1.71	3.43

Since the demand load was reduced after the initial session, it was hypothesized that the rate of task performance would reflect this reduction, i.e., the

rate for Session D > Session A > Sessions B or C. Using the Kruskal-Wallis test, the difference was found to be significant, ($H=5.6$, $p = .05$), thereby indicating support for the hypothesis.

H_2: As the degree of organizational stress increases, organizational incumbents will increasingly limit their activity to those tasks of highest priority.

As the response to the high demand session progressed, officers became increasingly selective in dispatching units anywhere except to the disaster site. The program was designed so that routine requests continued to come in to the radio room at a normal rate. With limited resources, therefore, officers were often confronted with difficult decisions and tried to provide callers with meaningful alternatives.

A crude test of the hypothesis concerning limitation of task performance was attempted through an anlysis of the types of routine complaints to which police cruisers were not dispatched. As indicated in Table 6, a marked change in the dispatching pattern resulted.

TABLE 6

CRUISER DISPATCH PATTERN FOR ROUTINE EVENTS[a]

Session	Cruiser Dispatched	Cruiser Not Dispatched
Normal	61	4
Stress	10	22

[a] $x^2 = 39.7$; df = 1; $p < .001$.

Cruisers dispatched during the normal session responded to a wide variety

of incidents ranging from overparked automobiles to missing person reports.

However, the ten incidents to which cruisers were dispatched during the high

demand or stress session were all of very high priority by most criteria, e. g.,

personal injury auto accidents, a cutting, shooting, and so on. Thus, the hypo-

thesis was supported.

H_3: As the degree of organizational stress increases, there will
be an increase in the rate of decision-making.

Data testing this hypothesis is presented in Table 7. The rate of decision-

making clearly increased quite sharply, about 168%. Also, the disproportionate

nature of the increase by rank is readily observable. The sergeant's greater

rate of decision-making was significantly higher ($X^2 = 29.3$, df = 1, p $<.001$).

TABLE 7

NUMBER OF DECISIONS MADE[a]

Officer	Session A	Session D
Complaint Clerk 1	57	124
Complaint Clerk 2	46	105
Dispatcher	82	172
Sergeant	11	124
Total	196	525

[a] The number of decisions was operationalized by counting all instances
where alternatives were evaluated and a course of action was selected.

Decision-making being an extremely complex process, was analyzed in

several different ways. For example, decisions were recorded as to their basis,

e. g., receiving unsolicited advice or information. Several trends emerged from

this analysis as can be seen in the following tables:

TABLE 8

UNSOLICITED INFORMATION RECEIVED BY PATROL OFFICERS[a]

Unsolicited Information Given By	Session A	Session D
Another Officer	21	13
Sergeant	2	13

[a]$x^2 = 7.95$, df = 1, p $<$ .01.

TABLE 9

UNSOLICITED INFORMATION RECEIVED BY ALL OFFICERS[a]

Unsolicited Information Received By	Session A	Session D
Officer	23	26
Sergeant	1	18

[a]$x^2 = 8.67$, df = 1, p = $<$ .01.

The giving of unsolicited information changed patterns between sessions. There was for example, a disproportionate increase in unsolicited information given by the sergeant to patrol officers during the stress session. Similarly, as revealed in Table 9, the receiver pattern also changed, with the sergeant receiving significantly more unsolicited information. Thus, under stress, the data indicate that the sergeant's position becomes a focal point for both the collection and the dispersal of information.

Clearly, decision-making changed in the groups we studied. Everyone parti-

cipated more in the process. However, there was an upward status shift in the

sense of a disproportionate increase in decision-making by the sergeant. This

was a finding that had been overlooked in the DRC field studies.

H_4: As the degree of organizational stress increases, the frequency
of group-initiated interorganizational contacts will increase.

The data collected on this, is reported in Table 10. There was a large in-

crease in incoming calls from other organizations but this is a reflection of the

research design more than anything else. However, the tripling of calls ini-

tiated by the radio room does lend support to the hypothesis.

TABLE 10

INTER-ORGANIZATIONAL COMMUNICATION

Session	Incoming	Group-Initiated
A	11	7
D	70	21

In general, the realistic simulation group study was far more successful than

had been anticipated. However, as any good study does, it raised some basic

questions about the theoretical model being used and the way aspects of it were

being studied in the laboratory. This led to the development of an experimental

design that is described in the next chapter.

Chapter III

THE REALISTIC SIMULATION GROUP STUDY

The major laboratory research conducted during the whole course of the project was a simulation of an already functioning group. Actually, three different groups were involved since the social units studied were the different work shifts in the radio dispatching room of a metropolitan police department. Consequently, this was an examination of actual organizational components differing both in complexity and established structure from the small ad hoc groups initially studied, and discussed in the previous chapter. These parts of an existing organization were also subjected to a high demand situation. However, this research dealt not only with the patterned interactions looked at in the small group study but utilized most of the dimensions of the theoretical model of organizational stress described earlier.

The initial part of this chapter describes the methodology used in simulating an actual, functioning group. The chapter concludes with a selective presentation of findings from this particular study. A more detailed analysis of the data is still in process and will eventually be reported elsewhere.[1]

The Methodology

After the pilot study described earlier and in combination with an intensive search of the relevant literature, a laboratory method was devised which appeared to possess considerable potential for organizational research. This was designated by the DRC laboratory staff as "realistic simulation." While not a totally new method, it did differ substantially from many simulation studies by other researchers.[2]

In essence, the method requires that: (1) a functioning group, (2) whose members are not aware that they are in a controlled situation, be (3) assigned tasks identical to those normally encountered, (4) in a familiar physical setting, as well as (5) a social context similar to that with which the organization or one of its major components normally interacts.

Selection of an organizational unit for simulation was not an easy decision to make. After reviewing and rejecting a number of possibilities the DRC staff chose the communication system of a metropolitan police department. In actual fact, this meant the three work shifts of four persons each that operated the radio dispatching room of the department. The following were among the more positive reasons for this choice:

1. The dispatching unit occupies a crucial position in any police organization, and in the event of a community stress situation, the functions performed by this group are highly significant, not only for the organization, but for the entire community as an information processing center.

2. The tasks of the members of the work group are almost entirely verbal in nature; that which is not verbal assumes written form.

3. Analysis of group activity is facilitated in that a total recording of all verbal and other overt behavior could be made in the laboratory without interfering in any way with the ongoing actions of the group.

4. In terms of the physical setting, all incoming information from the outside world reaches the work group either through radio, telephone or intercom -- mechanical means readily reproduced in the laboratory.

5. Because of this kind of isolation of the social unit, variations in demands on the group could be relatively easily manipulated.

6. The communication system involved is relatively closed allowing for almost complete simulation in a laboratory setting.

7. Last, but not least, a DRC field team doing research on the Indianapolis Coliseum explosion had studied that city's police department and had

obtained a recording of all its radio communications during the disaster; the possibility of a parallel laboratory study to the field study clearly suggested itself.

All three work shifts from the police dispatching room participated in three sessions in the laboratory, during which communication activity was identical to what the groups normally experienced in their actual radio room in the downtown police headquarters. These sessions were followed by a "stress" session in which demands on the communication system were markedly changed through a simulated crash of a large jet aircraft into an apartment house complex in the city. All twelve sessions were about two hours in length. To prevent discussions of the laboratory activity between shifts, all sessions were run on the same day, i. e., shifts received identical "exposures" on the same days.

