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A COMPARATIVE STUDY OF COMMUNICATION EFFICIENCY  
IN TWO UNITS OF LOCAL CITY GOVERNMENT

by

Joseph F. Connors

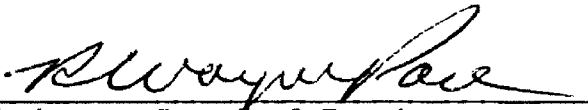
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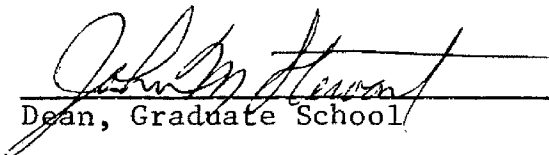
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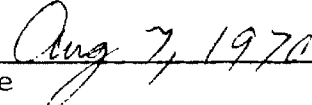
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## ACKNOWLEDGMENTS

The writer wishes to express his appreciation to all members of the committee and staff for their interest and assistance.

Special thanks are due Dr. R. Wayne Pace who has guided the development of this study to its completion. His time, knowledge, and understanding have been invaluable in furthering the growth of the writer's education.

Joan, Lorelei, and Chad are also thanked for their tolerance and patience these past few months.

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## CHAPTER I

### INTRODUCTION

#### Purpose of the Study

The purpose of this study was to discover, describe, and compare the speed and accuracy with which messages were transmitted in two units of the local city government of Missoula, Montana. Messages were initiated and traced throughout the two units. Interviews were conducted as a follow-up in an attempt to secure descriptive explanations that might reveal sources of delay and inaccuracy in the transmission process.

#### The Organization Studied

Although the organization itself was not a major variable in this study, it may be that different types of organizations, with different publics and orientations, exhibit different types of attributes when analyzed in terms of information flow, especially when the factors of speed and accuracy of the flow become the major focus.

Blau and Scott<sup>1</sup> categorize organizations on the basis of the type of individuals who are the prime beneficiary of their operations: mutual-benefit associations (employees), business concerns (owners),

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<sup>1</sup> Peter M. Blau and Richard W. Scott, Formal Organizations, San Francisco: Chandler Publishing Company, 1962, p. 42.

service organizations (customers), and commonweal organizations (public-at-large).

The organization examined in this study may be described accurately as a "commonweal" type. Commonweal organizations, according to Blau and Scott,<sup>2</sup> are different from the other types of formal organizations in the following ways: (1) they are governed by abstract principles and consist of the application of these principles to particular cases; (2) lack of self interest is expected to govern the operations of such an organization; (3) the source of discipline within such an organization is the hierarchy of authority; and (4) finances for the organizations are derived from taxes rather than profits. Nevertheless, all formal organizations have certain characteristics in common, and Weber<sup>3</sup> suggests the following five as basic: (1) the tasks that need to be accomplished are distributed among the various positions as official duties to be performed. Implied is the clear cut division of labor among positions, which makes possible a high degree of specialization; (2) the positions are organized into hierarchical structure with attendant authority; (3) a formally established system of rules and regulations governs official decisions and actions; (4) officials are expected to assume an impersonal attitude in their contacts with clients; and (5) employment by the organization constitutes a career for officials. According to Weber, the ideal type of

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<sup>2</sup> Ibid., p. 54.

<sup>3</sup> Max Weber, The Theory of Social and Economic Organization, trans. A. M. Henderson and Talcott Parsons, ed. Talcott Parsons, New York: Oxford University Press, Inc., 1947, p. 152.

formal organization is a bureaucracy, and adherence to the above-mentioned characteristics is assumed to improve both rational decision-making and administrative efficiency in the organization.

The basic issue posed by commonweal organizations is that of external democratic control; the public must possess the means of controlling the ends served by these organizations. The internal structure of commonweal organizations is also important; it is expected to be bureaucratic, governed by the criterion of efficiency. Blau and Scott<sup>4</sup> point out that "the challenge facing these organizations is the maintenance of efficient bureaucratic mechanisms that effectively implement the objectives of the community, which are ideally decided upon, at least in our society, by democratic methods. (Internal democratic control by the membership might well be at the expense of efficiency and would thus lessen the organization's ability to effect the democratic will of the community.)"

The organization of the city government of Missoula, Montana, is portrayed in Figure 1 and consists of fifteen departments, boards, and commissions that report to the Mayor, who in turn governs the city with the advice and consent of the City Council. The ease with which the basic characteristics of a bureaucracy are revealed in the structure of the city government leads one to conclude that it adequately meets the criteria of a formal organization from which one might learn something concerning the flow of information.

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<sup>4</sup> Blau and Scott, Op. cit., p. 55.

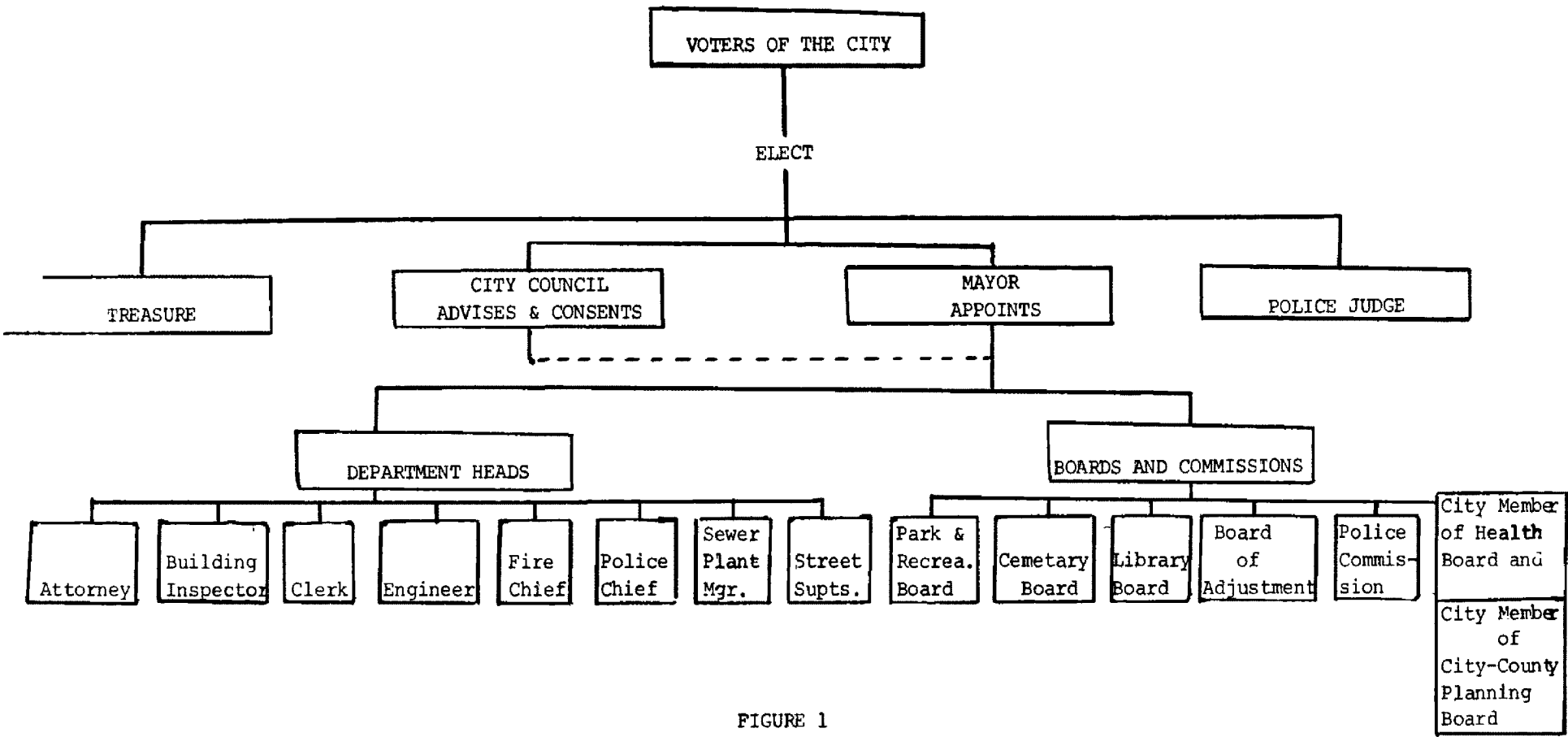


FIGURE 1

STRUCTURE OF ALDERMANIC FORM OF GOVERNMENT IN MISSOULA, MONTANA

The Street Department and the Fire Department were selected for analysis in this study. A brief explanation of the structure, size, and administrative arrangements of these two units will indicate their suitability for studying the flow of information within a formal organization.

Figure 2 depicts the structure of the Street Department, which functions at two or three levels, depending on the task. The department consists of twenty-four members with a street superintendent and an assistant superintendent functioning at the supervisory level; they are assisted by a secretary. The superintendent is responsible for all maintenance, snow removal, leaf pick-up, and sweeping operations. He receives his instructions directly from the Mayor and provides supervision over the operating engineers and teamsters. The assistant superintendent is responsible for all operations in the absence of the superintendent; his normal function is to provide supervision over the mechanics. The superintendent moves around within the city inspecting the various projects under progress while the assistant remains in the area of the city garage. For all practical purposes the secretary's function is primarily administrative; she handles incoming calls and maintains records.

The employees of this department are divided into three categories depending upon the nature of the function they perform: (1) mechanics, (2) operating engineers, and (3) teamsters. Mechanics are responsible for maintaining departmental equipment. Operating engineers are responsible for the utilization of the heavy equipment; they drive a

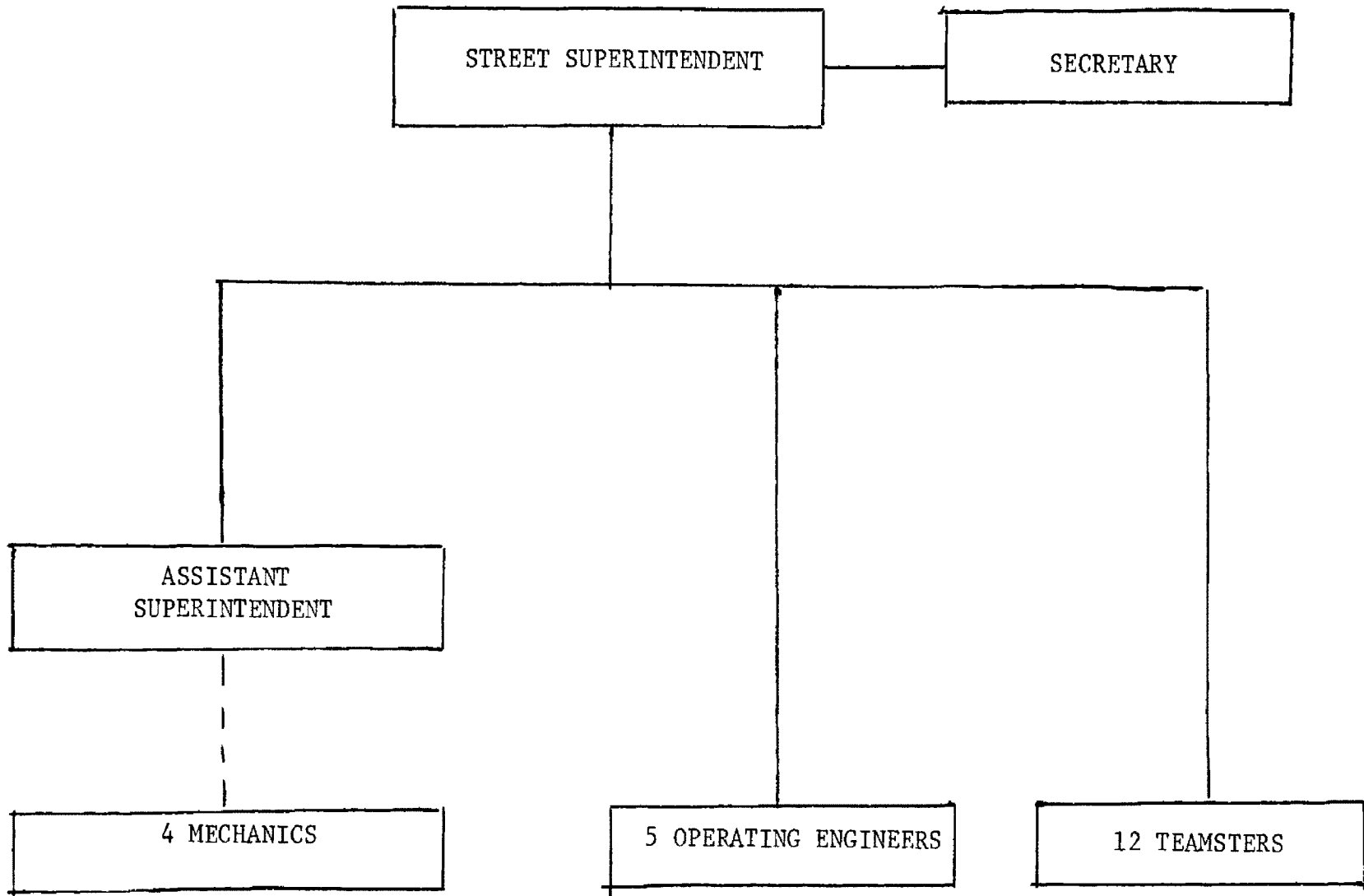


FIGURE 2

STRUCTURE OF THE STREET DEPARTMENT

grader or loader. Teamsters are responsible for providing assistance to the operating engineer and function as light equipment drivers; they drive a dump truck or street sweeper.

