BROUILLETTE, John Robert, 1935-
COMMUNITY ORGANIZATIONS UNDER STRESS: A STUDY
OF INTERORGANIZATIONAL COMMUNICATION NETWORKS
DURING NATURAL DISASTERS.

The Ohio State University, Ph.D., 1970
Sociology, general

University Microfilms, A XEROX Company, Ann Arbor, Michigan
COMMUNITY ORGANIZATIONS UNDER STRESS: A STUDY OF INTERORGANIZATIONAL COMMUNICATION NETWORKS DURING NATURAL DISASTERS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

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* * * * *

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The research in this dissertation was supported in part by PHS Grant 5 RO1 MH 15399-02 from the Center for Studies of Mental Health and Social Problems, Applied Research Branch, National Institute of Mental Health.

Many faculty members have been instrumental in assisting me throughout my graduate studies. Foremost among them was my adviser, Dr. Russell R. Dynes, whose untiring guidance, encouragement, and support were always forthcoming when they were needed most. Also I would like to express my sincere appreciation to Dr. E. L. Quar-antelli who, with Dr. Dynes, provided an invaluable graduate training program at the Disaster Research Center which allowed me to apply and advance the sociological knowledge I had been exposed to earlier in formal course work. A special word of thanks belongs to Dr. John F. Cuber who introduced me to The Ohio State University as a teaching assistant under him and who ushered me out when he sat on my final Doctoral oral examination. He has been a significant influence and inspiration to me throughout my graduate program.

I am deeply indebted to all my colleagues at the Disaster Research Center who worked with me in developing my research design, gathered field data, and offered constructive criticism of the final study. Also, the informal, but professional interaction with the graduate assistants and associates has been of immeasurable value.
Sincere gratitude is due to Miss Janet Patterson and Mrs. Sheryl Pustay, who typed this dissertation. In spite of other pressing demands, they each worked skillfully, loyally, and diligently until the work had been completed.

Finally, I must express my appreciation to my wife Mary and to my daughter Mary Beth for their love and patience. Their contribution cannot be measured.
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CHAPTER I

INTRODUCTION

This is a study of communication networks among community organizations in natural disasters. The object is to develop -- and in part to test -- hypotheses relating the prior emergency experience of a community to the nature of the communication net developed while undertaking certain disaster tasks.

While sociologists have studied organizations for decades, they have focused primarily on relations within rather than between organizations. More recently, however, some researchers have studied relations between and among organizations. There still remains a level of analysis which has been relatively untouched: the overall community structure of interaction among organizations. Within this structure interdependent, interacting organizations exchange information, loan personnel or material, and perform mutual services. A necessary prerequisite for all types of interaction is communication. Therefore it is a basic process.

While many situations exist in which interaction among organizations occurs, disasters provide a particularly useful laboratory in which to study this general interaction process in greatly heightened form. Communities attempt to cope with the resulting physical and
social disruption and in the mass assault which follows, different
elements both within and outside the community — individuals, families,
ininformal groups, and organizations of all types and sizes — become in-
volved. Community organizations lose autonomy and become more interde-
pendent. Every organization lacks certain important resources such as
information, equipment, appropriate skills . . . to successfully meet
its objectives. Therefore, we find various degrees of coordination and,
therefore, communication among organizations during community
emergencies.4

What type of communication patterns exist among community organiza-
tions engaged in natural disasters? We are interested in such things
as: What organizations are involved? What organizations communicate
with which other organizations? What is the nature of the communication
links among organizations? Is the communication network confined prima-
arily to organizations within the community or is there considerable com-
munication across community boundaries? What are the similarities and
differences in communication patterns of various communities affected by
natural disasters?

What factors account for particular types of communication nets
during disasters? Data gathered by the Ohio State University Disaster
Research Center suggest many factors may account for the communication
patterns which emerge.5 We will look at only one of these factors — the
community's prior experience with disasters. It helps them to anticipate
the demands to be faced in future disasters by providing them with the
necessary cues to build into their structure an effective and efficient
response. We are interested in such questions as: Has the community
been impacted by natural disasters before? When? How often? Does the community have a disaster subculture? Does it have rehearsed disaster plans?

The research has both practical and theoretical importance. On the practical side, this information should aid those charged with disaster planning and/or coping with disaster-generated problems. The study should also add to the body of sociological knowledge on the community, complex organizations, and communication.

Theoretical Framework

Modern system's theory appears to be a useful framework within which to conceptualize interorganizational communication networks. According to the theory, a "system" is . . .

. . . a complex of elements or components directly or indirectly related in a causal network, such that each component is related to at least some others in a more or less stable way within any particular period of time.

In the present research, the "community" is synonymous with "system" and "organization" with "component." Therefore, the organized structure of a community is made up of a network(s) of interdependent heterogeneous interacting organizations. By "organization" we mean purposefully formed . . .

groups of individuals in which interaction is mediated and indirect (but not excluding the direct), of somewhat enduring continuity, falling in size between face-to-face clusters and the larger collectivities, such as cities, states, and societies.

As defined here, organizations may include complex organizations, offices, agencies, and emergent groups. Although the latter are
normally less complex and less permanent, they are discernible interaction systems possessing a structure and exist for a period of time during the emergency period.

A crucial aspect of the modern system perspective pertains to communication or information flow. "Communication" is the process through which an organization sends a signal or message over a channel to another organization and produces an effect.\textsuperscript{10} "Communication," used in this sense, becomes the total process; "channel" refers to the physical conditions allowing communication to take place;\textsuperscript{11} and "signal" or "message" refers to what is communicated.

Organizations, then, communicate with one another to solve the problems created by a disaster agent. If we shift the focus of attention from communication between any two given organizations to the total communication process among all organizations involved, we can then make more general statements about the community's organizational communication pattern. We will refer to this pattern as the community's communication network.

We intend to view this communications network in particular tasks in a specific community context under disaster conditions. "Disaster" has been used in several different ways in the literature referring to the agent\textsuperscript{12} itself, the physical damage, or the social disruption. Fritz opts for the latter by defining disaster as . . .

. . . an event, concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of a society, undergoes severe danger and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society is prevented.\textsuperscript{13}
If we substitute "community" for Fritz's "relatively self-sufficient subdivision of a society," his definition directly facilitates the discussion. Thus, a disaster agent causes or threatens to cause physical disruption to the community impairing routine functioning. The physical disruption may include deaths, injuries, destruction of property, disruption of community utilities and other services, and so on.

We refer to "community" not in the interactive sense, but rather in geographical terms of towns and cities. As such, it can be identified on maps and located by longitude and latitude.\textsuperscript{14}

Many functions or task areas may be undertaken during natural disasters including warning, pre-impact activity, search and rescue, care of casualties, emergency restoration of services, welfare, community order, and so on. In attempting to deal with each of these task areas, community organizations develop communication nets. "Communication net," in this context, is communication among all community level organizations for the purpose of solving problems pertaining to the various task areas listed above. The communication net encompasses both the organizations themselves and the communication links among them. Although where the system's boundary is drawn is somewhat arbitrary, it is consistent with actual behavior in most natural disasters in the United States since the initial response occurs at the community level, where even local sub-units of national organizations may have considerable local autonomy. The local community organizations become the elements of the system, while all non-local organizations engaged in any of the aforementioned tasks will be viewed as extra "community system" or part of the relevant environment.
Step One: Derivation of Tentative Hypotheses

The general research hypothesis is -- THE COMMUNITY'S COMMUNICATION NETWORK DURING NATURAL DISASTERS IS RELATED TO THE NATURE OF ITS PRIOR DISASTER EXPERIENCE. This relationship is outlined below.

FIGURE 1

RELATIONSHIP OF INDEPENDENT AND DEPENDENT VARIABLES TO BE STUDIED

<table>
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<th>Independent Variable</th>
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We will discuss the relationship between the major dependent and independent variables in three distinct steps. In step one we derive a number of tentative hypotheses. Step two is an intermediate step in which we seek documentary support for these hypotheses. Here we peruse the disaster literature for material supporting the tentative hypotheses. Step two is the subject of Chapter III. In step three we actually test a selected number of the tentative hypotheses. Step three is the subject of Chapter IV.

We will discuss the independent variable first, the dependent variable second. We expect the former, community's prior experience, to
affect the communication net. Although prior experience is actually a continuous variable, we will dichotomize it in the present study — prior experience and no prior experience. "Prior experience" refers to a community which has had either actual experience or has a disaster subculture similar to that of the disaster in question. By "actual experience," we mean the community has experienced a similar type of natural disaster at least twice in the last twenty years and at least once in the last five years.

In some ways the criteria for "actual experience" is quite arbitrary. There is nothing inherently sacred about the terms, twice, twenty, and five. On the other hand, it has been DRC's experience that "it takes more than one shot to make an impact." That is to say, a disaster which struck a community thirty years ago is likely to have very little effect on its response to a disaster today. So by requiring a community to have experienced at least two similar disasters in the last twenty years -- at least one of which occurred in the last five -- we can be better assured that the disasters will have had an impact on the community's interorganizational communication structure.

"Prior experience" includes not only actual experience but also it includes communities with disaster subcultures similar to that of the disaster in question. "Disaster subculture" refers to communities which are in specific disaster-prone areas and have developed norms, expectations, and patterned ways of dealing with potential threats. "For example, Cincinnati could be considered a flood subculture in that the city's organizations have incorporated into their operating procedures
ways of adapting to floods. For the same reason Miami can be referred to as a disaster subculture -- a hurricane subculture in this case.

We decided to treat a disaster subculture as having prior experience because existing in a disaster prone area might "give" a community the same quality of experience as if the community had actually been impacted by the disaster itself. For example, if the suburbs surrounding a large city were hit several times by tornadoes, it would not be surprising for the central city to take steps to build into its structure protective mechanisms for future disasters. This has actually happened in several places. Therefore we decided to include both actual prior experience and having a disaster subculture under the more general term, prior experience. Finally, "no prior experience" would apply to communities without either actual prior experience or a disaster subculture.

The dependent variables, which developed into the tentative hypotheses, were derived from several sources. Some of them came as a result of this researcher's firsthand knowledge of many of the communication problems facing community organizations during disasters. After consulting with other DRC staff members, a few more were added to the list bringing the grand total to twenty-three. Although we had undertaken no systematic studies in the area, it seemed to us that communication problems would be different for communities with prior experience than they would be for communities without prior experience. On the basis of this researcher's field experience, general knowledge of the
disaster literature, and conversations with other DRC staff members,
twenty-three hypotheses were developed which related community's
prior experience to its communication network.

For purposes of discussion each hypothesis is placed in one of the
following, intermediate categories: content, configuration, degree of
coordination, size, continuity, or level of message transaction.
"Content" refers to characteristics of messages (links) between organiza­
tions. The first nine hypotheses pertain to the content of messages.
On the other hand, "configuration" pertains to attributes of the organi­
zations themselves, rather than to the communication links between them.
Hypotheses 10-14 refer to the organizations themselves. "Degree of co­
ordination" refers to the number and length of communication links among
organizations. Hypotheses 15 and 16 fit under this category. "Size"
refers to the number of organizations, number of messages, and length
of messages which make up the communication net. Hypotheses 17-19 are
placed here. "Continuity" refers to the amount of carry-over in com­
munication patterns from pre-emergency times. Hypotheses 20-22 pertain
to continuity. Finally, "level of message transaction" pertains to the
point of entry of messages into the organization. Hypothesis 23 has been
placed here. These twenty-three hypotheses are listed below.

Content

HYPOTHESES 1. -- There will be less unnecessary duplication of
messages among organizations in communities with prior experience
than in communities without prior experience.

HYPOTHESES 2. -- There will be fewer misdirected messages among
organizations in communities with prior experience than in
communities without prior experience.
HYPOTHESIS 3. -- There will be fewer messages indicating one organization's lack of knowledge of other organizations' domains in communities with prior experience than in communities without prior experience.

HYPOTHESIS 4. -- There will be more adequate messages in communities with prior experience than in communities without prior experience.

HYPOTHESIS 5. -- The communication net will be less overloaded in communities with prior experience than in communities without prior experience.

HYPOTHESIS 6. -- More messages will deal with means to achieve emergency goals (rather than the goals themselves) among organizations in communities with prior experience than in communities without prior experience.

HYPOTHESIS 7. -- There will be more functional separation of communication among organizations in communities with prior experience than in communities without prior experience.

HYPOTHESIS 8. -- Communication will be more systematic, selective, and controlled in communities with prior experience than in communities without prior experience.

HYPOTHESIS 9. -- There will be more adequate information from the disaster site in communities with prior experience than in communities without prior experience.

Configuration

HYPOTHESIS 10. -- Fewer key organizations will be missing from the net in communities with prior experience than in communities without prior experience.

HYPOTHESIS 11. -- Fewer organization-sets will be present in communities with prior experience than in communities without prior experience.

HYPOTHESIS 12. -- Emergent groups will less likely be part of the communication net in communities with prior experience than in communities without prior experience.

HYPOTHESIS 13. -- Fewer extra-community organizations will be part of the communication net in communities with prior experience than in communities without prior experience.
HYPOTHESIS 14. -- A central communication center will be more likely to exist in communities with prior experience than in communities without prior experience.

Degree of Coordination

HYPOTHESIS 15. -- The communication net will have a greater number of links in communities with prior experience than in communities without prior experience.

HYPOTHESIS 16. -- The length of communication links will be shorter in communities with prior experience than in communities without prior experience.

Size

HYPOTHESIS 17. -- The communication net will contain more organizations in communities with prior experience than in communities without prior experience.

HYPOTHESIS 18. -- There will be more messages sent over the communication channels in communities with prior experience than in communities without prior experience.

HYPOTHESIS 19. -- Messages will be shorter in length in communities with prior experience than in communities without prior experience.

Continuity

HYPOTHESIS 20. -- Organizations will communicate with fewer new organizations in communities with prior experience than in communities without prior experience.

HYPOTHESIS 21. -- Organizations will communicate with a greater number of organizations of different type in communities with prior experience than in communities without prior experience.

HYPOTHESIS 22. -- Communication links will be less likely based on pre-existing friendships than on other criteria in communities with prior experience than in communities without prior experience.

Level of Message Transaction

HYPOTHESIS 23. -- A greater proportion of messages transmitted will be at lower levels among organizations in communities with prior experience than in communities without prior experience.
In this chapter we formulated the major problem of the study -- to analyze the relationship between a community's prior experience and its subsequent communication network during a disaster. In step one we presented twenty-three hypotheses. We now turn to Chapter II in which we will present the research designs used to analyze the hypotheses in steps two and three.
FOOTNOTES: Chapter I


3. This comment has been made by Robert C. Anderson, "A Sociometric Approach to the Analysis of Interorganizational Relationships" (Paper delivered at the annual meeting of the American Sociological Association, San Francisco, 1967).

4. Very little work in natural disasters has focused systematically on either communication or on interorganizational relationships, and research on communication among organizations in natural disasters is even bleaker. One of the major exceptions in communication in disaster is Harry B. Williams, "Communication in Community Disasters" (Ph.D. dissertation, University of North Carolina, 1956). A fairly extensive treatment of interorganizational relations in disasters can be found in William H. Form and Sigmund Nosow, *Community in Disaster*.

5. Data gathered by DRC has focused primarily on intraorganizational rather than interorganizational factors. In spite of this, however, the data do contain many observations on an interorganizational level.

6. The empirical usefulness of the various "system theories" has been questioned and oft times discarded because they could not be applied to empirical situations. The closed system model neglected the relations between the system under study and its environment -- structure and functioning. The open system proponents, on the other hand, saw the need for taking into account the relations between the system and its environment. Although the system was open externally, its openness did not extend into the system itself. It was viewed as adaptive, but stable, always straining for equilibrium and a more steady state. The emphasis was on the maintenance of a given structure. Change was neglected. Finally, the open system theorists emphasized concensus and
cooperative relations to the exclusion of deviance and conflict. Clearly, the difficulties with traditional system theories would have to be surmounted before the notion of systems could be applied to the study of organized behavior in disasters.

Modern system's theory overcomes many of the criticisms of the more traditional "closed" and "opened" system theories. In the modern system perspective, complex adaptive systems are also open "but they are open internally as well as externally in that the interchanges among their components may result in significant changes in the nature of the components themselves, with important consequences for the system as a whole." (Walter Buckely, "Society as a Complex Adaptive System," in Modern Systems Research for the Behavioral Scientist, ed. by Walter Buckley (Chicago: Aldine Publishing Company, 1968), p. 490. According to this model, structure of extra-community organizations, of organizations within the community, and of communities themselves change.


11. For instance, examples of channels would be radio or telephone networks among organizations; in face-to-face communication, the channel could be the air waves which carry the sound; or a channel could refer to a messenger sent by one organization to another. The channel does not determine the nature of the communication but it can either facilitate or limit the variety of choices available. For example, telephone communication is impossible between organizations if the telephone lines are down.

12. "Agent" refers to the natural element itself -- tornado, hurricane, earthquake, and so on.


CHAPTER II

THE RESEARCH DESIGN

Introduction

In this chapter we present the general design for examining the relationship between a community's prior experience and its emergency communication network. This is undertaken in three progressive steps. Step one, the derivation of twenty-three tentative hypotheses, has already been discussed in Chapter I. The object of step two is to seek support for these tentative hypotheses. This is accomplished in an ex post facto manner through analysis of existing data. Finally, the object of step three is to actually test a selected number of the tentative hypotheses. This is done using a cross-sectional design, analyzing data collected by this researcher. The hypotheses to be tested are chosen from the twenty-three tentative hypotheses on the basis of the results in step two of the study and on the limitations of the research design. The selection process is discussed later in the chapter. Throughout the study we confine our attention to natural disasters which have occurred in the United States. This alleviates many problems of control which are likely to be encountered when one attempts to lump U.S. and non-U.S. disasters together.
Step Two: Seeking Documentary Support from the Literature

The Research Approach

In step two, the intermediate step, we analyzed data gathered by DRC personnel as well as by others. Regarding the latter, the Center has abstracted 249 sources covering approximately 200 separate peacetime disasters. Each of these was examined through content analysis and where relevant material on the twenty-three hypotheses was found, it was abstracted and/or the original source was consulted.

The Disaster Research Center has collected data on approximately eighty community disasters both here in the United States and abroad. DRC has collected approximately 2,000 taped interviews of an intra-organizational nature with officials. Several interview guides have been used in the past to collect information. An outline of the major topics covered is found in Appendix B. From interview and other types of data, DRC staff members have written many reports and papers. Although most other researchers did not gather data specifically to test the tentative hypotheses, they did collect and report information pertaining to communication structure and process. In the present study each report and paper on domestic disasters was read and where data on the twenty-three variables was mentioned, the appropriate interviews were analyzed.

On many of the disasters, DRC maintains other supportive material. This includes exhaustive newspaper accounts, official reports, minutes of meetings, maps, tables of organization, and emergency operating
procedures. When either the reports or papers present material on 
interorganizational communication, the supportive data was consulted.

We analyzed the data in the following manner. When information was 
found in the literature on one of the variables of interest to us, it 
was noted under the appropriate hypothesis. When the analysis of the 
disaster literature and secondary sources had been completed, each hy­
pothesis was evaluated. Because of the lack of any control of the re­
search design by this researcher and because the original authors normal­
ly had not attempted to test our particular hypotheses, our evaluation 
was necessarily very rough. We classified the hypotheses in three cate­
gories: (1) those supported strongly, (2) those not supported strongly, 
and (3) those negatively supported. The results for each of the 
twenty-three hypotheses are presented in Chapter III.

Source of Data

We found reports on 28 natural disasters which presented data per­
taining to our hypotheses. In this chapter we will describe each 
emergency situation (case) in the following manner. First, each event 
is described briefly. Second the affected community is classified as 
having or not having had prior experience. To have prior experience, 
the community must have been either (1) impacted by a similar agent at 
least twice in the last 20 years and at least once in the last five 
years or (2) have a similar type disaster subculture.

Case #1. -- Earthquake, Bakersfield, California.3 At 3:41 p.m., 
August 22, 1952, an earthquake shook Bakersfield, California. Two
persons were killed, 32 were injured, and physical damage over 98 city blocks was several million dollars. The city had no prior experience.

Case #2. -- Tornado, Warner-Robins, Georgia. At 5:12 p.m., April 30, 1953, a tornado struck Warner-Robins, Georgia, killing 16-19 and injuring approximately 350. The city had no prior experience.

Case #3. -- Tornado, San Angelo, Texas. At 2:15 p.m., May 11, 1953, a tornado struck San Angelo, Texas, killing 10 and destroying 320 homes. Damage was estimated at $3,123,000. San Angelo, which lies in tornado alley, had developed an extensive disaster subculture. It maintained extensive, practiced, community-wide disaster plans for dealing with tornadoes. Therefore, the city is classified as having prior experience.

Case #4. -- Tornado, Waco, Texas. At 4:30 p.m., May 11, 1953, a tornado hit Waco, Texas, leaving 114 dead and 100 seriously injured. One hundred and fifty homes were totally destroyed, 250 had major damage, and 450 minor damage. Damage was estimated at $51 million. A tornado had never struck the city before. Despite the fact that Waco was in a disaster-prone area, it had not developed a disaster subculture at either the individual or organizational level. Therefore, Waco is considered as a community without prior experience.

Case #5. -- Tornado, Flint-Beecher, Michigan. At 8:25 p.m., June 8, 1953, a tornado raked Flint, Michigan, killing 116 and injuring 900-1,000. Six hundred ninety-six buildings were damaged or destroyed at an estimated cost of $10 million. A tornado had never struck the cities; therefore, they are classified as having no prior experience.
Case #6. -- Tornado, Worcester, Massachusetts. About 5:00 p.m., June 9, 1953, a tornado struck Worcester, Massachusetts, killing 66 and injuring 738. Physical damage was estimated at between $32-52 million. Worcester had no prior experience with tornadoes nor had a disaster subculture. Therefore it was classified as a community without prior experience.

Case #7. -- Tornado, Shrewsbury, Massachusetts. Just after 5:00 p.m., June 9, 1953, Shrewsbury, a residential suburb of Worcester, Massachusetts, was struck by a tornado. Six persons died and approximately 193 were injured. Damage was estimated at nine million dollars. The city had no prior experience and is classified as such.

Case #8. -- Flood, Eagle Pass-Piedras Negras (United States and Mexico, respectively.) Between June 27-30, 1954, the Rio Grande flooded vast areas in and around Eagle Pass, Texas, and Piedras Negras, Mexico. In Eagle Pass no one was killed and 360 were injured, damage was estimated at $3.6 million. Although the Rio Grande was subject to periodic flooding, nothing near the magnitude of the 1954 flood had ever hit the twin cities. In addition, neither community had developed a disaster subculture. Therefore, they are classified as having no prior experience.

Case #9. -- Coliseum Explosion, Indianapolis, Indiana. At 11:06 p.m., October 31, 1963, a violent explosion occurred during a "Holiday on Ice" show at the State Fairground Coliseum at Indianapolis, Indiana. Eighty-one persons were killed and 400 others were injured. The city had never experienced a disaster such as this; therefore it is classified as not having had prior experience.
Case #10. — The San Antonio Atomic Energy Commission Explosion. At approximately 10:24 a.m., November 13, 1963, an explosion occurred at the Medina Facility of the United States AEC near San Antonio, Texas. This was a case of a potential, rather than actual, disaster. A mushroom-shaped cloud rose over the Facility area, which many thought might be radioactive. No contamination from radioactive materials was found, however. The base or city had never experienced an emergency like this before; therefore it is classified as a community with no prior experience.

Case #11. — Fire in Nursing Home, Fitchville, Ohio. About 4:45 a.m., November 23, 1963, a fire broke out in the Golden Age Nursing Home in Fitchville, Ohio. Sixty-three patients were killed and 21 others were routed from their sleep. Only one other nursing home fire in the history of the country has resulted in more victims. The nursing home was a total loss. The community had never experienced a disaster of this type or magnitude before; therefore it is classified as having had no prior experience.

Case #12. — Dam Break, Los Angeles (Baldwin Hills), California. At approximately 3:38 p.m. December 14, 1963, a break occurred in the Baldwin Hills Dam in Los Angeles sending 292.4 million gallons of water into a one square mile residential and business area below. Only 5 people were killed and 27 injured, but damage to private and public property was estimated at several million dollars. The Los Angeles metropolitan area is one of the most disaster prone areas in the United States. To cope with the many and diversified emergencies which
occur, the city and county have developed extensive disaster plans which are practiced periodically. Therefore the city is classified as having had prior experience.

Case #13. -- Plant Explosion, Attleboro, Massachusetts. At 6:51 p.m. January 12, 1964, an explosion occurred in the Thompson Chemical Plant at Attleboro, Massachusetts. Seven died and approximately 40 others were injured. The city had never experienced a disaster such as this; therefore, it is classified as not having had prior experience.

Case #14. -- Flood, Cincinnati, Ohio. In March 1964 the Ohio River flooded large areas in and around Cincinnati, Ohio. There were no deaths or injuries. The city has experienced many floods in the past and has developed extensive disaster plans to cope with them; therefore, it is classified as having had prior experience.

Case #15. -- Earthquake, Anchorage, Alaska. At 5:36 p.m., March 27, 1964, an earthquake shook the city killing 7 and injuring about 50. Damaged were 157 non-residential buildings and 360 homes; 77 of the latter were totally destroyed. Anchorage had never been hit by an earthquake before; it is classified as having no prior experience.

Case #16. -- Seismic Wave, Crescent City, California. At midnight, 12:40 a.m., 1:20 a.m., and 1:45 a.m., March 28, 1964, Crescent City, California, was struck by seismic waves generated by a severe earthquake shock. At least 11 died, 24 were injured, and damage was extensive. The city had not experienced seismic waves such as this in the past twenty years. Despite the fact that this coast-city lies in an area prone to seismic waves, it had never developed a disaster subculture.
There was a notable absence of any sort of community-wide planning. Therefore, Crescent City is considered a city without prior experience.