However, before such sessions could actually be run a tremendous amount of preparatory work had to be done. In essence, almost everything had to be simulated if the five characteristics of a realistic simulation noted earlier, were to be present. Some of the preparations undertaken will now be briefly discussed.
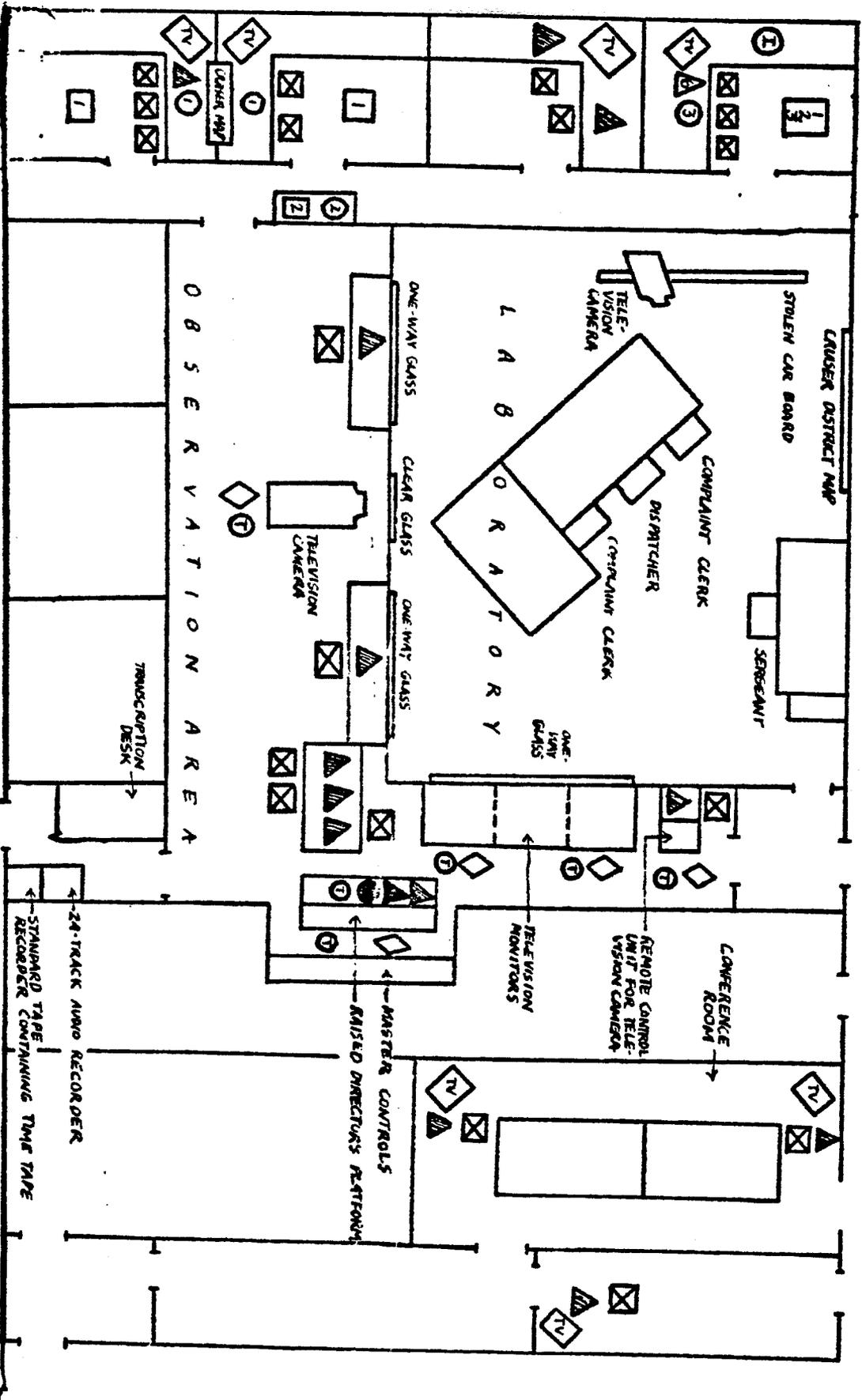
After permission and cooperation had been obtained from the local police, systematic field observations were carried on in the actual radio room of the department, and recordings were made of communications received and transmitted. These observations allowed the DRC laboratory staff to become familiar with the physical layout of the radio room, procedures followed, jargon used, records kept, and so on. Particular attention was paid to the basic communication flow between the radio room work staff (consisting of two complaint clerks, one dispatcher, and one sergeant) and the police radio cruisers, as well as the telephone calls from private citizens and others.[3]

Using these observations as a guide, as much of the actual physical layout as possible was reproduced in the laboratory. What was set up is indicated in Figures I and IA. The reproduction of the radio room per se was relatively simple, but there were some major problems in simulating the communication flow from the outside.

For this purpose, two things had to be done. One, a number of DRC staff members were trained to play the role of various units and organizations; in all 19 simulators were trained: five to simulate police cruiser operators, eleven to simulate telephone callers; and three to act as if they were personnel in organizations other than the police department. The simulators were not only rehearsed but were provided with "call cards" giving information on the nature of the calls they were to make as well as background information to allow them to carry on "ad lib" conversations.

The second major thing done was the preparation of a master script or scenario detailing all the calls and contacts most of the simulators were to make with each police work group that was going to appear at a session in the laboratory. The rates and natures of the simulated call for normal sessions were made to correspond as closely as possible to the pattern of actual calls a radio room work shift would receive in a given period of day on a certain day of the week (the time selected was a Friday night from 8 to 10 p.m.). Thus, the 594 normal session calls prepared for the simulation were adjusted to actual patterns in the city for type of incident, day of the week, time of the day, sex of caller, and geographical location.

TOTAL FACILITY: DESIGN AND PERSONNEL PLACEMENT[a]

[a] Not Drawn to Scale

LEGEND:

△ - Phone, number given for "outside" line

▲ - Phone, standard (line to WOSU-TV video tape room)

▲ - Phone, closed circuit

① - Microphone, Radio Channel 1

② - Microphone, Radio Channel 2

③ - Microphone, Radio Channel 3

① - Microphone, Inter-organizational monitor

1 - Speaker, Radio Channel 1

2 - Speaker, Radio Channel 2

3 - Speaker, Radio Channel 3

◇ - WOSU Engineer

⊠ - Simulator

① - Television Communications System, microphone and headset

● - Microphone, master (broadcast over all speakers)

TV - Television Receivers

For the stress session 990 calls were also prepared. Sequencing of calls
for this session was based on a master script which listed certain events as
they were to occur, e.g., 8:15 p.m. -- a jet plane with 151 passengers and crew
crashed into a large apartment house complex; 8:26 -- (cruiser at scene,
excited) "This damn thing just exploded! Some of our officers and some firemen
have been hurt."; 8:36 -- (Wagon at Riverside Hospital) "Riverside is full, send
victims elsewhere." In this way calls were sequenced to coincide with the appro-
priate events. These events were to be indirectly communicated to officers in
the laboratory by cruiser simulators and callers, e.g., at 8:27 several callers
opened with, "I just heard on T.V. about the plane crash, do you need blood
donors?"

After all these preparations, the sessions were run. There is a crucial
question: Did the DRC laboratory staff have a realistic simulation? The answer
is, yes.

First, and perhaps most important, existing groups with a history were
used. Group behavior was guided by already established set of norms and definite
interpersonal expectations. In debriefing sessions and interviews conducted
after the simulation, shift members noted that they thought of themselves as a
team, e.g., each knew what the others would do in a variety of situations. As
one of them verbalized it:

> . . . it seems like we get more done in an emergency or a
> catastrophe like this because of it -- I'll know what T____'s
> going to do, it seems like, and he'll know what I'm going
> to do, and P____ knows what we're both doing.

Not only had all of the officers worked together for a prolonged period of time; they also expected the groups to remain intact for a relatively indefinite time. Clearly these were groups with both a collective past and future.