Figure 3 depicts the structure of the Fire Department in which personnel are arranged according to the function they perform, either line or staff. The department consists of forty-eight members with a fire chief and an assistant fire chief functioning at the supervisory level. The fire chief has command and control over the entire department and is responsible for the extinguishing of fires and the necessary and incidental protection of life and property connected with all fires. He receives his instructions directly from the Mayor. The assistant chief assumes the responsibilities of the chief in his absence; his normal function is to provide supervision over the staff section; however, the chief and the assistant chief are the primary elements in the chain of command for both the line and staff sections. Within the line section are located the combat forces--those members directly responsible for fire fighting. Positions are in accordance with rank; captains, lieutenants, and firemen are assigned to each of the three shifts. The members are also rotated in assignment to each of the two fire stations within the department (headquarters and southside). The night shift at both stations has extra members in the form of student firemen. Within the staff section are located those functions associated with administration, fire prevention, and training. The secretary functions as the coordinator--she maintains necessary records and handles incoming calls. The fire prevention bureau



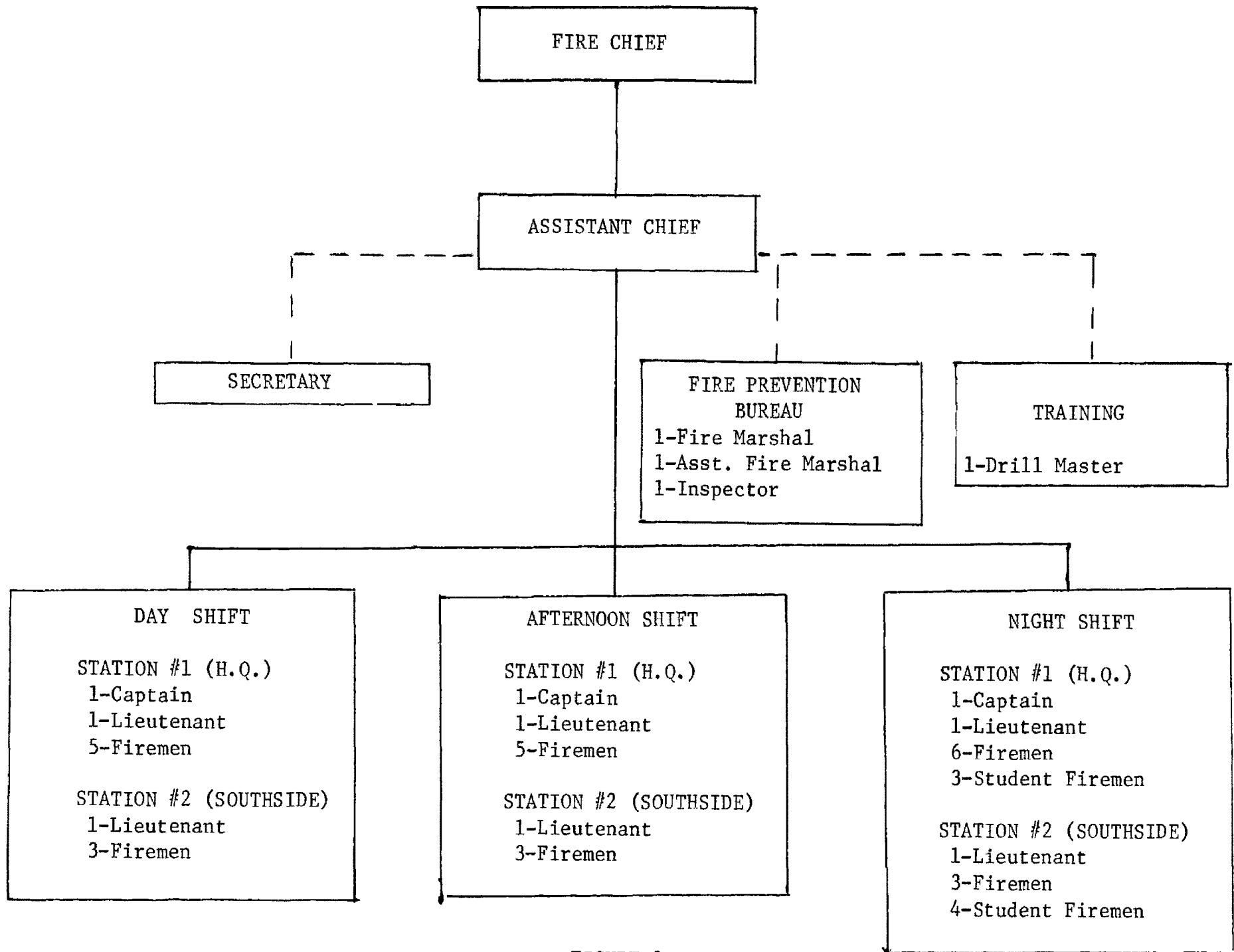


FIGURE 3  
STRUCTURE OF THE FIRE DEPARTMENT

conducts investigations concerning potential fire dangers and also cooperates with the line section on fire origin and arson investigations. The training section provides the entire department with appropriate instruction and practical application sessions. The fire marshal and drill master are of a rank higher than a captain but below that of the assistant chief; however, their authority and responsibility are confined to fire prevention and training, respectively; they have no jurisdiction over the line captains.

#### Statement of the Problem

With increased "institutionalization" of society and the development of formal organizations to assist in the management of the lives of human beings from birth to the grave, it seemed appropriate to examine a key dimension of organizational life--the flow of information. This study represents an attempt to discover, describe, and analyze differences in the speed and accuracy of information flow between two units of a single organization--one unit rated as less efficient (communicates the slowest and least accurately) and one unit rated as more efficient (communicates the fastest and most accurately).

The basic question to be answered by this study may be phrased as follows: What differences exist between the two units in terms of speed and accuracy of information flow? A corollary question is, of course: What are the sources of any differences that might emerge?

The objectives of this study can be expressed in the following research questions:

1. Given that unit rated as communicating the fastest with the most accuracy, what can be determined about its communication network?
  - a. How often is a message received by the appropriate recipient?
  - b. What is the amount of time involved in the transmission of each of four specific messages?
  - c. What is the accuracy of a received message in terms of content? That is, how many of the five W's (who, what, where, when, and why), concerning a message can the receiver identify correctly?
2. Given that unit rated as communicating the slowest with the least accuracy, what can be determined about its communication network?
  - a. How often is a message received by the appropriate recipient?
  - b. What is the amount of time involved in the transmission of each of four specific messages?
  - c. What is the accuracy of a received message in terms of content? That is, how many of the five W's (who, what, where, when, and why), concerning a message can the receiver identify correctly?
3. Is there a significant difference between these two units concerning:
  - a. Number of times intended recipients receive messages?

- b. Amount of time involved in the transmission of a message?
- c. Number of message elements identified correctly?
- 4. What factors seem most important in influencing the serial transmission of messages?
- 5. What seems to be the most accurate description of the communication networks of the units under study?

It was the intention of this study to examine two units of the local city government in an attempt to make comparisons based on aspects of communication efficiency--the speed and accuracy with which messages were transmitted to members of the units. This study was also directed towards providing insight concerning reasons why receivers were or were not able to correctly identify elements of content of the messages, and towards describing unit communication patterns. As such, the order of the research questions tends to represent a natural sequence for the development of this study. In this sequence each unit was first examined independently, then comparisons were made to depict differences between these units, explanations were postulated to clarify the sources of such differences, and diagrams were constructed describing the communication networks.

The specialized manner in which certain concepts are employed in this report is described below:

- 1. The term "unit" represents a department within the formal structure of the local city government.

2. "Communication Efficiency" represents the speed and accuracy with which a message is transmitted from its source to its intended receiver.
3. "Speed" refers to the number of minutes and/or hours lapsed between the initiation and reception of a message from source to intended receiver.
4. "Accuracy" refers to the reception of a message by the person(s) designated as the intended receiver(s) and the correct identification of the five elements of content of the message by the receiver(s).
5. "Serial Communication" refers to the flow of information when a message is relayed to others by a series of single channel interactions in which each person first receives and then transmits the message.

#### Review of the Literature

In organizations, serial or person-to-person-to-person communication is inevitable, possibly inherent, and definitely plagued with potential weaknesses. The flow of information through person-to-person-to-person networks in formal organizations has been studied in experimental, laboratory situations for the past twenty years with systematic success. The present study was conducted to provide insight into the nature of serial communication in two units of a formal organization in an attempt to begin to bridge the gap between

controlled experimental conditions and the real social situation of work organizations. The focus of this study centered on communication efficiency, that is, the speed and accuracy with which messages were transmitted through two units of local city government. Therefore, prior to the commencement of this study it seemed relevant to examine research in light of three specific questions:

1. Is the efficiency of message transmission an important facet of communication within the formal organization?
2. Are there specific factors that operate in human relationships that influence the accuracy of message transmission in general?
3. Does serial communication affect the efficiency of message transmission?

#### Importance of Efficient Message Transmission in Organizations

Literature in the area of organizational communication tends to indicate that the efficiency of message transmission is an important facet of communication within the formal organization. Planty and Machaver,<sup>5</sup> for example, observed that "the passing on of orders, policies, and plans necessary to modern industrial life is the backbone of efficient management." The growth and complexity of modern

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<sup>5</sup> Earl Planty and William Machaver, "Upward Communication: A Project in Executive Development," in Redding and Sanborn, Business and Industrial Communication, New York: Harper & Row Publishers, 1964, p. 350.

industry, they explain, create pressures upon management at all levels to develop effective means of transmitting to lower echelons information that is vital to the continuing, efficient operation of the business. Misinformation and the resulting misunderstanding lessens work efficiency. Perry and Mahoney<sup>6</sup> refer to efficiency when they note that "the immediate objective of any communication system is the accurate transmission of information." In their view,

"This may not be the ultimate objective of communicating, as in the hypothesized relation of information and morale, but it is the immediate objective of communicating. Ultimate objectives are related to the communications program only through their relationships with the immediate objective, transmission of information. Hence, effective communications may be defined, in one sense, as communications which result in efficient and accurate transmission of information."<sup>7</sup>

Bavelas and Barrett<sup>8</sup> assert that "in an enterprise whose success hinges upon the coordination of the efforts of all its members, the managers depend completely upon the quality, the amount, and the rate at which relevant information reaches them. The rest of the organization, in turn, depends upon the efficiency with which the managers can deal with this information and reach conclusions, decisions, etc." They discovered that the speed at which relevant information reached

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<sup>6</sup> Dallis Perry and Thomas A. Mahoney, "In-Plant Communication and Employee Morale," in Redding and Sanborn, p. 521.

<sup>7</sup> Ibid.

<sup>8</sup> Alex Bavelas and Dermot Barrett, "An Experimental Approach to Organizational Communication," Personnel, Volume 27, Number 5, March, 1951, p. 371.

the appropriate source correlated highly with the pattern or type of network employed. They suggested that characteristics of information flow ought to be studied in real organizations, and that "the importance of bridging the gap between the simple, directly controlled experiment and the very complex, indirectly controlled social situation cannot be overestimated."<sup>9</sup>

Studies mentioned in this section tend to suggest that the efficiency of message transmission is an important facet of communication within the formal organization.