Case #17. — Montana Flood. During the first half of June 1964, the Sun, Teton, and Marias Rivers flooded a large area of northwestern Montana. Although neither deaths nor injuries occurred in Great Falls, extensive flooding forced many to flee from their homes. As the city had had no extensive flooding in recent history, it is classified as having had no prior experience.

Case #18. — Hurricane Cleo, Miami, Florida. On August 26, 1964, Hurricane Cleo struck Miami, Florida. Cleo killed a total of 122 persons on her trek across the Caribbean; only six of these were on the U.S. mainland. Damage, however, was extensive; the Office of Emergency Planning estimated it at $115 million in Florida alone. The city has had extensive experience with hurricanes prior to 1964.

Case #19. — Tornado, Elkhart, Indiana. At approximately 6:00 p.m., April 11, 1965, a tornado struck Elkhart and surrounding areas, killing 49 and injuring hundreds. Destroyed were 66 farm buildings, 393 homes, and 42 mobile homes. Damage to private property alone was estimated at $5.5 million. The city had neither experienced a tornado in recent history nor developed a disaster subculture. Therefore, the community is classified as having had no prior experience.

Case #20. — Tornado, Marion, Indiana. At about 8:00 p.m., April 11, 1965, a tornado slashed across the south side of Marion, killing five persons, injuring over one-hundred, and causing millions of dollars in damage. Although the city had been impacted by a
tornado in 1956, it had not experienced one since then. Neither had Marion any semblance of a disaster subculture. Therefore, it is classified as having no prior experience.

Case #21. — Flood, St. Paul, Minnesota. In April 1965 Saint Paul, Minnesota, experienced its worst flood of the century. High waters of the Mississippi and Minnesota Rivers caused extensive property damage in the state estimated at over $23 million. Ten persons died. St. Paul has developed a definite disaster subculture both at the organizational and individual level; the city has experienced floods periodically in the past. Therefore, we will classify it as having prior experience.

Case #22. — Tornadoes, Minneapolis, Minnesota. Between 6:27 and 8:40 p.m. May 6, 1965, six separate tornadoes struck several Minneapolis, Minnesota suburbs. Thirteen died, 500 were injured, and property damage was estimated at $50 million. This city is being treated as having had prior experience for two reasons: First, the city did have disaster plans for dealing with tornadoes, but second and much more important was the fact the tornadoes hit just ten days after the area had been inundated by the greatest floods in the city's history. The flooding served as prior experience because the community, which had organized for the floods, had not de-mobilized when the tornadoes struck. Thus, it was "ready and waiting" for the tornadoes.

Case #23. — Hurricane Betsy — Flood, New Orleans, Louisiana. Just after midnight on Friday, September 10, 1965, Hurricane Betsy slammed into New Orleans, Louisiana. Much later the same day Betsy forced Lake Pontchartrain out of its banks flooding large areas
of the city. There were no deaths and relatively few injuries, but the physical damage was extensive. Over 18,000 homes received major damage and another 60,000 had minor damage. New Orleans has been hit periodically by hurricanes for which it has developed community-wide emergency plans which are practiced; therefore, it is classified as having prior experience.

Case #24. — Tornado, Jackson, Mississippi. At approximately 4:30 p.m., March 3, 1966, a tornado struck just outside Jackson, Mississippi. Twenty were killed and 300 were injured in the Jackson area alone. Major physical damage occurred at the Candlestick Park shopping center. Jackson had never before been struck by a tornado; therefore, it is classified as having had no prior experience.

Case #25. — Tornado, Topeka, Kansas. Shortly after 7:00 p.m., June 8, 1966, a tornado cut a swath through Topeka, Kansas, killing 17 and injuring approximately 550. Property damage was estimated at between $80-100 million. Although Topeka had never been struck by a tornado, it was in the highly tornado-prone "tornado alley." The city had developed extensive disaster plans for coping with such a disaster; therefore, it is classified as a community with prior experience.

Case #26. — The Great Snowstorms, Chicago, Illinois. On January 26-27, 1967, the city of Chicago and surrounding areas received 23 inches of snow during a 29-hour period. Six days later 5.5 inches more fell on the city, followed by another 8 inches four days later, bringing the total snowfall to 36.5 inches in just eleven days. This was the greatest amount of snow the city had ever received in such a short period of time. Forty-five died (most indirectly, however)
and there were no major injuries. The city's routine life was brought to a grinding halt with an estimated 50 million tons of snow blocking all transportation routes, many for two and three weeks. Chicago lies in a snow subculture; each year it must cope with heavy snow. Also it has developed community-wide emergency plans for dealing with it; therefore, we will classify it as having had prior experience.

Case #27. -- Flood, Fairbanks, Alaska. Between August 12-20, 1967, the Tanana River Valley of which Fairbanks is a part was inundated in greater magnitude than ever before. For the city, a flood of this magnitude was a new experience, and therefore it is classified as having no prior experience.

Case #28. -- Hurricane Beulah, Brownsville, Texas. Hurricane Beulah, the third largest in U.S. history, hit the Texas coast near Brownsville, Texas, on September 20, 1967. Subsequent heavy rains caused much flooding. Also many tornadoes spun off Beulah. In Texas, 11 died and numerous persons were injured. It was estimated that 300,000 persons fled their homes from the storms and flooding. Damage was estimated at $5.5 million in Texas and New Mexico. Texas gulf cities, such as Brownsville, had experienced many hurricanes in the past. Hence, it will be classified as having had prior experience.

Conclusion

Step two should not be construed as a test of the hypotheses. Rather, we are using the prior disaster literature on communication
to seek support for the twenty-three hypotheses. This will aid us in determining if these hypotheses have any basis in reality or if they are purely hypothetical. On the basis of our findings, we will test some or all of the twenty-three hypotheses.

Step Three: Analysis of Data to be Collected

The Research Approach

This step was designed entirely by this researcher and all data gathered and analyzed was done so either by him or under his direct supervision. It is part of a larger Disaster Research Center study of community coordination in natural disasters. Like the larger study, it will focus on interorganizational relationships -- especially communication -- in the many emergency task areas (i.e., warning, pre-impact activities, search and rescue, care of casualties, restoration of essential services, welfare, and community order).

The object here is to test a number of the tentative hypotheses which were analyzed in step two. Two separate criteria were used to select hypotheses to be tested in step three, the final stage of the study. The first prerequisite was that the hypotheses must be capable of being tested with this researcher's design.

A second criteria also had to be met before the tentative hypothesis would be selected for testing in step three. The results of step two were categorized as either showing strong positive support, moderate or weak positive support, lack of support, or negative support. All hypotheses which drew positive support from the disaster literature
would appear to have at least some basis in reality and therefore were considered for testing in step three of the study.

Regarding hypothesis which drew no support, a judgement would have to be made on the reason why they drew no support. If they were inadequately supported simply because the previous researcher had not addressed himself to those particular hypotheses in question, we would treat them in the same way we would treat hypotheses which were positively supported. That is, they would be considered for testing in step three. On the other hand, if the author did address himself to particular hypotheses and still found inadequate support, they would be dropped from further consideration for lack of any basis in empirical reality. For the same reason, hypotheses which were negatively supported would not be considered for further testing in the final step of the study.

Insofar as possible, we will attempt to apply certain principles of experimental design to our research in the field. Because it is practically, physically, legally, and ethically impossible for the researcher to either subject communities to natural disasters or to overtly control the relevant variables; we will accomplish the manipulation and control of relevant variables and parameters by selection. To this end, we first selected communities with prior experience as well as communities without. Second, the selected communities were similar on the major factors which could affect their communication networks in disasters. Finally, each community was impacted by similar disaster agents.
We have chosen to analyze communication nets in four communities in natural disasters; two communities which had prior experience and two which had not. Within the limits of choice available, we selected communities of similar types and in similar situations. The two cities with prior experience were Sioux Falls, South Dakota and Sioux City, Iowa; the two without prior experience were Minot, North Dakota and Glendora, California. The cities were all impacted by similar types of natural disasters in the spring of 1969, the first three by floods alone and the latter by floods and mudslides. The cities range from 31-100,000 in population. In choosing these particular cities, we are able to control for size of city, type of disaster and time of event.

Data Collection

The Disaster Research Center has a staff of approximately 20 professional field researchers (sociology faculty and graduate students). Field research teams ranging in size from two to five researchers are prepared to leave for any community emergency on two-hours notice. In the case of the four emergencies covered in the current study, DRC dispatched field teams immediately upon receiving word of flooding and mudslides. In each disaster DRC had field teams "on the scene" during the emergency period as well as a second time in the post-emergency period. Table 1 below shows the emergency periods in each of the four cities and the field trips conducted to each city.
To determine which organizations made up the emergency communication net(s) in each community, the "snowball" technique was used. Starting with an organization known to be involved, the researchers asked key informants to list other organizations involved in undertaking certain tasks as well as other organizations with which their own organization communicated. The organizations which appeared to be involved in a major way were contacted and, in turn, informants in that organization were asked the same questions. Eventually, we contacted all of the organizations which were involved in a major way in the emergency.

The primary method of data collection was taped interviews with organizational informants who were most likely to be aware of the form and content of the communication between their own organization and others. A formal interview schedule was developed to tap relevant aspects of both dependent and independent variables. Key informants
most often included the administrative head, operational head, and/or major communication or liaison personnel of the organization. The number of informants interviewed in each organization ranged from one to four, depending on the organization's size, complexity, and heterogeneity.

Several sources other than that taped by the interview guide were used. These sources were direct observations made by this and other DRC researchers during the emergency periods in the four cities, written documents on various aspects of the organization and community, logs and tapes, after-action reports, minutes of meetings, and the like.

In all, 44 organizations in the four cities were contacted and a total of 82 interviews with organizational and city officials were conducted. Table 2 shows the organizations contacted as well as the number of interviews in each organization. We will now turn our attention to the analysis of the data in step three.

Analysis of Data

The primary source of data used in testing the hypotheses was obtained from both formal and informal interviews. The data are qualitative being obtained from a relatively open-ended interview guide. Each field researcher was thoroughly familiar with the specific nature of the study, field procedures to be used, and
<table>
<thead>
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<td>Los Angeles County Road Department</td>
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<tr>
<td>Ward County Sheriff's Department</td>
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<tr>
<td>Ward County American Red Cross</td>
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<td>Ward County Commissioners</td>
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<td>Minot City Government</td>
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<tr>
<td>The National Guard</td>
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<td>KTYN Radio of Minot</td>
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<td>Northern State Power Company</td>
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Sioux Falls, South Dakota

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<td>The Salvation Army of Sioux Falls</td>
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**Sioux City, Iowa**

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<td>Sioux City City Government</td>
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<td>Sioux City American Red Cross</td>
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<td>Sioux City Public Service</td>
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<td>Sioux City Police Department</td>
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<tr>
<td>Sioux City Fire Department</td>
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<tr>
<td>Siouxland Interstate Metropolitan Planning Council</td>
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**Total Interviews** 82
questions to be asked. Each had extensive training in field work procedures relating to this study in a variety of other natural disasters. This was imperative if each researcher was to gather comparable data.

The data were analyzed in the following manner. First, each interview was read. Where data supporting (both positively and negatively) a hypothesis were found, they were recorded under the hypothesis in question. If the data support the hypothesis as it is stated, it will be judged positive; if the data support the converse of the hypotheses, it will be judged negative; if there was insufficient support to judge the hypothesis either positive or negative, it will be judged as having inadequate support.

No hypothesis was evaluated solely on one source of data. In each case several sources were sought to either confirm or negate the hypothesis to be tested. We now turn to a discussion of some of these other sources.

One major source came from the interviews with other organizational officials. An important check on the validity of one official's statements would be the statements made by other officials. If consistent information was received from all informants, we would be able to give much more credence to the validity of their responses than if they had given inconsistent answers to the researcher.

We used still another criterion in evaluating the evidence. It pertained to the physical and/or organizational location of the informant. For example, information from informants in a "better position to know" the situation was given greater weight in evaluating each hypothesis.
Thus, more credence would be given to what an official said who was present at the emergency operating center than to what an official said he had heard second-hand.

Another important source of information came from personal observations by DRC field team members. Because of their presence on-the-scene during the emergency period, they were able to observe organizations functioning in the field. These personal observations served as another validity check on interviewee responses. On-the-scene observation also served another function. It aided the researcher in questioning the informant in the interview situation by enabling him to probe much more adeptly.

Another very useful source of data was documentary material -- recent history of the city, newspapers, emergency period logs, written reports, minutes of meetings, organizational charts, disaster plans, and the like. This material was very useful in helping to fill in gaps concerning areas not covered in the interviews. For example, minutes of an interorganizational meeting uncovered communication among two organizations not obtained in the interview situation. One of the most important functions of the documentary material was that it provided the background material upon which the cities were matched.

When both interview and secondary source material had been collected and analyzed for each hypothesis, we had to make a judgement on how to classify each one: positive support, negative support, or insufficient data. The decision in each case was made on the basis of the criteria outlined above.
In this chapter we presented the general designs for examining data in steps two and three of the study. We now turn to Chapter III for a description and analysis of data obtained from previous disaster literature on communication among organizations.
FOOTNOTES: Chapter II

1. See Appendix A for the general guide used in abstracting previous disaster studies. For the actual abstracts refer to the Disaster Research Center, "Specific Disaster Literature Analysis," 2 vols., mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1967).

2. The Center has collected data in approximately eighty community disasters including earthquakes (in Japan, Alaska, Chile, Iran, El Salvador, and Greece), hurricanes (in Florida, Texas, and Louisiana), floods (in Italy, Iowa, Alaska, Montana, Texas, California, Ohio, Colorado, and Minnesota), mudslides (in California), as well as tornadoes (in Indiana, Iowa, Florida, Arkansas, Kansas, and Mississippi). Large explosions and fires, toxic incidents, destructive seismic waves and major dam breaks have also been studied in Australia, Italy, Canada, and different parts of the United States.


6. Ibid.


11. Thomas E. Drabek, Disaster in Aisle 13: A Case Study of the Coliseum Explosion at the Indiana State Fairgrounds, October 31, 1963 (Columbus: College of Administrative Science, The Ohio State University, 1968); Interviews with organizational officials.


13. William A. Anderson and E. L. Quarantelli, "A Description of Organizational Activities in Fitchville, Ohio Nursing Home Fire," Disaster Research Center Note, no. 8, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1964).


15. Daniel Yutzy, "Some Organizational and Community Activities after an Explosion at the Thompson Chemical Company, Attleboro, Massachusetts," Disaster Research Center Note, no. 2, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1964); Interviews with organizational officials.

16. William A. Anderson, "Some Observations on A Disaster Subculture: The Organizational Response of Cincinnati, Ohio to the 1964 Flood," Disaster Research Center Note, no. 2, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1965); Interviews with organizational officials.

18. Daniel Yutzy, "Aesop 1964: Contingencies Affecting the Issuing of Public Disaster Warnings at Crescent City, California," Disaster Research Center Note, no. 4, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1964); William A. Anderson, "Seismic Sea-Wave Warning in Crescent City, California, and Hilo, Hawaii," Disaster Research Center Research Report, no. 13, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1967).


20. Interviews with organizational officials.


22. Ibid.


29. George Jay Warheit, "The Impact of Major Emergencies."

30. Interviews with organizational officials.

31. The general manual describing the field procedures to be used, sources and types of data to be collected, and the interview guide used can be found at DRC. Disaster Research Center, "Community Coordination Field Manual," mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1968).

32. Chapin discusses various modifications of the ideal experimental design which are useful in the social sciences. The design we are following is closely related to Chapin's natural experiment. See F. S. Chapin, Experimental Designs in Sociological Research (New York: Harper and Row, 1947). It might be instructive to describe how the ideal experimental design should be applied in the field. This will allow us to recognize more fully the strengths and limitations of the design we will actually use.

1. Either randomly select or purposefully select two samples of communities. One sample would be designated as the experimental group, the other the control group. If we use the latter sampling technique (purposive sampling), we must be certain that the two samples are equal in all important aspect. In other words, we must match our samples on communities on all relevant variables and parameters (constants).

2. Control all environmental factors which might differentially affect the two samples.

3. Interject the independent variable (prior experience) into the experimental group of communities.

4. Then let both groups experience a similar type of disaster.

5. Measure the dependent variable (communities' communication network).

6. Other things being equal, any differences between experimental and control groups can be attributed to the former's prior experience.

33. In the current research, we are interested in organizational personnel as "informants" rather than as "respondents." We are concerned with organizational rather than individual characteristics.
34. See Appendix C for an outline of the major topics covered in the interview guide. Also Appendix D is a checklist-short answer form used by the researcher in summarizing responses to questions on the interview guide.
CHAPTER III

STEP TWO: DESCRIPTION AND ANALYSIS
OF PREVIOUS DISASTER LITERATURE

Introduction

The purpose of this chapter is twofold. First, it presents some of the empirical work in the literature pertaining to each of the twenty-three tentative hypotheses. It points out those relationships about which a great deal is known as well as those about which we know very little.

The second purpose of this chapter is to seek documentary support for the twenty-three hypotheses pertaining to the relationship of a community's prior experience to its communication network during an emergency. This was accomplished through the analysis of previous data on interorganizational communication in disasters. Data were found in twenty-eight disasters which pertained either directly or indirectly to the problem at hand. Ten of the communities met our criteria of having prior experience; eighteen did not.

The format to be used is as follows. First, a tentative hypothesis is stated. Second, each dependent variable is defined. Finally, data from the literature on disasters which illustrate the relative support for each of the hypotheses is presented. Not all data on communication among organizations will be discussed. Rather, we will
present findings illustrative of the characteristics of inter-
organizational communication within the particular community in
question.²

Tentative Hypotheses

Content

"Content" refers to characteristics of messages among organiza-
tions within the net or between organizations within the net and non-
net organizations and the general public. Nine hypotheses are advanced
in this category.

HYPOTHESIS 1. — THERE WILL BE LESS UNNECESSARY DUPLICATION OF MESSAGES
AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COM-
MUNITIES WITHOUT PRIOR EXPERIENCE.

By "unnecessary duplication" we refer to unnecessary replication
of information being passed along the communication channels. One
would expect that communities with prior experience would have much
less unnecessary duplication of messages during natural disasters.
One case gives some support for this statement.

Cities Without Prior Experience

Drabek found much unnecessary duplication during the 1963 Indiana-
polis Coliseum explosion. "Requests were often simultaneously dupli-
cated at several of the organizational headquarters."³ This resulted
in the duplication of some activities and neglect of others during the
immediate disaster response.⁴
Cities With Prior Experience

No data were found pertaining to this hypothesis from communities with prior experience.

In summary we were able to find very little information pertaining to unnecessary duplication of messages.

HYPOTHESIS 2. -- THERE WILL BE FEWER MISDIRECTED MESSAGES AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

By "misdirected messages" we mean messages that were sent to or arrived at the wrong destination. For example, one organization requesting information from another which was outside the latter's domain. An exaggerated hypothetical instance would be where an organization requests weather information from the local hospital. Clearly, such information lies outside the domain of hospitals.

Cities Without Prior Experience

Here we found confirming evidence in two previous disasters -- one community had prior experience; one did not. In Indianapolis, a city which had never experienced a major explosion and had no interorganizational plan for coping with disasters, there was a major explosion in 1963. Drabek found that requests were made to the police radio dispatcher for such items as mobile crane and cutting torches, equipment which they did not have.5

Cities With Prior Experience

On the other hand, in Cincinnati, which has had extensive experience with flood-fighting and had developed very adequate
interorganizational emergency plans, a flood resulted in a minimum of
misdirected messages. Everyone knew what everyone else was doing.6

Although positive, the data are relatively meager. Few re­
searchers appear to have addressed themselves to the problem of
misdirected messages among organizations in disaster.

HYPOTHESIS 3. -- THERE WILL BE FEWER MESSAGES INDICATING ONE ORGANI­
ZATION'S LACK OF KNOWLEDGE OF OTHER ORGANIZATIONS' DOMAINS IN COMMUNI­
TIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE

It is to be expected that in communities with prior experience,
organizations will be familiar with not only what to expect from the
physical disaster agent itself, but they will also accumulate know­
ledge about other disaster relevant organizations -- the latter's
material resources, population served, and services rendered.7 There­
fore, we would expect fewer messages being transmitted showing lack of
knowledge of organizational domains in communities with prior experience
than in those without prior experience.

Cities Without Prior Experience

In the previous literature the picture is clear and supportive of
the hypothesis. Data on seven disasters indicated a lack of under­
standing of other organizations' domains in communities without prior
experience. Bakst found in Worcester that "there was some misunder­
standing between Red Cross and Civil Defense authorities as to which
organization had jurisdiction over relief measures."8 Civil Defense
and Red Cross each had separate intraorganizational disaster plans and
each assumed it had overall responsibility for relief and welfare
activities.9 Rosow found the same to be true regarding social services
in the Flint-Beecher tornado. There existed a failure in communication among organizations and the general public as exhibited by their lack of knowledge of other organizations' domains. For example, "the people (as well as other organizations) who appealed for blood and bedding did not know that the Red Cross had sizeable stocks of both on hand and that chapter supervisors had arranged for extra blood to be delivered from other cities." One organizational informant stated that during the entire emergency period, "nobody knew what somebody else had already done, where anything was being done, or what else needed to be done."

In 1954 in Eagle Pass, Texas, which had never experienced a flood anywhere near the magnitude it did that year, political officials had little knowledge of what they could expect from different organizations. Consequently, there was much overlapping of organizational activities.

Data gathered by the Disaster Research Center also tends to support the hypothesis. This is most explicitly stated by Drabek regarding the 1963 Indianapolis Coliseum explosion. He found a great amount of indecision and confusion in attempts by certain organizations to ascertain what other organizations were doing and what resources other organizations might have. In many cases the role of key organizations remained ambiguous; the responsibilities of several emergency groups and Civil Defense never became fully clear. This was illustrated by the fact that:

a. The Fire Department had to be "reminded," or perhaps explicitly told of the willingness and ability of CD to locate special emergency equipment.
b. Similarly the Police Department was twice telephoned and asked if they needed any CD equipment.

c. Several hospitals were never officially notified of the disaster, by CD or by any other organization so specified by CD.

d. There was confusion as to which group would handle welfare inquiries, with an abortive attempt by the CD to locate this function at the command post.

e. Ambulance drivers did not follow the direction of the CD communications officer, suggesting that the coordinating function of CD was not recognized.

f. The County Coroner was relegated to an insignificant role in the CD disaster plans. However, under Indiana law the absolute authority resides with the Coroner in a disaster area where a death has occurred.¹²

A similar situation occurred with the Indianapolis Red Cross Chapter.

Other organizations were apparently uninformed as to Red Cross plans. Officers at the Police Department sent prospective blood donors directly to hospitals rather than to the chapter house. About 200 blankets were stored at Red Cross headquarters, those could have been quickly moved to the scene upon request by the fire department instead of ordering their men to "strip their beds" before going to the Coliseum.¹³

From their actions, it was evident that many organizations had little understanding of Red Cross standard operating procedures.

In the same way, Indianapolis hospitals had little knowledge of other organizations' needs and resources. They had need of certain types of information -- like how many victims they would receive. They did not know, however, which organization(s) had this information. Likewise, because hospitals did not know what other organizations were doing, the former did not know how or where they could be of most assistance.¹⁴
The Alaskan earthquake is illustrative of another instance where a community without prior experience had a marked lack of knowledge of other organizations' domains.

There were areas of ambiguity regarding which organizations had responsibility when different groups cooperated with one another. The nature of the formal relationship between CD and the local government was represented by the Mayor and the City Manager and not altogether clear (at least as the relationship was visualized on the scene in the immediate post-impact period). There also seemed to be some confusion over the degree of responsibility of different organizations engaging in similar non-routine tasks (e.g., which group had the authority to requisition emergency supplies, to issue official statements, etc.).

Other instances arose depicting the unclarity of the understanding of organizational domains and activities during the Alaskan earthquake. Quite often organizations just did not know what each other was doing. One hospital official explained, "the hospital didn't know what the CD was doing and CD didn't know what the hospital was doing." Similarly, it was very unclear during the early stages of the emergency period just which organizations were responsible for which tasks. For example, "it was unclear which organization should handle messages of inquiry as to the safety of people in the area; as a result, several organizations such as the Red Cross, The Salvation Army, local CD, and the mass media attempted to carry out this task."16

Similarly, in Attleboro, Massachusetts, after an explosion in a chemical company one key respondent stated that "no one knew what all other organizations were doing or not doing." The 1964 Great Falls, Montana flood also exhibited several instances of lack of knowledge of other organizations' domains. Because of this lack . . .
Several major sources of equipment and personnel remained virtually untapped during the emergency period. For instance, the City Garbage Department had men and trucks which would have been useful during the sandbagging and evacuation phase, but these resources were never used. The National Guard, which was in encampment close by, and which had its headquarters in the city, had personnel and equipment available for security and patrol activity. Although the local police were undermanned, given the size of the emerging security problem, the Guard was never asked to assist in patrol and security.17

Cities With Prior Experience

Data gathered by the Disaster Research Center in communities with prior experience are directly applicable to this hypothesis. The first was in the Los Angeles suburb of Baldwin Hills, California, where a dam broke sending 292.4 million gallons of water into the community. During the disaster the various emergency organizations, such as the Los Angeles police, were quite familiar with the responsibilities and activities of other organizations operating around them. Another instance can be illustrated in the interaction between the Red Cross and The Salvation Army. Because of past experience in working with each other, they were well aware of each others' domains.18

The second example of a community with prior experience is Cincinnati, Ohio, in operations during the 1964 flood. Anderson, in his report on the community, implicitly recognized the awareness on the part of one organization of the responsibilities of other organizations. This is evident in his usage of such phrases as . . .

flood operation procedures call for an agreed upon division of labor between such organizations as . . .
the activities of . . . these organizations are . . . patterned and predictable . . . and, as such, are an essential aspect of the experience and expectations of the organizations.19

In summary, data from nine communities are presented which pertain to one organization's knowledge of other organizations' domains. The data support the hypothesis quite strongly.