Second, the police officers involved did know that it was not an actual radio room operation, i. e. , that they were not receiving calls from actual citizens making real complaints, etc. However, none of the shifts knew they were participating in a simulation. They had followed the orders of supervisors who had told them little more than to report to the DRC laboratory and to "behave as if this were the real thing and you were downtown. "

Debriefing sessions revealed that the group members had reached three conclusions about what they were doing in the laboratory. Many had decided that tests were being run for equipment to be used in a new radio room. Since plans for a new police facility in the city were in the "discussion stage" at the time of the study, this was a very logical possibility. Some officers decided that a new type of civil service examination was being conducted or tested. A few thought that further promotions might be based on the adequacy of their behavior in the laboratory. Other officers suspected that a new training device was being tested. The significant point is that all of the participants gave the simulation some type of social definition other than what it was. Thus, new sets of norms (i. e. , "experiment norms") were not imposed, since the subjects were not aware of the kind of controlled setting they were in.

Realistic tasks were given. The different shifts carried them out, for example, using data forms identical to those used daily. The pattern of simulated calls was quite similar to what the system normally experienced during the time simulated.

In operation, the behavior of the laboratory group was as identical to its actual counterpart as could be imagined. This conclusion was based on a variety of data: (1) direct observations of the laboratory sessions, (2) detailed review of video recordings, (3) analysis of transcripts of the 24 track audio recordings, (4) extensive group debriefing sessions and (5) direct observations of the actual police radio room in operation. The conclusion reached, similar to that of the police participants was that the behavior observed in the laboratory during normal and stress sessions was what would have been observed in the actual police radio room if the same events had been reported there.

In preparing the physical setting, only minor modifications had to be made in equipment and layout. In debriefing sessions, the group members said they could not see any crucial ways in which the simulated equipment altered their normal work patterns. The DRC laboratory staff felt that there was a very subtle relationship between the work patterns and the physical equipment, and detected slight alterations in behavior that might have been a consequence of that. In the main, however, the different shifts did appear to work in what they regarded as a familiar physical setting.

A meaningful social situation was also created. Much effort had been put into developing realistic telephone calls and radio exchanges. The police officers involved seemed to believe this was successful. As one of them said, "I think it was realistic right down the line. I mean the people at the other ends of the lines were real convincing."

The item mentioned most frequently was the simulator's ability to interact "meaningfully."

> I think what made this actually so realistic to me was,
> you know -- they call up and say this was Finnigan's
> Bar. We got, we have a fight going on here. So you
> know, you say, 'Well where's Finnigan's at?'-- and
> they say, well it's on Fourth Street, north of First or
> something like this. I mean they know where it is at
> and everything, see. Ya, I asked them where the
> street's at. This is something I'll do once in a while
> if I'm not too familiar with the street, maybe it's a
> new section of town or something. I'll ask them where
> it's at rather than get up, run over and check maps and
> everything. We can have a car on the way by the time
> you can look it up. So I'll ask some of the people where
> the street's at and the people on the phone even knew
> where the streets were.

A related factor was the larger social context in which these work groups

usually operate. Every shift day, for several years in most cases, the group

members continually construct mental images of the outside world using only

secondary information, i.e., telephone and radio communication. They were

thus able to quickly "become at home" in the laboratory. As one officer indi-

cated: "As a rule you just get so wrapped up in it and you forget you're working.

I mean that it's not actually happening. You get engrossed."

The Findings

In some respects, all the data obtained in this study were oriented to two

basic questions: (1) Was there organizational stress in the groups we put into

the laboratory, and (2) Did the patterned interactions of those groups change in

the high demand or stress session? As already indicated, the findings presented

below were selected from a larger number and do not exhaust all the analyses

that have been or will be made of the data gathered.

Was there organizational stress? The theoretical model developed and

presented earlier had conceptualized stress as the organizational state or condition

when demands exceed capability. The simulated plane crash was used to generate a change in demands so as to "overload" the work shifts. Demands were changed along three axes: quantity, quality, and priority. A program was constructed so that the rate of incoming calls could be raised from an average of two to three calls per minute to 21 calls per minute. The levels of incoming calls were determined by the processing rate of each shift. On this basis, it was felt that seven calls per minute per person answering would be more than adequate to overload the communications system. Since only 21% of the total 1155 calls prepared for the stress sessions were processed by the "most efficient" of the shifts, the prepared program seemed adquate.

However, to what extent did the demands exceed the capabilities of the group? What was the level of organizational stress? To obtain a measure of this, tele-phone caller simulators recorded the number of seconds between the time they completed dialing a number and when an officer answered. This was concep-tualized as "lag time," i.e., the delay between the phone ringing (potential demand made known) and it being answered (demand met). If no answer was obtained within three minutes, the call was recorded as a demand on the group which was never met. A compilation of these lag times, thus provides a gross indicator of the degree to which the demands exceeded the capability of the group. As might be expected and as indicated in Table I, lag time (or level of stress) increased during the stress session (D).

TABLE 1

LEVEL OF ORGANIZATIONAL STRESS[a]
AS INDICATED BY "LAG TIME," IN MINUTES

	Session			
Group	A	B	C	D
1	254.06	138.89	110.88	260.82
2	256.62	92.79	93.32	352.30
3	281.18	140.54	102.48	303.02

[a]Based on "total lag time" divided by number of minutes in each session.

Following the initial session (A), the shift members indicated that while the simulation was a faithful reproduction of their actual communication system, the call rate seemed somewhat high. As a consequence, incoming calls for sessions B and C were reduced by 20 percent. This unplanned deviation from the original research design, however, also allowed the making of a gross test.

If lag time is a good indicator of the level of organizational stress, then one should find the following variation: session $D >$ session $A >$ sessions B or C. The hypothesis was tested using the data in Table 1, and the Kruskal-Wallis one way analysis of variance by ranks test. A value of $H=6.49$ was obtained which is significant beyond the .01 level. While gross, this quantitative data clearly supports the notion that a markedly different level of organizational stress was present in session D when compared with the prior or normal sessions.

Was there a change in the patterned interactions? Given the nature of the positions in the radio room, interaction between the officers on each of the shifts

was crucial to task accomplishment. The interaction was examined to see if the

general pattern might have changed from a normal to a stress session. Using

only one set of the available data, and coding for directionality (i. e., initiator

or receiver) the results presented in Table 2 and 3 were obtained.

TABLE 2

INITIATOR-RECEIVER PATTERN, SESSION A

Initiator[a]	Receiver				Total - I	Rank I
	W	C	V	I		
W		17	14	9	40	2
C	27		3	12	42	1
V	26	4		3	33	3
I	9	15	3		27	4
Total-R	62	36	20	24	142	
Rank-R	1	2	4	3		

[a]Positions during session "A" were: Dispatcher-W, Complaint Clerk 1-C, Complaint Clerk 2-V, and Sergeant-L

TABLE 3

INITIATOR-RECEIVER PATTERN, SESSION D

Initiator[a]	Receiver				Total-I	Rank-I
	W	C	V	I		
W		3	18	23	44	4
C	7		27	32	66	3
V	9	18		70	97	2
I	17	27	92		136	1
Total-R	33	48	137	125	343	
Rank-R	4	3	1	2		

[a]Positions during Session "D" were: Dispatcher-V, Complaint Clerk I-C, Complaint Clerk 2-W, and Sergeant-L

It is clear from this that there was considerable change in the rate of inter-action, thus in the patterns.[4] For example, during session "A," interaction between group members averaged 2.4 exchanges per minute, i.e., 142 exchanges occurred during a 60 minute period. This rate more than doubled during the high demand session when an average of 5.7 exchanges per minute occurred.

An interesting finding also appeared when the ranks of initiators and receivers between sessions were compared. A "deviation" score was computed based on changes in rank (e.g., in session A reported in Table 2, the sergeant ranked fourth as initiator, but in session D reported in Table 3, he ranked first -- this gives him a "deviation" score of 3). The overall results are presented in Table 4.