#### Factors that Influence the Accuracy of Message Transmission

Several studies indicated that there are specific factors that operate in human relationships that influence the accuracy of message transmission. For example, Leavitt and Mueller,<sup>10</sup> working with college instructors and students in the classroom, executed two correlated experiments in which they varied the conditions under which audience members and lecturer could exchange questions and answers about highly artificial and stylized oral instructions dealing with geometrical figures. Their conclusions indicated that accuracy of message transmission is improved with increased feedback, that zero feedback creates a lack of confidence in the speaker, that zero feedback

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<sup>9</sup> Ibid., p. 365.

<sup>10</sup> Harold J. Leavitt and Ronald A. Mueller, "Some Effects of Feedback on Communication," Human Relations, Volume 4, 1951, pp. 401-410.



encourages hostility, and that sender experience contributes more than receiver experience to improved accuracy of communication.

Newman<sup>11</sup> tested to determine ability to remember meaningful material and in so doing discovered that the more meaningful material was better remembered. He also concluded that essential matter was more efficiently recalled than non-essential matter. In this study short stories were read by the observers and reproduced after equal intervals of sleep and waking. His results specifically showed that the average amount of essential material retained was 86% after waking and 87% after sleeping. The average amount of non-essential material retained was 23% after waking and 47% after sleeping. He concluded that, "Forgetting is an active process, which is much retarded by the inherently organized character of meaningful material."<sup>12</sup>

Another study that provides an additional explanation of factors influencing accuracy of message transmission was that by Read.<sup>13</sup> He discovered that the obstacles to upward communication are made even more formidable when the subordinate lacks trust and confidence in his boss's motives, and when he also perceives his boss as being influential with top executives. But Read was careful to insist that "high

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<sup>11</sup> E. B. Newman, "Forgetting of Meaningful Material During Sleep and Waking," American Journal of Psychology, 1939, Volume 52, pp. 65-71.

<sup>12</sup> Ibid., p. 69.

<sup>13</sup> William H. Read, "Upward Communication in Industrial Hierarchies" Human Relations, Volume 15, 1962, pp. 3-15.

mobility aspirations strongly militate accurate communication of potentially threatening information even when high trust prevails."<sup>14</sup>

Haney,<sup>15</sup> concerned with message accuracy, suggested that bilateral communication tends to be decidedly more accurate than unilateral. Concerning implications about accuracy and confidence, he stated, "Generally speaking, the confidence generated in the bilateral transactions was warranted. In fact, 92.6% of those expressing confidence in their interpretations did have correct interpretations. Unilateral communication tends to engender doubt and rightfully so for only 29.3% of the confident were also accurate."<sup>16</sup> Haney had hoped that something could be learned with respect to the relation of the estimation of elapsed time and degree of personal involvement in the communication experience. However, it became obvious that individuals' time estimates tended to be grossly discrepant and thus this objective of the study was not realized. He cautioned, however, that once messages become routinized for sender and recipient, unilateral communication may be quite adequate with the added advantage of greater speed. Leavitt drew this same conclusion and suggested a restrictive utility for bilateral communication.

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<sup>14</sup> Ibid., p. 14.

<sup>15</sup> William V. Haney, "A Comparative Study of Unilateral and Bilateral Communication," Academy of Management Journal, Volume 7, Number 2, June 1964, pp. 128-136.

<sup>16</sup> Ibid., p. 133.

Two-way communication improves the accurate communication of previously uncoded or insufficiently coded ideas. But two-way communication contributes considerably less to accuracy after the code has been clarified--after new problems have been programmed and routinized. Coupling this generalization with the notion that new problems occur more frequently in upper organizational echelons, we can also tentatively conclude that two-way communication is more useful within the management group than further down the line.<sup>17</sup>

Studies mentioned in this section identify: (1) feedback, (2) trust and confidence, (3) feelings of superiority, and (4) bilateral interactions as factors that might interfere with or encourage accuracy in message transmission. Such insights were considered potential explanations for delay and inaccuracy in the transmission of the four specific messages in the present study.

#### Effects of Serial Communication on Efficient Message Transmission

Literature also indicated that messages may develop inaccuracies when the single channel that connects two persons is extended so that the message must be relayed to others by a series of single channel interactions in which each person must first receive and then transmit the message.

Research on serial communication received an early thrust from the work of Bartlett,<sup>18</sup> as he dealt with perception, remembering, and

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<sup>17</sup> Harold J. Leavitt, Managerial Psychology, Chicago: The University of Chicago Press, 1958, p. 127.

<sup>18</sup> F. Bartlett, Remembering: A Study in Experimental Psychology, New York: Macmillan, 1932, p. 93.

recall. In his experiments, subjects were exposed to information in the form of folk-tales, argumentative passages, and simple drawings, and were asked either to reproduce such information at various time intervals or to transmit it through several persons to its final destination. The differences between the original message and the final message after serial transmission were dramatic. Bartlett wrote: "Accuracy of reproduction is a rare exception and not the rule."<sup>19</sup> His research tended to indicate that as messages were passed from person-to-person-to-person, they suffered a sizable loss of information, distortion of factual content, change of emphasis, addition of new details, and the maximizing of internal elements.

A study of Tresselt and Spragg<sup>20</sup> had two purposes: first, to report the ways in which the reproduction of verbally presented prose materials varied from the original, not during a considerable lapse of time, but rather under the conditions of seriality--passing the material from person to person, and secondly, to examine the effect of a "mental set" upon the directional changes of the reproductions. They concluded that, "changes in the serial reproductions of verbally presented prose materials may be described according to the same principles used to describe changes in visually presented geometric forms; the two appear to have many features in common. Further, the

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<sup>19</sup> Ibid., p. 89.

<sup>20</sup> M. E. Tresselt and S. D. Spragg, "Changes Occurring in the Serial Reproduction of Verbally Perceived Materials," Pedagogical Seminary and Journal of Genetic Psychology, 1941, Volume 58, pp. 255-264.

changes which occur in each can be affected by the induction of a 'mental set' prior to presentation of the material."<sup>21</sup>

In the study of rumor transmission (serial communication as defined in this study), Allport and Postman<sup>22</sup> found that rumors spread when the subject matter of the material was of interest to the participants. Rumors were found to spread among like-minded persons. In serial transmission, rumors assimilated individual interests and prejudices, and became exaggerated and conventionalized. They stated that:

As a rumor travels, it tends to grow shorter, more concise, more easily grasped and told. In the successive versions fewer words are used and fewer details mentioned.<sup>23</sup>

Wood<sup>24</sup> conducted an investigation on influence of attitude in serial communication in which chains of subjects serially reproduced racially biased material. Subjects were categorized by means of a test on degree of prejudice. The findings indicated that information was lost when it was not in agreement with the prejudice of the subjects. Material was added to synchronize with their prejudice.

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<sup>21</sup> Ibid., p. 263.

<sup>22</sup> G. W. Allport and L. Postman, The Psychology of Rumor, New York: Henry Holt and Company, 1948, p. 75.

<sup>23</sup> Ibid.

<sup>24</sup> Carolyn Wood, "An Analysis of Changes Occurring in the Successive Stages of Verbal Abstracting," (unpublished Master's Thesis, Iowa State University, 1944), cited in Curtis A. Stadstad, "The Factor of Relevance in the Serial Reproduction of Orally Transmitted Information," (unpublished Master's Thesis, University of Montana, 1967).

Wood concluded that subjects' attitudes "colored" material as serial reproduction progressed.

Johnson and Wood<sup>25</sup> reported similar results in their study on serial reproduction and they pointed out that there is a tendency for changes to be made in accordance with the subject's own attitudes. In their use of different topics in the various stages of abstracting, they concluded that changes are brought about in three ways: (1) by the omission of material contained in the original article, (2) by distortion of material in the original article, and (3) by addition of new material by the person doing the abstracting.

Brissey<sup>26</sup> studied the serial transmission of written information. Written messages were serially transmitted through five groups of subjects individually and the responses were quantified through use of a relevance-weighted test. Relevance values for test items were developed through the use of two groups of judges who rated the importance of each true test-item on a scale from zero to nine. Those items, on which there was a high agreement between groups on the preliminary study, sixty-one in all, were retained for the main experiment. Information as quantified through use of relevance weights was subjected to analysis of variance to determine the degree to which subjects were informed, misinformed, and uniformed. The findings indicated that the

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<sup>25</sup> Wendell Johnson and Carolyn Wood, "John Told Jim What Joe Told Him: A Study of the Process of Abstracting," ETC, 1944, Volume 2, p. 26.

<sup>26</sup> F. L. Brissey, "The Factor of Relevance in the Serial Reproduction of Information," Journal of Communication, 1961, Volume XI, Number 4, pp. 208-215.

more relevant information was transmitted and recalled more accurately than the less relevant. The relevant information seemed to stay at a high level from group to group or even to increase in mean relevance, because, apparently, irrelevant information was lost in the serial reproduction process.

Brissey's findings tend to challenge certain earlier conclusions including those proposed by Bartlett, who reported that all manner of changes in information could be expected to take place in serial reproduction of information. Brissey, however, employed the concept of "set" in reference to retention of most-important-information, and found that information for which a relevance set was induced by instructions before transmission was transmitted more accurately.

Stadstad<sup>27</sup> conducted a study on the serial reproduction of orally transmitted information to determine if under conditions of common relevance set, and with regard to those statements considered most relevant for a specified hypothesis, participants could transmit information with equal accuracy. He employed procedures that paralleled those of Brissey with the exception that his study focused on the serial transmission of oral messages, where Brissey focused on the transmission of written messages.

Subjects in Stadstad's study conveyed meanings from individual to individual in five person chains. Some of the information contained

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<sup>27</sup> Curtis A. Stadstad, "The Factor of Relevance in the Serial Reproduction of Orally Transmitted Information," (unpublished Master's Thesis, University of Montana, 1969).

in the messages as sent was forfeited by the receivers as each in turn sent his own message via a tape recorder. Stadstad pointed out that, "The amount and kind of information that was forfeited could very well have been the result of many factors. Private differences in motivation, interest, training, prior experiences, prejudice, understanding, and many other factors may have been influential in the selectivity process."<sup>28</sup> However, in spite of these differences, this study seemed to indicate that the relevance set induced by instructions was effective in reducing information forfeiture from person-to-person in chains of up to five individuals. This study also indicated that the more important information tended to be that which was of lesser importance than that of the correctly transmitted information.

Haney,<sup>29</sup> in his study on accuracy of serial communication, stated:

"Regardless of its direction, the number of 'conveyors' involved, and the degree of its conformance with the formal structure, serial transmission is clearly an essential inevitable form of communication in organizations. It is equally apparent that serial transmission is especially susceptible to distortion and disruption. Not only is it subject to the shortcomings and maladies of 'simple person-to-person communication,' but since it consists of a series of communications, the anomalies are often compounded."

He contended that the motives and assumptions of the communicator are of significant influence on the accuracy of serial transmission. He pointed out that when one person conveys a message from another

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<sup>28</sup> Ibid., p. 51.

<sup>29</sup> William V. Haney, "Serial Communication of Information in Organizations," ETC, March, 1964, pp. 13-29.



person to a third person he may be influenced by at least three motives of which he may be largely unaware; they are:

1. The desire to simplify the message. In such a situation, the message is unconsciously simplified because passing on a detailed message is burdensome and taxing. Among the details most susceptible to omission are those already known or those it is presumed the recipient will know without it being told to him.

2. The desire to convey a "sensible" message. In such a situation messages that appear incoherent, illogical, or incomplete are often not passed on or modified and then passed on.

3. The desire to make the conveyance of the message as pleasant and/or painless as possible for the conveyor. In such a situation a message tends to lose harshness as it moves up or down the organizational ladder. People do not relish the reactions of others to a disagreeable message; therefore, it is toned down before being passed.<sup>30</sup>

In addition to the transmitter's motives, his assumptions about the message must also be considered, according to Haney.<sup>31</sup> The two most pervasive and dangerous myths about communication are the assumption that words are used in only one way and the assumption that inferences are always distinguishable from observations. Such dangers as those previously mentioned along with these two assumptions tend to

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<sup>30</sup> Ibid., p. 15.

<sup>31</sup> Ibid., p. 16.

cause three trends according to Haney: they are: omission, alteration, and addition.