HYPOTHESIS 4. -- THERE WILL BE MORE ADEQUATE MESSAGES IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

By "adequate" we mean that messages will not be ambiguous, incorrect, or conflicting. We expect that community organizations which have had more prior experience will "know" the value of complete, concise, understandable, and correct messages and, therefore, will take all necessary steps to achieve this end. Williams supports this contention by stating that more errors will be made in emergency situations than under normal conditions because of the compressed time perspective in the former. Therefore errors will likely appear in the communication net. But, he goes on to say that knowledge, prior experience, and training will modify such a tendency.20 We interpret William's statements to mean that "to modify" is "to lessen" the number of errors which will be made. Data from eleven cases are relevant to this hypothesis.

Cities Without Prior Experience

Tornadoes struck two separate communities in 1953, neither of which had prior experience. In the first, which occurred in Warner, Georgia (Warner-Robins Tornado), relief and registration activities between groups were both inadequate and uncoordinated. For example,
lists compiled and disseminated by Red Cross and other organizations were incorrect. 21

Likewise, subsequent to a tornado which cut through Worcester, Massachusetts, lack of prior experience and pre-planning led to ambiguous communication among organizations. Two conflicting reports were disseminated to other organizations and the general public.

Within 24 hours of the disaster some of the local hospitals announced that they would send no hospital bills to any victim of the tornado. The newspapers then printed a statement that the Governor’s office had announced that the Commonwealth of Massachusetts would pay all such bills. These announcements were intended to be helpful, but they created a difficult administrative problem in arranging payment to the hospitals for the medical care provided the victims of the tornado. 22

In a third example, during the 1954 Eagle Pass-Piedras Negras flood Clifford found that the Eagle Pass fire department received conflicting and inadequate orders. 23

Data gathered by DRC illustrates numerous cases in which communities without prior experience have had communication problems with conflicting, inadequate, ambiguous, or incorrect messages. One of the most notable is Drabek’s analysis of the 1963 Indianapolis Coliseum explosion in which he notes numerous instances of misinformation being disseminated among organizations and to the general public. For example, information to and from local hospitals was inadequate and often incorrect. Police headquarters informed persons that victims had been taken to one hospital when in fact they had been taken to another; doctors and nurses were asked to go to hospitals where they were not needed; and much misinformation concerning hospital activities and needs was given to organizations and relatives of victims. 24
In general, many organizations in Indianapolis were giving out information inconsistent with that being given out by others.

The poor communication system between the police and other groups intensified as well as created intra- and inter-organizational difficulties. Questions could not be answered, the giving of incorrect information was almost unavoidable and mass personal convergence was generated. Many of these problems would have been less serious if there had been an adequate two-way information flow between the police and other organizations.\textsuperscript{25}

During the 1964 Alaskan earthquake many respondents reported instances of false information being disseminated by various organizations. Radio stations would often broadcast conflicting information because Civil Defense would say one thing and the U.S. Army would negate it and vice versa. As one organizational official put it:

There were some problems present when local radio stations would announce things and say they came from the office of Civil Defense. In several instances, these announcements were incorrect or gross exaggeration of the facts. This was solved when a man came to the aid of the (CD) director. This man was manager of one of the local (radio) stations.\textsuperscript{26}

In the 1963 explosion which occurred at the Medina Atomic Energy Commission Base, San Antonio, Texas, initially "one radio station reported that it was probable that a nuclear reactor had blown up."\textsuperscript{27} While an explosion had occurred, no nuclear reactor was involved and therefore no contamination was present.

In the 1964 Great Falls, Montana Flood much conflicting and inaccurate information was, at times, sent to various organizations or released to the public.

In another instance, Yutzy reported that . . .

. . . police officers reported that a representative of the Corps of Engineers had said two key bridges were in danger of collapse. The bridges were closed while the
Civic Center headquarters sought confirmation. When neither CD nor the Corps could confirm the report, The City Engineer's office asked that traffic be resumed. 28

Anderson found during a seismic sea-wave warning in Crescent City, California, that much information being passed along communication channels was ambiguous, inadequate, improperly worded, or incomplete. The community received almost simultaneously, bulletins which appeared conflicting. The California Disaster Office said "this is not a tidal wave warning . . . it is still not known that a wave has been generated." This release was followed immediately by the U.S. Coast and Geodetic Survey indicating "the probability of a tidal wave warning; a wave has been generated." 29

Communication problems of this sort also existed during the 1965 Palm Sunday tornadoes in Indiana. In both Elkhart and Marion, several emergency organizations and the general public received inadequate information upon which to act. The distinction which the Weather Bureau made between a "tornado forecast" and "tornado warning" was not clear to anyone (including radio and TV stations) except its own personnel. The radio and TV stations, especially the latter, amplified the ambiguity further when they interrupted their broadcasts to announce a supposedly dangerous situation, and then quietly resumed normal broadcasting -- considerably diminishing the intended impact of the warning message. 30

One of the major problems encountered by organizations during the 1966 Jackson, Mississippi tornado was the passage of incorrect information along communication channels, some of which stemmed from the
local mass media. In one instance, the administrative assistant of one hospital requested a local TV station to announce that the less severely injured go to one of the other hospitals in the city. Instead the station announced that the hospital was full, could handle no more patients, and that no more victims should be brought in for treatment. No hospital, however, was ever filled to capacity.31

In another instance the major hospital in Jackson did receive information from ambulance drivers and others, but their reports consisted of gross exaggerations of the actual situation -- estimates which turned out to be extremely high (e.g., statements were made that as many as another 100 persons would be found in the wreckage at the shopping center, when, in fact, very few were found.32

Cities With Prior Experience

During the Minneapolis tornadoes community organizations had minimal problems in communicating correct information among themselves. Also, one radio station in the city was able to broadcast very accurate and adequate information to the general public. By jettisoning all its regular programs and going to nothing but coverage of the tornado, the station clearly impressed listeners that this was a special situation, that the warnings were not the "usual" announcements of severe weather. The unusual action of this and a few other stations greatly reinforced the alerting occasioned by the sirens and the initial broadcasted warning statement of the weather bureau. To the extent that the mass media needs or intends to convey the notion
of an emergency, it can very effectively do so by itself operating in a manner clearly confirming the unusualness of the situation.

In summary, data from twelve communities are presented which pertain to conflicting, inadequate, ambiguous, or incorrect messages among organizations. In general, communities with prior experience have fewer of these types of communication problems than do communities without prior experience.

HYPOTHESIS 5. -- THE COMMUNICATION NET WILL BE LESS OVERLOADED IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

By "overloaded" we mean that the channels of communication among organizations or between organizations and the public have become so jammed that the organizations have difficulty receiving or sending information. Mere convergence on the phone may be insufficient to indicate an overloaded condition. We would expect communities with prior experience to have developed ways of coping with overloading on telephones through the use of direct phone lines, unlisted numbers, radios, and the like. As Williams suggested earlier, overloaded physical communication facilities can be expected, especially where the community has no prior experience. Fritz has also found this type of communication overloading in almost all disasters studied.33

Cities Without Prior Experience

In the Worcester tornado, Bakst found that telephone communication was inadequate, and it seemed reasonable to assume that the telephone system could not bear the major load of communication in a
similar disaster elsewhere. In the same city, Rosow found that the phones became so overloaded the local civil defense actions were greatly hindered.

Personnel of the Disaster Research Center have found many instances where channels of communication have been greatly overloaded in communities without prior experience. Drabek found overloaded communication facilities hindered the community's response during the Indianapolis Coliseum explosion.

Informational convergence on telephones seriously interfered with interorganizational communication. Normal telephone lines into most emergency organizations were overloaded with calls by non-organizational persons. The point here is the implications for organizational functioning. Telephone lines (became) sufficiently saturated through public responses so as to make them relatively useless for inter-organizational purposes. Alternative means of communication using different modes are probably more useful (for interorganizational use).

For instance he found that the fire department was overloaded and unable to give out adequate information. Second, he found that

Lack of a communication system between local hospitals contributed to an overload of their communication facilities. The consequence was a massive traffic of telephone calls which soon overloaded the existing outside communication facilities of the institutions.

Haas found that immediately after the Medina Atomic Energy Commission Base explosion communication lines became so jammed that it became impossible for Base officials to notify responsible city officials. Similarly, Yutzy found that during the Attleboro, Massachusetts chemical plant explosion many emergency organizations were
unable to communicate with each other due to the convergence of incoming calls on telephone lines.$^{39}$

During the Great Falls, Montana flood, overloading severely impaired the community's response to the disaster.

Telephone activity increased . . . as the flood crest approached. Overloading became so acute that at 9:15 p.m. an urgent appeal was made to the "general public" to limit the use of telephones. . . . Organizational personnel found it difficult to place important calls without undergoing considerable delay.$^{40}$

This became especially problematic between two key emergency organizations -- Civil Defense and the city engineering department.

Convergence on the lines of communication was also problematic during the Palm Sunday tornadoes in Indiana. This was especially true of cities in the Elkhart area.

Convergence of messages on the telephone made it impossible for some organizations to contact particular parties to relay pertinent information to them. Thus, the South Bend Weather Bureau finally issued a bulletin to all broadcasting stations urging them to "ask people not to call the Weather Bureau unless they have weather to report. We have had numerous poor joke calls and they tie up the lines."$^{41}$

Similarly, communication convergence existed during the Jackson, Mississippi tornado, but with different consequences.

Starting around 5 p.m., and for about an hour thereafter, phone communication into and out of the hospital was very difficult. Telephone lines were jammed not only because of the calls at the hospital but also as a result of the large increase in calls in the Jackson metropolitan area.

(However), at least from an organizational viewpoint, there is no evidence that important information or inquiries failed to get through.$^{42}$

Jackson, Mississippi is the only case analyzed in which convergence along communication lines in a community without prior experience
did not seem to impair organizational functioning. The data was insufficient to explain why this particular case runs counter to other DRC findings and our expectations.

Cities With Prior Experience

Organizations in Baldwin Hills were able to alleviate much of the overloading on the lines of communication during the emergency period. Anderson relates the unique manner in which this was accomplished.

The CD organization from Paramount, a city located in the Los Angeles area, established a much needed communication system through its headquarters in Paramount and mobile communication posts stationed around the disaster area. Through this radio system, information concerning the safety and plans of evacuees was relayed to concerned friends and relatives. At the request of evacuees, radio messages were even sent free of charge to friends and relatives living in other cities. This had the effect of reducing the load on telephone exchanges in Los Angeles.43

In summary, data from seven communities are presented which pertain to overloaded interorganizational communication nets. Generally, communities with prior experience have less overloaded channels of communication than communities without prior experience.

HYPOTHESIS 6. -- MORE MESSAGES WILL DEAL WITH MEANS TO ACHIEVE EMERGENCY GOALS (RATHER THAN THE GOALS THEMSELVES) AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Here, "goals" refer to what has to be done, whereas "means to achieve goals" refer to how the goals are to be achieved and by whom. We expect communities with prior experience to know what goals are to be achieved; they often know what has to be done. If such is the case in natural disasters, we would expect much of the communication on
the nets in communities without prior experience to contain "goal-related" rather than "means-related" information.

Cities Without Prior Experience

Very little data were found pertaining to this hypothesis. The one instance was the Alaskan earthquake in 1964. Typical responses made by organizational officials included "The city didn't know what to do;" "a meeting was held to decide goals;" and "the first problem encountered was the agreement of final authority on a pass system."

Cities With Prior Experience

No data were found pertaining to the means-goals problem. In general, there appears little in the disaster literature to either support or refute the tentative hypothesis.

HYPOTHESIS 7.-- THERE WILL BE MORE FUNCTIONAL SEPARATION OF COMMUNICATION AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

By "functional separation" we mean that the communication nets will be specialized or that certain types of information will be kept isolated or separate from other types. Lack of "functional separation," then, would be an undifferentiated net.

An infinite number of types of symbolic functional separation could be innumerated in disasters but some types which have been described in the literature appear more relevant than others. At least four general types of communication nets are found during the emergency period: (1) public information net, (2) routine communication net, (3) rehabilitation net, and (4) emergency operations net. The latter, in turn, can be broken down more finely into warning,
pre-impact, search and rescue, care of casualties, restoration of essential services, welfare, community order, and the like. In communities with prior experience, we would expect to find greater differentiation because they have found it to be more efficient and effective in the solution of disaster-related problems.

Functional separation, in turn, can be achieved in one of two ways. First, it can be accomplished through the use of one communication net but through either multiple channels among organizations or through just one channel but is somehow separated at the transmitting or receiving points. For example, a community may have only one net but yet be able to isolate, keep separate, and disseminate public information, routine communication, and the like. The second way in which communities can separate the different types of communication is by setting up more than one net or subnets. An example of this type would be one in which certain organizations (or segments thereof) were assigned certain tasks while others were assigned other tasks. For instance, Salvation Army, Red Cross, and the Seventh Day Adventists might be elements of the welfare net, while the fire department, police department, and civil air patrol might be the elements of the search and rescue net.

Cities Without Prior Experience

DRC has found several instances where communities without prior experience have had little or no differentiation of the four types of functional separation discussed above. Drabek found that during the Indianapolis Coliseum explosion there was no separation of public
information and emergency operations information. This resulted in members of the press often getting in the way of policemen when the latter were attempting to undertake emergency tasks. Finally, the situation became so intolerable that the members of the mass media were forced out of the disaster area.44

Likewise, because of no central control during the Alaskan earthquake, there was poor functional separation of the various types of communication. During the Great Falls, Montana floods, Yutzy found no separation initially between public information and general emergency operation communication.45

Cities With Prior Experience

In two communities with prior experience -- the 1967 Chicago snowstorm and the 1965 St. Paul flood -- several instances of functional separation were evident. Soon after it became apparent that Chicago was in the middle of a full-fledged emergency, three separate communication-coordination centers were set up. The snow command was the primary operational headquarters set up to deal with the immediate technical-operational problems posed by the heavy snow. Its primary function was the dispatching and coordinating of emergency resources and equipment. A second center was set up in city hall to deal with "administrative matters and secondary problems created by the blocked streets." Finally, another center was set up in city hall to receive requests from and to disseminate information and policy to the general public.46
St. Paul also has a long history of fighting natural disasters — namely flooding along the Minnesota and Mississippi Rivers. Immediately when the flood threat became imminent, at least three discernible communication-coordination nets were set into motion according to plan. First, the city isolated public information from emergency operational communication. The operational head of the city's emergency response announced via the mass media that . . .

THE CIVIL DEFENSE FLOOD INFORMATION CENTER WILL ANSWER ALL QUESTIONS CONCERNING THE FLOOD OPERATIONS AS FAR AS THE TAXPAYER, PRESS, OR ANY OTHER INTERESTED PARTIES ARE CONCERNED. PLEASE FUNNEL ALL QUESTIONS TO THEM. ONLY OPERATING PERSONNEL AND PEOPLE HAVING TO DO WITH THE ACTUAL FLOOD CONTROL WORK SHOULD BE CALLING THE (city's emergency organizations). 47

In turn the information center advised the mass media and public of the current status of the flooding and what precautions the public should take. This procedure allowed operational personnel to focus on solving the technical problems uninterrupted by nonoperational problems.

Two other communication nets were clearly in evidence during the emergency period. One net consisted of those organizations "concerned with the immediate problems of averting the flood" while the other net contained those organizations that were concerned with either what to do if the flood could not be averted or what had to be done when the flood waters receded. "This division of labor (functional separation) worked out particularly well; operational personnel engaged in flood control were required to spend minimal time" communicating and coordinating with organizations concerned with emergency, but non-flood control problems. 48
In summary, data from nine communities are presented which pertain to the functional separation of communication among organizations. In general, the evidence positively supports the tentative hypothesis.

HYPOTHESIS 8. -- COMMUNICATION WILL BE MORE SYSTEMATIC, SELECTIVE, AND CONTROLLED IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

By "systematic, selective, and controlled," we mean that the information being passed along the channels was relevant and concise; there was minimal extraneous information; it was generally more clear; and it evoked the response intended by the transmitter. In many ways, this hypothesis (#8) overlaps hypothesis #7; information which is functionally separated is more often systematic, selective, and controlled. But the emphasis here is slightly different. We would expect that communities with prior experience would have learned that the more selective and systematic the information they transmit, the more apt they are to solve disaster-related problems.

Cities Without Prior Experience

During the Alaskan earthquake several organizational officials noted that there was "no effective central clearing house" for information, that it was handled very unsystematically. In another instance Yutzy discovered that information between the net and the general public was not controlled, systematic, or selective but rather it consisted of mass requests of various kinds over radio and TV. In Great Falls an instance of this ... can be seen in the response of CD to the surge of calls for rescue which came to them (from the public and other
organizations) late Tuesday evening. They issued a public call for all available boats and crews to report to a specific staging area and to be ready for rescue work. The response was quick and extensive, but also served to accentuate the already severe traffic tie-up.49

Cities With Prior Experience

Rosow noted that in San Angelo, Texas, communication was systematic and selective. Messages flowed rapidly and smoothly through pre-arranged channels.50

Although the data are positive, they are rather meager. This author was able to find information on systematic communications in only three of the twenty-eight disasters.

HYPOTHESIS 9. -- THERE WILL BE MORE ADEQUATE INFORMATION FROM THE DISASTER SITE IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

This hypothesis is similar to #4. There are two types of adequate communication: (1) within the net and (2) inputs entering the net. Hypothesis #4 was concerned with the adequacy of information among organizations within the net while hypothesis #9 is concerned with the adequacy of information into the net from the disaster site.

"Information from the disaster site" is self explanatory; it refers to the adequacy of the information from the field into the net describing a certain state of affairs at the disaster site. Information can be fed into the net in several different ways. First, field units of certain organizations may receive and feed information about the physical disaster and demands up through their own organization and into the net. For example a police officer sights a tornado, radios this information to the police communication center, which in turn
notifies other organizations. Second, organizations, groups, or individuals outside the net may notify a "net organization." For instance, an individual in the disaster stricken area calls the fire department to tell them that a large fire has just broken out in an apartment house. A third situation can exist where some of the organizations in the net are receiving adequate information while others are not. An instance of this would be a case in which the public utilities and public works department receive adequate information from the field but fail to relay it to other emergency organizations.

Cities Without Prior Experience

Lack of adequate information from the field in communities without prior experience is much in evidence in the disaster literature. During the Flint-Beecher tornado . . .

the command post did not bridge a gap between a comprehensive level and the activities on the ground. A breach remained between strategic leaders and those working in the field. This inadequate contact between headquarters and ground inevitably set limits on the leaders' knowledge of the field situation and their ability to coordinate activities.51

... nobody had a comprehensive picture of the overall situation or knew the limits of the stricken area. ... one of the volunteer fire departments working in the eastern end of the stricken area surveyed a part of that section about an hour after the tornado. But this limited information was not disseminated, either then or later, and was not incorporated into a comprehensive picture of the emergency by any of the potential leadership groups.52

Likewise in the Worcester tornado, many organizations received inadequate information from the field. They had knowledge neither
of what other organizations were doing nor the general scope of the disaster. This was especially true of Civil Defense, which according to the organizational chart was to provide overall leadership and coordination. "They had no comprehensive picture of the field situation or how their activities were related to it."

CD had only superficial knowledge of the location and extent of the emergency.

Fragmentary reports began to filter into headquarters about one and a half to two hours after the tornado. These were mainly impressions about the field from occasional volunteers who returned to the office. During the period when most of the help was dispatched, Civil Defense operated almost completely without specific information.

There were two immediate causes of the agency's severe isolation from events: (1) Civil Defense had no direct communication with the field nor systematic contact with any other operating agency; (2) Civil Defense headquarters was serviced by only two telephones, and this created almost a complete communications impasse.

In addition, Civil Defense -- an organization often charged with taking inventory of the field situation in disasters -- "did nothing to get survey information. It neither had a survey team in the field, nor sought such information from other operating agencies."

Data collected by the Disaster Research Center also show that one of the major problems during the emergency is the inadequate flow of information from the field. In Indianapolis, many key organizations received a paucity of information from the field. Police officers didn't have . . .

sufficient information to judge adequately what was needed (at the disaster site); they knew only that an explosion had occurred. Therefore, no discrimination was possible as to whether or not a particular piece of equipment, volunteer, etc., could be used at the
Having only an inadequate informational feedback from the disaster site itself, there was little that Police Headquarters could do to direct and slow the mobilization of other organizations and individuals in the area.56

The Fire Department experienced similar problems of inadequate information from the disaster site.57

Similarly, according to one hospital administrator, communication between hospitals and the scene of the disaster was non-existent.

Since most of the hospitals received no official word about the disaster, even after they had implemented their emergency plans, they remained uncertain about how many victims might be dispatched to them. . . . In general, hospitals had difficulties in obtaining feedback from the disaster scene or in learning what other organizations were actually doing.58

Inadequate information was problematic for the major emergency organizations in the Medina Atomic Energy Commission Base explosion. As a result of overloading of telephone lines and no alternate means of communication "responsible local officials had no way of knowing . . . whether or not there was danger to the surrounding population or if assistance was needed on the base itself."59 As a result much time was lost.

Likewise, hospital officials in Attleboro couldn't ascertain what type and amount of medical supplies and services were required because they were unable to obtain information whether directly from the field or indirectly from organizations that had the necessary information.60

Data from the 1964 Alaskan earthquake indicate that emergency organizations in Anchorage had little information concerning the field situation.
Initial information about the extensiveness of damage (from the Alaskan earthquake) was severely hampered by lack of communication from the impacted areas. For a considerable length of time after the earthquake, no one possessed verified information about the total extent of the damage.61

During the Jackson, Mississippi tornado, there was an initial lack of communication from the disaster area to emergency organizations; this was especially true of the hospitals. The first information from the field came when the first two casualties arrived unexpectedly at the city's major hospital. In fact no direct contact was ever established with any emergency organization or agency at the scene of the disaster. This lack of feedback from the field "meant that the hospital had no idea of how many cases to expect or when they might arrive."62

Cities With Prior Experience

Only one instance of insufficient knowledge of the field situation was reported by an official in the Los Angeles police department during the Baldwin Hills Dam Break. He felt that the water and power company had not kept the police posted on what the former was doing regarding the dam. But in general, organizational officials interviewed shortly after the emergency indicated no such lack of knowledge from the disaster site. On the contrary, the major emergency organizations had units in the field shortly after impact and they funneled information on emergency conditions to the emergency communication center in the Los Angeles police building shortly after.

During the 1965 Minnesota floods, emergency organizations in St. Paul kept a close inventory of flood levels and channeled this
information very effectively to all emergency organizations. The Minnesota State Civil Defense, with the help of local CD units, the Corps of Engineers, and survey units of local DPW's, depicts how an organization in a disaster subculture was able to gather data from the disaster site (i.e. flooded areas) and transmit the information to the mass media and all other relevant emergency organizations. In order to accomplish this most efficiently, state Civil Defense kept up-to-date, detailed logs on the field situation.

In the same city, emergency organizations held periodic meetings throughout the flood threat, whereby organizational officials returning from the field would report flooding conditions and requests for needed equipment and skilled persons on the dike. Relevant information was then passed on to other organizations not present at the meetings and to the mass media for dissemination to the general public.

In summary, data from nine communities are presented which pertain to the adequacy of information from the disaster site. The data overwhelmingly support the tentative hypothesis advanced here.

Configuration

Whereas "content" refers to characteristics of the messages among organizations, "configuration" refers to the organizations themselves. Five hypotheses based on the configuration of the net are presented here.

HYPOTHESIS 10. -- FEWER KEY ORGANIZATIONS WILL BE MISSING FROM THE NET IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.
By "key organizations," we mean that either (1) organizations officially assigned to a specified domain were absent or (2) organizations with crucial resources and skills were not functioning in the disaster. An example of the first type would be where the community disaster plan designates the city manager as operation head of emergency organizations, but for some reason he does not perform that function. An instance of the latter would exist where cranes and bulldozers were badly needed but a construction company possessing these resources was either not asked for or declined to use them.

Cities Without Prior Experience

We found evidence concerning missing organizations in two cities which had no prior experience. Rosow noted the lack of participation of Civil Defense in the Worcester tornado. "Notably missing from the picture of overall leadership is the Civil Defense." In Indianapolis the coroner was not notified initially of the coliseum explosion in spite of the fact that Indiana law requires the coroner to be in charge of any situation where there are deaths. In the same disaster, although hospitals were supposed to be some of the first organizations to be notified according to the CD disaster plan and although their resources and skills were crucial, several of them were never officially notified of the disaster by CD or any other organization.

Cities With Prior Experience

No data were found pertaining to the absence of key organizations from the communication net during a disaster. In summary, the data
supporting this hypothesis -- in both communities with and without prior experience -- are quite meager.

HYPOTHESIS 11. FEWER ORGANIZATION SETS WILL BE PRESENT IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

The concept organization-set is analogous to Merton's role-set. In the organization-set, organizations substitute for individual positions. The organization which is the point of reference is called the focal organization and its organization-set is evidenced by: (1) the existence of boundary personnel who have relationships with personnel in other organizations, (2) the flow of products and services from one organization to another, (3) the flow of information from one to another, and (4) the flow of personnel from one to another.

Of greatest relevance here is the third point referring to the flow of information among organizations. We expect to find that organizations without prior experience communicate with other organizations "like" themselves either because they have similar domains or because they have communicated with them prior to the emergency. For example police organizations such as local police, sheriff, and highway patrol have similar functions and therefore are used to communicating with each other. Similarly, hospitals communicate with other hospitals, and utilities and departments of public works tend to communicate with each other during normal times. Hence, in communities without prior experience we would expect organizations to continue to communicate with other organizations "like" themselves during a disaster. We would not expect to find a synthetic organization developing in the initial stages of emergencies in communities with no prior experience. On the other hand, in communities with prior experience we might expect a more
integrated effort with organizations of different functional type communicating with each other. In this case we would expect to find a synthetic organization developing earlier in the emergency period.