TABLE 4

CHANGE IN INTERACTION PATTERN, BY POSITION

Position	Initiator	Receiver
Complaint Clerk 1	1	0
Complaint Clerk 2	2	1
Dispatcher	0	0
Sergeant	3	1
Group Total	6	2

This data indicates that while the pattern changed, the change was highly localized. There was primarily a change in initiators rather than receivers. The sergeant became a major initiator of interaction during the high demand session.

This data confirms that in one sense, at least, the patterned interactions changed.

In the original theoretical model, it had been assumed that the patterned interactions could be analyzed along four dimensions: tasks, decision-making, lines of authority and communications. From the theoretical model a series of hypotheses were developed that indicated what types of changes would occur within each of these dimensions if an organization was in a stress condition. Four of these tested hypotheses are discussed below.

H_1: As the degree of organizational stress increases, the rate of task performance will increase.

Data to test this hypothesis were available for all shifts through the Time Sequence Record form kept by all telephone caller simulators. One possible index of the rate of task performance is the average number of calls answered per minute. The results are presented in Table 5.

TABLE 5

AVERAGE NUMBER OF CALLS ANSWERED PER MINUTE

| Group | Session | | | |
	A	B	C	D
1	1.73	1.55	1.47	2.40
2	1.92	1.93	2.02	3.33
3	1.72	1.66	1.71	3.43

Since the demand load was reduced after the initial session, it was hypothesized that the rate of task performance would reflect this reduction, i.e., the

rate for Session D $>$ Session A $>$ Sessions B or C. Using the Kruskal-Wallis test, the difference was found to be significant, (H=5.6, p = .05),thereby indicating support for the hypothesis.

H_2: As the degree of organizational stress increases, organizational incumbents will increasingly limit their activity to those tasks of highest priority.

As the response to the high demand session progressed, officers became increasingly selective in dispatching units anywhere except to the disaster site. The program was designed so that routine requests continued to come in to the radio room at a normal rate. With limited resources, therefore, officers were often confronted with difficult decisions and tried to provide callers with meaningful alternatives.

A crude test of the hypothesis concerning limitation of task performance was attempted through an anlysis of the types of routine complaints to which police cruisers were not dispatched. As indicated in Table 6, a marked change in the dispatching pattern resulted.

TABLE 6

CRUISER DISPATCH PATTERN FOR ROUTINE EVENTS[a]

Session	Cruiser Dispatched	Cruiser Not Dispatched
Normal	61	4
Stress	10	22

[a] x^2 = 39.7; df = 1; p $<$ .001.

Cruisers dispatched during the normal session responded to a wide variety of incidents ranging from overparked automobiles to missing person reports. However, the ten incidents to which cruisers were dispatched during the high demand or stress session were all of very high priority by most criteria, e. g., personal injury auto accidents, a cutting, shooting, and so on. Thus, the hypothesis was supported.

H$_3$:   As the degree of organizational stress increases, there will be an increase in the rate of decision-making.

Data testing this hypothesis is presented in Table 7. The rate of decision-making clearly increased quite sharply, about 168%. Also, the disproportionate nature of the increase by rank is readily observable. The sergeant's greater rate of decision-making was significantly higher (X^2 = 29.3, df = 1, p $<$ .001).

TABLE 7

NUMBER OF DECISIONS MADE[a]

Officer	Session A	Session D
Complaint Clerk 1	57	124
Complaint Clerk 2	46	105
Dispatcher	82	172
Sergeant	11	124
Total	196	525

[a] The number of decisions was operationalized by counting all instances where alternatives were evaluated and a course of action was selected.

Decision-making being an extremely complex process, was analyzed in several different ways. For example, decisions were recorded as to their basis, e. g., receiving unsolicited advice or information. Several trends emerged from

this analysis as can be seen in the following tables:

TABLE 8

UNSOLICITED INFORMATION RECEIVED BY PATROL OFFICERS[a]

Unsolicited Information Given By	Session A	Session D
Another Officer	21	13
Sergeant	2	13

[a]$X^2 = 7.95$, df = 1, p $<$ .01.

TABLE 9

UNSOLICITED INFORMATION RECEIVED BY ALL OFFICERS[a]

Unsolicited Information Received By	Session A	Session D
Officer	23	26
Sergeant	1	18

[a]$X^2 = 8.67$, df = 1, p = $<$ .01.

The giving of unsolicited information changed patterns between sessions. There was for example, a disproportionate increase in unsolicited information given by the sergeant to patrol officers during the stress session. Similarly, as revealed in Table 9, the receiver pattern also changed, with the sergeant receiving significantly more unsolicited information. Thus, under stress, the data indicate that the sergeant's position becomes a focal point for both the collection and the dispersal of information.

Clearly, decision-making changed in the groups we studied. Everyone participated more in the process. However, there was an upward status shift in the sense of a disproportionate increase in decision-making by the sergeant. This was a finding that had been overlooked in the DRC field studies.

H_4: As the degree of organizational stress increases, the frequency of group-initiated interorganizational contacts will increase.

The data collected on this, is reported in Table 10. There was a large increase in incoming calls from other organizations but this is a reflection of the research design more than anything else. However, the tripling of calls initiated by the radio room does lend support to the hypothesis.

TABLE 10

INTER-ORGANIZATIONAL COMMUNICATION

Session	Incoming	Group-Initiated
A	11	7
D	70	21

In general, the realistic simulation group study was far more successful than had been anticipated. However, as any good study does, it raised some basic questions about the theoretical model being used and the way aspects of it were being studied in the laboratory. This led to the development of an experimental design that is described in the next chapter.

FOOTNOTES

1. Dr. Drabek, who conducted most of the research discussed in this chapter, is continuing to analyze the data he reported on in preliminary form in his dissertation which is being published in monograph form. See Thomas E. Drabek, Laboratory Simulation of a Police Communication System Under Stress (Columbus, Ohio: College of Administrative Sciences, 1968).

2. See, for example, Harold Guetzkow (ed.) Simulation in Social Science: Readings (Englewood Cliffs, N. J.: Prentice Hall, 1962), and Karl E. Weick, "Laboratory Experimentation With Organizations" in J. G. March (ed.), Handbook of Organizations (Chicago: Rand McNally, 1965).

3. The basic communication flow went as follows: (1) outside caller reports incident, (2) complaint clerk secures and records necessary data using police code, (3) data form is passed to dispatcher who locates and assigns an appropriate cruiser, (4) data is transmitted to cruiser in code language, (5) data form is filed in "in-process" box, (6) after incident is "cleared," the cruiser relays the type of disposition to dispatcher, and (7) dispatcher records disposition and then returns the data form to a complaint clerk who then files it in the "completed" box.

4. It is of interest to note that despite the change in persons, the dispatcher position ranked first as receiver and second as initiator in both sessions. This data provide empirical support to the crucial nature of the dispatcher position in a police communication network which Kemeny and Snell predicted using mathematical theory. John G. Kemeny and J. Laurie Snell, Mathematical Models in the Social Sciences (New York: Ginn and Company, 1962) pp. 101-102.

CHAPTER IV

THE EXPERIMENTAL SIMULATION GROUP STUDY

The third major study conducted in the laboratory attempted to move in a more experimental direction. The first part of this chapter briefly indicates the experimental design that was developed. The second part sets forth the major hypotheses that were brought to a test. Unfortunately, because of unexpected delays and then a subsequent move in academic position by the DRC staff member who undertook most of the experiment, the complete data analysis for this study has not yet been completed and only preliminary results are available.

The Research Design

This study was conducted in the same laboratory setting as was the previous one with much of the same equipment and layout being used. In this sense, this research was as realistic as the previous study was. Furthermore, most of the same persons took part, simulators as well as police officers of the radio group. Thus, many of the personnel involved were in a familiar situation and had the prior laboratory experience as part of their background. While not on as massive a scale as the simulation study, the experiment was almost as complex and also involved many people.