In the present study, an attempt was made to determine what factors seemed to affect the serial transmission. That is, did omission, alteration, and/or additions occur in the transmission of the specific messages?

In this section of the review of the literature, it has been implied that messages develop inaccuracies when they are passed from person-to-person-to-person. It has also been suggested that accuracy of serial communication is affected by numerous factors, including: (1) loss and distortion of information, (2) addition of new material, (3) meaningfulness of material, (4) interest in and agreement with material, and (5) induction of a "mental set" prior to presentation of material.

Brissey summed up very appropriately the importance of accuracy in the serial transmission of information and the need for further research in this area when he stated:

Previous investigations employing the method of serial reproduction provide unsettling implications with regard to the accuracy of communication in ordinary social situations. It appears, however, that if these investigations are actually representative of socially significant processes in which information is generated and passed on from individual to individual, social affairs would be considerably more chaotic than appears to be the case. In some measure greater than these studies seem to imply, decisions, judgments, and actions appear to be effectively negotiated on the basis of serially reproduced materials. If this observation is defensible, then it is desirable to conduct an empirical search for

factors that contribute to the accuracy of serial reproduction.<sup>32</sup>

This chapter described the purpose, scope, and rationale of the present study. The type of organization studied, the problem and research questions, and relevant literature were examined.

Chapter II will present a detailed description of the methods and procedures employed in this study. Chapter III will present the methods of analysis and the results, and Chapter IV will summarize the findings and suggest conclusions and implications.

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<sup>32</sup> Brissey, Op. cit., p. 208.

## CHAPTER II

### METHODS AND PROCEDURES

In April of 1970 a preliminary meeting was held with the Mayor of Missoula, Montana. At that time the possibility of conducting a communication research study in the organization of the local city government, utilizing personnel of two different units as subjects, was discussed. A letter requesting permission to conduct such a study was sent to the Mayor the following week (see Appendix A). It was decided that a study of this nature could be conducted and official permission was granted in writing (see Appendix B).

#### Selection of the Sample

Of the thirteen functioning departments within the local city government, the Police Department, Fire Department, Street Department, Park and Recreation Department and Library Department were selected as potential units for study. These selections were made using the criterion of each department having at least twelve personnel employed.

On Tuesday, April 21, fifteen employees of the City of Missoula, working within the City Hall, were selected and administered the "Selection of Sample Rating Sheet" (see Appendix C). Those selected included administrators, supervisors, secretaries, and clerks. City Hall personnel were utilized because it was felt that they would be

familiar with the various departments under consideration and thus have grounds for making evaluations; City Hall is the administrative area of the government and as a result a large portion of each department's business is channeled through it. All employees of the building (excluding Police Department personnel; other potential units are housed in other buildings) were listed in alphabetical order and assigned consecutive numbers. Fifteen numbers were drawn from a table of random numbers and those employees having the corresponding names were selected.

Table I depicts the results of the analysis of the Selection of Sample Rating Sheets.

TABLE I

SUMMARY OF RATINGS FROM SELECTION OF SAMPLE RATING SHEETS  
BY FIFTEEN CITY HALL EMPLOYEES OF SPEED AND ACCURACY OF CITY UNITS

Units	Frequencies			
	Slowest	Fastest	Least Accurate	Most Accurate
Police Department	2	3	4	4
Fire Department	0	7 <sup>b</sup>	0	6 <sup>b</sup>
Street Department	7 <sup>a</sup>	1	7 <sup>a</sup>	2
Park & Rec. Dept.	3	2	2	2
Library Department	<u>3</u>	<u>2</u>	<u>2</u>	<u>1</u>
TOTAL:	15	15	15	15

<sup>a</sup>Slowest and least accurate.

<sup>b</sup>Fastest and most accurate.

The Street Department was rated the unit that communicates the slowest and also the unit that communicates with the least accuracy. The Fire Department was rated the unit that communicates the quickest and also the unit that communicates with the most accuracy.

### Data-Gathering Instruments and Procedures

Most of the data for this study was gathered by tracing the flow of messages in the units by means of interviews and questionnaires, and by personal observation by the investigator. Four messages were initiated by the Mayor, and, using a procedure suggested by Davis<sup>33</sup> (ecco analysis), the messages were systematically charted as they were diffused throughout the units. Interviews were conducted with members of the units following the transmission of all four messages.

### Development of the Messages

Four test messages were developed (see Appendix D-G) pertaining to information the Mayor actually desired to have communicated to the personnel of both units under study. Each message was structured to contain five specific elements of content:

- (1) Who--to whom does the message pertain?
- (2) What--with what does the message specifically deal?
- (3) Where--where does the message have application?

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<sup>33</sup> Keith Davis, "A Method of Studying Communication Patterns in Organizations," Personnel Psychology, Volume 6, 1953, pp. 301-312.

- (4) When--when does the message go into effect?
- (5) Why--why should the message be implemented?

Each message was typed on a card with the elements of content arranged in sequential order as described above. Each card contained the same set of instructions, which read:

Please read the entire message as it appears on the card. Transmit it by the media (vehicle) you feel most appropriate whether it be face-to-face, telephone, or special office-to-car radio. It needs to be transmitted to the Fire Chief and the Street Superintendent at the same or approximately the same time.

Message number one, on the topic of defensive driver classes, was released on Thursday, April 20. Message number two, on the topic of city telephones, was released on Monday, May 4. Message number three, on the topic of tax exemption status, was released on Wednesday, May 6. Message number four, on the topic of traffic laws, was released on Friday, May 8. The messages were released by the Mayor to the appropriate personnel by use of the telephone between 8:00 and 8:30 a.m. Two extra messages were released on each of these dates to serve as distractors. All telephone calls were followed-up with a typed memo spelling out the particulars of the message; this follow-up procedure also applied to the extra messages.

A pilot study was conducted to determine if any of the possible answers for any given question were weak distractors. For the purpose of this study a weak distractor was considered an answer that was seldom, if ever, chosen on the basis of chance. A Communication 111, Introduction to Public Speaking, class was utilized to provide the

necessary subjects. The class was divided into two groups, experimental and control. The experimental group was first read a message and then administered a questionnaire containing five multiple choice type questions. The questions were directed toward determining how many elements of the actual message the receiver could identify. This procedure was repeated for each of the four messages. The control group was administered the questionnaires without exposure to the messages. As a result of a comparison of the information obtained from these two groups, several possible alternatives were rewritten prior to their utilization in the main study.

#### Communication Efficiency Questionnaire

A "Communication Efficiency Questionnaire" (CEQ) was developed as a means of measuring the dimensions of speed and accuracy of message transmission. The questionnaire was divided into two basic parts: Part I consisted of five questions that were sociometric in nature, directed toward determining (1) if and when a message was received, (2) the location of the receiver upon receipt of the message, (3) who told the receiver about it, (4) the media employed, and (5) to whom the receiver passed the information about the message.

Part I represented a means by which communication patterns of members of each unit could be mapped. A technique similar to this was employed by Davis<sup>34</sup> in 1953 when he reported a field study of organiza-

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<sup>34</sup> Ibid.



tional communication in which an "ECCO" analysis (Episodic Communication Channels in Organizations) was employed to chart the channels involved in the flow of information in an operating unit. Davis focused on the grapevine and described information flow relevant to non-intentionally transmitted messages, i.e., messages that were not deliberately developed as part of the daily work of the organization. This study utilized intentionally developed, job related messages as they were transmitted through the formal channels of the units.

Davis's basic approach was to get from each message receiver information about how he first received an item of information and then reassemble the communication pattern in terms of sequences of chains. Respondents were asked when the communication took place, where it occurred and the media (vehicle) used. Respondents were provided a list of organization employees included in the study population. Davis suggested that his technique could be used in many ways, a few of which are: (1) communication patterns can be superimposed on the formal structure for comparison. (2) A check of variables such as seniority, age, and physical proximity against which the communication pattern can be made. (3) Proportion of communication between line and staff and within each can be calculated. (4) Speed of the grapevine can be compared to the speed of formal communication. (5) Groups or individuals that receive but don't relay information and amounts of distortion can be identified.

Walton<sup>35</sup> employed a similar approach as he randomly selected employees of a U.S. Naval Ordnance Test Station and asked this

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<sup>35</sup> E. Walton, "Communication Down the Line: How They Really Get The Word," Personnel, Volume 36, 1959, pp. 78-82.

question: Suppose management made an important change in the way the station would be run--through what channel or means of communication would you most likely get the word first? The responses were as follows: thirty-eight percent selected the grapevine, twenty-seven percent selected their supervisor, seventeen percent selected the official memo, seven percent selected the station newspaper, four percent selected the station directive, four percent selected the bulletin board, and four percent responded indicating other means.

The Davis and Walton studies provided valuable insights for constructing questions that would allow for the determination of the communication patterns of unit members in the present study.

In the present study an attempt was made to determine if the intended receivers could recognize the elements of content of four different messages through the employment of a multiple-choice test.

Part II of the questionnaire consisted of a question pertaining to each of the five specific elements of content: who, what, where, when, and why. This represented a means of determining how much information was actually transmitted to the members of each unit in an attempt to determine how informed each member was. Brissey pointed out that it is necessary to evaluate, "the accuracy with which information has been transmitted in a given situation and to do this one must appraise the degree to which each participant is informed."<sup>36</sup> This part of the CEQ functioned as an attempt to have each member identify (recognize) each of the five elements of the message.

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<sup>36</sup> Brissey, Op. cit., p. 209.

The conceptual framework provided by Davis, particularly in light of his findings and implications for use of "ECCO analysis," led to the employment of a message tracing instrument in the present study. The Communication Efficiency Questionnaire was derived from procedures developed by Walton<sup>37</sup> and Brissey.<sup>38</sup>

#### Questionnaire Procedures

The Communication Efficiency Questionnaire was administered to all members of both units present for work on each day that a message was transmitted (the N for a given day varied with absences from work). The CEQ's (see Appendix H-K) were placed in envelopes and delivered to the subjects as they arrived at their initial place of duty. This task was accomplished between 7:30 and 8:00 a.m. Each envelope contained the same instructions but with different times designated for opening. Names were not used on the envelopes but a system of coded numbers was used instead. Subjects were informed that they were not to sign their names and that their

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<sup>37</sup> Walton, Op. cit.

<sup>38</sup> Brissey, Op. cit.

responses would be kept confidential. The instructions on the questionnaire also informed the subjects to place the CEO back into the envelope when completed and to keep the envelope, noting that it would be collected prior to the completion of the work shift. CEQ's were collected prior to 4:30 p.m. each day. A total of fifty subjects were utilized, twenty-four from the Street Department and twenty-six from the Fire Department. However, the number of subjects that received the CEQ on a given day was not constant but varied by message, due to time-off and sickness.

#### Interview Procedures

Interviews were conducted with selected members of both units during the week of May 11-15 in order to obtain descriptive explanations that might indicate what actually occurred in the transmission of the four messages. A total of sixteen individuals were interviewed, eight from each unit. They were selected at random from among those who indicated on the CEQs that they had received the messages. These interviews were conducted as a secondary means of obtaining data; they were employed in conjunction with the CEQs. Alderfer<sup>39</sup> recommended the use of such a follow-up technique in stating, "when interviews can be used in conjunction with questionnaires, there exists the possibility

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<sup>39</sup> Clayton P. Alderfer, "Convergent and Discriminant Validation of Satisfaction and Desire Measures by Interviews and Questionnaires," Journal of Applied Psychology, Volume 51, 1967, pp. 509-520.

of reducing respondent-researcher alienation and thus increasing the validity of the questionnaire data."

The use of interviews in organizational research is not a new thing; in 1954 Ross<sup>40</sup> conducted interviews to learn about day-to-day communication practices of supervisors. Maier, Hoffman and Read<sup>41</sup> used the interview technique in their study as they interviewed pairs of superior and subordinate members located in five companies. Mellinger<sup>42</sup> used the interview as a method of gathering information to design a questionnaire; a similar procedure was also employed by Read.<sup>43</sup> Simons<sup>44</sup> used intensive face-to-face interviews in his study of supervisory personnel; the interviews were guided by structured questions which were specifically designed to determine the direction that the interviews would take. In the present study a similar technique was employed as all interviews were conducted from an interview guide (see Appendix L).

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<sup>40</sup> Raymond S. Ross, "A Case Study of Communication Breakdown in the General Telephone Company of Indiana, Inc.," (unpublished Ph.D. dissertation, Purdue University, 1954).