Cities Without Prior Experience

Data from the Flint-Beecher tornado is illustrative of who communicates with whom during emergency periods. This applies equally at both the individual and organizational level. Here we are interested only in the latter. Rosow lists community membership, organizational affiliation, official status, informal influence, and occupational identity as the most relevant factors affecting who communicates with whom. Of these, occupational identity was the strongest single orienting principle; hospitals look to other hospitals; sheriffs offer to help other sheriffs' offices, and so on. He generalized from occupational identity to what might be called occupational type in the Flint-Beecher tornado. Police-type organizations such as state police, sheriff, and city police worked more closely with each other than they did with "civilian agencies."

Cities With Prior Experience

The Disaster Research Center has found evidence of the synthetic organization, and hence, fewer organization-sets, occurring in communities. These developed during the 1965 St. Paul flood, the 1967 Chicago snowstorm, and the 1967 Hurricane Beulah in Texas.

Although the empirical work on either organization-set or synthetic organization has been minimal, the data indicate in a positive but
weak fashion that a greater number of organization-sets will arise in communities without prior experience.

**HYPOTHESIS 12.** -- **EMERGENT GROUPS WILL LESS LIKELY BE PART OF COMMUNICATION NETS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.**

By emergent group we mean new structures which engage in new emergency tasks. Dynes and Quarantelli describe them as having...

...no predisaster existence and when the emergency is over they generally tend to dissolve. They also are often relatively small groups, usually bear no name, and typically do not develop any clear-cut boundaries. Yet, they do emerge in large-scale disasters, are treated by outsiders and members as if they were entities, and play a very important role in the overall collective response.™

We expect fewer emergent groups in communities with prior experience because these communities will know more about what types of demands to expect, and therefore will be more apt to incorporate adapting mechanisms into the structures of the ongoing organizations rather than leaving a void during emergencies for emergent organizations to fill.

**Cities Without Prior Experience**

Two major types of groups emerged in communities without prior experience: coordinating groups and smaller search and rescue groups. Coordinating groups emerged in several disasters. Rosow noted that an ad hoc disaster committee of the city government developed in Worcester very early in the emergency period.™ In the 1953 Waco tornado, Moore described the emergency of the Central Control Committee to coordinate organizations throughout the crisis.™ Likewise, during the Great
Falls, Montana flood, a central emergency coordinating group composed of top city and county officials emerged.\(^73\)

The disaster literature also points out the emergence of smaller groups; most often these are charged with search and rescue early in the emergency period. These groups were present during the Eagle Pass flood,\(^74\) the Flint-Beecher tornado,\(^75\) and the Alaskan earthquake.\(^76\)

Cities With Prior Experience

Only one case of emergence was reported in communities with prior experience. Zurcher described the emergence of a volunteer work crew during the 1966 Topeka tornado.\(^77\)

The research in the area of emergent groups in disaster has not been prolific, especially in communities with prior experience. We need more research in communities with prior experience before we can make any statements concerning support for the tentative hypothesis.

**HYPOTHESIS 13.** FEWER EXTRA-COMMUNITY ORGANIZATIONS WILL BE PART OF THE COMMUNICATION NET(S) IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

We would expect to have more involvement by extra-community organizations in communities without prior experience because of (1) need for coordination skills beyond that for which the disaster-stricken community is prepared to supply and (2) need for more resources than are available in the community itself. Therefore we would expect more communication links to be established with outside organizations to provide coordination or supply needed skills and resources.
Cities Without Prior Experience

During the Flint-Beecher tornado Rosow found heavy involvement of and communication with outside organizations. This was especially true of the state police who were given supreme authority of disaster measures. 78

Similarly in Worcester the involvement of outside groups was extensive.

Estimates of the number of outside groups which helped in Worcester varied, but there must have been about 75-100. These included private, municipal, state, federal, civilian, military, and out-of-state organizations. 79

During the Alaskan earthquake many outside organizations were heavily involved, especially the U.S. Army and the Alaska State Civil Defense. Much of the organizational communication across community boundaries dealt with the asking for outside resources and as a result of outside organizations being heavily involved in coordination of the emergency effort in Anchorage and surrounding towns and cities. One high ranking official in the Army said that many community organizations were communicating directly with them "rather than going to their own operations center . . . . They kept coming to the Army.

Cities With Prior Experience.

In several cities which had previous disaster experience, DRC personnel have found much communication between community and extra-community organizations. This was the situation in the 1965 St. Paul flood, Topeka tornado, Cincinnati floods, Chicago snowstorm, and Hurricane Betsy in New Orleans. But the quality of the communication was different from that found in communities without prior disaster
experience. In the latter, outside organizations provided much more overall coordination and were asked to provide many more human and material resources. In communities with prior experience the communication tended to deal much more with keeping outside organizations abreast of the emergency situation or outside organizations letting community organizations know that the former would remain on standby just in case they should be needed.

In summary, the hypothesis is not supported as it is presently stated. There was a great deal of extra-communication in both communities with and without prior experience. The content of the communication in the two types of communities did differ significantly as was described above.

**HYPOTHESIS 14.** — A CENTRAL COMMUNICATION CENTER WILL MORE LIKELY EXIST IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

We expect to find communication centers in communities with prior experience because they have learned its value in handling information most effectively and efficiently in a compressed time period.

**Cities Without Prior Experience**

Rosow states that in the Flint-Beecher tornado, although authority was centralized in one organization, the state police, the emergency situation was not appropriately handled because of a number of reasons. The main and most important one was the lack of a central communication center. Likewise he found no central emergency or communication center evolved in Worcester until long after the impact of the tornado.
In at least five disasters, DRC has found no central communication coordination center evolving in the initial emergency phase, and in some cases none has developed throughout the entire emergency or rehabilitation phases. In two cases Yutzy found none. In the chemical plant explosion in Attleboro, Massachusetts, there was no overall official interorganizational communication center (nor plan for one) at any time during the entire post-impact period. In Great Falls, he also found no center during the early stages of the flood.

Similarly no communication center developed during the post-impact period following the Alaskan earthquake to store and coordinate specific information collected by different individuals and groups. Information "was not systematically channeled to any collection point." Several organizational officials supported this observation with comments like "there was no central communication facility" and "what we needed most was some sort of central location where communication among the city's organizations could take place." Researchers at DRC found no center established during the Fitchville, Ohio nursing home fire. Finally, after tornadoes cut through many parts of Indiana on Palm Sunday 1965, in only one of eight counties studied did this researcher find any semblance of a central communication center. This was in South Bend; the rest had none.

Cities With Prior Experience

In two communities studied by DRC, well developed communication centers were activated immediately after impact. The first was in the 1964 Cincinnati flood. Here a common center which existed primarily for the police and fire, was immediately expanded to incorporate
other organizations. Second, according to plan, the Los Angeles emergency operating (communication) center was activated within minutes after it heard of the Baldwin Hills dam break.87

The existing data appear to support the tentative hypothesis very strongly. Communities with prior experience seem much more likely to have central communication centers than communities without prior experience.

Degree of Coordination

"Degree of coordination" refers to the number and length of communication links among organizations. The most coordinated communication network would be one in which every organization communicated with every other organization by the shortest possible means, while the least coordinated net would be one in which each one responded autonomously (i.e., no communication with any other organization. Two tentative hypotheses are advanced regarding coordination in the net.

HYPOTHESIS 15. -- THE COMMUNICATION NET WILL HAVE A GREATER NUMBER OF LINKS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

In many cases this hypothesis overlaps with hypothesis 14; communities with centralized communication centers tend to have more highly coordinated nets. This is not a logical imperative, however. It is quite possible to have a high degree of coordinated communication without having it physically centralized. It is also possible to have a central communication center without having a highly coordinated net. Nonetheless, we expect that the two variables do hang together and a central communication center and a coordinated net are both more likely to be found in communities with prior experience.
Cities Without Prior Experience

In the Flint-Beecher tornado emergency period, Rosow found little central coordination among organizations. Instead organizations tended to work as independent, autonomous units. Although the state police were given supreme authority, because of a lack of a central communications center, coordination among emergency organizations was poorly handled. For example, the Red Cross, fire department, and state police each had their own radio nets, but "they had no shared communication center that could put all the information together."88

Organizations and groups operating in the field tended to function autonomously without communicating with other organizations. In one instance a group was engaged in search and rescue.

... nobody checked on his team's work progress nor did he report the results of their search to anybody. Nobody kept track of the operation. This team simply worked all night long on rescue and search, through three presumably directed searches before daylight. When asked about this, the respondent was puzzled and could not reconcile the idea of three directed searches with the continuous, nightlong operation of his team which had no contact with anybody in the supervisory position.89

Other agencies worked the same way.

Thus, information tended to remain within organizations rather than being sent to the field center. On this basis, for example, survey information collected in part of the field by a volunteer fire department was not purposively fed into field headquarters.90

Also in the area of health and welfare there was little overall coordination.

Flint social services represent the case par excellence of many actors working with private definitions. With minor exceptions, action was taken independently without reference
to the groups who might have been concerned. This showed a failure of communications within organizations and between officials or agencies. Officials mobilized help without finding out what help the Hurley Hospital authorities themselves needed or might have suggested. The people with superior information or qualifications were not consulted. . . . The independent action was extremely disruptive for others and ineffective because attention was diverted from other realistic possibilities.

Both Rosow and Bakst found the situation in the Worcester tornado to be very similar to that found in the Flint-Beecher tornado. Bakst reported that no central or synthetic organization emerged in Worcester and very little interorganizational communication existed, especially in the early stages of the post-impact period. This was evidenced by the fact that evacuation of casualties and first aid was uncontrolled; traffic and transportation were uncontrolled; no coordination among organizations and agencies existed; and there was the lack of a strong central head. Lack of communication was most notable in the community's hospitals. Here there was inadequate communication both among hospitals and between hospitals and other agencies. Rosow, like Bakst, also found lack of coordination among emergency organizations. Although Civil Defense attempted to coordinate overall activities, "comparatively few organizations willingly gave up their operating autonomy to CD." Rosow, like Bakst, also found lack of coordination among emergency organizations. Although Civil Defense attempted to coordinate overall activities, "comparatively few organizations willingly gave up their operating autonomy to CD."

In the 1952 Bakersfield, California earthquake, there existed a totally inadequate communication set-up within organizations as well as among organizations. This hindered overall community coordination and, hence, effectiveness.

In the Warner-Robins (Georgia) tornado lack of interorganizational communication and coordination in relief and registration led to large
errors in their findings. For example the Red Cross and other organizations compiling lists of the dead and injured failed to check their findings with each other.95

In the Eagle Pass-Piedras Negras flood on the Rio Grande there was no coordination and little cooperation among Eagle Pass organizations in evaluating needs and dispatching information.96

In the 1953 tornado which struck Waco, Texas, there was little coordination among organizations. Despite the fact that Waco was in "tornado alley," no disaster subculture had ever developed there. This was evidenced by the fact that "a lag of approximately two hours . . . occurred between the first warning given the general population and the cognizance of it" by the majority of people.97 City officials had made several attempts to organize a functional plan but it was geared to nuclear attack and even this plan failed to materialize.

In Attleboro there was minimal interorganizational communication. Each organization tended to work independently at the task which seemed most urgent for it. For example one organization official stated that . . .

There is an arrangement between the Red Cross and local fire department that in the event of any fire beyond a certain alarm (four alarm usually), the fire department will automatically notify the Red Cross. However, . . . the Red Cross chapter was not notified (in this instance).

In another instance in the same emergency, officials at one hospital did not communicate with other organizations regarding emergency medical services. They did however try to reach "either the police or fire headquarters by telephone (but) met with complete failure."98
During the Indianapolis Coliseum explosion many of the emergency organizations functioned autonomously. Informants stated that organizations failed to coordinate activities with the city's hospitals. For instance no communication existed between ambulances and hospitals, between hospitals and organizations at the disaster site, or even among hospitals themselves. Lack of communication created major difficulties in the community response to the disaster. Drabek summed it up well in the following statement.

Little attention was paid to the activities of other groups until the injured had been removed, about an hour after the explosion. In a sense, the priority given to attending victims appeared to obscure a perception of parallel activities by other emergency organizations.

This, in turn, also prevented personnel at the various organizational headquarters from knowing what actions were being taken by other organizations. Yet aside from the efforts of a CD communication officer, at the scene in his sound truck, few attempts were made to establish interorganizational communication.

Lack of interorganizational communication and coordination led to several other difficulties in Indianapolis. Police were unable to direct ambulances where to take patients. Also because communication between the Red Cross and police was nonexistent, blood donors were sent to the wrong place to give blood. And as mentioned earlier there was no initial coordination between the coroner and other emergency organizations in spite of the fact that the coroner is the authority in activities dealing with the dead.

In another major disaster studied by DRC, lack of coordination was very evident. Dynes observed that initially organizations did not coordinate their activities. Organizations functioned autonomously,
"perceiving little necessity to coordinate their activities with those of other organizations during the immediate post-impact period." 100

No supra-organization ever developed. Many organization officials who were interviewed perceived this to be the case. For example, "police saw their responsibility as that of maintaining security and traffic control." 101 Therefore, they worked alone. Similarly the fire department restricted their activities to those which could be carried out alone -- fire fighting. A high ranking Red Cross official stated that their organization did not coordinate adequately with other organizations. The same type of comments pertaining to adequate coordination were mirrored by other officials -- the former mayor, the Army liaison representative, and various other organizational officials.

Consequently there was much unnecessary duplication of effort.

"The centralization of a list of missing persons was only gradually accomplished because at least three different organizations initially attempted to deal with this problem independently of each other." 102

Even the semblance of coordination which did develop later was not the type described earlier where organizations gave up some of their autonomy to create a synthetic organization. Later in the emergency period there was some communication and coordination at the interorganizational level but it tended to be diadic rather than a total centralized, coordinated effort.

During the later stages of the emergency period, local organizations began to coordinate their activities with others. . . . (But) there was no overall coordination; rather, most of the coordination was of one organization with another organization. The police department, local CD, and The Salvation Army, for instance, established different liaison arrangements with the military groups operating in the city. 103
This, then, was the dominant picture during the Alaskan earthquake -- no disaster plans, no overall coordination or communication, and hence, much duplication of effort, lost time, and loss of effectiveness.

In Great Falls, there existed no emergency plan for interorganizational responsibilities, coordination, and authority. Organizations had minimal contact with each other. Consequently, "without overall coordination, several agencies sometimes responded to the same request." Too, as overloading occurred on communication facilities, organizations couldn't talk with each other. 104

Lack of communication, and therefore coordination, among organizations was the case in both pre- and post-impact periods in the Palm Sunday tornadoes in northern and central Indiana. In both Elkhart and Marion, organizations functioned autonomously as if no other organizations were available to help. Most of the time warnings of the impending threat to the two cities were not passed on to either other emergency organizations or to the general public. In Marion the police headquarters notified neither units of their own department nor other organizations until after the first tornado hit the county. "If there was any pattern to the response of such organizations, it was that of inaction insofar as further dissemination and transmission of the tornado forecasts were concerned."105 Hence, emergency organizations and the public at large often did not receive the warnings in time or at all.106

This is not to say that no coordination existed anywhere in the state. There was a certain amount of monitoring of the state highway
patrol radio. But in only one Indiana city studied by DRC, South Bend, was there any semblance of coordination and communication among organizations at the community level. In a few other cities there was a fan-out system but it did not seem to function too rapidly or well. Particularly noticeable was the fact that there was very poor communication with extra-community organizations. In some instances efforts were made to alert the organizations in nearby counties; in other places no attempt at all was made. The overall picture is of a rather erratic pattern of if, who, when, and how other non-mass media organizations were alerted.

In the Jackson, Mississippi tornado, the most blatant example of lack of coordination occurred among hospitals and between hospitals and every other emergency organization.

Much more disturbing was the lack of any information from the major disaster site about two miles distant. The hospital was not connected to any organizational radio network . . . and no direct contact was ever established with any agency which had personnel at the (site of the disaster).107

Hence, a major communication gap existed among those organizations engaged in search and rescue (police, fire, ambulance service, etc.) and the organizations which were charged with caring for tornado victims (the hospitals).

DRC found numerous instances in the Fairbanks floods of communication gaps and lack of coordination among community organizations. It was almost an ideal case of a number of autonomous organizations working in parallel, duplicating each other's efforts in one case while leaving crucial tasks undone in another. Communication among organizations was ineffective. According to a high official in the
Red Cross, it was supposed to deliver food but it had no vehicles. Civil fense had vehicles that Red Cross was supposed to be able to use, but because of a communication gap between the two organizations, Red Cross got no response. He went on to say that some major outside organizations attempted to come in and to coordinate the city's response, but because they were insufficiently informed of local problems, and no pre-emergency communication links existed, they had much difficulty. According to a top level public utilities official, it was not until after the emergency had run its course that a coordination of effort on the part of community organizations started to develop.

Cities With Prior Experience

DRC has found that the response in three communities with prior experience is especially relevant; they are the Baldwin Hills dam break, Cincinnati floods, and the Great Chicago snowstorm. During the Baldwin Hills dam break one organizational official did indicate a definite breakdown in communication between the Los Angeles water and power and the police department. But this was the exception to the rule. In general, the response was highly coordinated, with communication flowing efficiently among organizations. This was all made possible through the centralization of information in the Los Angeles police department emergency communication center.108

In the Cincinnati floods the community response was even more highly coordinated. Because of much prior experience and the development of a disaster subculture, many ties among organizations had developed. Many organization officials interviewed by DRC staff
members reported the existence very early of a close communication network which kept everyone well informed on the physical situation and in the case of need, there was very little delay in communication. Organizations central to the net included police, fire, public health, Civil Defense, Red Cross, and The Salvation Army. A weather bureau official stated that many channels of communication existed (with back-up links ready in case of need) during the earliest stage of flooding. The community followed its warning plan whereby the weather bureau warns or notifies a number of agencies, including Red Cross, radio, and press. It does this via teletype and telephone. If telephones are out, the Queen City Emergency Network (radio amateur group) helps disseminate the warnings.

Finally, in the Chicago snowstorm the city maintained a highly coordinated effort throughout the emergency. Although there were three separate coordination centers (operational, rehabilitation, and public requests), effective communication and coordination was maintained among organizations as well as between the coordination centers themselves.

In summary, the evidence seems quite convincing. There are a greater number of communication links among organizations in communities with prior experience than in communities without prior experience.

HYPOTHESIS 16. -- THE LENGTH OF COMMUNICATION LINKS WILL BE SHORTER IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

"Length of communication links" refers to the number of times a message sent by a transmitter must be relayed before it reaches its
destination. The shortest possible link is illustrated in the case where the police chief wishes to contact the fire chief and calls him on the phone. On the other hand, a longer link would be the case where the police chief (who still wishes to contact the fire chief) calls the Civil Defense office and the latter in turn relays the message to the fire chief. We would expect that communities with prior experience would have shorter communication links in emergency situations because they "know" they are more efficient.

Cities Without Prior Experience

Communication links were long in the Flint-Beecher tornado.

For example, a police car reached Beecher from Pontiac, about 35 miles away. The men had to inform a Pontiac hospital if a particular medical instrument should be sent to Flint. The radio transmitter of the police car was too weak to reach Pontiac directly. The message was sent to the Pontiac hospital over the following circuit: Pontiac police (verbal) to volunteer fire truck (radio) to the association "control center" (phone) to Flint police headquarters (phone) to Pontiac police (phone) to Pontiac hospital. Instead of a two-step radio-phone link from the police car to headquarters to the hospital, there was a six-link circuit which took three minutes instead of one.\textsuperscript{110}

DRC has found that communication links in both the Alaskan earthquake and Indiana tornadoes were indirect and therefore quite lengthy. In Alaska, "because of lack of direct communication with any section of the city, officials found it difficult to arrive at any quick assessment of the damage."\textsuperscript{111} One high ranking official stated that communication was inadequate, that there were more sub-links or mediating organizations between the transmitting and receiving organizations. The official said that there appeared to be no channel through which CD could request directly information and supplies from the Army
that there was no direct channel between Civil Defense and other organizations. A Red Cross official said it got so bad at times that because of lack of adequate communication, "a Red Cross representative in outlying areas often (had to call) through CD to get the Red Cross office in Anchorage."

Similarly, in both Elkhart and Marion during the Indiana tornadoes, "communication channels were often lengthy and slow" for the most efficient and effective response.

Cities With Prior Experience

No data were found pertaining to this hypothesis from communities with prior experience.

In summary, there seems to be some support for the proposition that communities with prior experience will have shorter communication links than communities without prior experience. However because of lack of data from communities with prior experience this statement cannot be made too strongly.

Size

Another dimension of a communication net is its size, i.e., how large it is with regard to number of organizations, number of messages, length of messages, and number of channels or communication links. Data on the latter, number of communication links, could have been presented in this section, but it was so intricately bound up with community coordination we chose to discuss it in hypothesis 15. Therefore three hypotheses are presented here regarding the size of communication nets.
HYPOTHESIS 17. -- THE COMMUNICATION NET WILL CONTAIN MORE ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

We would expect that duplication of effort as well as gaps in crucial tasks would be more likely to occur in communities without prior experience. Only those organizations with well-known emergency responsibilities are likely to become involved and, even then, only in areas where there is continuity with their normal tasks and responsibilities. That is to say, certain organizations (police, fire, Civil Defense, public works, Red Cross, The Salvation Army, hospitals, ambulance services, and so on) have well-known emergency responsibilities which they must undertake from time to time in non-disasters. For example the water department may have to repair a broken water main, the fire department may have to put out a large fire, . . . But by definition, natural disasters often pose both qualitatively and quantitatively different demands on the community. This means that, for example, there may be not only larger fires but also different tasks which have not been assigned to organizations prior to the emergency. DRC has found that frequently search and rescue has not been assigned to any organization(s) in "non-experienced" communities. In other instances, organizations claim they each have responsibilities for the same emergency task -- take for example, Red Cross and Civil Defense both claiming they are in charge of welfare, or Red Cross and The Salvation Army claiming to be in charge of feeding and clothing the general public.

Communities can solve the problem of gaps in emergency tasks in one of two ways: (1) by organizations enlarging their domains or
(2) by incorporating more organizations into the net. We would expect communities to do both; this hypothesis pertains only to the latter.

The data collected in previous disasters were inadequate. Much more controlled situations are necessary to evaluate this hypothesis than the other hypotheses tested so far. Certain variables must be controlled, especially characteristics of the disaster agent and city.

HYPOTHESIS 18. -- THERE WILL BE MORE MESSAGES SENT OVER THE COMMUNICATION CHANNELS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

On first thought this hypothesis may appear contradictory to hypothesis 5, which suggested that "the communication net will be less overloaded in communities with prior experience." It would seem logical to assume that the greater the number of messages on the channels of communication, the more likely the chance that the communication net would be overloaded. But this is not necessarily true. If community organizations have extended the number of channels within the net and/or have "learned" how to make more efficient use of existing links, a larger number of messages could be sent over the net without causing it to be overloaded. We expect that "experienced" communities will be more highly coordinated, and therefore more messages will flow through the net.

The data found in the literature were judged too inadequate to allow us to evaluate this hypothesis. They were not specific enough to answer questions pertaining to the number of messages sent. This researcher initially thought that tape recordings and/or logs of community organizations might provide an adequate data source, but they
were found to be inadequate too. Even organizations which tape some of their communication often do not tape telephone conversations. Although DRC has collected a number of such tapes, they were found inadequate for several reasons. First, in several disasters studied, tape recordings were used to monitor radio transmissions only, therefore tapping only one of many possible channels between organizations. Second, relatively few organizations tape or keep specific logs of their transmissions. But third and most crucial, even organizations such as police and fire departments, which do normally tape or log some of their communications, never record the total interorganizational communication. For example, in one city the police used three frequencies during a natural disaster, but only recorded channel A. In another case, only intraorganizational messages between the police dispatcher and patrol cars were taped, leaving unrecorded all of the messages transmitted and received via phone, word of mouth, etc. Summarizing then, prior data have proved very inadequate for evaluating this tentative hypothesis.

HYPOTHESIS 19. -- MESSAGES WILL BE SHORTER IN LENGTH IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

We expect that organizations with prior experience in natural disasters will have learned that the communication net will function most efficiently if messages are kept brief and concise. The same amount of information can be passed in shorter messages, because organizations with prior experience require fewer words to "get the message across." Brief messages are necessary because of the high volume of
information which must pass through the net in the compressed time period which exists in emergencies.

The data found in the literature were judged inadequate for the same reasons given in hypothesis 17. The data were neither specific enough nor gathered under sufficiently controlled conditions to enable us to evaluate this hypothesis.

Continuity

All of the hypotheses presented in the study compare emergency states of communication nets in communities with and without prior experience. The three hypotheses presented in this section, however, add a new dimension: the degree of change which has occurred in the communication net from a prior non-emergency state. In general we would expect greater continuity in communities with prior experience.

HYPOTHESIS 20. -- ORGANIZATIONS WILL COMMUNICATE WITH FEWER NEW ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

A "new organization" is one with which the focal organization has not communicated before. We expect that organizations in communities with prior experience will have "learned" the importance of maintaining contact with a wide range of organizations which have emergency relevant resources and/or skills. An example of this type of contact among organizations during normal times would include both communication which might occur over the phone and the communication which occurs in the course of routine interaction between the organizations. The body of data in the previous literature which we read was inadequate to evaluate this hypothesis.
HYPOTHESIS 21. -- ORGANIZATIONS WILL COMMUNICATE WITH A GREATER NUMBER OF ORGANIZATIONS OF DIFFERENT TYPE IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

By "types of organizations," we are referring to occupational or institutional categories such as police organizations (city police, sheriff's department, highway patrol, etc.), public utilities and public works, health (hospitals, ambulance services, etc.), welfare (Red Cross, The Salvation Army, etc.) and so on. We expect that organizations in communities with prior experience will be more likely to communicate with organizations of a different type because they "know" they must if they are to solve disaster-related problems most effectively and efficiently.

Cities Without Prior Experience

One instance relating to this hypothesis was found in the literature. Rosow pointed out that in several of the cities struck by tornadoes, contact among organizations tended to be haphazard and sporadic and when it did occur tended to be within similar occupational or institutional groups.