In many respects the study was conducted in the same way also as the realistic simulation study. That is, calls by simulators following a script (although not involving a disaster) were used as input to three different shifts of the actual dispatching group of a major metropolitan department. As in the earlier simulation study, four sessions in all were run, the first primarily a practice one.

The major difference between this and the simulation study was in the basic research design used. In essence, manipulation of variables or an experiment was attempted. The decision to proceed in this way stemmed from observations that were made of the communication activities of the radio group in its actual dispatching room in the downtown headquarters of the organization. The DRC staff observed that there were two types of communication inputs to the group. There were organizational or group demands, i.e., requests for service which were evaluated by radio room personnel as being legitimate demands on the organization. There were also calls or requests for information which were not demands on the group itself, but which constituted positional demands for the officers who received them.

This observation was translated into an experimental setting. The DRC staff decided to vary both positional pressures and organizational demands. The former was done by simply varying the number and rate of incoming positional calls, while concurrently keeping the rate, number and order of organizational demand calls constant. Conversely, organizational or group demand was varied by changing the capability of the group (for technical reasons it was easier to vary the first part of the capability/demand ratio with relation to stress, than it was to alter the latter). Operationally, this was done by reducing the outside resources the group could call upon.

The experimental condition for each shift of the group which participated in the study are indicated in the following figure. For each condition, the number of organizational demands and the rate of their input is the same, and an effort was made to limit as much as possible any qualitative differences in these demands.

In condition A and B, where organizational capability is high relative to organizational demands, the group is viewed as not being in a state of stress. In conditions C and D, organizational demand is in excess of capability and the organization can be thought of as being in a state of stress. In conditions A and C, the individual incumbents of positions receiving calls are under only normal pressures. In conditions B and D, demands are arriving at the positions at such a rapid rate that there is always a backlog, thus a state of high pressure for the position. Condition A, of course, provides the base line data.

	Positional Demands	
	LOW	HIGH
Organizational Capability HIGH	A	B
Organizational Capability LOW (stress)	C	D

The basic question the DRC staff was examining in this study was the same one examined in the realistic simulation study and most of the other laboratory research done. Given these different combinations or conditions, how did the interaction patterns of the group change? Several hypotheses were advanced and these are discussed in the next section.

The Hypotheses

Four major hypotheses were advanced about what happens to a group under the experimental conditions indicated above.

Hypothesis 1 was that if a state of stress exists for the organization, then the members of the group will attempt to cope with this by increasing the group's capability to handle the given level of demand.

There are two observable mechanisms which a radio shift can use in an attempt to cope with stress to increase the effective capability of the organization. One is to reduce the manpower sent on a demand from that normally required. The second is to reassign personnel from demands they have already been given, to newer demands. The expectation was that to the extent that stress results in this kind of behavior, there should be minimal occurrences of such behavior in conditions A and B, and maximum appearances in conditions C and D.

Hypothesis 2 was that if a state of stress exists for the organization, the group will attempt to cope with this by decreasing demands to correspond more closely to capabilities.

One method of reducing the effective demand level is to reject demands which would normally be accepted. In the DRC research design, each experimental session contained 45 calls involving normally accepted demands, and a variable number of calls which would not normally be accepted as demands. Thus, for each shift, it was possible to see the number of normally accepted demands which were rejected during the stress session, the number of normally rejected calls which were accepted as legitimate demands and those which were accepted or rejected in both the normal and stress sessions.

Viewed on a four-fold table, the results would distribute as follows:

		STRESS CONDITIONS	
		Reject	Accept
NORMAL CONDITIONS	Accept	1	2
	Reject	3	4

The null hypothesis in this would be that deviations in cell 1 should equal deviations in cell 4 except for random variations. In fact, if Hypothesis 2 is correct, cell D should be zero and cell A significantly higher than zero.

The second method of reducing the effective demand level is to refer some demands to other organizations which could handle them. Still another way of reducing the level is to defer handling a demand until some later time. In the latter case, the average backlog in conditions A and B should be significantly less than the backlog in conditions C and D. If the deferring of demands is a function of organizational stress but not of positional pressure, there should be no significant difference between conditions A and B, or between conditions C and D.

> Hypothesis 3 was that if a state of organizational stress exists, the group will respond by increasing the amount of consultation and interaction between themselves.

If this hypothesis is correct, there should be substantially more initiated interaction in conditions C and D than in conditions A and B. This would be particularly true of task-related interaction. It is possible of course that in conditions A and B interaction might consist primarily of non-task related comments whereas in conditions C and D, it could consist mostly of task-related comments.

> Hypothesis 4 was that if members of a group are subject to unusually high positional pressures, they will work at a faster rate.

There could be significant differences in how group members handle demand calls and non-demand calls, particularly when they are under high pressure. If the rate of performance increases only as a function of pressures, then the average duration of calls should be less in conditions B and D than in conditions A and C with B = D and A = C. If the rate of performance increases only as a

function of organizational stress, then the average duration of calls should be less in conditions C and D than in conditions A and B with A = B and C = D. On the other hand, if the rate of task performance is related to both organizational stress and positional pressures, then the average duration of calls should be greater in condition A than in conditions B, C and D.

The preliminary analysis of the data does not suggest any major unexpected finding. The results do not seem to be inconsistent with those obtained in the realistic simulation study. More important, both studies raised some basic questions of procedure among the DRC laboratory staff. The next chapter discusses the kind of study such questions generated.

CHAPTER V

THE "ANALOGUE" GROUP STUDY

The two major simulation studies discussed in the previous chapters provided much data and contributed to a clarification of the theoretical research model originally advanced and developed. Some of the substantive issues also raised have already been discussed. However, both studies as well as the very first ad hoc small group study generated additional questions or issues of a different order. What these were and how the DRC laboratory staff attempted to deal with them is discussed in this chapter. First, the questions are noted; then the study conducted in an attempt to answer some of them is described.

Questions and Issues from the Prior Studies

Apart from substantive matters, there were questions or issues of both a practical and methodological nature raised by the first three studies conducted in the laboratory. One question was whether the "pay-offs," researchwise, were proportionate to the extensive efforts required to mount each of the studies and to process the data obtained. Another issue had to do with the sampling limitations almost inherent in at least the two simulation studies. Still another question was the degree of actual control being exercised by the DRC laboratory staff in its research effort. Finally, there was the issue of whether or not the methodology being used had a tendency to become an end in itself. Each of these points will now be discussed in more detail.

1. As should be clear from the descriptions in the earlier chapters, a rather massive effort in terms of time, equipment, resources and manpower had to be

mounted in each of the laboratory studies. The more elaborate the study, further-more, the greater the preparations necessary and the more complex the sheer problem of the coordination of the research. In addition, the data generated, particularly through the mechanical means of reproduction, reached physically impressive but at times almost unmanageable proportions.

None of these matters of course would be considerations if the returns in results or outputs were anywhere near the inputs that were involved. However, a positive ratio on this was not easy to see. It is necessary, of course, to keep in mind the probability of latent and long run research values that would not be readily apparent. Nevertheless, appearances and impressions were enough to suggest that the DRC laboratory staff ought to attempt to develop a less massive research effort that actually might generate a correspondingly higher "pay-off."

2. The simulation studies required particular kinds of social units. That is, the groups that could be used in the laboratory had to have certain characteristics. These included such things as: a) limited size -- the group had to be small enough to function naturally in the limited space available in the laboratory; b) relative simplicity -- the normal functioning of the group could not involve the use of equipment, supplies or materials which, for technical or other reasons, the DRC researchers could not provide or substitute a functional equivalent; c) much autonomy -- to the extent the group being studied was a subunit of a larger organi-zation it had to be highly self contained; d) task realism -- the group had to be able to perform its normal tasks realistically within the confines of the laboratory; e) feasibility of reproduction -- the kind of social context within which the group usually operated had to be such so that it could be simulated in the laboratory;

f) task comprehensibility -- the expertise of the group could not be too exotic or at least it had to be within the abilities of the laboratory staff to provide adequate feedback for research purposes.