<sup>41</sup> N. R. Maier, L. Richard Hoffman, and William H. Read, "Superior-Subordinate Communication: The Relative Effectiveness of Managers Who Held Their Subordinates' Positions," Personnel Psychology, Volume 16, 1963, pp. 1-11.

<sup>42</sup> Glen D. Mellinger, "Interpersonal Trust as a Factor in Communication," Journal of Abnormal and Social Psychology, Volume 52, 1956, pp. 304-309.

<sup>43</sup> Read, Op. cit.

<sup>44</sup> Herbert W. Simons, "A Comparison of Communication Attitudes and Related Job Performance of Supervisors in a Large Commercial Enterprise," (unpublished Ph.D. dissertation, Purdue University, 1961).

The interview guide was developed around those motives and assumptions discussed by Haney<sup>45</sup> as influencing the conveyor in his transmission of messages. Questions were directed toward determining if the interviewee (receiver) felt: (1) a desire to simplify the message, (2) a desire to convey a "sensible" message, or (3) a desire to make the conveyance of the message as pleasant and/or painless as possible to the conveyor. Questions were also asked to determine if: (1) details were omitted, (2) details were altered, or (3) details were added.

The guide was directive in nature but it employed numerous open-ended questions. Without exception, the questions were asked in the same order as they appeared on the guide. Responses were recorded during the discussion. The length of time spent in individual interviews varied from fifteen to forty minutes. Information obtained by the interviews was utilized as descriptive materials to explain what happened during the transmission of messages, that is, to reveal sources of delay and inaccuracy in the transmission process.

Visual observations by the investigator of specific activities that occurred within the two units were made during the administration of the Communication Efficiency Questionnaires. An account of the specific activity was immediately made whereby the particulars of the act were recorded. Explanations of visual observations by the investigator were utilized to substantiate the qualitative data and to propose

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<sup>45</sup> Haney, Op. cit., p. 25.

assumptions concerning those factors that seemed to influence the serial transmission of messages.

### Analysis and Interpretation of the Data

The data obtained by the methods and procedures described above were codified for analysis. Responses were evaluated and transcribed into categories and tabulated into frequencies and mean scores, depending upon the precise nature of each question and the type of data generated. Other data were analyzed using qualitative procedures.

The categorized data were then analyzed in the following manner:

1. Mean scores were determined by message for each unit concerning the amount of time-lag between initiation and receipt of a message and the number of elements correctly identified.
2. Percentages were obtained instead of means to determine the number of subjects that received each message, comparisons were then made utilizing the "receipt factor" formula described by Davis.<sup>46</sup>
3. An analysis of variance (ANOVA)<sup>47</sup> was employed to determine if a significant difference existed between receipt factors of the two units.

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<sup>46</sup> Davis, Op. cit., pp. 308-309.

<sup>47</sup> James L. Bruning and B. L. Kintz, Computational Handbook of Statistics, Glenview, Illinois: Scott, Foresman and Company, 1968, p. 17.

4. Simple t-tests<sup>48</sup> were employed to determine if a significant difference existed between the means for each unit.

Qualitative data were analyzed in the following manner:

1. Information obtained through interviews and observations were classified according to those factors that influenced the transmission of messages in the units under study.
2. Prototype diagrams were drawn from data obtained in the message transmission patterns, depicting the general network of each unit by message. A brief description of the basic characteristics of each network was also created.

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<sup>48</sup> Ibid., pp. 9-12.



## CHAPTER III

### ANALYSIS AND RESULTS

Chapter I reported the purpose, scope, and rationale of the present study. The type of organization studied, the problem and research questions, and relevant literature were also examined. Chapter II described the methods and procedures which were used in the investigation. This chapter presents the methods of analysis and the results of the study.

#### Methods of Analysis

The results of this study were analyzed by separating them into five sections, corresponding to the five research questions.

Data on the first two research questions were derived from the Communication Efficiency Questionnaires and were analyzed by calculating: (1) a receipt factor ratio describing the proportion of subjects who received the message, and (2) the mean time-lag between initiation and receipt of each message by each unit.

The receipt factor is a ratio which simply expresses the proportion of subjects in a unit who received a message. If seven out of ten persons in a department were informed regarding a particular message, the group receipt factor would be .70. The higher the receipt factor, the greater the number of individuals receiving the message. The

formula is  $\frac{R}{(PR)} = S$ , where "R" is the number of receipt units, "(PR)" is the number of potential receipt units, and "S" is the receipt factor. This formula is particularly useful in comparisons because it portrays data on a uniform basis.

Analysis of the third research question consisted of making comparisons between the two units on receipt factors, mean time-lag between initiation and receipt of a message, and the number of message elements identified correctly. One of the most commonly used tests of significance is the t-test. It is used to determine whether the difference between two groups of subjects is significant. In most situations, the subjects are randomly assigned to the two groups; one of the groups is then manipulated experimentally, and the effects of the manipulation are analyzed by comparing the performance of the two groups. However, as in the present study, there are instances where the groups are already constituted and the researcher wishes to determine whether they differ with respect to some variable, such as receipt factor, time-lag, or accuracy of received message. The t-test allows for the comparison of two units when means for the units can be obtained. In such a situation this test can determine whether the difference between means is significant, and if so, at what level; t-tests were therefore employed to analyze data for parts (b) and (c) of this research question.

Data for part (a) was analyzed by using an analysis of variance (ANOVA). This design is basically an extension of the t-test, but it was more applicable to the data than a t-test since the receipt factor did not represent true mean scores. This analysis was made between

departments on the basis of the receipt factors of all four messages.

Data on the fourth research question were analyzed qualitatively and descriptively by classifying the information obtained through interviews and observations according to those factors that influenced the transmission of messages in the units.

Analysis of the fifth research question consisted of charting the message transmission patterns for each of the four messages by department. These patterns indicate whether a subject received the message, and if so, from who he received it and to whom he passed it. This information was also obtained from items in the CEQ. Utilizing the data indicating whom each subject passed a message to, prototype diagrams were drawn depicting the general network of each unit by message. Each diagram is accompanied by a brief explanation of its basic characteristics.

### Presentation of Results

Data gathered on five general research questions and a number of sub-questions will be presented in the remainder of this chapter.

In an attempt to describe components of efficiency in communicating, data were gathered on three dimensions of efficiency: receivers reached, time involved in transmission, and accuracy in identifying elements of messages. These data were utilized to provide an analysis of research questions 1, 2, and 3.

Question 1: Data on Fire Department

Part (a). How often was a message received by the appropriate recipient?

Results of this question were tabulated from responses on the Communication Efficiency Questionnaires to the question, "Did you know by (time) o'clock today of a message concerning (topic of message)?"

Table 2 summarizes the results of this question. Results indicate that 100 percent of the subjects received message 1 and 2, but that only approximately 85 percent received message 3, and only 45 percent received message 4.

TABLE 2

PROPORTION OF SUBJECTS IN THE FIRE DEPARTMENT  
WHO RECEIVED EACH MESSAGE

Message	Potential Receivers (PR)	Actual Receivers (R)	Receipt Factor (S)*
1	13	13	1.000
2	13	13	1.000
3	13	11	.846
4	11	5	.455

\*Represents the ratio of  $\frac{R}{(PR)}$

It appears that the accuracy of message receipt (receipt factor) diminished with each succeeding message in the Fire Department.

Part (b). What was the amount of time involved in the transmission of each of the four specific messages?

Results on this question were gathered from time notations by each subject on the Communication Efficiency Questionnaires indicating the hour and minute the message was received. Data represents the difference between the time notations and a standard initiation time specified at the moment each message was initiated.

Table 3 summarizes the results on this question and shows an increase in the mean amount of time-lag between initiation and receipt

TABLE 3  
TIME-LAG BETWEEN INITIATION  
AND RECEIPT OF EACH MESSAGE IN THE  
FIRE DEPARTMENT

Subject	Message Number							
	1		2		3		4	
	Hr.	Min.	Hr.	Min.	Hr.	Min.	Hr.	Min.
1		05		05		05		05
2		30		15		10		55
3		15		17		26	1	00
4		05		30		26		55
5		05		45		35	1	00
6		15		30		05		
7		05		15		25		
8		20		20		25		
9		15	1	15	1	45		
10		15	1	15	1	35		
11		40		45	1	25		
12		30		47				
13		45		50				
Mean Time-Lag In Hours and Minutes	00	19	00	36	00	40	00	47

from message 1 through message 4. Each successive message required a greater number of minutes to reach its recipients after initiation. The mean time-lag for message 1 was 19 minutes, indicating that it was the message transmitted the fastest (less than one-third of an hour). Message 4 required an average time of 47 minutes, representing the message transmitted the slowest (more than three-quarters of an hour).

Part (c). How many of the five W's (Who, What, Where, When, and Why) concerning each message were the receivers able to identify correctly?

Results on this question were tabulated from responses on the multiple-choice test portion of the Communication Efficiency Questionnaire that requested each subject to correctly identify five elements of each message. Table 4 summarizes the results on this question, and

TABLE 4  
NUMBER OF ELEMENTS CORRECTLY IDENTIFIED  
FOR EACH MESSAGE IN THE FIRE DEPARTMENT

Subjects	Message			
	1	2	3	4
1	5	5	5	4
2	3	5	3	4
3	5	5	5	3
4	4	5	5	3
5	5	5	4	3
6	5	3	3	
7	5	4	4	
8	5	5	3	
9	5	5	4	
10	5	5	3	
11	5	5	4	
12	5	5		
13	4	4		
Mean Number of Elements Correctly Identified (out of 5 Possible)	4.69	4.69	3.90	3.40

indicates that the largest number of correct elements were identified for messages 1 and 2 (4.69 out of 5), and message 4 had the fewest number of elements identified correctly (3.40 out of 5).

These data seem to indicate a relationship between the speed with which messages traveled through the organization and the accuracy with which they were received. When the time-lag was least, the greater was the number of message elements identified correctly.

Question 2: Data on Street Department

Part (a). How often was a message received by the appropriate recipient?

Results on this question were tabulated from responses on the Communication Efficiency Questionnaires to the question, "Did you know by (time) o'clock today of a message concerning (topic of message)?"

Table 5 summarizes the results on this question. Results indicate that approximately 70 percent of the subjects received messages 2 and 4,

TABLE 5

PROPORTION OF SUBJECTS IN THE STREET DEPARTMENT  
WHO RECEIVED EACH MESSAGE

Message	Potential Receivers (PR)	Actual Receivers (R)	Receipt Factor (S)*
1	18	11	.611
2	13	9	.692
3	17	5	.294
4	16	11	.688

\*Represents the ratio of  $\frac{R}{(PR)}$

but that only approximately 60 percent received message 1, and only 30 percent received message 3.

It appears that the accuracy of message (receipt factor) alternated with each succeeding message, as messages 2 and 4 were received by more subjects than messages 1 and 3.

Part (b). What was the amount of time involved in the transmission of each of the four specific messages?

Results on this question were gathered from time notations made by each subject on the Communication Efficiency Questionnaires indicating the hour and minute the message was received. Data represents the difference between the time notations and a standard initiation time specified at the moment each message was initiated.

Table 6 summarizes the results on this question and shows that the mean amount of time-lag between initiation and receipt of messages

TABLE 6  
TIME-LAG BETWEEN INITIATION  
AND RECEIPT OF EACH MESSAGE IN THE  
STREET DEPARTMENT

Subjects	Message Number							
	1		2		3		4	
	Hr.	Min.	Hr.	Min.	Hr.	Min.	Hr.	Min.
1		15		05		05		05
2	2	00	1	00		25		05
3	2	30	1	15	7	30	1	35
4	3	40	3	45			1	35
5	5	30					1	35
6	2	00					1	35
7							1	50
8							1	45
9							1	35
Mean Time-Lag In Hours and Minutes	2	38	1	31	2	40	1	16



varied greatly between any two successive messages. Messages 4 and 2 required approximately 1½ hours for transmission (1 hour 16 minutes and 1 hour 31 minutes, respectively). However, the mean time-lags for messages 1 and 3 were approximately 2½ hours (2 hours 38 minutes and 2 hours 40 minutes, respectively).

Part (c). How many of the five W's (Who, What, Where, When, and Why) concerning each message were the receivers able to identify correctly?