Cities With Prior Experience

We found one example of organizations of different type communicating with each other. Organizational officials, reflecting on the 1964 Cincinnati floods, stated that cooperation between the fire and police departments was unusually good and that they communicated with and helped each other. Similarly in the same emergency, other officials stated that the Red Cross and Civil Defense cooperated with each other throughout the emergency period.
In summary, we did not find very much relevant information pertaining to this tentative hypothesis. What we did find, however, was supportive of it.

HYPOTHESIS 22. -- COMMUNICATION LINKS WILL BE LESS LIKELY BASED ON PRE-EXISTING FRIENDSHIPS THAN ON OTHER CRITERIA IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

We expect this tentative hypothesis to be supported because organizations in communities with prior experience "know" that their communication with other organizations must be based on criteria pertaining to the latter organizations' relevant skills and resources. On the other hand, community organizations without prior experience will communicate initially on the basis of another criterion, prior friendship. These communities would be less likely to have disaster plans or procedures which outline the appropriate communication structure necessary for solving disaster-related problems.

Cities Without Prior Experience

DRC has found two instances which bear directly on the problem — the Indianapolis Coliseum explosion and the Alaskan earthquake. In the latter, the coordination which developed among community organizations grew out of pre-existing friendships rather than pre-arranged plans. Likewise, Drabek found during the Indianapolis Coliseum explosion that while much cooperation and communication took place between heads of the emergency organizations, most of it was based on prior personal relationships rather than on previous agreements or expectations.
Long-standing personal relationships became highly significant in the absence of specific plans which designated authority relationships and organizational responsibilities. . . . Among the many examples that might be cited, the following illustrates the point. The Executive Director of the local Red Cross Chapter had a friend in an executive position at the telephone company whom he called when additional telephones were needed; he also telephoned a friend at Fort Thompson when "lower echelon" hospital officials refused to give Red Cross nurses a casualty list.114

Cities With Prior Experience

Here we find numerous instances in which emergency communication was based on previous agreements, expectations, or disaster plans rather than on prior interpersonal relationships. Pre-existing friendships may have had an impact on the quality of the communication link, but it was not the basis upon which the link was established. The following cities all maintained disaster plans which spelled out the appropriate communication structure to be followed. Among those studied by DRC were the Cincinnati floods, Baldwin Hills dam break, St. Paul floods, Chicago snowstorm, Topeka tornadoes, Hurricane Betsy in New Orleans, and Hurricane Cleo in Miami.115

In summary, we found much data supporting this tentative hypothesis. Communication links in communities without prior experience appear to be based more heavily on pre-existing friendships than on other criteria such as disaster plans.

Level of Message Transaction

HYPOTHESIS 23. -- A GREATER PROPORTION OF MESSAGES TRANSMITTED WILL BE AT LOWER LEVELS AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.
"Level of message transaction" refers to that point where messages enter community organizations. For example if the public works director calls the police chief, communication has occurred at a higher level than if a public works foreman calls a police sergeant. We would expect that decision making in communities with prior experience is pushed downward during emergencies. During the St. Paul floods we found that "various levels within the department (especially the lower levels) became more autonomous -- making a greater percentage of the decisions without consultation with higher officials." In this case, some of the decisions made involved communication with other organizations. Hence, the greater the percentage of decisions made at lower levels, the greater the communication at lower levels. This would include interorganizational communication at lower levels also. In reading the disaster literature we found very little data pertaining to the level of message transaction among organizations.

Summary

In this chapter we perused the disaster literature seeking support for twenty-three tentative hypotheses. Data from twenty-eight disasters were presented to illustrate support for them. Initially we had planned to summarize the findings in this chapter in four categories: hypotheses showing strong positive support, moderate or weak support, lack of support, and negative support. But because none of the hypotheses were negatively supported, the latter category was deleted. Hence, the findings are placed under one of
the three remaining categories. Under hypotheses showing strong positive support, we placed those which drew support from at least six disasters in the literature. Nine hypotheses fell in this category. Under the category, hypotheses with moderate or weak positive support, we placed those which drew support from one to five disasters. Ten hypotheses fell in this category. Within the category, lack of support, we placed those hypotheses which drew no support from the literature. Four hypotheses were placed here. Each hypothesis is placed in the appropriate category below.

**Hypotheses Showing Strong Positive Support**

3. There will be fewer messages indicating one organization's lack of knowledge of other organizations' domains in communities with prior experience than in communities without prior experience.

4. There will be more adequate messages in communities with prior experience than in communities without prior experience.

5. The communication net will be less overloaded in communities with prior experience than in communities without prior experience.

7. There will be more functional separation of communication among organizations in communities with prior experience than in communities without prior experience.

9. There will be more adequate information from the disaster site in communities with prior experience than in communities without prior experience.

13. Fewer extra-community organizations will be part of the communication net in communities with prior experience than in communities without prior experience.

14. A central communication center will be more likely to exist in communities with prior experience than in communities without prior experience.

15. The communication net will be more coordinated in communities with prior experience than in communities without prior experience.
22. Communication links will be less likely based on pre-existing friendships than on other criteria in communities with prior experience than in communities without prior experience.

Hypotheses Showing Moderate or Weak Positive Support

1. There will be less unnecessary duplication of messages among organizations in communities with prior experience than in communities without prior experience.

2. There will be fewer misdirected messages among organizations in communities with prior experience than in communities without prior experience.

6. More messages will deal with means to achieve emergency goals (rather than the goals themselves) among organizations in communities with prior experience than in communities without prior experience.

8. Communication will be more systematic, selective, and controlled in communities with prior experience than in communities without prior experience.

10. Fewer key organizations will be missing from the net in communities with prior experience than in communities without prior experience.

11. Fewer organizational sets will be present in communities with prior experience than in communities without prior experience.

12. Emergent groups will less likely be part of communication nets in communities with prior experience than in communities without prior experience.

16. The length of communication links will be shorter in communities with prior experience than in communities without prior experience.

21. Organizations will communicate with a greater number of organizations of different type in communities with prior experience than in communities without prior experience.

23. A greater proportion of messages transmitted will be at lower levels among organizations in communities with prior experience than in communities without prior experience.

Hypotheses Showing Lack of Support

17. The communication net will contain more organizations in communities with prior experience than in communities without prior experience.
18. There will be more messages sent over the communication channels in communities with prior experience than in communities without prior experience.

19. Messages will be shorter in length in communities with prior experience than in communities without prior experience.

20. Organizations will communicate with fewer new organizations in communities with prior experience than in communities without prior experience.

On the basis of our findings in this chapter, we will select certain of the tentative hypotheses to test in controlled situations. We now turn to Chapter IV to discuss these hypotheses.
1. See Chapter II for the enumeration of the twenty-eight disasters selected for analysis in phase one.

2. The reader should interpret the data in this light. Just because no negative support was presented for a particular tentative hypothesis does not mean there were no instances in the community of negative support for the hypothesis. Rather, it should be interpreted to mean that, in general, there was positive support for that hypothesis.


4. Ibid., p. 163.

5. Ibid., p. 54.


10. Ibid., p. 310.


13. Ibid., p. 79.


16. Ibid., p. 12.


25. Ibid., p. 54.

26. This is a direct quote from a transcribed interview. In the remainder of this chapter, all quotes not footnoted have been obtained directly from transcribed interviews.


no. 15, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1966), pp. 10-11.


32. Ibid., p. 15.


34. Bakst, et al., The Worcester County Tornado.


37. Ibid., p. 159.


44. Drabek, Disaster in Aisle 13, pp. 14-20.


48. Ibid.
51. Ibid., p. 211.
52. Ibid., p. 222.
53. Ibid., pp. 111-112.
54. Ibid., p. 124.
55. Ibid., pp. 112-210.
57. Ibid., p. 61.
58. Ibid., p. 108.
63. Rosow, "Authority in Natural Disasters," p. 120.
64. Drabek, *Disaster in Aisle 13*, p. 152.
67. We are using "synthetic organization" as developed by Thompson and Hawkes. It is an emergent organization usually made up of important community and extra-community officials for the sole purpose of coping with the consequences of the physical disaster event. See James D. Thompson and Robert W. Hawkes, "Disaster, Community Organization, and Administrative Process," in *Man and Society in Disaster*, ed.


69. Ibid., pp. 277, 334.


73. Yutzy, "Authority, Jurisdiction, and Technical Competence."


79. Ibid., p. 149.

80. Ibid., pp. 216-227.

81. Ibid., p. 118.

82. Yutzy, "Some Organizational and Community Activities," p. 11.


85. William A. Anderson and E. L. Quarantelli, "A Description of Organizational Activities in the Fitchville, Ohio Nursing Home Fire," Disaster Research Center Note, no. 8, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1964).

86. Brouillette, "A Tornado Warning System."


89. Ibid., p. 233.

90. Ibid., p. 238.

91. Ibid., p. 310.


99. Drabek, Disaster in Aisle 13, p. 156.


101. Ibid.

102. Ibid., p. 12.

103. Ibid., pp. 13-14.


106. Ibid., p. 34.

114. Drabek, Disaster in Aisle 13, pp. 174-175.

115. Regarding the Cincinnati floods see Anderson, "Some Observations on a Disaster Subculture;" regarding the Baldwin Hills dam break see Anderson, "The Baldwin Hills, California Dam Disaster;" regarding the St. Paul floods see Brouillette, The Department of Public Works; regarding the Chicago snowstorm see Brouillette and Ross, "Organizational Response;" regarding the Topeka tornado see Robert Stallings, "A Description and Analysis of the Warning Systems in the Topeka, Kansas Tornado of June 8, 1966," Disaster Research Center Research Report, no. 20, mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1967); regarding Hurricane Betsy see George Jay Warheit, "The Impact of Major Emergencies on the Functional Integration of Four American Communities," (Ph.D. dissertation, The Ohio State University, 1969). The material pertaining to Cleo came from transcribed interviews.

CHAPTER IV

STEP THREE: THE FOUR CITY STUDY

Introduction

Step two of the study was devoted to the analysis of twenty-three tentative hypotheses based on the relationship of a community's prior experience to its interorganizational communication network. The disaster literature was perused to seek documentary support for these hypotheses. The purpose of step three of the study is to systematically test a number of the hypotheses in a more controlled situation which is designed specifically for that purpose. In this chapter we will present the findings of the third or final step.

On the basis of the results in the second step of the research, twenty of the twenty-three hypotheses met our criteria for testing in step three. All twenty-three hypotheses met the first criteria for being tested in the final step because none of them received negative support in the literature. However three hypotheses were dropped from the study because they were incapable of being tested with the research design. These were hypotheses 17, 18, and 19 which pertained to the size of the communication net. Therefore hypotheses 1-16 and 20-23 were tested in step three of the study.
Disasters Selected

We decided to test the remaining hypotheses on four U.S. cities struck by natural disasters in 1969 -- three of them in the Midwest, one on the West Coast. As early as January 1969 the U.S. Weather Bureau and the Army Corps of Engineers had predicted the possibility of serious flooding throughout the Midwest. Eight states were included in the prediction -- North Dakota, South Dakota, Minnesota, Wisconsin, Nebraska, Iowa, Illinois, and Missouri.

Heavy snow had fallen throughout the area in January and February; the weather remained extremely cold until about April 1, when temperatures rose sharply and heavy rains saturated the area. Serious flooding resulted in the area in April, 1969. The three cities studied in the Midwest were Sioux Falls, South Dakota; Minot, North Dakota; and Sioux City, Iowa. Glendora, California, the fourth city studied, experienced torrential rains and the subsequent flooding and mudslides in town and adjacent mountain ranges north of the city in January 1969.

Description of Four Cities

Glendora, California Torrential Rainstorms, and Subsequent Flooding and Mudslides

Glendora, with a population of approximately 31,000, is a residential suburb of Los Angeles. It lies 30 miles east of the city on the slopes and base of the mountains. Glendora, incorporated in 1911, has a council-manager type government. A five-man council is elected at large. The council in turn selects a mayor from their own ranks to serve as the head of the council. The city manager serves as the
city's administrative head and coordinates the city's departments. The line of operational departments include: department of public works, police, and Civil Defense. One notable difference between Glendora and other cities of its size is the absence of its own fire department. Here Los Angeles County provides fire protection for the city and has fire stations and men assigned to it. For our purposes we will view county firemen permanently assigned to the Glendora fire station as part of the local response to any emergencies which might arise. The city's organizational chart is found in Figure 2.

FIGURE 2

ORGANIZATIONAL CHART OF GLENDORA, CALIFORNIA

The city maintains close relations with many county, state, federal, private, and volunteer agencies. The county deserves special mention; the extent of its complexity and vastness of its resources lies second only to the city of Los Angeles. It is quite unusual in the United States to have a county organized to this extent. The close ties between Glendora and the county fire department have already been
mentioned. A close working relationship is also maintained with the county flood control district, road department, sheriff's department, health department, and Civil Defense. The uniqueness of this relationship lies in the fact that the county resources are much greater than those of the city, and hence are a ready source of material and personnel resources during emergencies.

The Emergency. Twenty or thirty years ago, a watershed fire in the mountain areas of Glendora would have affected a relatively small number of people. Today however, since the area is highly developed and rather densely populated, the same fire could and did endanger lives and caused property damage estimated to be over two million dollars for both the private and public sectors.

On July 12, 1968, Glendora's "Easley Canyon Fire" occurred, followed by the August 23, 1968 "Canyon Inn Fire." The total burn covered approximately 20,000 acres of watershed directly above Glendora.

Fire in a watershed is in reality only half of the total disaster picture. It is the other half of the disaster, the resulting flooding and debris run-off, which is the real threat.

Grass was planted on the burned-off slopes. Unfortunately, weather conditions were not conducive to early germination of this seeding which accordingly did not provide immediate growth of the root system. Late winter rains finally germinated the seed, but not in time to provide the desired results before the many heavy rainstorms came. When it became known that the seeding had failed, some city and county organizations began their preplanning for the potential flood danger during the anticipated winter rains.
On Sunday, January 19, heavy rains began falling on the area and continued intermittently for over a week. By Tuesday, January 20, flooding became a serious problem and the next day mud and other debris began to wash down the canyons into the city. The most severe storm conditions occurred all day Saturday, January 25. Evacuations, rescues, assistance with flooded personal property, and related tasks were at their greatest height on this date. By Monday, January 27, the heavy rain began to dissipate and the debris stopped flowing into the city.

The result: mud-laden debris was strewn over the city obstructing traffic on many thoroughfares; 130 homes were damaged, 25 seriously. There was no loss of life. Damage to private property alone was estimated at $837,905.

**Prior Experience.** Although the mountain ranges around Glendora are subject to periodic forest fires and the subsequent threat of mudslides due to the winter rain, neither serious flooding nor mudslides had occurred since 1938. Even in the 1968 forest fires directly above Glendora, city organizations were minimally involved. Likewise, the city had developed no disaster subculture. Therefore when testing the hypotheses we will treat Glendora as a community without prior experience.

**Minot, North Dakota, Floods**

Minot, North Dakota, a city of 37,000, lies in the north central part of the state and straddles the meandering Souris (Mouse) and Des Lacs Rivers. It is the retail and trade center of a vast agricultural
empire including part of Canada and Montana as well as northern North Dakota. The city lies within the eastern boundaries of oil-rich Williston Bason and is surrounded by a number of lignite strip mines. It is also a major and active grain processing center, flour milling center, and a distribution center for all agriculture needs.

Minot has a council-manager form of government. The council has 14 members, two elected from each ward. The mayor, who is elected at large, is the presiding officer. The council is the governing and policy making body of the city. The city manager is the administrative head. He is appointed by the council and is in charge of all daily operations of the city functions and services including supervision of more than 250 employees and several million dollars worth of equipment and buildings. The manager makes recommendations to the council and keeps it informed of city operations at all times. Line departments include police, fire, public works, Civil Defense, health, airport, auditorium, and cemetery. The city's organizational chart is presented in Figure 3.

The city maintains normal relationships with county, state, and federal agencies; these agencies serve as potential manpower and material resources for the community if they are needed. Two not-so-common resources should be mentioned. The first is the Minot Air Force Base, 15 miles north of the city. More than 18,000 military personnel and their dependents are assigned and almost 700 civilians are employed at either the base or at three remote radar stations. Material resources include aircraft, base facilities, supplies and equipment, and the missile complex. The base is sometimes referred
FIGURE 3
ORGANIZATIONAL CHART OF MINOT, NORTH DAKOTA

The second unique resource is Minot State College, a state-supported four-year liberal arts and teachers college. It has an enrollment of over 2,000 students.

The Emergency. North Dakota, like much of the rest of the Midwest, had received extra heavy snowfall during January and February. Rapid thawing began the first week in April. By the afternoon of the sixth it was evident that the Des Lacs River, which traversed the city, would flood. Diking started in Minot; men from the Minot Air Force Base moved in to help. By the eighth streets in the low areas throughout
the city were beginning to flood forcing the affected families to evacuate their homes.

On April 9 diking and sandbagging were in full swing in the low areas and by the tenth, over 300 homes had been evacuated. Thousands of volunteers and dozens of trucks engaged in evacuating people, working on diking, and sandbagging. Major streets were beginning to close due to flooding. Broadway, Minot's most heavily travelled thoroughfare, was flooded.

The Des Lacs crested at 17.03 above flood stage during the night of the eleventh. Damage at that time was estimated at $3,250,000. On April 12, the river started to recede.

Prior Experience. Minot had very little prior experience with flooding, nor did it have a disaster subculture. The only type of emergency to hit the community was a rather infrequent snowstorm, which did not pose as many problems for organizations or the general public. Therefore when testing the hypotheses we will treat Minot as a community without prior experience.

Sioux City, Iowa Floods

Sioux City, on the Western border of Iowa, lies on the confluence of three rivers -- the Floyd, Big Sioux, and mighty Missouri Rivers. The city, with a population of approximately 100,000, serves as the retail distribution center of the area as well as one of the largest livestock markets in the United States. In addition to the normal transportation routes of rail, road, and air, the city utilizes the Missouri River for barge transportation as far south as New Orleans, Louisiana.
Sioux City has operated under the council-city manager plan since 1954. Policy decisions are made by a five-member city council elected at large. The mayor of the city, who is one of the councilmen, is chosen by his fellow members and presides at each council meeting.

The city manager is a professional administrator, appointed by the council to coordinate the operating departments of the city. Line departments include public service (streets, sewers, central maintenance garage, and sanitation); police; fire; airport; parks, recreation and cemeteries; engineering; traffic engineering; health; personnel; finance; building inspection; utilities; Civil Defense; and urban renewal. The city's organizational chart is presented below.

FIGURE 4
ORGANIZATIONAL CHART OF SIOUX CITY, IOWA
The city maintains normal relations with various county, state, and national agencies. Unique to Sioux City however is SIMPCO, Siouxi-land Interstate Metropolitan Planning Council. It was officially formed early in 1965 under the Interlocal Cooperation Act affecting three counties, one each in Iowa, Nebraska, and South Dakota, and provides for its membership of local governments to plan and act cooperatively on matters of mutual interest and need. SIMPCO completed the planning stages of a community nuclear shelter plan for the three counties. This plan was financed 100 percent by the Office of Civil Defense. SIMPCO could provide needed communication and material links among organizations in the area. However Sioux City has more to offer other communities than do the latter for Sioux City.

The Emergency. As early as February 11, 1968, Sioux City officials were informed that the city could expect major flooding in the Spring. The first week in April heavy snow cover and drastically warmer temperatures led to very rapid runoff into the Floyd, Missouri, and Big Sioux Rivers. The Army Corps of Engineers, through extensive diking projects on both the Floyd and Missouri, abated any threat of flooding. By April 7 the Big Sioux had reached flood stage, and on April 10, it crested at 11.7 feet above flood stage. The dikes held; therefore little was flooded in Sioux City itself. The crest was the greatest in history topping the 10.2 foot level set in 1962. The Big Sioux was back in its banks on Friday, April 18.
In all, damage to private and public property was negligible; no deaths or injuries were reported. Forty-one families from the Riverside area, the lowest part of Sioux City, were evacuated during the emergency period.

Prior Experience. Sioux City has had a great deal of experience in flood fighting throughout the years. In recent history, the three rivers passing through and by the city have caused flooding and/or serious flood threats in 1951, 1952, 1957, and 1966. In addition, the city has developed an extensive disaster subculture. For this reason we are treating Sioux City as a community with prior experience.

Sioux Falls, South Dakota, Flood Threat

Sioux Falls, with a population of 80,000, lies on the eastern border of the state on the Big Sioux River and Skunk Creek. An important livestock market, Sioux Falls is a commercial and industrial center. Meat-packing houses and stockyards are the leading industries of the community.

The city has a mayor-commission type government, all of which are elected at large. The mayor and two commissioners make both policy decisions and coordinate the activities of other city departments; in most cities these two responsibilities are split between mayor and city manager. The city's line departments include police, fire, streets, sewers, sewage, engineering, traffic engineering, garbage disposal, garage, water, light, street lighting, building maintenance, and Civil Defense (city-county). The general organizational chart is found in Figure 5.
FIGURE 5
ORGANIZATIONAL CHART OF SIOUX FALLS, SOUTH DAKOTA

Besides the normal resources found in most U.S. cities, Sioux Falls can call upon students from its two colleges if additional manpower is needed.

The Emergency. Like most other cities in the upper Midwest, Sioux Falls received heavy snow in December and January. By April 4 rapid thaws caused the Skunk Creek and Big Sioux River to rise out of their banks. The Big Sioux crested at 19.73 feet above flood stage on Thursday evening, April 10. This was the greatest flood of the century in terms of level of flood crest; yet very little land was flooded. In all, 50 families were evacuated from low-lying areas; no lives were lost.

Prior Experience. Sioux Falls has had a history of floods, the most recent ones occurring in 1960, 1962, and 1967. Therefore when
testing the hypotheses, we shall view the city as one with prior experience.

Presentation of Data

The data bearing on each hypothesis is presented -- first for communities without prior experience; second for communities with prior experience. A summary of the empirical support for each hypothesis is found in Table 3 near the end of the chapter.

Content

HYPOTHESIS 1. -- THERE WILL BE LESS UNNECESSARY DUPLICATION OF MESSAGES AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

Organizational officials agreed that very little duplication of messages existed in either Glendora or Minot. And what little there was, was deemed either helpful or necessary. The following remarks by the head of a city organization was typical of the responses given to DRC staff members. "Oh, I would say there was some duplication. I don't think (there was) any major amount of it."

Cities With Prior Experience

Every organizational official interviewed said that there was no unnecessary duplication of messages among organizations. Because of adequate prior experience and preplanning, officials knew how to communicate efficiently and therefore did not have to resort to any unnecessary duplication of messages.
Summary

We had expected cities without prior experience to have problems with unnecessary duplication of messages. However, the data found in Glendora and Minot do not support this assertion. Therefore, on the basis of our findings, hypothesis 1 has negative support.

HYPOTHESIS 2. -- THERE WILL BE FEWER MISDIRECTED MESSAGES AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

Organizational officials stated that there were very few, if any, misdirected messages on the communication net in either Glendora or Minot. Organizations appeared "to know" where certain emergency resources and personnel could be found. In part, this knowledge could be attributed to the relatively small size of the cities and to the close working relationships which existed among organizational personnel in normal times.

Cities With Prior Experience

Organizational officials in both Sioux City and Sioux Falls knew of no misdirected messages among organizations. They attributed this to prior experience and adequate preplanning.

Summary

We had expected that organizations without prior experience would have problems with misdirected messages. The data in both Glendora and Minot did not support this statement. Therefore hypothesis 2 is supported negatively.
HYPOTHESIS 3. -- THERE WILL BE FEWER MESSAGES INDICATING ONE ORGANIZATION'S LACK OF KNOWLEDGE OF OTHER ORGANIZATIONS' DOMAINS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

The data are conflicting. Although previous disaster literature showed a strong positive relationship between community's prior experience and knowledge of other organizations' domains, the data tended to be negative in Glendora. Although there was some confusion early in the emergency period regarding city versus county jurisdiction in certain areas, organizations appeared "to know" much about other disaster relevant organizations -- their material resources, population served, and services they could be expected to render. Again, this knowledge can be explained in part by the city's relatively small size and the close working relationship among organizational personnel which existed in non-emergency periods.

Unlike the situation in Glendora, most organizational officials in Minot weren't sure which organizations had what responsibilities. A high ranking city official gave a typical response when he said . . .

This is one of the weaknesses that developed when Civil Defense started working with us on this. I think there was not a clear enough line of demarcation in their respective functions -- what was expected of each organization . . . (For example) for a while there was confusion with sandbags; there was confusion with what people were supposed to do.

Similarly a top level administrator wasn't sure who should be the authority in a disaster -- the city or Civil Defense. Most organizations in Minot did lack knowledge of many other organizations' domains.
Cities With Prior Experience

In both Sioux City and Sioux Falls organizational officials were quick to point out their knowledge of other organizations' domains. In the former this could be seen clearly in communication patterns among organizations both prior to and during the emergency period. The disaster plan spelled out very accurately the responsibilities of all disaster related organizations at both the organizational and inter-organizational level. The director of an emergency organization summarized the state of affairs when he noted the following:

I think this (messages indicating knowledge of other organizations' domains) is based on the understanding of the working of the inter-departmental heads. We all serve on the staff: we all understand . . . what the other guy's problems (are) and how he handles it. We (have) got to understand what his operation is. So every department has a pretty good idea what the other guy's talking about.

Another city official related to us how each organization's emergency responsibilities were delineated. These responsibilities were in turn known and accepted by most of the other community organizations.