Actual groups with such characteristics are not too numerous in any community. The police units used in the DRC simulations had the characteristics in almost ideal form, but even they could not have been used if the studies had been conducted a year later.[1] These facts, plus an inability to find another organizational group that could be readily used suggested to the DRC staff that the potential samples (if not the universe itself) for possible laboratory studies were somewhat limited, and that consideration needed to be given to other kinds of units for study.

3. There were limits in the degree of actual control exercised by the DRC staff in the laboratory studies. Among the major factors probably affecting ability to manipulate the situation were the following. In the simulations, the complexity of the usual social context of the groups used was such that it was very difficult to train simulators to play their roles adequately. It is impossible to foresee all contingencies that do arise in any given laboratory exercise, thereby allowing the possibility of different kinds of spontaneous adjustments and innovations which were not a part of the research design being used. To some extent, the researchers and the group members being studied, had to interact outside of the laboratory situation, introducing an unknown element into the relationship. Finally, the sheer number of people involved in the kind of laboratory study conducted by DRC necessitated a timing and a coordination that allowed little margin for error.

While these were limits to the laboratory studies, none did seem to occasion major difficulties in the studies actually undertaken. However, while "sins of commission" were not apparent, possible "sins of omission" loomed in the background. Thus, the DRC staff felt that steps should be taken to improve the degree of control over the research conducted. Control of course has no merit in itself but needs to be considered for the ultimate purpose of obtaining greater knowledge or understanding.[2]

4. A minor but clearly obvious tendency, at least in the simulations, was to make the laboratory situation as life-like as possible. There is no question that there is a temptation to add "realistic" elements almost for the sake of realism alone. At least, little effort was made to justify inclusion of certain objects, procedures, etc., other than their actual counterpart existence.

Methodologically, the argument about realism can be made both ways and in a basic sense, no researcher is against studies being as realistic as possible.[3] Nevertheless, there is a question of the degree of realism that is relevant. The DRC staff felt that there would be some value in "decluttering" a study and seeing what could be gained from that. One way to do this was to move in the direction of a more formal, hypothesis testing design, and including only matters directly relevant to that purpose.

Research Design and Findings

Given the line of thinking just indicated, the goal became a study which would use easily accessible subjects in a less complex but better controlled design with a clearer hypothesis testing focus. For this purpose an ad hoc analogue was constructed. This involved using ad hoc groups in a laboratory situation designed

to impose a parallel structure on both the group and laboratory environment so that certain formal identities could be maintained between the ad hoc analogue and an actual situation. The intent was to abstract certain properties from the previous simulation studies and to recreate them in a simplified fashion in the ad hoc analogue.

Four aspects were crucial to this study. The subjects involved were just that, they did not have to be members of organizations. The basic research design was less complex focusing as it did on certain formal properties of behavior rather than actual behavior as such. These two characteristics in turn allowed far better control by the researchers than was possible in the prior studies. Finally, with such control hypothesis testing was facilitated.

The analogue was constructed by using student groups and an abstract logual task designed to pose task problems and to permit action possibilities parallel to those of the policemen used in the earlier simulation studies. This study was designed to test the general hypothesis that these groups operating under stress conditions (demands in excess of capability) would undergo performance degradation as a sole consequence of excessive demands. A stress factor was defined as the difference between mean performance drop under stress conditions and mean performance drop under control conditions due to fatigue or other factors.

Six 3-man groups and one 2-man group were used in the study which was conducted over a seven week period. Each group meeting took place in the laboratory for two hours, twice a week. Participants were taught the rudiments of a propositional calculus which was used as basis for their task performance in the study. The task itself consisted of developing "well formed formulas" from random arrays

of logic symbols. These symbols were given at a predetermined rate to the groups who had to code the formulas, and dispatch them to appropriate "proof units." A system of rewards and penalties was designed to encourage speed and accuracy. Each group was in competition with every other group for the highest score.

All groups participating were tested under both stress and control conditions several times over the period of the study. The stress condition consisted of introducing demands (random symbol arrays) at a rate clearly in excess of the groups' abilities to process them. The control condition consisted of introductory demands at a rate near capability. Group performance was measured as the number of formulas dispatched per five minute interval.

Data were obtained from 69 sessions (32 stress and 37 control ones). An analysis revealed that group performance tended to rise very slightly over the course of each session, whether stress or control. This finding was, of course, directly contrary to the general hypothesis advanced and precluded testing more specific hypotheses. Two possibilities, however, made the finding equivocal. It was possible that the capability levels of the groups were not reached early enough in the sessions to allow time for a performance degradation to occur. It was also possible that the sessions were not long enough to test the hypothesis adequately.

Further analysis of the data showed that there was no significant variability between groups in the extent to which performance tended to increase over the sessions nor was there any important difference between stress and control conditions in the strength of this tendency. There was, however, a significant

difference in the number of errors committed under the two conditions, i. e., the error rate was slightly higher under stress than under control conditions. This might be interpreted as kind of performance degradation but the errors tended to be randomly distributed throughout any given session, not skewed toward the latter portion of the sessions as is implied by the degradation hypothesis.

This study was not successful from a substantive point of view. However, it did have the merit of forcing the DRC laboratory staff to make explicit some of its assumptions about simulations. This was particularly true with respect to the problems associated with organizational simulation. The work undertaken also helped in part to lead to a somewhat narrower focusing of research in the next study conducted in the laboratory. The focus came to be on interaction patterns, as is described in the next chapter.

FOOTNOTES

1. The police department involved moved its dispatching room to a new location with equipment that would have been impossible to reproduce in the BSL laboratory.

2. There is sometimes a tendency in laboratory research to swing to the opposite extreme and to introduce controls almost for control sake, instead of for the relevance it may have to the research being undertaken. For a discussion of controls and problems in laboratory work, see Karl Weick, "Laboratory Experiments with Organizations" in J. G. March (ed.) Handbook of Organizations (Chicago: Rand McNally, 1965), pp. 194-260.

3. For discussions of the problem of realism see Karl Weick, "Organizations in the Laboratory" in Victor Vroom (ed.) Methods of Organization Research (Pittsburgh: University of Pittsburgh Press, 1967), pp. 1-56, and Bernard S. Phillips, Social Research: Strategy and Tactics (New York: MacMillan, 1966), pp. 145-152.

CHAPTER VI

THE CROSS-CULTURAL GROUP STUDY

The interaction patterns of the participants were a major DRC research interest in all of the prior laboratory studies except for the analogue group one just discussed. However, these interactions were treated as a dependent variable and as a collective product. Little attention was given to the nature of the interaction itself. This became the focus of the last study conducted by the DRC staff in the laboratory where an exploratory analysis was made of interaction and more specifically, for reasons to be indicated shortly, of interactions between persons from different cultural backgrounds.

The chapter first discusses the reasons for the cross-cultural focus of this study. It concludes with a report of some very preliminary findings from the initial exploratory sessions that were run to initiate this phase of the research. The future and more systematic research projected along this line is discussed in the following chapter.

A Cross-Cultural Interaction Focus

In both simulation studies, those reported in Chapters III and IV, there was generally an increase under stress in the necessity for intraorganizational communication from one member to another. However, under such conditions when demands are greater than capability, there is not sufficient time for complete communication -- at least, the verbal communication and its content becomes restricted, often taking a truncated form. Nevertheless, the intraorganizational necessity for information is quite strong. Therefore, much information is

transmitted through non-verbal cues. There are undoubtedly several categories of these. For example, hand gestures, grimaces and expressive facial motions, body sets, etc., all supplement if not substitute for substantive verbal communication processes in some stress contexts. However, certain other features such as interruptions of the remarks of others, length of silent pauses, initiation of vocal action in an ambiguous situation, etc., are also another category of non-verbal cues operative in many stressful interaction situations.