Results on this question were tabulated from responses on the multiple-choice test portion of the Communication Efficiency Questionnaire that requested each subject to correctly identify five elements of each message. Table 7 summarizes the results on this question, and indicates that approximately four elements were identified for messages

TABLE 7

NUMBER OF ELEMENTS CORRECTLY IDENTIFIED FOR EACH MESSAGE IN THE STREET DEPARTMENT

Subjects	Message			
	1	2	3	4
1	5	5	4	5
2	5	5	2	5
3	5	5	3	2
4	0	5	4	4
5	3	4	3	4
6	1	4		3
7	2	3		4
8	1	4		4
9	5	3		5
10	5			5
11	5			3
Mean Number of Elements Correctly Identified (out of 5 possible)	3.36	4.22	3.20	4.00

2 and 4 (4.22 and 4.00 out of 5, respectively), and that approximately 3 elements were identified for messages 1 and 3 (3.36 and 3.20 out of 5, respectively).

It appears that within the Street Department, the mean number of elements correctly identified alternated with each succeeding message, as more elements of messages 2 and 4 were identified correctly than in messages 1 and 3.

### Question 3: Data Comparing Fire and Street Departments

Part (a). How often was a message received by the appropriate recipient?

Analysis of this question consisted of making comparisons between the receipt factors of the previous two research questions. An analysis of variance was run between the departments on the basis of the receipt factors of all four messages.

Table 8 summarizes the analysis of variance on the receipt factors between the units (Fire Dept. vs Street Dept.). The F of 2.536 was

TABLE 8

#### ANALYSIS OF VARIANCE BETWEEN DEPARTMENTS

Source	SS	df	ms	F	p
Total	.4342	7			
Between groups (Fire Dept. vs Street Dept.)	.1291	1	.1291	2.5363	< .20
Within groups	.3051	6	.0509		

found to be significant at the .20 level of confidence, indicating that with degrees of freedom (df) of 1 and 6, the difference between groups would occur by chance less than twenty times in one hundred times. The difference, for purposes of this study, was not significant for making "safe" generalizations; however, since the nature of the data and the relative lack of controls both may have conspired to distort real relationships, the .20 level of significance is reported to indicate possible tendencies. Such tendencies are to be taken only as trends and not as safe generalizations.

Part (b). What was the amount of time involved in the transmission of each of the four specific messages?

Analysis of this question consisted of making comparisons between the mean time-lags of the previous two research questions. For purposes of comparison, t-tests were employed. These tests were run between departments for each message.

Table 9 summarizes the results of the analysis. There seems to be a difference in the time-lag between initiation and receipt of all four messages when the two departments are compared. The highest level of significance was determined for message 1, at the .001 level of confidence. Message 2 was also significant at a fairly high level, .05. However, the level of significance diminished with each successive message, and messages 3 and 4 were significant at the .10 and .20 levels of confidence, respectively.

TABLE 9

ANALYSIS OF DATA PERTAINING TO TIME-LAG  
BETWEEN INITIATION AND RECEIPT OF MESSAGE  
WITHIN THE FIRE DEPARTMENT AND STREET DEPARTMENT,  
PORTRAYED BY MESSAGE

Message	Fire Dept. Means in Minutes	Street Dept. Means in Minutes	t value	df	level of significance
1	19	158	4.66	17	.001
2	36	91	2.17	15	.05
3	40	160	1.78	12	.10
4	47	76	1.42	12	.20

The difference in time-lag between departments for message 1 was found to be significant at the .001 level. An explanation for such a difference is that the topic of this particular message pertained to defensive driver classes, a topic that could have been considered as threatening to Street Department personnel. As a result, the personnel of this department might have assigned a negative connotation to message 1 and thus rejected it.

Part (c). How many of the five W's (Who, What, Where, When, and Why) concerning each message were the receivers able to identify correctly?

Analysis of this question consisted of making comparisons between the mean number of elements identified correctly by each unit. For purposes of comparison, t-tests were employed. These tests were run between departments for each message.

Table 10 summarizes the results of the analysis. A difference in accuracy of received message content for all four messages seems to

exist between the two departments. However, in the case of only message 1 was the difference beyond the .05 level of confidence. For messages 2, 3, and 4, differences occurred at the .20 level of confidence.

TABLE 10

ANALYSIS OF DATA PERTAINING TO  
NUMBER OF ELEMENTS CORRECTLY IDENTIFIED  
IN THE FIRE DEPARTMENT AND STREET DEPARTMENT,  
PORTRAYED BY MESSAGE

Message	Fire Dept. Means in Minutes	Street Dept. Means in Minutes	t value	df	level of significance
1	4.69	3.36	2.35	22	.05
2	4.69	4.22	1.51	20	.20
3	3.90	3.20	1.55	14	.20
4	3.40	4.00	1.25	14	.20

Question 4: Data Pertaining to Serial Transmission of Messages

What factors seemed to influence the serial transmission of messages?

The methodology employed in this study did not provide satisfactory data to answer this particular research question. Although data was obtained that provided insights into those factors that could influence the serial transmission of messages in general, no attempt was made to determine the factors that actually influenced the transmission of the four specific messages utilized in this study. Since no attempt was made to have various personnel reproduce the messages, the researcher was not able to determine the actual

influencing factors. However, the following section reports the data that was found.

Data on this question are reported qualitatively. The data consists of direct quotations and paraphrased comments that identify and illustrate factors that seemed to influence the serial transmission process. These data were taken from the Communication Interview Guides on which were recorded subject responses to questions on individual and departmental communication practices, and from records of observations by the investigator of specific activities that occurred within the two units. Explanations of visual observations are utilized to substantiate qualitative data and to propose assumptions concerning those factors that seemed to influence the serial transmission of messages. These factors included: (1) the media employed to transmit the message, (2) the location of subject upon receipt of the message, (3) the type of activity the subject was engaged in at the time he received the message, (4) the meaningfulness the subject assigned to the message, (5) the subjects interest in and agreement with the message, and (6) the expectations of subjects with respect to speed with which routine messages were to be transmitted.

First, when asked to respond to the statement, "By what means did you first receive message 1 (pertaining to defensive driver classes)," the 8 subjects from the Fire Department indicated that they received it orally. Three subjects of the Street Department indicated they received the same message by memo posted on the bulletin board. The remaining 5 subjects indicated that they received it orally. Visual

observation revealed that memos pertaining to the messages employed in this study were placed on the bulletin boards of both units. However, it was also observed that members of the Fire Department had a tendency to discuss such messages while performing their daily duties around the stations and during coffee breaks. The discussion of messages during work and at coffee breaks might account for the fact that members of this unit indicated they first received the message orally instead of reporting that they read it first.

The situation was somewhat different at the Street Department. Although the memos were posted, it was observed that not until the lunch break or just before closing did members have an opportunity to read the bulletin board. When these same subjects were asked, "Did you receive the message by any other means later," the 8 subjects from the Fire Department responded that they read it on the bulletin board. Only 1 subject from the Street Department indicated he received the message by a second means, he indicated that he also heard about it orally from another employee.

Second, when asked to respond to the question, "Where were you located when you first heard about message 1," the 8 subjects from the Fire Department indicated that they were at various locations within the fire station, including the truck room, the control room, and the coffee room. Six of the subjects from the Street Department indicated that they were located within the garage area either in the shop or the lunch room when they first heard about the message. The remaining 2 subjects indicated that they had first heard about the message while on

a job, approximately 5 miles from the garage.

Third, when asked to respond to the statement, "What were you doing at the time you first heard about message 1," all 8 members of the Fire Department indicated that they were performing their normal duties around the station or having coffee. Five members of the Street Department indicated that they were performing their normal duties. The remaining 3 members responded that they were eating their lunch. All members of both units, when probed concerning how busy they were at the time they first received message 1, indicated that they were able to devote their attention to it without being bothered by other matters; however, 3 members of the Street Department indicated that they did not pay much attention to the message.

When subjects were performing their daily duties it appears that they had ample time to devote their attention to receiving the message. However, when subjects were thoroughly engaged in an activity such as fighting a fire, little if any time was devoted to transmission of a message that did not pertain to the emergency situation. An explanation of what occurred the day message 4 was released tends to support such an assumption. The day message 4 was released a fire alarm was sounded at approximately 8:00 a.m. All personnel from the headquarters station except the secretary were required to fight this fire. Message 4 was released from the Mayor but the Chief was not available so the secretary received it. Personnel did not return to the station from the fire until approximately 9:30 a.m. when the secretary passed the message to the Chief. As a result of the emergency, many of the



members of the Fire Department did not receive message 4. Those who did, indicated they received message 4 approximately 1 hour after it was transmitted by the Mayor.

The Street Department, on the other hand, exhibited a high rate of reception for message 4; however, there appears to be an explanation for this particular performance. During the morning of the day message 4 was initiated, the skies were overcast and it rained. As a result, many members of the Street Department were required to work in the area of the garage rather than in the city. Thus, the poor weather and the subsequent proximity of the subjects to the posted memo appears to account for the performance of the Street Department in quickly receiving message 4.

Fourth, a difference in the time-lag between departments for message 1 was found to be significant at the .001 level. When seeking an explanation for such a difference, it was noted that message 1 pertained to defensive driver classes. This topic appears to have been a subject area considered as threatening to Street Department personnel, since all members are required to drive some form of a vehicle while performing their job, and thus such classes could have been perceived as an attack upon their driving ability. Three of the eight members of this department who indicated they had received message 1 stated that they devoted very little attention to this particular message. These three members indicated that they felt such classes were totally unnecessary. As a result of such comments, it appears that personnel of the Street Department might have assigned a negative connotation to this

particular message and thus rejected it.

Fifth, another factor that could have influenced the transmission of message 1 and closely related to the previous factor was that of subject interest in and agreement with the message. It seems safe to assume that if members of the Street Department felt there was no need for such classes, they might resist transmitting such a message with the speed and accuracy they would a message with which they agreed.

Sixth, the expectation concerning the dissemination of routine messages could explain the Fire Departments' performance. Realizing that fire units function on the basis of speed, that is, the immediate response to a problem, the transmitted messages could have been considered part of the normal daily activity. As such, the receipt of any message by the Chief which is directed to the members of the unit is expected to be disseminated immediately to all personnel on duty.

In addition to data on factors that tended to influence the serial transmission of a specific message, an attempt was made to explore subject attitudes toward changes that might take place in their everyday transmission of messages. Therefore, a number of hypothetical questions were also asked of the subjects interviewed.

When asked to respond to the question, "As a message is passed from person-to-person-to-person, does it undergo change," all 16 subjects responded that they felt a message does undergo change. In indicating what specific types of changes occur, 9 stated omission, 4 stated distortion, 2 stated addition, and 1 felt that change of emphasis occurred most often.

When asked to respond to the statements, "Some people say it is better to ask (or tell) a man to do something only once. After that he is on his own. Others say that anything important needs to be repeated," 10 subjects indicated that they felt an important message needs to be repeated. The remaining 6 subjects indicated that they felt an important message need not be repeated. However, two of these subjects pointed out that an explanation to the effect that a particular message is important might enhance the potential of its being understood. An interesting elaboration on this question was presented by a member of the Fire Department who stated, "In the Fire Service everything has to be fast and accurate and this is accomplished through repetition and training."

When asked to respond to the question, "Would you do anything to a 'detailed' message before passing it on," only two subjects responded with a "yes" answer. Their yes answers were elaborated in the following manner:

1. "Yes, I would underline what I felt was the most important parts that pertained to our section."
2. "Yes, I would make sure I understood it, check with the source for explanation on points not clear before I passed it on."

Three yes responses were given to the question, "Would you do anything to a message that appears incoherent, illogical, or incomplete before passing it on?" These responses included:

1. "Yes, I certainly would, I would check on it, call or to go to the source."
2. "Yes, I would try to make it logical, use my own judgment as to what I thought the person was trying to say."
3. "Yes, I doubt if I would pass it on immediately; I would first check with the sender to get it straight."

When asked to respond to the question, "Would you do anything to a message that appears disagreeable to the person you are transmitting it to before sending it to him," eight subjects indicated they would and eight subjects indicated they would not do anything to the message before sending it. Some typical responses were:

1. "Yes, I would want to discuss it with the source."
2. "No, but I would try to transmit it, in a personal manner."
3. "Yes, I would try to correct it, contact the person and find out what it is all about."
4. "No, I don't think so, it is not within my authority to change it."
5. "Yes, I would have to study it out, I would need to figure an approach to deliver it without being too offensive."