We delineated responsibility into the various sections. The public service department, they were responsible for the dike work. The city engineer (was) responsible for coordinating the river states and so on. The police had the job (of) providing security. The fire department (was in charge of) rescue. Civil Defense was generally in charge of communication. We had a manpower section which we set for the enlistment of volunteers and to direct a labor force to any particular point that they were needed. We had a transportation officer and these are, with the exception of the manpower, all city employees. Then a transportation officer was in charge of a motor pool. . . The welfare section was headed up by the head of social services here in Woodbury county. . . . Welfare provided housing, feeding of people, relocation, moving people, and so on. We had several meetings . . . on a regular basis prior to the arrival of the emergency. We
knew where we were going to locate certain segments. Public service moved the field headquarters out to Riverside, the area that was threatened. Manpower and transportation worked out of the city auditorium where we had parking lots, and we also had the basement of the auditorium where we could handle large groups of people. Civil Defense people with their communication section tied in the various private radio, or the various city radio networks. They tied fire and police, public service and our networks as well as their own particular radio networks.

In summary every organizational official interviewed was familiar with the responsibilities of other organizations. Strong communication links were maintained among organizations to keep everyone abreast of the activities of the various organizations.

Similarly in Sioux Falls, every organizational official interviewed was aware of the domains of other organizations. This was primarily the result of pre-emergency meetings in the flood control center. The head of an emergency organization explained the functions of these meetings.

We had several meetings before we started into this, explaining what we were going to do, how we were going to do it to city department heads so they knew when the call came -- what they were supposed to do.

An organizational official intimately involved with the city's emergency response suggested that not only were other organizational officials aware of their own domains but also so was he.

And since I wrote the flood plan I had a pretty good idea of who was supposed to be where, when. . . . The various departments that had their responsibilities ahead of time, they knew what their responsibilities were. When the time came for them to exercise them they were prepared. The information that the street department knew--when the water started rising and so forth--that they'd be called on for men and equipment (men, equipment, and operators as assigned). There would be a front-end loader assigned to
each sector if needed. That trucks would be necessary for hauling sand and sandbags. This worked out quite well. The sewer department knew they had the responsibility for inland flooding, pumping sewers through a lift station. They handled this quite well, but we coordinated with them to make sure we had everything plugged up... They were kept aware of what I was doing... and they kept me aware of what they were doing.

From interviews with the two co-directors of the city response, it was evident that each was aware of the domains of all organizations involved during the emergency period.

Summary

The data supporting this hypothesis are conflicting. In Glendora the support is negative; organizations were generally aware of other organizations' responsibilities and activities. This was the reverse of what we had predicted. In the other three cities -- Minot, Sioux City, and Sioux Falls -- the data supported the hypothesis very strongly.

HYPOTHESIS 4. -- THERE WILL BE MORE ADEQUATE MESSAGES IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In both Glendora and Minot, there were many inadequate messages being transmitted through the communication net. In Glendora this was most evident among city organizations, much less so among the county organizations. One city official summed it up very succinctly when he stated the following:

Because of long links, having to relay messages several times from output to input, the messages tended to become distorted -- not communicating exactly what was intended.
Similarly in Minot many persons indicated a lack of adequate information during the emergency. Some of this was due to lack of sufficient telephone and radio equipment. But the major problems were human, not physical. Each organizational official interviewed stated he was aware of unreliable message transmission among organizations or between organizations and the general public. There were problems in "transmitting different information about what was supposed to be the same situation."

One of the major problems resulted in the absence of any coordination of public information among organizations. Often organizations didn't coordinate the information so correct facts never reached the mass media. And at times when the radio-TV stations didn't have sufficient information, they would "improvise." Hence, many different sources were disseminating information to the general public without checking its validity. Rumors ran rampant. One organizational official put it well when he related the following:

I would say that the first few days the information sometimes didn't jive. There were various opinions. Some of the media had information that others didn't have and some of them would probably make the news a little bit more interesting by adding some adjectives and some figures that perhaps would have been best not put in the newscast.

One high ranking city official pointed out the inadequacy of information pertaining to what flood levels the city could expect. Every organizations' officials in Minot indicated a lack of adequate information on communication channels.
Cities With Prior Experience

City officials in Sioux City and Sioux Falls overwhelmingly agreed that messages among organizations were not problematic. In Sioux City no organizational official noted any problem with conflicting, inadequate, ambiguous, or incorrect messages. Plans were laid and followed which kept these problems to a minimum. All information was checked and double-checked before it was disseminated over the mass media. Often ranking city officials would give the public crucial disaster-related information over TV. A top city administrator said, "When we made a decision, why I went on live television and explained why we had to do this."

An emergency organization head describes how information was checked for its validity.

We don't like to have people editorialize in communication. "You need seven 5-ton trucks" doesn't mean "We need five 7-ton trucks." Our people have been trained to pick up (any) differential between what is being said and what they know to be the facts. We immediately made a check on that. . . . (For example) we had a number of people reporting, "There's some water somewhere." We immediately had them stand by while we checked with the engineer and the public service. . . . (Someone) would call back to us and say it is either "yes" or "no," and then we could put the information out.

Official after official noted a distinct lack of any of the aforementioned problems in the communication net.

In Sioux Falls the findings were the same. There were relatively few instances of conflicting or ambiguous messages, and even those which arose didn't inhibit the community response. A Civil Defense official noted the relative unimportance of the latter.
We had one instance where the sheriff's department made a release and it wasn't cleared through this office and was put on the air. There were a number of rumors that were loosed; (they) were ... not correct. We had a little "chit-chat" with the radio stations and they took care of it. ... We made our mistakes but they were minor.

Other organizational officials echoed this official's thoughts of the matter.

Summary

The data support the hypothesis very strongly. Communication in both Glendora and Minot was much less adequate than it was in Sioux City and Sioux Falls. We predicted that this would be the case.

HYPOTHESIS 5. -- THE COMMUNICATION NET WILL BE LESS OVERLOADED IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In both Glendora and Minot, city and organizational officials agreed that overloaded communication lines were a major problem in the early stages of the emergency. In Glendora, the overload existed on both radio and telephone. Too many agencies attempted to use a single frequency. For example the police department was on the same frequency with four other nearby police departments. Hence the air was overloaded. Similarly, telephone lines were jammed by citizens attempting to call various organizations and offices for information.

In Minot two types of physical facilities were overloaded -- two-way radio and telephone. Overloading on organizations' radios was much less a problem than the overwhelming convergence on telephones. This was especially acute because both organizations and the general
public relied heavily on telephonic communication. A typical response was made by an emergency organization volunteer to the question, "Were your lines of communication overloaded?" His response was "yes," especially in the first flood.

As a matter of fact the telephone company for whom I work . . . asked many many times for people to refrain from using the telephone because the equipment -- although under normal conditions its in good shape to handle any number of calls -- there was so much convergence of communication efforts through the telephone system that it became bogged down. It couldn't handle it.

Similarly, another organizational official reiterated the nature of the problem in the following:

It's almost an impossibility to get into them (Red Cross). I suppose Civil Defense is the same way. The city has asked that people not use the telephone unless it's an absolute emergency, of course. But I think that probably one thing they could use would be more telephones down at Red Cross headquarters or Civil Defense headquarters and so forth. (We needed) more direct lines -- not extensions -- but direct lines. Maybe they've got them now; I don't know. But I know that many, many times we'll sit here for ten minutes just constantly ringing the Red Cross number until they finally get it . . . . But that was the only big problem that we had.

Every organizational official interviewed noted problems of overloading of communication lines. Not all problems, however, severely hampered the effectiveness of the organizations as that revealed by the quotations above.

Cities With Prior Experience

In Sioux City there was very little overloading of the communication net because of the redundancy built into the system. All major links had a back-up, so if a primary link was loaded to capacity, a secondary link was available. Two-way radios backed up land
lines and vice versa. One city official knew of only one instance of overloading and that was cleared up very rapidly. Another reason for lack of overloading was the presence of unlisted numbers on many organizations' phones.

In Sioux Falls both the public and organizational personnel were asked to use the phones only if it was vital for the community's response to the flood situation. All parties were kept informed on the current state of the physical danger and on what organizations were doing. Similarly, organizational officials using the Civil Defense radio system were asked "that during this period -- unless it's an emergency -- don't use the system. So it was available to us strictly for flood fighting. No problem there." No organizational official interviewed had difficulty reaching another party on either the phone or radio.

Summary

The hypothesis is supported very strongly in the direction predicted. Communication channels in both Glendora and Minot were completely overloaded; in Sioux City and Sioux Falls they were not.

HYPOTHESIS 6. -- MORE MESSAGES WILL DEAL WITH MEANS TO ACHIEVE EMERGENCY GOALS (RATHER THAN THE GOALS THEMSELVES) AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

The evidence in both Glendora and Minot supports the hypothesis. For example, the former had no community-wide disaster plan indicating responsibilities (goals) of the various organizations in an emergency.
Consequently these goals had to be developed during the emergency period itself. This preoccupation with goals was first evidenced in the 11:00 a.m. meeting on January 22. One high-ranking city official stated that the first thing to be decided was:

who (what organization or office) was to have charge of certain areas within the city and what department was supposed to do such things as were necessary in different areas of the city.

Also, because there was so much involvement by county organizations during the emergency, much time and energy was spent deciding what areas should be handled by county organizations and what should remain under the domain of the city.

Similarly Minot had little knowledge of the demands it would have to face during the Des Lacs flood. This was evidenced by the fact that many organizational officials spent much of their time and energy early in the emergency period deciding how the Des Lacs flood would affect them and, in turn, what they could do to meet the major demands to be placed upon them.

The complete lack of anticipation of demands to be placed on city organizations and the obvious inability to know what the city's "goals" were is illustrated in the following dialogue:

**DRC Interviewer:** Did the disaster create any new tasks which had not been previously assigned to a community organization?

**Community Official:** Well I suppose that the tasks (of) the fighting of a flood is something not normally assignable, particularly in a community that hasn't had a flood like this in 40 or 45 years. I suppose that the entire operation of fighting a flood is new to all of us.

Even the decision-making structure had to be decided on after the crisis was almost upon the city. As there was no community-wide
communication center with the usual organizational officials there to make decisions, a top level city administrator decided to direct the city's response from the "field" in the front seat of his car.

Until the major goal decisions could be made, the more specific response to the actual demands could not be made. In both Glendora and Minot, the organizational officials spent more time attempting to identify major community goals than with how to accomplish them.

Cities With Prior Experience

In both Sioux City and Sioux Falls, most of the interorganizational communication dealt with means to achieve community goals rather than with the goals themselves. The reason was simple. Because of prior experience and extensive community-level disaster plans, the emergency goals were quite clear even before the flood waters hit. Hence, most interorganizational communication involved means to achieve pre-determined goals. In Sioux City, a Civil Defense official indicated that not only was the community aware of emergency goals to be undertaken during the recent flooding, but also it had knowledge of goals during different types of natural disasters. For example:

If a tornado comes in, . . . we know the first thing (is to) secure the area, go in and make your rescue and reconnaissance of the area -- take care of the "people problem" first. Immediately the public services are clearing areas to get in. . . . They know how to do this. They come on in. The Salvation Army will be there immediately to start feeding the troops and evacuating (victims). The Red Cross would be there with their people. The health department would be there; they know how to respond.

In Sioux Falls organizations followed their community-wide disaster plan very closely. Developers of the plan appeared to
anticipate quite well the most serious problems which could be
presented during a flood crisis. Therefore most communication dealt
not with major goals but rather with means to achieve them.

Summary

Interorganizational communication in the two cities without prior
experience initially dealt much more with defining the basic emerg­
gency goals than with the means to achieve them. We found the re­
verse in Sioux City and Sioux Falls. These two cities were well
aware of the major goals to be met. Hence, the data support the
hypothesis very strongly and in the direction we had predicted.

HYPOTHESIS 7. -- THERE WILL BE MORE FUNCTIONAL SEPARATION OF COMMUNI­
CATION AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN
IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In both Glendora and Minot there was little functional separation
of interorganizational communications. There are several levels of
possible functional separation; the macro level would include separa­
tion of public information from interorganizational communication. In
Glendora, several organizational officials stated that there was very
little of this type of separation of messages on lines of communica­
tion. The city made no provisions for separating public information
from other types. For example a high ranking city official noted the
following regarding public information:

The reporters and TV cameras would come in on their own.
They would make their own appraisals and any time that
anyone wanted to speak to myself or the city manager, why
surely we were here.
Similarly in Minot, communication nets were not specialized; various types of information (public, operational, and administrative information) were not isolated or separated from each other. A top city administrator noted this marked lack of functional separation of different types of information in the following statement:

The major communication problem in the Des Lacs flood was that we didn't have a centralized control for releasing information -- which was a bad communication problem because rumors ran so rampant all over the city that nobody could keep up with what was going on and consequently, the public and the citizenry were confused most of the time in the Des Lacs flood until we got set up.

All information tended to converge on and be disseminated by many different organizations and individuals, with no separation according to type.

Cities With Prior Experience

In Sioux City and Sioux Falls there was definite functional separation of communication among organizations. In the former just prior to impact, community leaders set up the structure which would keep separate public, administrative, and operational information. The city had its public information officer. All public information was channeled through him; the director of public works was the operational head; and the mayor and the council served as administrative heads. Even the Red Cross which normally handles its own information collection, processing, and dissemination cleared most of the information through the city's public information officer. A Red Cross official said, "We would ask them (Red Cross personnel) to clear
through the city's public information officer. We would give what information we felt necessary to his office and let him clear through there."

Not only was there functional separation among different types of emergency information (e.g., public, operational, and administrative) in Sioux City, but also between emergency and non-emergency information. The public works director gave an example of the latter when he said, "I gave all non-flood fighting responsibilities to my assistant director and other division heads."

Likewise in Sioux Falls there was functional separation of communication regarding administrative, operational, and public information. For example, all public information was funneled to the flood control headquarters where it was disseminated to organizations and the general public. As the project coordinator related to us:

One thing we did find that was helpful: all (public information) releases were to be coordinated through this office (communication center) . . . We had good cooperation all the way through the press, and I think this helped us a lot.

Similarly, all information and requests from the general public were funneled to the flood control center. Telephone numbers of the communication center were released to the public.

Operational and administrative information also tended to be separated in Sioux Falls. According to the project coordinator he made "the technical decisions; . . . (Civil Defense) provided the political coordination which was necessary."
Summary

There was more functional separation of interorganizational communication in Sioux City and Sioux Falls than there was in Glendora and Minot. These findings had been predicted; therefore the data are very strong in support of the hypothesis.

HYPOTHESIS 8. -- COMMUNICATION WILL BE MORE SYSTEMATIC, SELECTIVE, AND CONTROLLED IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

A significant amount of interorganizational communication in Glendora and Minot was not systematic and controlled. In Glendora there was little screening of messages; much extraneous communication flowed through the network making for less organizational efficiency or effectiveness. Similarly, several organizations sent messages to general rather than specific audiences. For instance at the request of a local organization, area radio and TV stations broadcast a blanket call for volunteers of every type and description. On the other hand, organizations had developed no techniques for selecting and controlling incoming calls. One organization official stated that they "received" requests from everybody. There was no centralization of communication which would allow the filtering of incoming messages and outgoing directives.

In Minot much of the communication was extraneous and not clear; hence, many conversations were clogging up the communications net.

A Red Cross official related this to us in the following:
I'm sure that the major communication problem was that there was no central news source. People, organizations, and groups were just making news releases to the various media and in many cases these releases were not necessarily authentic... The rumor project, the rumor mill was really working at that point.

Cities With Prior Experience

In both Sioux City and Sioux Falls no official interviewed indicated any problems with lack of concise messages over the communication lines. Civil Defense either operated or had charge of a large portion of the two cities' communication network. Most of the personal operating radios had had previous, extensive training in the efficient and effective use of radio equipment. But even beyond the communication facilities provided by Civil Defense, the evidence indicates few problems with unsystematic or unselective communication.

Summary

Interorganizational communication in Sioux City and Sioux Falls was much more systematic, selective, and controlled than in Glendora and Minot. The data support this hypothesis strongly in the direction predicted.

HYPOTHESIS 9. -- THERE WILL BE MORE ADEQUATE INFORMATION FROM THE DISASTER SITE IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

Local organizations in Glendora had little knowledge of the nature and extent of damage to the community for a considerable period after impact. Top organizational officials either had to go out physically
into the field to ascertain the extent of the damage or call on county organizations which had more adequate networks for receiving feedback from the disaster site. Even the latter course of action was not taken for some time.

Similarly, in Minot community organizations listed "lack of adequate information from the disaster site" as one of their two or three major problems. The information was inadequate either because it was unreliable, too slow, or in some cases non-existent. In spite of the fact that the United States Weather Bureau had predicted a high probability of flooding in all of the northern Midwest, organizational officials either could not or did not institute mechanisms for (1) gathering appropriate information regarding rising Des Lacs River or what certain organizations were doing there or (2) disseminating this information to organizations away from the disaster site.

One Disaster Research Center staff member asked two top city officials and a Red Cross official if they had sufficient knowledge of river conditions on the Des Lacs and what various organizations were doing at the disaster site. The three responses follow:

City Official #1: No, no we didn't. That was where our big problem was. That's why if we'd have known from the first time the Des Lacs started to run off that we were going to be faced with the problem . . . , we would have had different planning as far as isolating big areas against this flood, where we would have diked, and what we would have done. And we did not have that information.

City Official #2: Oh, this was an absolute mess, just an absolute mess. . . . The local flooding situation was -- we were fighting it ourselves. We had no liaison upstream; we had no government people in here telling us what to expect.
Red Cross Official: We were trying to do what I thought was best in all cases. . . . With a little more knowledge of the situation we would have done a better job.

Responses of organizational officials came to the same conclusion: the information from the disaster site was not sufficient.

Cities With Prior Experience

Throughout the emergency period communication from the field was more efficient and accurate in Sioux City than in any other city studied. The city's communication center, administrative officials, and most organizations had quite adequate information from the disaster site. When asked if he had adequate knowledge about the field situation, one top city official replied "... Yes. One of the reasons that I think we did was because I was in close communication with these key people." In addition he met with key organizational officials at least three times a day to keep abreast of the situation in the field.

As the flood waters were rising threatening North Sioux City's Riverside area, city officials took steps to obtain information about the threatened population should quick evacuation be necessary. The welfare department made up a questionnaire. A Civil Defense official described how this was accomplished.

They made up this questionnaire which was distributed to every family in Riverside and from this, (the welfare department) was getting all the information that was necessary. We had a list of every family in Riverside by area. We knew whether or not these families needed shelter, whether they needed assistance with their transportation of household goods. We knew if they had a sick or invalid person in the family. . . . We knew just exactly how many people in any given area were going to need the various services, should we have to evacuate.
The situation was the same in Sioux Falls as it had been in Sioux City. The information from the disaster site was very adequate; this was true especially of information about the number of dead and injured, damaged areas, and the general physical situation. An organizational official in charge of the city's response related the following to us.

We had the Corps of Engineers and the weather bureau with their gauging stations all along the line. The state radio point at Parker, South Dakota, would give us -- twice a day -- all of the readings on the Sioux River from where she starts to where she dumps into Sioux City. . . . So the information was fed to us. We could tell you exactly what the water was doing all the way up the river. And we kept this in a log.

Similarly, the project coordinator stated that one of the keys to the success of the city response was good communication from the river.

This is one of the important things that we did have; we did have frequent readings of all the eight stations around the city and upstream from the city. . . . You could pretty well tell what was going on.

Summary

The data strongly support the hypothesis in the direction predicted. Sioux City and Sioux Falls obtained much more adequate information from the disaster site than did Glendora and Minot.

Configuration

HYPOTHESIS 10. -- FEWER KEY ORGANIZATIONS WILL BE MISSING FROM THE NET IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.
Cities Without Prior Experience

In Both Glendora and Minot several key organizations were missing. In Glendora two major disaster-related organizations were quite conspicuous due to their absence -- Civil Defense and the Red Cross. A Civil Defense organization (or any one organization carrying out a civil defense function) never existed throughout the emergency and the Red Cross did not come in until late in the emergency period. This left a temporary void in what are normally considered Civil Defense and Red Cross activities.

In Minot several organizations or offices were missing or not functioning fully during the Des Lacs flood. For example, although Civil Defense existed and carried out a few tasks, it did not play the important role it usually does in communities with prior experience. The organization tended to function more or less autonomously and outside any communication net. Likewise, the mayor's office was not actively involved in the emergency.

A more serious deficiency arose in Minot after about three or four days. Fatigue among officials began to set in and many organizations had no mechanisms for rotating personnel to keep key positions filled at all times. For a period of a day or two several offices were either missing or functioning way below par. A top city administrator reported that communication and coordination . . .

broke down a little bit on Wednesday because not only (a top administrator) but also several of his supervisors were up from Saturday night through Wednesday. Thinking we were going to have this thing whipped, we stayed right with it. Well, it finally got to the point where some of us were just not effective any longer. We went home (and) got some sleep. . . .
Cities With Prior Experience

No traditional emergency organizations were missing in either Sioux City or Sioux Falls. For instance, some organizations in cities with little prior experience are either marginal to or absent from the city's communication net. Such was not the case in Sioux City. Civil Defense, often one of these marginal organizations, was fully integrated into the net in this disaster. Other offices and organizations not always fully integrated into communication nets in some disasters are the Red Cross, The Salvation Army, county welfare department, and a city public information officer. In Sioux City all of these were present and were an integral part of the net.

Also, unlike the earlier Des Lacs flood in Minot, North Dakota, in Sioux City most positions were backstopped. "The department heads were usually in the field and their man was liaison. . . . The department heads can only work so many hours and so when he wasn't there, the liaison man was now the decision-maker."

In Sioux Falls none of the emergency organizations operating in many crisis situations was missing. But there is a more important aspect of an organization's presence which should be mentioned. Quite often an organization was physically present but incapacitated in some way as we described in Minot. This contingency was handled quite well in Sioux Falls. Because of an elaborate, pre-planned shift system, no organizations nor key personnel were missing during the emergency period. Second, organizations did not function autonomously outside the net, but rather were linked together through the flood control center.
Summary

Fewer key organizations were missing in Sioux City and Sioux Falls than in Glendora and Minot. In the latter two cities some traditional emergency organizations were not present and organizational functioning was greatly impaired because of the fatigue of their personnel. The data support this hypothesis in the direction anticipated.

HYPOTHESIS 11. -- FEWER ORGANIZATION-SETS WILL BE PRESENT IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In both Glendora and Minot no organization-sets were found. It is even tenuous to view all community organizations as making up one set because of all the extra-community linkages which existed. Rather, the situations in the two cities can more accurately be characterized as ones in which synthetic organizations emerged. They developed very slowly throughout the emergencies and were not very coordinated until very late in the emergency periods.

In Glendora and Minot the locus of decision making tended to reside in a coalition of city, county, state, and federal organizations. At the city level the city manager's office was the center or locus of decision making in the synthetic organization. In many emergencies Civil Defense is an integral part of the synthetic organization. But Glendora had neither a Civil Defense organization nor another organization with comparable skills. In Minot Civil Defense was understaffed and geared primarily for nuclear attack -- not a natural disaster. In no sense was it prepared to take any leadership role during a flood disaster.
Cities With Prior Experience

Like Glendora and Minot, synthetic organizations developed in Sioux City and Sioux Falls. But there were differences. In the latter two cities a very tightly-knit, highly integrated synthetic organization developed very early in the emergency. It happened by plan. Each community's disaster plan specified what the appropriate relationship among organizations should be, and the plan was followed quite closely in both cities.

Another difference between cities with and cities without prior experience should be mentioned. In both Sioux City and Sioux Falls Civil Defense tended to be at the center of the synthetic organizations; in Minot and Glendora Civil Defense played a minor and non-existent role, respectively. Prior to the disasters in the two former cities, Civil Defense units played important roles within the community in both emergency and pre-emergency periods. In both instances their organizations maintained a police-trained, deputized security force and in Sioux City the organization also maintained an active rescue squad. Both had been accepted as legitimate decision-making bodies even before the disaster.

Summary

It was expected Glendora and Minot, cities without prior experience, would have more organization-sets than Sioux City and Sioux Falls, cities with prior experience. Such did not turn out to be the case, however. Each of the four cities was characterized not so much by the number of sets they had, but rather by the presence of a
synthetic organization in all four cities. As discussed above, however, the types of synthetic organizations differed significantly between the two types of cities.

In summary, the data do not support the hypothesis. We did not find a large number of organization-sets in either Glendora or Minot.

**HYPOTHESIS 12. -- EMERGENT GROUPS WILL LESS LIKELY BE PART OF COMMUNICATION NETS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.**

*Cities Without Prior Experience*

In both Glendora and Minot there was some evidence of emergence. In the former two major groups emerged. The first evolved as the major community coordinating body consisting of several city and county organizations and offices. City personnel included were the mayor, city manager, police chief, director of public works, and several councilmen. County personnel included one each from the fire department, flood control district, sheriff's department, and county road department. Between January 22-27, a group consisting of these personnel developed into the major decision-making body for the city.

Although a second group existed in a germinal state prior to the emergency, it emerged into a major emergency organization as the crisis developed. The Glenkirk Presbyterian Church's Helping Hands Organization filled a void by undertaking many of those tasks normally handled by the missing Civil Defense and Red Cross.

In Minot the major group which emerged was at city hall toward the end of the first emergency. The group formed to coordinate the city's response (except for welfare) during the second emergency.
Persons making up the group represented the city (city manager and mayor), county commissioners, National Guard, Air Force, Corps of Engineers, utilities (gas and electricity), and a liaison member from the news media.

Cities With Prior Experience

In Sioux City and Sioux Falls very little, if any, emergence occurred. A high city official stated that no new groups emerged during the flooding. A Civil Defense official stated that they didn't even use "walk-in" volunteers. Only highly trained volunteers were used.

We don't use "walk-ins." We use nothing but our own people. We're a semi-military (organization) in this sense of the word. We have organizations with their own (volunteer) chiefs, their own officers. We have a very tightly disciplined group.

The same situation existed in Sioux Falls where there was no evidence of groups emerging during the emergency period. Even volunteers which often inundate organizations during disasters were notably absent. "Walk-in" volunteers were used but only in situations where (1) unskilled labor was needed and (2) they could work together as a group under the close supervision of city personnel. Large numbers of "walk-ins" were used to fill sandbags, but were not used extensively elsewhere.