All this suggested to the DRC laboratory staff, the value of making a study of non-verbal cues. Such a view in no way minimized the importance of substantive verbal communication in an interaction situation. Rather it highlighted the necessity of examining both verbal and non-verbal aspects, and that consideration in a comprehensive research effort should be given to the latter as to the former.

While interaction processes have been the focus of attention of many social theorists, relatively little empirical work has been done on the non-verbal aspects. Much of the otherwise relevant writings by anthropologists and psychiatrists have not been based on systematic observational studies.[1] Experimental research into the effects of non-verbal cues in interaction have been even more wanting. The studies conducted have tended to focus on the perceptual rather than the interactional aspects of the behavior.[2]

A few attempts at categorizing non-verbal interaction cues have been made.[3] It has been found, for example, that individuals can recognize far more subtlety in non-verbal cues than they themselves can produce. However, from a sociological perspective, it is clear that a considerable amount of the non-verbal cues given (at least if categorized by the microscopic analysis characteristic of kinesic

research) can be considered to be "noise" in the communication process. In

other words, there are relatively few cues which are emitted in any interaction

setting which are attended to and given meaning in the interaction context. In

stress situations, the number of such "critical cues" should be even less than in

the "normal" situation, because of the greater number and intensity of cues that

must be dealt with in such contexts. Therefore, it should be possible to isolate,

in stress situations, the more gross and critical cues which do communicate

information non-verbally.

The identification of such critical cues is made difficult, however, by the

fact that non-verbal cues are primarily non-conscious in origin. That is, cul-

tural norms define which non-verbal cues are appropriate for any given intended

expression, and many of these signs are learned quite early in life. Thus, iden-

tification of relevant non-verbal cues in stress situations is made difficult by the

cultural conditioning of the researcher. As Robert Park and others have suggested,

when one is concerned with finding the heart of the meaning to an individual, it

is necessary to find out what he takes for granted. But since the general cul-

tural backgrounds of researchers and subjects of study are the same in most

studies, it is difficult to formulate and identify the crucial non-verbal cues in

these kinds of situations.

However, interpersonal interaction between members of different cultures

contains some important elements of a stress situation. It also allows each

individual in the interaction context to observe what would be the crucial cues in

his own culture in the other individual. Chances are that some or most of these

cues will differ between the two cultures. The cross-cultural interaction setting,

then, would seem to be a natural one for an attempt to isolate and define these crucial cues.

This then was the reasoning of the DRC laboratory staff. It led to a study aimed at exploring what non-verbal cues entered into play in interaction in a stress situation and what accounted for them. One relatively easy way to make such observations was to look at interaction situations where non-verbal cues were more likely to come to the fore. One such possible situation, with some element of stress, was interaction between participants from different cultural settings and where the determining factors could be analyzed beforehand. The specific research design developed to explore this is discussed in the following section.

Research Design and Preliminary Findings

The main focus of the exploratory work conducted over a three month period was on the observation and recording in the laboratory of cross-cultural inter-action as it progressed and the ways it differed, if any, from more culturally homogeneous interaction. For this purpose, two types of laboratory sessions were conducted. The first involved the separate observation of two culturally homogeneous groups. One group was made up of Americans, the other of Indians, all graduate students at the university, and paid an honorarium for their partici-pation in the research. Both groups were given an issue to discuss with instruc-tions to arrive at some sort of consensus about that issue and to write what they collectively agreed to upon a blackboard. Each group was given an hour to per-form the assigned task.

The second type of laboratory sessions was designed to get at cross-cultural interaction. Four groups were used in these. Each consisted of four-man groups composed of one of the Americans who had participated in the earlier all-American session, one Indian who had similarly participated with the other Indians, one Japanese student, and one Thai student. These culturally heterogeneous groups were assigned the same kind of discussion task which characterized the first type of sessions, but the substantive topics were changed.

Among the kinds of data collected were the following:

1. Observational data. Notes were taken on the gestures and other non-verbal manifestations of the groups' members during the sessions.

2. Verbal data. All sessions were tape recorded.

3. Interview data. Eleven standardized questions were asked of each group member in a post-session interview.

4. Questionnaire data. Each group member completed a questionnaire which called for census-like information about himself.

5. Sentence completion data. Each group member filled out a 33 item sentence completion test.

Since the laboratory sessions were concluded just prior to the writing of this report, all the analyses have not yet been completed.[4] The discussion below is primarily based on a preliminary analysis of the verbal data, and some of the observational data. The verbal data were chiefly analyzed from a non-substantive or non-content point of view.

The major finding of the pilot work can be summarized in one statement and it is that in cross-cultural interaction, members of _both_ groups in the interaction will modify their normal interaction behavioral patterns. In other words, it is not enough to look at only the behavior of foreigners in the United States or at the

behavior of Americans overseas in order to understand cross-cultural interaction. The "native" group member in the interaction also changes his behavior when in such situations. The additional observations reported below further document this statement and suggest a hypothesis of convergence, i. e. , that members of all groups change their behavior in such a way as to come closer to the norms of the other group.

This can be seen in the length of contribution made by each individual to the group's discussion. Table I presents the mean length of statement for Americans in their culturally homogeneous session and their average in the culturally hetero- geneous sessions, as well as comparable data for the Indians. It is clear that Americans made significantly longer individual contributions than Indians in the culturally homogeneous session, but that both groups "converged" in the culturally heterogeneous sessions. Americans decreased their statement length and Indians increased their statement length when in the cross-cultural situation.

TABLE 1

LENGTH OF STATEMENT BY SESSION
(LINE/ACT RATIO)

Group Member	Homogeneous Session	Heterogeneous Session
American	5. 89	3. 56
Indian	2. 78	3. 60

The general type of statement made by group members in culturally hetero- geneous interactions as contrasted to culturally homogeneous interactions also

support the convergence hypothesis. Thus, Americans increased the number of their supportive statements when in cross-cultural interaction and in a rather dramatic fashion -- from two to three or more times as many supportive statements were made in discussions involving foreign participants than were made in the all-American group. This, of course, concurs with the broad observation that Americans tend to be (at least on the surface) polite in interaction with foreigners and tend to avoid direct disagreement with them. However, while Americans increased their supportive statements substantially, they still fell below the Indian group norm in this regard. The Indians provided rather high levels of support for one another in their culturally homogeneous sessions.

In contrast, Indians did not increase their support levels in a cross-cultural context. Rather, they decreased the number of negative comments they made. In this respect they were no more successful than the Americans were in their change of supportive statements. Although the Indians did decrease their negative remarks, their new level was still above the American group norm for negative comments.

Some other differences between the American and the Indian groups also stood out. The Indians, for example, seemed not to be constrained by the general American norm that only one participant at a time should speak at such a kind of meeting. The consequence was that the Indian session often became a quadralogue with all the members speaking at once. Likewise, the Indians seemed much less constrained by the physical setting than the Americans were, feeling free to move around the room and continuing to participate in the discussion, whereas Americans tended to fall silent if they moved away from the center of the group. In addition,

the Indian discussion was conducted at a considerably higher volume level than the American one.

All in all, the exploratory work in this study was quite successful and encouraging. Even a preliminary screening of some of the data uncovered noticeable differences among at least two of the different cultural groups being studied. The initial results supported the usefulness of further studies along the same line. Some such projected research for the future by the DRC laboratory staff is indicated in the following chapter.

FOOTNOTES

1. Among the better writings are those by Edward Hall, The Silent Language (New York: Doubleday, 1959), and Jurgen Ruesch and Weldon Kees, Nonverbal Communication (Berkeley, California: University of California, 1956).