In conclusion, as a result of data recorded on the Communication Interview Guides and records of observations by the investigator of

specific activities that occurred within the two units under study, factors emerged that seemed to influence the serial transmission of messages, including: (1) the media employed to transmit the message, (2) the location of subject upon receipt of the message, (3) the type of activity the subject was engaged in at the time he received the message, (4) the meaningfulness the subject assigned to the message, (5) the subjects interest in and agreement with the message, and (6) the expectations of subjects with respect to the speed with which routine messages were to be transmitted.

Question 5: Data Pertaining to the Communication Network  
of the Fire and Street Departments.

What seems to be the most accurate description of the communication networks of the units under study?

A number of attempts have been made to describe communication networks, including studies by Bavelas and Barrett,<sup>49</sup> Leavitt and Mueller,<sup>50</sup> and Davis.<sup>51</sup> These researchers tend to agree that human communication requires at least two persons, but each person acts independently. Person A may talk or write, but he has not communicated

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<sup>49</sup> Bavelas and Barrett, Op. cit.

<sup>50</sup> Leavitt and Mueller, Op. cit.

<sup>51</sup> Keith Davis, "Management Communication and the Grapevine," Harvard Business Review, Volume 31, 1953, pp. 43-49.

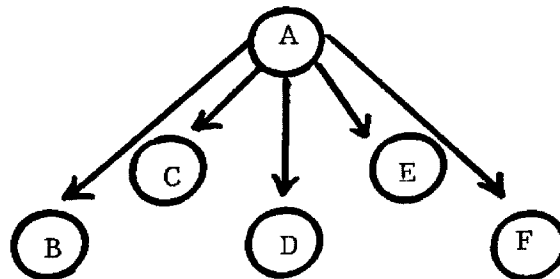
in the true sense until person B receives. The individual is, therefore, a basic communication unit. That is he is one "link" in the communication structure for the transmission of any given message. The manner in which the members of any group or department may be linked together by a communication network are numerous.

Some of the more common patterns or connections (links) representing communication networks are:

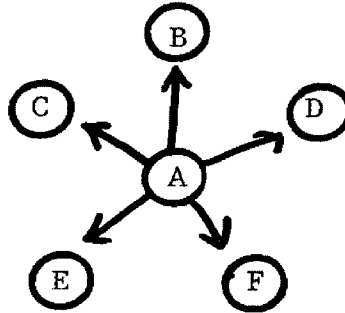
1. The single-strand chain--Where A tells B, who tells C, who tells D, and so on.



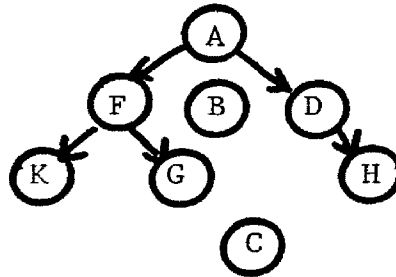
2. The gossip chain--Where A seeks and tells everyone else.



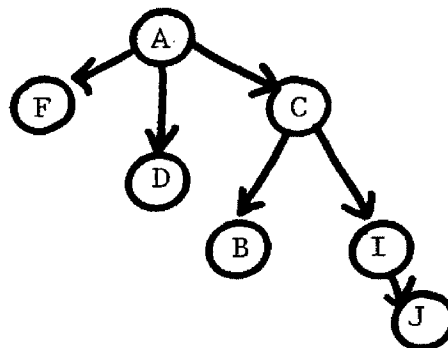
2. The wheel chain--Where A communicates with all others and they in turn communicate with him.



4. The probability chain--Where A communicates randomly, say, to F and D, in accordance with the laws of probability; then F and D tell others in the same manner.



5. The cluster chain--Where A tells three selected others; perhaps one of them tells two others; and then one of these two tells one other.



According to Davis, the formal communication chain (network) is largely determined by the chain of command or by formal procedures. The data on networks gathered in this study was concerned with charting the formal network of the two units under study.

Data on this research question were derived from information provided in the Communication Efficiency Questionnaires concerning subject responses to questions indicating whether they received a particular message, if so, from who, and to whom they passed it. An examination of these responses allowed for the development of message transmission patterns for each of four messages employed in this study (see Appendix M-T). A visual examination of these patterns revealed data indicating to whom each subject passed a message. From this data prototype diagrams were drawn depicting the general network of each unit by message. These diagrams include each subject to whom a message was sent (according to responses on the CEQ) as well as subjects who were not designated as recipients, but who indicated that they received the message. Subjects were omitted from the diagram if they were not designated as receivers and indicated they did not receive the message.

## FIRE DEPARTMENT

### Message 1

The day this message was transmitted the chief was off duty and the assistant chief was in charge of the department. Figure 1 depicts the communication network of message 1 in which the assistant chief is indicated communicating directly with all members of the department on duty. Appendix M tends to substantiate this data as 8 members of the Fire Department did indicate they received the message directly from the assistant chief. This communication network appears to best fit within the classification of a wheel chain.



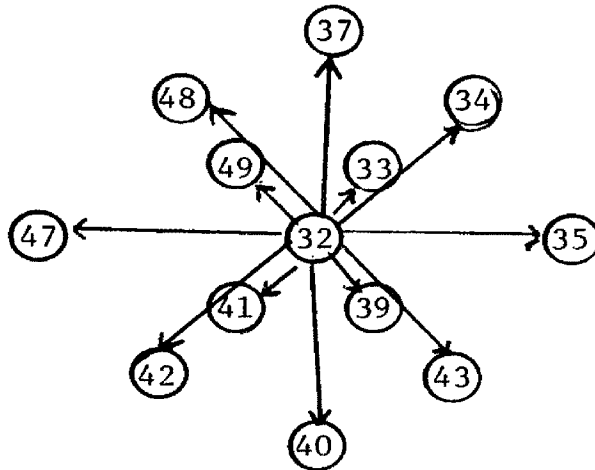


Fig. 4.--Communication Network for Message 1: Fire Department

Message 2

Figure 5 depicts the communication network for message 2 in which the chief communicated with the assistant chief, who in turn, communicated with the secretary, fire marshal, and one combat crew chief. The message was then transmitted by the fire marshal to the assistant fire marshal, who in turn, transmitted it to the fire inspector. The crew chief transmitted the message directly to each of the men on his crew. Appendix N tends to substantiate this data with one major exception: members 37, 33, and 39 indicated they received message 2 from the chief and not the assistant chief. The dotted lines depict directional message flow as reported by other unit members who indicated they received this message. The dotted lines depict that members 36, 44, 45, and 49 received message 2 from the chief. However, appendix N indicates that the chief did not transmit message 2 to these particular members. This communication network appears to be best described as a cluster chain.

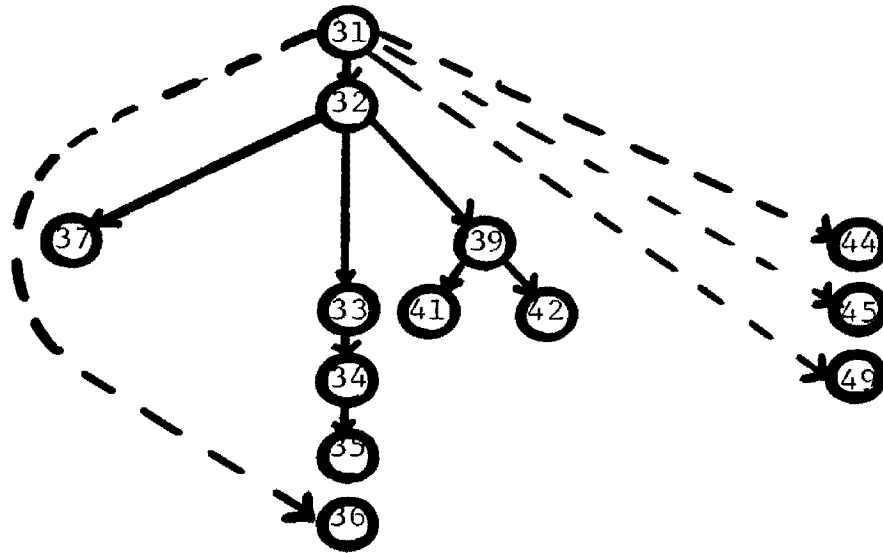


Fig. 5.--Communication Network for Message 2: Fire Department

Message 3

Figure 3 depicts the communication network for message 3 in which the chief communicated directly with the secretary, all members of the fire prevention bureau (fire marshal, assistant fire marshal, and fire inspector), and the two combat crew chiefs. This was the assistant chief's day off. One of the crew chiefs in turn transmitted the message directly to each of the men on his crew. Appendix 0 tends to substantiate this data with one minor exception; one crew chief indicated he received message 3 from the secretary and not the chief. The dotted lines depict directional message flow as reported by other members who indicated they had received this message. The dotted lines depict that members 44 and 50 received message 3 from member 31. However, appendix 0 indicates that member 31 did not transmit message 3 to these particular members. The dotted lines also indicate that member 48 received message 3 from member 44. However, appendix 0 also

indicates that member 44 did not transmit message 3 to member 48. This communication network also appears to fall within the classification of a cluster chain.

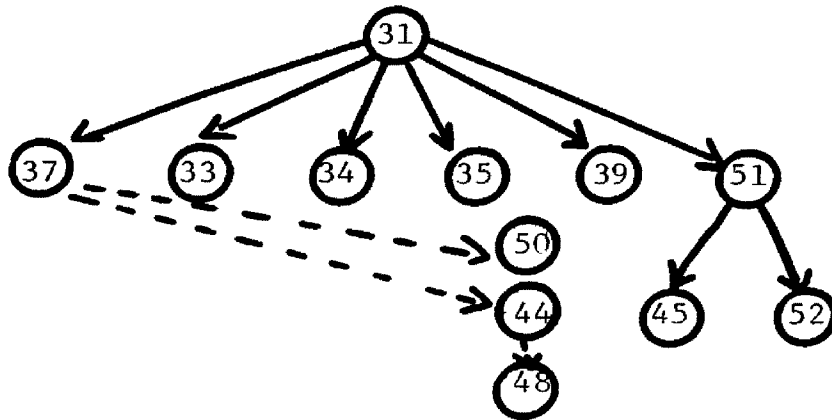


Fig. 6.--Communication Network for Message 3: Fire Department

Message 4

Figure 7 depicts the communication network for message 4 in which the secretary transmitted the message to the chief. The chief in turn, transmitted message 4 to both combat crew chiefs. Both the crew chiefs transmitted the message directly to each of the men on their crews. Appendix P substantiates this data except that it reflects that the men on the combat crews received the message by reading a memo. Four members in the department indicated they did not receive the message, making the network incomplete. This communication network appears to be best described as a cluster chain.

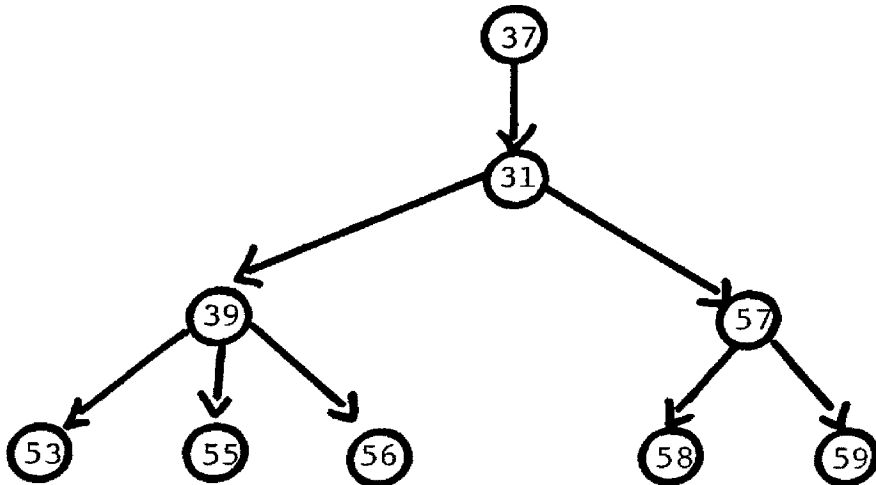


Fig. 7.--Communication Network for Message 2: Fire Department

#### STREET DEPARTMENT

##### Message 1

Figure 8 depicts the communication network for message 1 in which the street superintendent communicated with the secretary and the assistant superintendent. The assistant superintendent in turn, communicated with the two mechanics on duty. Appendix Q substantiates this data. Five members in the department indicated that they did not receive the message, and four men indicated they read the message in the form of a memo, resulting in an incomplete network. The dotted lines depict directional message flow as reported by other unit members who indicated they had received this message. The dotted lines depict that member 23 received message 1 from the street superintendent. However, appendix Q indicates that the street superintendent did not transmit message 1 to member 23. The dotted lines also indicate that members 15 and 16 received message 1 from member 21. However, appendix Q also indicates

that member 44 did not transmit message 3 to member 48. This communication network appears to be best described as a modified cluster chain.