Summary

More organizations and groups emerged in Glendora and Minot than in Sioux City and Sioux Falls. The data support this hypothesis in the direction predicted.
HYPOTHESIS 13. -- FEWER EXTRA-COMMUNITY ORGANIZATIONS WILL BE PART OF THE COMMUNICATION NET(S) IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

Extra-community organizations were heavily involved in both Glendora and Minot. In Minot both county and city officials overwhelmingly agreed that many county organizations were deeply involved within the city of Glendora -- communicating, coordinating, and passing material resources to city organizations. Although the city initially asked county organizations to come in and although the city still maintained overall authority to some extent, county organizations influenced greatly the specific strategy and tactics during the emergency. This was evident from the very first interorganizational meeting at 11:00 a.m., January 22, when a member of the Los Angeles County Board of Supervisors chaired the meeting. Los Angeles County organizations which were part of the emergency communication net were the fire department, flood control district, sheriff's department, road department, health department, and the chief administrative officer (i.e., county director of Civil Defense). The only state organization involved to any extent was the California State Highway Patrol.

Many non-local organizations also became involved in the community response in Minot and therefore were integrated into the local communication net. The major outside organizations involved were the county road department, Air Force, Army Corps of Engineers, and Bureau of Fish and Wildlife.
Cities With Prior Experience

Sioux City maintained a great deal of communication with outside organizations, but the latter were not part of any operational net. Rather the communication was primarily informational. Extra-community organizations were kept appraised of the situation just in case their services should be required. Most of the latter remained on standby rather than as part of the organized community response. A top official of the police department gave a typical response:

I had enough manpower to handle the situation. As you know, we didn't go into an all-out effort. . . . And therefore I wasn't called upon to exert the maximum that we had available. I had the highway patrol; I had the sheriff's office standing by . . . that I could have called on. It wasn't necessary.

In Sioux Falls there was much communication between community and noncommunity organizations. The content of most of the communication consisted of passing of information on the state of affairs rather than requests for help on the part of the city organizations. As an organizational official in charge of emergency operations put it, "we had some county help, or some state help. In this county the police (deferred) action on anything. They (would) defer action on . . . the second coming of the Lord if they could."

One organization, the Army Corps of Engineers, was heavily involved in the community response. Although it has the technical expertise, it was never asked to nor attempted to become the locus of community decision-making. Control of the community response remained at the city level.
Summary

We had predicted that Glendora and Minot would have more communication with extra-community organizations than Sioux City and Sioux Falls. We did not find this to be true. Although there were qualitative differences in the content of the messages, all four cities maintained a great deal of extra-community communication. Therefore hypothesis 13 is supported negatively.

HYPOTHESIS 14. -- A CENTRAL COMMUNICATION CENTER WILL MORE LIKELY EXIST IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

Every organizational official interviewed in Glendora (both county and city) stated that at no time during the emergency was there a central interorganization communication or coordinating center either in the field or at a fixed base station. Rather, most organizations functioned independently of each other. One of the major changes for the future advocated by officials was to "have closer communication . . . have all agencies in a center . . . (and that) closer proximity to a base station would be beneficial."

The only semblance of a communication center in Minot was one manned by Civil Defense in the county courthouse. However it never became a central communication center for the community or any segment thereof. Every organizational official interviewed noted a lack of any type of central communication center. When a top level city administrator was asked about the locus of coordination and decision-making he replied, "In the initial crest it (community coordination-
communication) was handled from the front seat of (my) car. I had radio communication and then I just went out in the field and directed everything from the car." In essence it was a one-man communication center, but even then he had contact with relatively few other organizations. To queries about the existence of a central communication center, other officials responded "we had everybody working in different places by themselves."

Cities With Prior Experience

Civil Defense provided a central location and extensive communication facilities for the community. The emergency operating center normally functions twenty-four hours a day -- emergency or no emergency. Therefore the center required no warm-up time. Trained personnel operated the center throughout the emergency. A Civil Defense official explained the center's communication potential.

We have hot lines there. One ties into my office, one ties into the (city) manager's office, one (to) the police, one (to) the sheriff's office, (one to) the city engineer's office, and one to the fire dispatcher's office.

We also have a hot line system that ties all the news media into the EOC. . . . We were talking about telephones. . . . We also have a radio system that ties in with all these people. But that is . . . a secondary communication system. . . . Then we have a hot line that runs directly to the weather bureau, and we have radio backup to the weather bureau. We have the ESSA teletype that's tied into there. So we can communicate with practically anybody we want. We have direct contact with Des Moines, too, by radio. And of course we have the hot line that we use in the warning system of the state. Communication-wise we're in very good shape.

Sioux Falls established a central communication center almost as encompassing as that found in Sioux City. The city established a
major communication center in the basement of the city hall. The police-fire department communication center is permanently established there. This was part of the community's emergency communication center. A secondary communication center was set up at the city's water treatment plant. This center served as the field command post which dealt with operational information.

Summary

The results of this hypothesis were conclusive. Cities without prior experience did not have a central communication center; cities with prior experience did. Therefore the support for hypothesis 14 is exceptionally strong.

Degree of Coordination

HYPOTHESIS 15. -- THE COMMUNICATION NET WILL HAVE A GREATER NUMBER OF LINKS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Previous Experience

In both Glendora and Minot there was a real breakdown in communication. In Glendora there were numerous instances where organizations either could not or would not communicate with each other. Some organizations lost physical communication with other organizations, but the major breakdown in communication stemmed not from the loss of physical ability to communicate but rather from lack of any plans to communicate with other organizations. Each organization tended to respond autonomously. As one official put it concerning communication and coordination between various organizations . . .
It was pretty much individual -- each one ascertaining what his normal functions would involve. We were looking at roads; I am sure the fire department was looking at the homes and so forth; the police were looking at security, looting, etc. So I would assume that for the first few hours there was very little joint effort, but (rather) each one (organization) appraising the situation as it applied to his organization.

Another official noted that very weak links existed among city organizations and between city and county organizations. Furthermore he added that "they had a tremendous coordinating problem."

The situation was no better in Minot. During the Des Lacs flood organizations tended to function autonomously and did not communicate readily with many other organizations. One instance of this has already been presented in hypothesis 9. In the discussion of that hypothesis a top city official stated that the city had absolutely no communication with organizations at the disaster site outside the city. City official after official confirmed the existence of this major communication breakdown. A Red Cross official noted an initial lack of communication and coordination among community organizations. The local radio stations had little communication with a number of organizations operating in the field. Each had to obtain information from its own people. Another Red Cross official stated that there was minimal communication among organizations. In addition he said he was not aware of what many others were doing for the first few days. According to a high city official, "This was one of the big reasons why the central control was set up." The control center was set up much later, however, almost at the end of the Des Lacs flood emergency period.
Cities With Prior Experience

Because of prior disaster planning and the presence of a superior communication center in Sioux City, many organizations were able to communicate with each other directly. A city administrator described how organizational officials maintained contact with each other from the very beginning of the emergency.

Then we met again just before the crest to make certain that everybody was in place -- that everything was going right. It was mainly a matter of communication and touching base and making certain that everybody had their assignments and that they didn't need any help. I think that having these department heads on this staff and having them work closely together and knowing what each other was going to do, aided the coordination very much. . . .

As we described earlier, many of the links were redundant in Sioux City. Telephonic communication was back-stopped by radio and vice versa. If one system should malfunction, communication links among organizations would still be maintained. Every organizational official interviewed agreed that there were many links among all community organizations.

Likewise, in Sioux Falls communication links were very strong among community organizations. Many of these links went through the flood control center. Strong links among organizations were maintained through the daily 9:00 a.m. meetings in the flood control center. A Civil Defense official described the function of the daily meetings.

We would have all department heads that were involved in the flood situation and (in) many cases (the) general public came in -- they were all invited -- and the news media. The purpose of this was to have each and every department head advised as to what the situation was at that minute. (For instance), in some cases the fire chief and the police chief normally would go home to
rest. They would come back in the morning at the briefing; they would know as much after that briefing as the Civil Defense director or coordinator. They were brought up to date on every detail that happened during the night.

In addition there were a large number of links among organizations which did not go through the communication centers.

Summary

Without a doubt, cities with prior experience had a greater number of communication links among organizations than did cities without prior experience. The data supporting hypothesis 15 are exceptionally strong.

HYPOTHESIS 16. -- THE LENGTH OF COMMUNICATION LINKS WILL BE SHORTER IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In Glendora messages in the communication net often had to be relayed several times between the sender and the final destination. Few emergency or direct lines among the various organizations existed. A top city administrator stated the problem succinctly when he said:

Well, because we didn't have a joint (frequency) or a single radio band, we had command posts here and there and lines running between the two. That was difficult and sometimes took several minutes (to send a message) . . . It was frustrating to spend fifteen minutes waiting and it could have made a difference -- maybe it did make a difference in some cases.

Similarly, the director of a city organization stated that their worst communication problem was the necessity of having to relay messages.
An example would be when I'd be out in the field, and I would need county assistance in an area. I would call in on my radio. I'd be monitored by the police; the police would then have to telephone my instructions to the road department. They in turn would have to call out on their radio and relay the answer back. So we lost a lot of time, and in some instances lost the value of communication because by the time the message was transferred through three or four different sets it may not have ended up exactly as we wanted. I'd say this was the worst problem we had.

One official attributed the presence of long links to the lack of a central command post and to the fact that many persons at various communication facilities were lower echelon personnel, thus requiring another call before a decision could be made.

In Minot several instances of long communication links were evident, but most organizational officials did not note this. Two supporting statements are included below.

**DRC Staff Member:** What were your major communication problems?

**A City Administrator:** Well probably just not enough communication units more than anything else. . . . There were a number of times when I certainly would have to have had a direct link with, say, a truck hauling materials.

Similarly, a YMCA officer stated that "because of many phones being overloaded, many messages had to be sent by a very indirect route."

**Cities With Prior Experience**

In Sioux City communication links were short. Organizational officials were unanimous on this score and expressed their opinion in several ways. First, the communication center facilitated this more than any other single factor. The EOC provided communication to all city and many extra-city organizations. Hence, if one organization
wished to communicate with another, the longest link was normally from the originator to the EOC to the receiving organization. A city official described how this would happen.

In other words, if I wanted something from the police and the police chief was not there and I wasn't "looking him in the eye," I would call Civil Defense, talk to the police representative, and have the message delivered where I wanted.

Quite often an organizational decision maker would be at the EOC in which case the link would even be shorter.

A top city administrator gave a couple specific examples of direct communication links between sender and receiver. He explained how often he would go on live television himself to explain what and why the city was undertaking certain emergency functions. Links were especially short between the city and mass media.

Before he (city's public information officer) left this office, he set up what we call the "hot-line" to the newspaper agencies . . . so that (when) he picks up the phone, it rings in all of their different places. He lets it ring three times . . . Then they all pick up their phones and they all hear the same thing at the same time. The newspaper people down here told me that without him (city's PIO) it would have been a very difficult situation for them to have gotten the news as fast and put it out if they hadn't had this service.

Because almost all organizations could communicate directly with the communication center in Sioux Falls and because many organizational officials attended the daily 9:00 a.m. meetings, communication links were very short. In the words of one organizational official, "If we had a problem we could call one person and then it was taken care of."
Summary

Communication links were significantly shorter in Sioux City and Sioux Falls than in Glendora and Minot. The data support this hypothesis and in the direction predicted.

Continuity

HYPOTHESIS 20. -- ORGANIZATIONS WILL COMMUNICATE WITH FEWER NEW ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In Glendora most organizations communicated with a few new organizations -- those with which they did not normally communicate. The most frequently named new organization was the Glenkirk Presbyterian Church's Helping Hands Organization.

In Minot several organizations communicated with new organizations, organizations not normally communicated with before. For instance, the mayor's office, city manager's office, and other city organizations communicated with several "new" organizations -- the Army Corps of Engineers and the National Guard. Likewise, the local Red Cross communicated with the Mennonites' disaster organization, the local ministerial association, and specific church groups -- organizations with which they had no prior contact.

Cities With Prior Experience

Most informants in Sioux City said they didn't communicate with many new organizations. Those new organizations that were mentioned were extra-community, such as the U.S. Coast Guard, Seventh-Day...
Adventists, and National Guard. "Ninety-nine percent" of the organizations had communicated with each other prior to the emergency.

In Sioux Falls a Civil Defense official indicated that most organizations had communicated with each other prior to the flooding. He went on to explain their own situation.

We (had) worked with all of them in the past. The citizens band, for example, we used them on our tornado watch. So we’ve worked extensively with them. The Salvation Army, of course. I would say that there was no new organization that entered into the flood control picture.

Summary

The data appear to support this hypothesis in the direction expected. In general, organizations in Glendora and Minot communicated more with new organizations than did organizations in either Sioux City or Sioux Falls.

HYPOTHESIS 21. -- ORGANIZATIONS WILL COMMUNICATE WITH A GREATER NUMBER OF ORGANIZATIONS OF DIFFERENT TYPE IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In both Glendora and Minot the type of organization (i.e. police, welfare, etc.) seemed to have little explanatory power in predicting which organizations would communicate with which other organizations. For example, police organizations tended to communicate with non-police organizations as often as they did with other police organizations.
Cities With Prior Experience

The findings in Sioux City and Sioux Falls were similar to those from Glendora and Minot. Community organizations communicated with many of different types.

Summary

The results were unexpected. We had reasoned that organizations in communities without prior experience would be more apt to communicate with the same organizations during the emergency that they had prior to the disaster -- organizations which would be of similar type. Such did not turn out to be the case, however. Organizations in communities without prior experience communicated with a great many organizations of different type. Therefore the support for hypothesis 21 is negative.

HYPOTHESIS 22. -- COMMUNICATION LINKS WILL BE LESS LIKELY BASED ON PRE-EXISTING FRIENDSHIPS THAN ON OTHER CRITERIA IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

The evidence indicates that all organizational officials in Glendora and Minot knew each other and this facilitated communication during the disaster. However, the nature of the relationship between pre-existing friendships and subsequent communication links is still an empirical question. Just because friends communicated with each other does not necessarily mean that the communication links were based on these friendships.
Cities With Prior Experience

Almost every organizational official knew the officials of other organizations personally. But like the communities without prior experience, the nature of the relationship between pre-existing friendships and subsequent communication links is very vague.

Summary

In all four cities each organizational official knew most of the other organizational officials personally. But the data were inadequate to establish that pre-existing friendships were the basis of subsequent communication patterns among organizations.

Level of Message Transaction

HYPOTHESIS 23. -- A GREATER PROPORTION OF MESSAGES TRANSMITTED WILL BE AT LOWER LEVELS AMONG ORGANIZATIONS IN COMMUNITIES WITH PRIOR EXPERIENCE THAN IN COMMUNITIES WITHOUT PRIOR EXPERIENCE.

Cities Without Prior Experience

In Glendora and Minot messages tended to be transmitted at the upper levels among organizations -- between department heads or top city officials rather than at lower superintendent, foreman, or worker levels. A typical answer to the question, "At what level was your communication with other organizations?" would be, "Oh most communication occurred at the city manager or department head level." Lower level personnel desiring to communicate with other organizations tried to accomplish this through their department heads or organizational officials, rather than directly.
Cities With Prior Experience

Many messages were transmitted at lower levels among organizations in both Sioux City and Sioux Falls. In the former, top city officials delegated much authority to lower levels. One of them stated that, "I delegated practically all of the welfare role and only took care of the hot-spots. The engineering -- I delegated that pretty much." This meant that communication was also passed among organizations at lower levels. When asked about this very point a Red Cross official replied:

I would say that a great deal of it was right down at the field level because . . . we were so well organized that each of these disaster chairmen in charge of one specific operation was handling his own communication.

Likewise in Sioux Falls much interorganizational communication took place at lower levels among organizations. The city's disaster plan (which was followed closely) delineated and dispersed decision-making responsibility. Therefore lower level personnel were aware not only of their own responsibilities, but also the responsibilities of other community personnel. Thus it became possible for interorganizational communication to take place at lower levels.

Summary

A greater percentage of the interorganizational communication in communities with prior experience was at lower levels than in communities without prior experience. Therefore the data support our hypothesis in the direction anticipated.
Summary

In this chapter we have seen significant differences in communication patterns of communities with and without prior experience. More specifically, 13 of the 20 hypotheses tested have been supported positively; that is to say, we have judged that there is a positive relationship between prior experience and the subsequent variable in question in 13 or 20 instances. The results are summarized in Table 3.

We must be very cautious, however, when attempting to infer a causal relationship between two variables in quasi-experimental research because control of all relevant factors is very difficult. One of the factors which we were unable to control was the severity of the disaster. More dollar damage occurred in Glendora and Minot than in either Sioux City or Sioux Falls. Because of this difference, one might suspect that it was the severity of the disaster rather than the presence or lack of prior experience which explained the subsequent communication patterns in the four cities.

Data from two sources, however, tend to negate the severity-of-the-disaster argument. First, sprinkled throughout the chapter are comments made by organizational officials in which they, themselves, infer that certain communication patterns were the result of prior experience or the lack of it. Also, many organizational officials in Sioux City and Sioux Falls said that the disaster "would have been much worse" in their two cities if it had not been for the integrated communication and coordination which existed in the two floods. In other words these officials were saying that communication patterns affected the severity of the crisis, and not the reverse.
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<th>Hypotheses Tested</th>
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**Content**

1. There will be less unnecessary duplication of messages among organizations in communities with prior experience than in communities without prior experience.  
   b - + +

2. There will be fewer misdirected messages among organizations in communities with prior experience than in communities without prior experience.  
   - - + +

3. There will be fewer messages indicating one organization's lack of knowledge of other organizations' domains in communities with prior experience than in communities without prior experience.  
   - + + +

4. There will be fewer inadequate messages in communities with prior experience than in communities without prior experience.  
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5. The communication net will be less overloaded in communities with prior experience than in communities without prior experience.  
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<td>6. More messages will deal with means to achieve emergency goals (rather than the goals themselves) among organizations in communities with prior experience than in communities without prior experience.</td>
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<td>7. There will be more functional separation of communication among organizations in communities with prior experience than in communities without prior experience.</td>
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<td>8. Communication will be more systematic, selective, and controlled in communities with prior experience than in communities without prior experience.</td>
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<td>9. There will be more adequate information from the disaster site in communities with prior experience than in communities without prior experience.</td>
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<td>10. Fewer key organizations will be missing from the net in communities with prior experience than in communities without prior experience.</td>
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<td>11. Fewer organization-sets will be present in communities with prior experience than in communities without prior experience.</td>
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<td>12. Emergent Groups will less likely be part of the communication net in communities with prior experience than in communities without prior experience.</td>
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<td>13. Fewer extra-community organizations will be part of the communication net in communities with prior experience than in communities without prior experience.</td>
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<td>14. A central communication center will be more likely to exist in communities with prior experience than in communities without prior experience.</td>
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Degree of Coordination

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<td>15. The communication net will have a greater number of links in communities with prior experience than in communities without prior experience.</td>
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<td>16. The length of communication links will be shorter in communities with prior experience than in communities without prior experience.</td>
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<td>Continuity</td>
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<td>20. Organizations will communicate with fewer new organizations in communities with prior experience than in communities without prior experience.</td>
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<td>21. Organizations will communicate with a greater number of organizations of different type in communities with prior experience than in communities without prior experience.</td>
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<td>22. Communication links will be less likely based on pre-existing friendships than on other criteria in communities with prior experience than in communities without prior experience.</td>
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<td>Level of Message Transaction</td>
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<td>23. A greater proportion of messages transmitted will be at lower levels among organizations in communities with prior experience than in communities without prior experience.</td>
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\(^a\)A = Glendora, California, Flood and Mudslides
\(^b\)B = Minot, North Dakota, Flood
\(^c\)C = Sioux City, Iowa, Flood
\(^d\)D = Sioux Falls, South Dakota, Flood

+ = Positive support for the hypothesis
- = Negative support for the hypothesis
0 = Inadequate data to test the hypothesis
Data from a second source also rules out disaster severity as an explanation of subsequent communication patterns. This data is derived from Minot, North Dakota's response to a second flood.

**Minot: The Second Time Around**

Minot experienced two separate disasters in April 1969. The first one, the Des Lacs flood, has already been discussed. The emergency period ended about April 12, 1969. On that date the U.S. Weather Bureau predicted even a greater crisis for Minot from the rising Mouse (Souris) River. This was the beginning of the city's second crisis in less than two weeks. The Mouse flood presented much greater demands on city organizations than had the earlier Des Lacs flood.

By gathering the data from Minot's response to a second flood, the community serves as its own control -- the only relevant aspect to change is that the city has now had prior experience. This allows much better control -- the before-after study of the same unit or population.

If the thesis is sustained that organizations "learn" from prior experience and this in turn affects their interorganization communication patterns, we would expect that Minot's communication patterns would be quite different in the first and second disasters. That is, Minot's response to the second disaster, the Souris River flood, should resemble that found in Sioux City and Sioux Falls.

We found that Minot's interorganizational communication response did indeed resemble that of Sioux City and Sioux Falls in many respects. Some of the major similarities are presented here.
1. A highly developed central communication center emerged after the Des Lacs flood but just before the Souris flood hit the city. (Hypothesis 14) Representatives of all city and extra-community organizations involved in coping with the flood threat were there. It became the command center for the area. A top city official set the center up after the Des Lacs flood reached its height.

I took time off then to begin the organization of the control headquarters. And we had that pretty well along and then again we got to the Souris thing (flood). When that hit us we (had) just set up a command headquarters, which I think has been responsible for the success that we've had to date.

Operational, administrative, and public information was all channeled through the center. Another top city official related how public information was handled.

All our releases from the city on emergency conditions were released at this command post. Everything that was to be released from the Corps (of Engineers) or the Fish and Wildlife Bureau was released through the city on a joint release. That was coordinated through and to the paper, and through and to the TV stations.

The development of a central communication center facilitated many other changes in communication patterns among organizations in Minot. Some of the major changes will be discussed now.

2. Minot experienced a tremendous increase in number of communication links. (Hypothesis 15) Organizations communicated with many more and different organizations during the Mouse River flood than during the Des Lacs flood. Considering the organizations in general, one high city administrator stated that . . .

They're much more congealed and coordinated now through this organization (city's communication center) than they ever were prior to that time. . . . (Civil Defense) was
brought right into the fold as an active, a real active, participant in our city effort through this deal.

Similarly, another top city administrator felt that, unlike the earlier flood, he had strong communication links with many other organizations for the first time.

So (in) every segment of our operations we had radio communication at some points, so we didn't have any blank spots in any of the key spots whether it was our own (city) people or one of the outside agencies. As a matter of fact (regarding) the National Guard people, we put them in the police department net so that I had contact with them right through the police department from my car so that the Air Force was working ... right off this command post... From the communications standpoint, we were pretty well organized to handle our problems.

Also more links carried public information to the public and to non-operational organizations. Several times a day a top level city administrator would broadcast from the central flood control headquarters simultaneously all over city radio-TV stations. This served as an important link between organizations at the command center and the public, and among organizations themselves. All other organizational officials concurred -- many more links were established during the Mouse River flood.

3. When the communication center was developed, communication among organizations and between organizations and the public was much more adequate. (Hypothesis 4) A city administrator related the following to us.

Everything went beautifully then. Perhaps the best thing that happened in this whole shift (to the communication center) was -- we were quite disturbed at the number of rumors that were developing during our first crest and this bothered me to no end. We heard everything from a 15-foot
wall of water to just about anything you can imagine. So when we decided to set up this command post we had two newsmen in the audience and we made it very plain to these people that we wanted one outlet for all news. All official news had to come from one outlet, and all five of the radio-TV outlets would have to cooperate. . . . So we effectively then cut off rumors.

Other officials confirmed this statement and went on to say that information among organizations was much more accurate during the Mouse River flood than it had been during the Des Lacs.

4. There was not nearly as much overloading in the second flood as there had been in the first. (Hypothesis 5) The change occurred for several reasons. First the Northern States Power Company placed extra phones in many organizations, thus lightening the load any one phone had to bear. But more important, the fact that the community restructured itself into a much more cohesive body led to a much more efficient communication system, therefore reducing the amount of communication necessary for community organizations to respond to the disaster. Finally and as a consequence of the community organization restructuring, the public was kept up to date by the news media and therefore relinquished their use of the phones to a large degree.

5. Toward the end of the first emergency (Des Lacs Flood), city officials were beginning to determine what the major goals (domain) of the city should be. When an emergency communication center was set up, the major tasks had been delineated. This meant that during the second emergency (Souris flood), organizational officials could spend most of their time on the means to achieve the major goals. (Hypothesis 6).
6. By designating certain organizational personnel or offices to be in charge of certain functional areas, messages could be separated or isolated from each other. (Hypothesis 7) For example, one top city administrator was "responsible for carrying out all the wishes of the city council, (another for) taking care of the publicity, . . ."

All information was funneled to the central communication center. There it was functionally separated and disseminated to the appropriate destination. One high official told us how this was accomplished in the center.

A member of each one of these organizations sat there with two phones at his disposal . . . and people (both organizational personnel and the general public) would call into this emergency number and an operator there would channel it to whichever organization was concerned with that person's problem.

He went on to describe the separation of public from operational information.

When we got our command headquarters set up, (one high ranking city official) stayed right there. When the national news services started coming in I was relieved of any responsibility for spending vast amounts of time being interviewed. The (city official) took care of all that -- all these calls that we got from all over the United States . . . I just merely channeled them to (his) desk and I had to spend no time at all. In other words, I could stay with the critical problem of the flood fight and (he) handled the "people" problem -- the interviews.

7. Communication from the disaster site was much more adequate during the second disaster. (Hypothesis 9) Every informant interviewed confirmed that statement. A top city administrator was asked,
"Did you feel that most organizations were able to get adequate information from the field?" He compared the two disasters in this way.

Well, probably not to start with on the Des Lacs (flood), no we didn't. But we got that pretty well arranged when the Souris (flood) started to hit us because we had more communication cars in the hands of the people that had the responsibility and they were communicating back to the center and to (me) and between each other, which is something that we improved 100 percent on over the Des Lacs situation.