2. See J. S. Bruner and R. Tagiuri, "The Perception of People" in Gardner Lindzey (ed.) Handbook of Social Psychology, Volume 2 (Cambridge, Mass: Addison-Wesley, 1954).

3. Among the best has been that by Ray Birdwhistell, Introduction to Kinesics: An Annotated System for Analysis of Body Motion and Gesture (Louisville: University of Louisville, 1952).

4. None of the material on the Thai or the Japanese students, for example, had been analyzed at the time of the writing of this report.

CHAPTER VII

PROJECTED STUDIES

This chapter first very briefly discusses the laboratory research projected over the next year (i. e., in 1968). In addition to continuing the discussion sessions reported on in the previous chapter, two other kinds of group sessions will be initiated. The chapter concludes with a phase outline of the laboratory research projected over the next several years.

Further Discussion Sessions

Apart from systematically analyzing the data obtained in the exploratory work, some additional discussion sessions will be run. They will be aimed at clarifying and documenting certain initial impressions obtained, e. g., both Thai and Japanese members of groups were low participators in the discussions as compared with Indian and American members. Several alternative explanations for this suggest themselves. Some of these could be tested by having Thai and Japanese groups participating in a culturally homogeneous session and using their native language only. The basic subject matter of the discussions will also be changed since in the case of the Thai participants at least, the previous topics (i. e., international politics) in the earlier laboratory sessions seemed to lead to certain kinds of self-definitions and a corresponding appropriate role in a culturally heterogeneous group session. These and a number of other questions generated by the exploratory work will be further examined in other discussion sessions. Since the discussion sessions have always been defined by the DRC laboratory staff as being exploratory in nature, no definite research closure will

be attempted with them. More definite and systematic results are projected instead for the other laboratory sessions visualized.

Instructional Sessions

The instructional sessions are meant to move towards what a field setting could be like (i. e., actual cross-cultural interactions between Americans and others in a foreign setting). For purposes of this study, three different types of laboratory sessions are being designed. In all three, the interaction will be primarily characterized by information transmission from an "expert" to a "naive" trainee. The differences in the types of sessions will be along the following lines:

1) In one type of interaction session the cultural background of the "expert" will be varied. For example, a German may instruct a Nigerian in some procedure or technique. In a similar kind of session an American will attempt to instruct a Nigerian in the same procedure or technique. The supposition is that in such a kind of dyadic relationship, the cultural background of the "expert" will make a difference in the response evoked.

2) In the second type of interaction session a "contrast culture" dimension will be introduced. The focus in these sessions will be on the "expert," for the supposedly "naive" trainee will actually be a "confederate" of the DRC laboratory staff. This confederate (a non-American student) will be taught to respond with contrary reactions and statements to the expert. In one sense, the research design is meant to induce cultural shock and stress for the "expert," and to see how he will react in such situations.

3)   The projected final set of instructional sessions are similar to the first

type indicated, except that the "expert" will have to train more than one "naive"

trainee at a time.   For example, one American may attempt to instruct three

persons with Mid-Eastern cultural backgrounds.

Game Sessions

While the instructional sessions could generate some stress, they are not

designed and except for the last type of the sessions, could not evoke substantial

group stress.   Needed for that are interaction situations necessitating cooperation,

competition, accommodation, etc., between members of different groups.   For

this purpose, the DRC laboratory staff intends to use games with fairly explicit

goals.   Variations of the conditions under which the games will be played will

allow some control of the degree of demands that could be introduced into the

situation, and thus the amount of collective stress that might be induced.

Two kinds of game sessions are visualized.   The first will be a cooperative

game condition.   In this setting the four members of a group will be involved in

a game in which each individual's reward is dependent upon the group's achieve-

ment.   Two sessions of each condition will be run -- one in which the group mem-

bers will receive a number of positive sanctions and a high reward, and another

in which the members will receive a large number of negative sanctions and a

low reward.   Both sets of sessions will be run with American homogeneous groups

and culturally heterogeneous groups.

The second kind of game session projected will be one in which the rewards

for each individual in the group will be contingent upon his own achievements.

Some kind of game will be used which will require negotiation and bargaining among the group members as part of the game. Both American culturally homogeneous groups and culturally heterogeneous groups will be run under this condition.

If all of the above sessions are run as planned, the DRC laboratory staff will then be ready to turn to the next phase of the research projected, that is, to rigorous experimental rather than just observational laboratory studies. The research is seen tentatively as going through the following phases.

1968

Phase I	January - June	Continuation of observational discussion sessions. Initiation of observational instructional sessions. Initiation of observational game sessions.
Phase II	June - October	Analysis of data from observational sessions. Preparation for laboratory experimental sessions.
Phase III	October-January	Running of pilot experimental sessions. Report writing on observational sessions.

1969

Phase IV	January - June	Systematic running of experimental sessions.
Phase V	June - October	Analysis of data from experimental sessions. Preparation for field research.
Phase VI	October-January	Preliminary field studies. Report writing on experimental sessions.

1970

Phase VII	January - June	Systematic field studies.
Phase VIII	June - October	Analysis of data from field studies.
Phase IX	October-January	Report writing on field studies.

APPENDIX I

List of DRC Staff Participants in the Research

Research Associates

Dr. Thomas E. Drabek	1964-1965
Robert Muzzy	1965-1967
Dr. Robert Roth	1967

Research Assistants

Thomas Cree	1964-1967
Mrs. Elaine Hobart	1964-1967
Gary Kreps	1967

Professor J. Eugene Haas was Principal Investigator from 1964 to mid-1967. Professor E. L. Quarantelli was Co-Principal Investigator from 1964 to mid-1967 when he became Principal Investigator. Professor Russell R. Dynes was Co-Principal Investigator from 1964 to 1967.

APPENDIX II

List of Papers and Publications from the Research

1. Cree. Group Task Performance Under Conditions of Excessive Demands. M.A. Thesis, Ohio State University, Department of Sociology, 1967.

2. Cree. Implications From An "Analogue" Study (draft of article to be submitted to professional journal).

3. Drabek. Laboratory Simulation of a Police Communication System Under Stress, Ohio State University, Disaster Research Center Monograph Series, 1968.

4. Drabek and Haas. Laboratory Simulation of a Police Communication System Under Stress: Preliminary Findings. (Paper read at 1966 American Sociological Association meetings).

5. Drabek and Haas. Organizational Simulation: A Study in Method (paper read at 1966 Midwest Sociological Society).

6. Drabek and Haas. Realism in Laboratory Simulation: Myth or Method. Social Forces, V-45 (March, 1967), 337-346.

7. Drabek and Haas. The Question of Realism in Laboratory Simulation: Myth or Method? (Paper read at 1965 American Sociological Association meetings).

8. Drabek and Haas. Community Disaster and System Stress: A Sociological Perspective (paper presented at 1967 Conference on Social and Psychological Factors in Stress).

9. Drabek, Haas, Quarantelli and Dynes. A Theory of Organizational Stress (a paper to be published in 1968 by the National Institute of Social and Behavioral Sciences).

10. Drabek and Haas. Studies of Police Communication Systems (tentative title -- to appear in 1968 May issue of Trans-Actions).

11. Drabek and Haas. Organizational Response to Stress (paper presented at the 1966 Ohio Valley Sociological Society meeting).

12. Hobart. Adaptive Response in Small Groups (draft of article to be submitted to professional journal).

13. Muzzy. An Experimental Simulation of a Police Communication System, Ph. D. dissertation (in process).

14. Quarantelli and Dynes. A Methodological Analysis of Field and Laboratory Subjects to the Same Research Instrument (paper in process).

15. Roth. Preliminary Findings From Pilot Studies of Cross-Cultural Interaction (paper in process).