A second high-ranking official described how he facilitated information flow from the field in this way.

We took a (private) contractor . . . and put him in one of our radio control cars so that I had contact with him at all times; he was never out of contact with us.

In the area of public information, radio broadcasts from the flood control center gave the public as well as non-operational organizations important information dealing with the current state of the disaster site. This was a marked difference from the situation in the Des Lacs flood.

8. With the establishment of a central communication center came shorter communication links among organizations and between the center and general public. (Hypothesis 16) All of the organizations represented at the center were able to contact each other directly, something many had been unable to do earlier.

Also links were greatly shortened between the center and mass media, and between the center and the public. First, during the Des Lacs flood the local radio-TV stations did not all have direct communication with each other. However during the Mouse River flood the
situation changed.

KMOT, KXMC, KHRT, KLMP, KTYN, and KCJB -- They're tied in through direct line communications. This was set up on Saturday night when the center was set up itself, and that's how they are connected. They're controlled through KLPM.

Second, as already discussed, one of the top level city administrators broadcast simultaneously and directly over all radio-TV stations periodically throughout the second flood.

The aforementioned are some of the major ways in which Minot's experience during the second flood was quite similar to that found in the two cities with prior experience. The systematic testing of the twenty hypotheses coupled with the description of the changes which occurred in Minot during its second emergency leads us to conclude that prior experience does affect a community's interorganizational communication patterns.
FOOTNOTES: Chapter IV

1. The testing of hypothesis 17, pertaining to the number of organizations actively functioning during a disaster, requires that we have a much more controlled situation than we are able to provide, given the fact that we must select from the relatively few cities which have natural disasters. One of the most critical variables to control if we are to test this hypothesis is the city's organizational structure. That is to say, any statements made pertaining to the number of organizations actively involved in an emergency make sense only when the organizational make-up of the cities under investigation are equal.

Hypotheses 18 and 19 -- pertaining to number of messages sent and length of messages sent, respectively -- would be very difficult to test in a field situation. The major reasons for this difficulty have been discussed at greater length in Chapter III. Summarizing that discussion, we noted the inadequacy of our ability either to control the situation or to develop adequate techniques for measuring these two variables. To measure these variables would require that we be able to control communication inputs to all organizations and to monitor all interorganizational communication. This we cannot do in field situations.
CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction

The primary purpose of this study was to look at the relationship between a community's prior disaster experience and its subsequent communication patterns during an emergency period. Although it has been popularly assumed that prior disaster experience makes a difference, little empirical data have been gathered which demonstrates that it actually does and how it does make a difference. To this end we undertook a three step study to analyze the relationship of a community's prior experience to the nature of its communication net during a natural disaster. In step one we derived twenty-three hypotheses. In the second step we presented twenty-three tentative hypotheses. Here we perused the empirical literature on disasters which occurred prior to 1969, searching for evidence which would help us to evaluate the tentative hypotheses. On the basis of our findings in step one and on the nature of our research design, we decided to test twenty hypotheses with data gathered by this researcher and other Disaster Research Center staff. This was the object of step three of the study. We chose to gather data on four cities struck by disasters in the winter and spring
of 1969. In this final step a positive relationship was found between a community's prior disaster experience and its interorganizational communication patterns.\(^2\)

**Descriptions of Typical Communities**

The findings in the third step showed that there are differences in communication patterns between communities with and without prior experience. It might be instructive to describe a typical community which has had prior experience; second, we will describe one which has not had prior experience.

**A Typical Community With Prior Experience**

This type of community has disaster plans; they are geared to natural disasters and they are interorganizational in nature. The presence of well-known, practiced plans is crucial because they have important implications for the communication patterns we find in the community. They affect the configuration of the communication net. For example, the plans usually call for a central communication center manned by representatives of all disaster-relevant organizations (Hypothesis 14). A tightly-knit synthetic organization evolves (Hypothesis 11). Organizations give up some of their operating autonomy to a higher authority. This physically manifests itself at the communication center.
Because of prior experience, organizational officials know what demands they can expect from the disaster agent. Therefore they are able to assign key organizations to cover all of the emergency task areas (Hypothesis 10). Because few, if any, tasks remain unassigned, there is less necessity for the emergence of new groups (Hypothesis 12). Depending on the seriousness of the disaster, community organizations maintain very close contact with outside agencies at the county, state, and federal levels (Hypothesis 13). However, control of the community response remains at the local level.

We also find the content of messages within the communication net to be related to a community's prior experience. Again, most of this can be traced back to the community's disaster plan, for it structures and sets limits on the range of communication patterns which are possible. First, many of the messages being sent over communication channels pertain to the means to accomplish certain emergency tasks rather than on deciding more basic questions such as what are the major tasks, what organizations should be responsible for the major task areas, and the like (Hypothesis 6).

Communication is functionally separated (Hypothesis 7). We find public information, routine communication, communication concerning rehabilitation, and emergency communication separated from each other. This is usually accomplished in one of two ways. It is sometimes done physically by having several different nets. For example, the public works department may use one channel for emergency communication and another for routine messages. Functional separation is sometimes
achieved on a single channel. Such could be the case of the switchboard operator in a communication center as he directs messages of all types to the appropriate destination.

Communication in communities with prior experience is also much more concise with minimal extraneous conversation (Hypothesis 8). Also the information being transmitted on the communication channels is much more adequate both within the net (Hypothesis 4) and from the disaster site (Hypothesis 9). Organizations "know from experience" the value of adequate information. Organizational officials have been trained how to check the validity of questionable information and how to send it unambiguously to its destination.

There is a tremendous volume of interorganizational communication during emergencies, but it does not normally overload the lines of communication to the point of making the community's emergency response less effective (Hypothesis 5). This situation is accomplished in several ways. Organizations normally maintain alternate ways of communicating among themselves. For example, they may have both radio and telephonic capabilities or they may even have gas-driven generators in the event the city's power should go out. Another potential threat can come from the public. Expecting this, officials in emergency organizations often set up direct lines between organizations or maintain unlisted numbers so that a convergence of phone calls by the public is not possible.

We find very little unnecessary duplication of messages (Hypothesis 1) or misdirected messages (Hypothesis 2) in these communities. Too, messages being transmitted among organizations indicate that
organizational officials are quite aware of the responsibilities of not only their own organization but also the responsibilities of others as well (Hypothesis 3).

Communication is highly coordinated. Organizations are tightly integrated into a net in which there are a large number of communication links (Hypothesis 15). In addition, the messages between organizations are most often sent by the shortest route (Hypothesis 16). This lessens the possibility of error creeping in, which is often the case when messages are relayed several times between transmitter and receiver. Direct lines are also much faster; this is important for a quick organizational response in a compressed time period. The central communication center directly facilitates more adequate coordination among organizations. Here we find decision makers assembled from a large number of emergency organizations. This, coupled with the presence of a large number of physical communication channels, allows for a coordinated and efficient response.

We find continuity of communication patterns from pre-disaster to disaster periods in communities with prior experience. For example, organizations tend to communicate with the same organizations they did before the disaster (Hypothesis 20). These tend to include a broad range of organizations of different occupational type (Hypothesis 21). For instance, city agencies, police organizations, welfare groups, etc., maintain contact with each other during normal, non-emergency periods as well as in disaster situations.

Finally, much interorganizational communication takes place at lower levels in the organizations (Hypothesis 23). This is made
possible because of the knowledge (1) of the domains of other organizations and, (2) of what to expect from the disaster agent. This completes our description of the typical community with prior experience. We now turn to a description of one without prior experience. This will facilitate comparison of the communication nets in the two communities.

A Typical Community without Prior Experience

Pertaining to its communication net, the community which has had no previous experience with disasters is the antithesis of the community with prior experience. It has no practiced, interorganizational disaster plans. Because of this, the entire configuration of the net is affected differently from what we found in a community with prior experience. Much of this can be explained by the absence of an active central communication center (Hypothesis 14). Without it, the community has more difficulty developing a coordinated response to the disaster. Although organizations give up a part of their operating autonomy and although we do see a semblance of a synthetic organization, it is not as tightly-knit and highly integrated as we noted in a community with prior experience (Hypothesis 11). Therefore major task areas remain left unattended. Key organizations are missing (Hypothesis 10) and emergent groups and extra-community organizations move in to fill the gaps (Hypotheses 12 and 13, respectively).

We find the content of messages to be quite different here than we found in a community with prior experience. Although it has problems neither with unnecessary duplication (Hypothesis 1) nor misdirected messages (Hypothesis 2), communication among organizations is totally
inadequate both within the net (Hypothesis 4) and from the disaster site (Hypothesis 9). Consequently, organizations have little knowledge either of the physical effects of the disaster agent or what other organizations are doing in response to them.

There is little functional separation of messages (Hypothesis 7). Both public and emergency communication tend to converge on the same channels with no attempt on the part of organizational officials to separate them. This leads to an overloaded net (Hypothesis 5) in which much extraneous information is being passed (Hypothesis 8). Because the community has not had previous experience with a similar natural disaster and because it has no appropriate community-wide disaster plans, much of the information among organizations necessarily pertains to defining the major task areas and assigning organizations to those areas (Hypothesis 6). This leads to a delay in the community response to the emergency.

As mentioned earlier, there is a notable lack of coordination among organizations. This is explained, in part, by the absence of a communication center. We find that there is a breakdown in communication among organizations. Many are either unable to or choose not to communicate with other emergency organizations (Hypothesis 15). And even when they do, it is often not by the shortest route (Hypothesis 16). Messages are relayed several times between their origin and final destination, increasing both the length of time lost and the possibility of inaccuracies creeping into the system.
We did not find continuity of communication patterns from pre-disaster to disaster periods. Organizations often communicated with new organizations during the crisis (Hypothesis 20), many of which were of different occupational type (Hypothesis 21).

Finally, the preponderance of communication among organizations entered the organizations at higher levels. Much less communication passed between organizations at lower levels than was the case in a community with prior experience (Hypothesis 23). This concludes the description of a typical community without prior experience.

Analysis of Findings

From the foregoing descriptions of communities we can see great differences between communities with and without prior experience. Although it was not the purpose of the study, certain relationships among various aspects of the communication net are either suggested by the data or appear logical. Certain variables imply, facilitate, or lead to the presence or absence of other variables. We shall present some of these hypothesized relationships. As such, they should not be viewed as verified, but rather as assertions which must be empirically tested.

Many of these variables appear to be linked together to form chains. In some respects an analogy could be made between these variables and a number of dominoes standing in a row. Knock one domino over and they all will fall. Similarly, the presence or absence of one of the twenty communication-net variables sometimes leads to the
presence or absence of a number of other communication-net variables. For example, the presence of a central communication center in communities with prior experience appears to facilitate the centralization of communication in a synthetic organization. The synthetic organization in turn appears to be associated with the presence of more key organizations as well as shorter and a greater number of communication links among organizations. The presence of more key organizations is associated with the presence of fewer emergent groups as well as fewer extra-community organizations in the community's decision-making net.

Another chain of variables might be linked to the presence of a central communication center. Where we have a center, we also have both greater functional separation of communication and more systematic, selective, and controlled communication. This leads to less overloading on the channels of communication. With less overloading we might expect more adequate communication both from the disaster site as well as within the net.

A diagram showing the predicted relationships among these variables can be seen in Figure 6. Also shown in the diagram are prior experience, the major independent variable in the present study, and disaster plans, an intermediate variable between prior experience and the communication net. The depicted relationships are tentative and require empirical testing for their verification.
FIGURE 6

PREDICTED RELATIONSHIPS AMONG VARIABLES IN THE COMMUNICATION NET IN A COMMUNITY WITH PRIOR EXPERIENCE

Prior Experience → Disaster Plans → Central Comma Center

Greater Number of Links → Fewer Emergent Orgs

More Key Orgs Present → Fewer Extra-Community Orgs in Opns. Net

Shorter Comm Links → More Adequate Information from Disaster Site

Greater Functional Separation of Comm → Less Overloading of Comm Net

Systematic, Selective, & Controlled Comm → More Adequate Messages within the Net

\[ a \text{Comm} = \text{Communication} \]

\[ b \text{Org} = \text{Organization} \]
Implications of the Study

The study is of both theoretical and practical import. In Chapter I we noted that communication is a basic process among organizations because it is prerequisite for other types of interaction among them. It is therefore necessary to understand the structure and process of interorganizational communication before we can understand other aspects of relations among organizations.

A community under stress — a natural disaster in this case — provides us with an ideal laboratory in which to study interorganizational relationships. Here organizations interact much more actively in a compressed time period. By analyzing interorganizational functioning in natural disasters, we may be able to extrapolate to other situations which require organizations to work together. For example, it may help us to understand interorganizational interaction in other stress situations such as a riot. On the other hand, it may aid us in understanding the structure of relations among organizations as they attempt to maintain major community functions such as production-distribution-consumption, socialization, social participation, social control, mutual support, and preservation of life and property. In our "organizational society," it is increasingly organizations working together that are called upon to solve the many problems too vast and complex for organizations to solve independently. It is important to study the structure and process of organizations as they interact to maintain these, the most basic functions in society.
The study has a practical message for communities which have not experienced a natural disaster: "Act like communities which have experienced a natural disaster." First, develop a disaster plan with special emphasis on the communication aspects of it. Adequate communication among organizations is necessary in all disasters and is often problematic if the community has no plan.

The disaster plan should be current and practiced. Although all four cities studied in phase two had disaster plans, neither Glendora nor Minot had up-to-date, practiced plans. "A plan that is not practiced is not a plan." Officials in the two cities with prior experience were familiar with not only the physical communication capabilities of the community, but also with the most efficient and effective communication structure during an emergency. This knowledge would be functional in a wide range of emergencies -- not just a flood.

The disaster plan should be comprehensive. By this we mean it should be interorganizational or community-wide. In Sioux City and Sioux Falls, adequate and functioning communication systems existed among all emergency organizations. This was not the case in Glendora and Minot. In the latter cities, many organizations had an adequate communication system within their own organizations, but did not have procedures set up for communicating with other organizations.

No disaster plan can adequately cover every contingency presented by the disaster agent; however, the general principles discussed here do appear to apply to a large number of different types of disasters.
Feasibility of the Modern System's Approach

In no sense did we attempt to test the modern system's theory; rather, we used it as a general framework within which we cast our study. To this end, the modern system's framework was useful in that it "fit" empirical reality quite well. The community interorganizational communication net became the system. The modern system's approach has at least three advantages. First, it leads us to focus not only on the component parts of the system (organizations), but also on the relations (communication links) among them. Second, it emphasizes the fluidity and adaptive behavior of the system and its component parts. Viewing systems as adaptive and problem solving appears to "fit" the reality of organizations communicating with each other to solve community problems in disasters. Third, the system is useful in studying any one of a wide range of different level units from small groups to the societal level. In this study, of course, we focused on the interorganizational level.

The major limitation of the modern system's theory is methodological. It would be very difficult to operationalize and test. It might better be referred to as an approach or framework -- not a testable theory. It is too early to judge the usefulness of the modern system's framework in sociological research, but at the general level it appears more useful in studying organizational behavior than the traditional open and closed system approaches.
Suggestions for Further Research

In the present study we found a relationship between a community's prior disaster experience and its subsequent communication net in four cities during floods and/or mudslides. The investigation was in large part exploratory; relatively little attention had been given previously to the study of interorganizational communication nets in crises situations. Therefore the findings must remain tentative until further research has been undertaken in the area.

In the diagram presented earlier in the chapter, we predicted that certain relationships between communication-net variables would exist. Future research could test our assertions in a disaster context in order to refine these relationships and to specify under what conditions the relations do and do not hold up. For example, it would seem worthwhile to test the proposition that "the greater the functional separation of communication within the net, the more adequate the information from the disaster site will be." The results from testing this type of proposition would certainly benefit those charged with disaster planning. Similar tests could be carried out on other propositions.

It is possible, however, for future research to focus on what may prove to be a more fruitful path -- a theoretical one in this case. We have noted that communication among organizations is prerequisite for other types of interaction. It would be instructive to study the relationship of the various communication-net variables to the structure
and process of community coordination in disasters. This would allow
the ordering of communication-net variables on the basis of their
relative influence on community coordination.

We viewed the communication net as a dependent variable in the
present study. However, by viewing it as an independent variable,
we can address ourselves to such questions as . . . Which, if any,
of the communication-net variables explain other types of interaction
among organizations? How does communication among organizations
influence coordination among them? Communication among organizations
should not be viewed as an end in itself. For although some problems
can be solved solely by one organization communicating with another,
most cannot. Many problems are solved jointly by organizations
performing services for each other, loaning personnel and/or material
goods to each other, and the like. We must learn more about the
relationship of interorganizational communication to other types of
interaction if we are to understand how community organizations find
solutions to their many problems -- in non-emergency periods as well
as in times of stress.

Another suggestion for further research is methodological. We
recommend that future research explore the applicability of a wider
range of methodological techniques to the study of interorganizational
communication patterns in a variety of social contexts. Too much
sociological data has been gathered solely with interview techniques.
Questionnaire and interview data are very useful in the social sciences,
but when used exclusively to study certain sociological problems,
they have severe limitations. We have found this to be especially true when undertaking field research in disasters. Too often the interviewee may not remember events exactly as they happened, or for some reason he may choose not to relate the events to the interviewer. Many other non-interview techniques and data sources which are at the disposal of the researcher should be used whenever possible. Some of the techniques and sources are non-participant observation by the researcher, the gathering of organizational tape recordings and/or logs, obtaining minutes of meetings, and the like. These secondary sources are important for at least two reasons. First they often fill in these gaps in an organizational official's memory. Second, they supplement interview data by helping to validate information received on questionnaires and in interviews. Any field work undertaken by social scientists in the future should attempt to integrate as many of these and other non-obtrusive, secondary sources into their research strategy as possible.

Several other suggestions should be mentioned for those wishing to pursue the verification of any of the hypotheses advanced in the present study. First, the research in the present investigation was limited to cities with populations of between 30,000 - 1000,000. Further research is necessary in both smaller and larger cities. Also, the present study was limited to cities struck by floods and/or mudslides. Some warning existed in every case studied. It is an empirical question as to whether the relationships we found would exist in communities hit by different types of disaster agents or in situations where the
community had no warning before impact. Again, we recommend more research in this area. We wonder, too, if our findings would apply in situations other than in natural disasters. For example, would prior experience in civil disturbances be related to communication among organizations in the same type event in the future. If so, how?

Also, the data which were gathered in both phases of the investigation were limited to the United States. It would appear useful to study community communication patterns in other societies. This would allow us to compare and contrast the effects of the cultural context on communication patterns.

Finally, many of the problems facing communities today require organizations to interact with each other for their solution. Therefore future research on interorganizational relations of all types will undoubtedly be of great value to both those who are attempting to understand interorganizational behavior in American society and those who are responsible for finding practical solutions to problems facing the community.
1. For a summary of the findings in phase one, see Chapter III, "Summary."

2. For a summary of the results in phase two, see Chapter IV, Table 3.

APPENDIX A

FORMAT FOR ABSTRACTING THE DISASTER LITERATURE
ABSTRACTS FROM THE DISASTER LITERATURE*

The abstracts include a summary and synthesis of selective aspects of the disaster literature. In carrying out this task, DRC personnel examined a total of 249 different sources covering approximately 200 separate peacetime disasters (war occasioned disasters were not included). The 249 sources constituted all the published and unpublished items available in the DRC repository as of December 31, 1964. The major focus was on systematic descriptive accounts of human and social responses to natural catastrophes. None of the material that the DRC gathered in its own field research was included in this analysis. The extraction of the material in an abstract form was completed late in 1964. In constituted, without question, the most extensive analysis of the disaster literature ever undertaken. The following information was extracted from each different source.

I. BASIC DATA

A. Characteristics of Disaster
   Event
   Date-Time
   Location
   Damage
   Cause
   Unique Aspects

B. Methodology of Data Collection
   Research Agency and/or Principal Research Personnel
   Source of Data
   Sample Plan
   Other Methodological Comments

C. List of All Organizations and Their Activities During Disaster

D. Brief Description of Emergency Social System

E. Community Context

*Format from the Disaster Research Center, "Specific Disaster Literature Analysis," 4 vols., mimeographed (Columbus: Disaster Research Center, The Ohio State University, 1967).
II. GENERALIZATIONS AND HYPOTHESES

III. SPECIFIC ORGANIZATIONAL ANALYSIS (each organization mentioned in the report is individually analyzed.)

A. Organizational Information
   Name of Organization
   Type of Organization

B. Organizational Description
   Organizational Goals and Activities
   Organizational Character
   Organizational Complexity
   Organizational Control
   Membership, Recruitment and Orientation
   History of Organization
   Public Image of Organization

C. Organizational Activities During Disaster
   Resources of Organization During Disaster
   Special Problems to Organization
   Organizational Change During Disaster
   Evaluation of Disaster Activity

D. Organizational Activities in Emergency Social System
   Existing Plans for Cooperation with Other Organizations
   Communication Networks
   Competition and Conflict with Other Organizations
   Use of Non-organization Members for Work of Organization
   Effect of the Emergence of Informal Organizations on Organizational Activity
   Effect of Role Conflict on Organizational Activity
   Relation of Organization to Governmental Units Active in Disaster

E. Other (additional comments, residual categories, etc.)
APPENDIX B

OUTLINE OF INTRAORGANIZATIONAL INTERVIEW GUIDE
INTRODUCTION

I should first introduce myself. My name is __________________.
I am a _________ at the Disaster Research Center at
the Ohio State University in Columbus, Ohio. We are engaged in
a comprehensive study of the working of organizations in disasters.
We have studied organizations in a number of foreign and domestic
disaster settings such as ____________________. One of the practical
results of this research should be improved planning and preparedness
for disasters.

You should know that your name will in no way be attached
(attributed) to any information you give us. No information will
be passed directly to anyone in your organization or in (city or area).
We do not include names in our reports.

We certainly appreciate your cooperation and assistance.
Some of the questions I will be asking you will appear a bit repetitious
but they are getting at somewhat different organizational dimensions.
We will be discussing the things you did, with whom you worked, how
decisions were made and so on during the emergency.

Main Points:

1. Who we are and what we are doing
2. Guarantee anonymity
3. Prepare respondent for what may appear to him to be repetitious
questions.
The following is an outline of the major topics covered in the indepth interview with each organizational official.

I. GENERAL BACKGROUND INFORMATION
   A. When you first became involved in the disaster
   B. Chronology of your activities during the emergency period

II. TASKS
   A. Comparing emergency tasks with pre-emergency tasks
   B. Official emergency tasks undertaken
   C. Unofficial emergency tasks undertaken
   D. Interpersonal relationships affecting which tasks you undertook

III. DECISION MAKING
   A. Comparing emergency decision making procedures with pre-emergency decision making procedures
   B. Official emergency decision making procedures
   C. Unofficial emergency decision making procedures
   D. Interpersonal relationships affecting how and what decisions were made

IV. LINES OF AUTHORITY
   A. Comparing lines of authority in emergency periods with that in pre-emergency periods
   B. Official lines of authority during the emergency period
   C. Unofficial lines of authority during the emergency period
   D. Interpersonal relationships affecting lines of authority during the emergency period

V. COMMUNICATION STRUCTURE
   A. Comparing the communication structure during the emergency period with that which existed prior to the emergency period
   B. Official communication structure during the emergency period
   C. Unofficial communication structure during the emergency period
   D. Interpersonal relationships affecting the communication structure during the emergency period

VI. THE NATURE OF THE DISASTER PLAN
APPENDIX C

OUTLINE OF INTERORGANIZATIONAL INTERVIEW GUIDE
I'm (Your Name) from The Ohio State University Disaster Research Center. We are engaged in a comprehensive study of the activities of organizations in disasters. We have studied organizations in a number of foreign and domestic disasters such as _______________. One of the practical results of this research should be improved planning and preparedness for disasters.

You should know that your name will in no way be attached (attributed) to any information you give us. No information will be passed directly to anyone in your organization or in (city or area)_____. We do not include names in our reports.

We certainly appreciate your cooperation and assistance. Some of the questions I will be asking you will appear a bit repetitious but they are getting at somewhat different aspects of the organization's activities.

We will be focusing on the activities of your organization and the relationships it had with other organizations to solve some of the problems created by the disaster. We are, therefore, interested in what your organization did rather than in your own activities as an individual member of (Name of organization or office)_____.

Main Points:

1. Who we are and what we are doing.
2. Guarantee anonymity.
3. Prepare respondent for what may appear to him to be repetitious questions.
4. Tell respondent we are focusing on the organization as a whole rather than on the individual members in it.
The following is an outline of the major topics covered in the interviews with each key organizational official.

I. GENERAL INFORMATION

A. Degree of involvement in the emergency by the informant.
B. Chronology of involvement of the organization during the emergency period.

II. GENERAL EMERGENCY OPERATION

A. Determine what other organizations were involved.
B. Determine what each organizations' relationships were with other organizations during the emergency -- especially communication relationships.
C. Rank organizations listed in "B" on the basis of amount of communication your organization had with each.
D. Determine if the organization's emergency tasks were specified by plan or were they "improvised."
E. Ascertain if a central communication center existed and if so, describe its functioning.
F. Determine if any meetings among organizations were held during the emergency period.
G. Determine what were the major communication problems among organizations during the emergency (Probe for major communication variables used in study).

III. PRIOR EXPERIENCE

A. Ascertain the extent and quality of each organization's involvement in past natural disasters.
B. Determine if the organization maintains practiced, inter-organizational disaster plans.

IV. WHAT WOULD THE ORGANIZATION DO DIFFERENTLY IN THE FUTURE
<table>
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<th>ORGANIZATIONS INVOLVED IN TASK</th>
<th>ORGS. COMMUNICATED WITH</th>
<th>TASKS (i.e., welfare, evacuation, etc.)</th>
<th>RANK FOR EACH TASK</th>
<th>NATURE OF COMMUNICATION (Requests for assistance, etc.)</th>
<th>LOCAL OR NON-LOCAL ORGANIZATIONS</th>
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