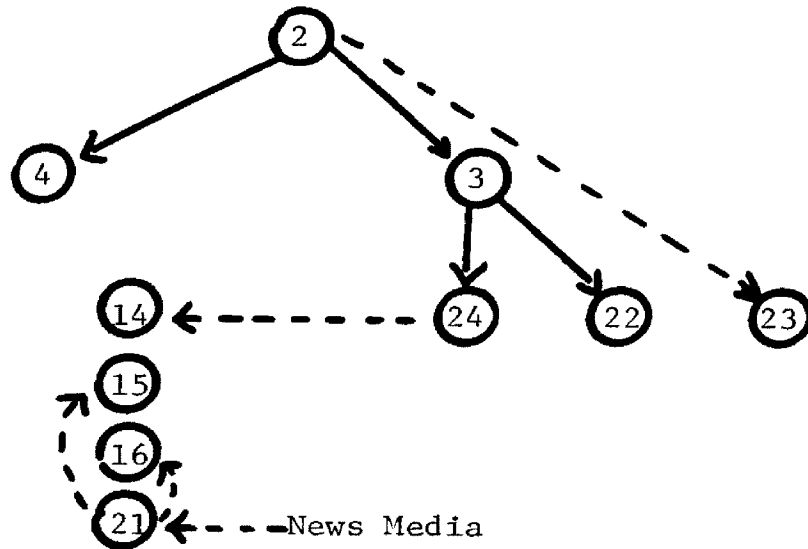


Fig. 8.--Communication Network for Message 1: Street Department

Message 2

Figure 9 depicts the communication network for message 2 in which the street superintendent is indicated communicating with the secretary and the assistant superintendent. The assistant superintendent in turn, communicates with the two mechanics on duty. Appendix R tends to substantiate this data. Five members in the department indicated they did not receive the message and five men indicated they read the message in the form of a memo, resulting in a grossly incomplete network. This communication network also appears to be best described as a modified cluster chain.

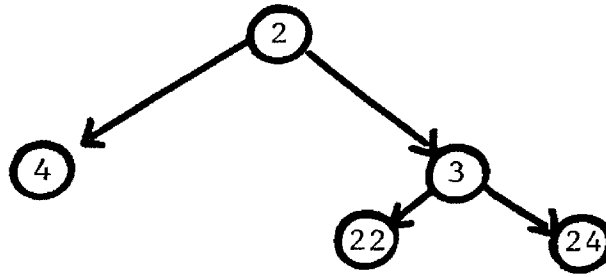


Fig. 9.--Communication Network for Message 2: Street Department

Message 3

Figure 10 depicts the communication network for message 3 in which the street superintendent communicated with the secretary and the assistant superintendent. The assistant superintendent in turn, transmitted the message to the one mechanic on duty. The secretary also indicated that she informed the mechanic about message 3. Appendix S tends to substantiate this data except that it indicates that the mechanic was informed of message 3 by the assistant superintendent. Thirteen men in the department indicated they did not receive the message and one man indicated he read the message in the form of a memo, resulting in an incomplete network. This communication network appears to be best described as a simulated probability chain.

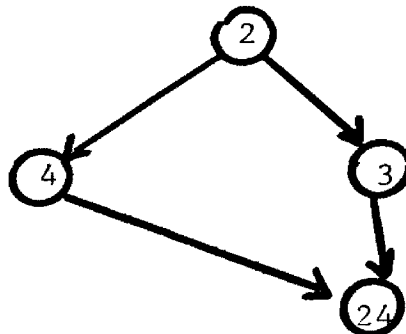


Fig. 10.--Communication Network for Message 3: Street Department

Message 4

Figure 11 depicts the communication network for message 4 in which the street superintendent communicated with the assistant superintendent, who in turn, communicated with the one mechanic on duty. However, appendix T indicates that the mechanic read the message in the form of a memo. Eight men in the department indicated they did not receive the message and six others indicated they read the message in the form of a memo, resulting in a highly incomplete network. This communication network is best described as a single-strand chain.



Fig. 11.--Communication Network  
for Message 4: Street Department

## CHAPTER IV

### SUMMARY, CONCLUSIONS, AND IMPLICATIONS

#### Introduction

With increased "institutionalization" of society and the development of formal organizations to assist in the management of the lives of human beings from birth to the grave, it seemed appropriate to examine a key dimension of organizational life--the flow of information. This study represented an attempt to discover, describe, and compare the speed and accuracy with which messages were transmitted in two units of the local city government of Missoula, Montana

#### Review of the Literature

The review of the literature consisted of examining research in light of: (1) the importance of efficient message transmission in organizations, (2) factors that influence the accuracy of message transmission in general, and (3) factors that affect the accuracy of messages in serial communication.

First, the literature tended to indicate that the efficiency of message transmission is an important facet of communication within the



formal organization. Planty and Machaver, for example, indicated that essential to efficient management is the passing on of orders, policies, and plans. Perry and Mahoney pointed out that the immediate objective of any communication system is the accurate transmission of information. Bavelas and Barrett indicated that managers of organizations depend completely upon the quality, the amount, and the rate at which relevant information reaches them. They also indicated that the rest of the organization, in turn, depends upon the efficiency with which the manager can deal with this information and reach conclusions and decisions.

Second, several studies indicated that there are specific factors that influence the accuracy of message transmission in general. For example, Leavitt and Mueller indicated that accuracy of message transmission is improved with increased feedback, that zero feedback creates a lack of confidence in the speaker, that zero feedback encourages hostility, and that sender experience contributes more than receiver experience to improved accuracy of communication.

Newman tested to determine ability to remember material. He found that the more meaningful material was better remembered and that essential information was more efficiently recalled than non-essential information.

Read identified additional factors influencing accuracy of message transmission when he discovered that the obstacles to upward communication are made more formidable when the subordinate lacks trust and confidence in his boss' motives, and when he also perceives his boss as being influential with top executives.

Haney, in speaking of message accuracy, suggested that bilateral communication was decidedly more accurate than unilateral. Leavitt tended to draw the same conclusions as Haney, and he suggested that two-way communication improved the accurate reproduction of previously uncoded or insufficiently coded ideas. However, he also suggested that two-way communication was more useful within the management group than further down the line.

Third, literature indicated that messages may develop inaccuracies when the single channel that connects two persons is extended so that the message must be relayed to others by a series of single channel interactions in which each person must first receive and then transmit the message (serial communication). This contention was supported by Bartlett when he discovered that the inaccurate reproduction of information was common, especially when messages were transmitted through several persons.

Tresselt and Spragg indicated in their study that changes in the serial reproduction of verbally presented prose material tended to be affected by the introduction of a "mental set" prior to presentation of the material.

Allport and Postman, in a study of rumor transmission, found that subjects in their experiment shortened the prose passages used in the serial reproduction of information to conform with their own past experiences.

Wood studied the influence of attitudes on the serial reproduction of racially biased material. She indicated that information was lost

when it was not in agreement with the prejudice of the subjects and that material was added to synchronize with the subjects' prejudice.

Johnson and Wood discovered in their experiment on serial reproduction, that changes were brought about in three ways: (1) by the omission of material contained in the original article, (2) by distortion of material in the original article, and (3) by addition of new material by the person doing the abstracting.

Haney indicated in his study that the motives and assumptions of the communicator about the message were of primary importance to the accurate transmission of the message. He pointed out that such motives and assumptions caused three trends: omission, alteration, and addition. These were the same three forms of change reported by Johnson and Wood.

Brissey studied the serial transmission of written information. His findings indicated that the more relevant information was transmitted and recalled more accurately than the less relevant.

Stadstad conducted a study patterned after Brissey's in which he investigated the serial reproduction of orally transmitted information which indicated that the relevance-set induced by instructions was effective in reducing information forfeiture from person-to-person in chains of up to five individuals. This study also indicated that the more important information tended to be transmitted accurately and to be retained in the serial process.

The review of the literature for the present study indicated that:

1. The efficiency of message transmission is an important facet of communication within the formal organization.

2. Specific factors tend to influence the accuracy of message transmission, including: (1) feedback, (b) meaningfulness of material, (c) trust and confidence, (d) feelings of superiority, and (e) bilateral interactions.
3. The accuracy of serial communication is affected by numerous factors, including: (a) loss and distortion of information, (b) addition of new material, (c) interest in and agreement with material, and (d) induction of a "mental set" prior to presentation of material.

#### Statement of the Problem

The basic question of this study was phrased as follows: What differences exist between the two units in terms of speed and accuracy of information flow? A corollary question was: What are the sources of any differences that might emerge? In order to provide a systematic method of determining answers to these questions, the objectives of this study were expressed in the form of five research questions: (1) How often is a message received by the appropriate recipient? (2) What is the amount of time involved in the transmission of each of the four messages? (3) What is the accuracy of a received message in terms of the amount of content that can be correctly identified? (4) What factors seem most important in influencing the serial transmission of messages? (5) What seems to be the most accurate description of the communication network used in the units under study?

### Methods and Procedures

The methods and procedures involved in this study consisted of: (1) selection of the sample, (2) development of four test messages, (3) development of the Communication Efficiency Questionnaires, (4) a pilot study, (5) transmission of the four messages and the administration of the questionnaires, (6) conducting interviews utilizing the Communication Interview Guide, and (7) investigator observations.

First, fifteen employees of the City of Missoula, working within the City Hall, were selected and administered the "Selection of Sample Rating Sheet." As a result of their responses on the rating sheets, the Fire Department was chosen as the unit that communicated the quickest and also the unit that communicated with the most accuracy. The Street Department was chosen as the unit that communicated the slowest and also the unit that communicated with the least accuracy.

Second, four test messages were developed pertaining to information the Mayor actually desired to have communicated to the personnel of both units under study. Each message was structured to contain five specific elements of content that identified the who, what, where, when, and why of the message.

Third, a Communication Efficiency Questionnaire was developed for each message as a means of measuring the dimensions of speed and accuracy for the transmission of each message. The questionnaire was divided into two basic parts: Part I directed toward determining (1) if and when the message was received, (2) the location of the receiver upon receipt of the message, (3) who told the receiver about

it, (4) the media employed, and (5) to whom the receiver passed the information about the message. Part II consisted of a question pertaining to each of the five specific elements of content. Subjects were directed to select one of the four possible answers as the correct answer to the statement.

Fourth, a pilot study was conducted to determine if any of the possible answers for any given question in Part II of the CEQ's were weak distractors. A Communication 111, Introduction to Public Speaking, class was utilized to provide the necessary subjects. The class was divided into two groups, experimental and control. As a result of a comparison of the information obtained from these two groups, several possible alternatives were rewritten prior to their utilization in the main study.

Fifth, the CEQ was administered to all members of both units present for work on each day that a message was transmitted (the N for a given day varied with absence from work). Messages were released by the Mayor to the appropriate personnel by use of the telephone between 8:00 and 8:30 a.m. Two extra messages were released on each of these dates to serve as distractors. All telephone calls were followed-up with a typed memo spelling out the particulars of the message; this follow-up procedure also applied to the extra messages. A total of 50 subjects were utilized, 26 from the Fire Department and 24 from the Street Department.

Sixth, interviews were conducted with selected members of both units during the week following the dissemination of the messages in

order to obtain descriptive explanations that might indicate what actually occurred in the transmission of the four messages. A total of 16 subjects were interviewed, 8 from each. All interviews were conducted from the Communication Interview Guide. The guide was directive in nature but it employed numerous open-ended questions. Without exception, the questions were asked in the same order as they appeared on the guide. Responses were recorded during the discussion.

Seventh, explanations of visual observations by the investigator of specific activities that occurred within the two units were utilized to substantiate the interview data and to propose assumptions concerning those factors that seemed to influence the serial transmission of messages.

#### Methods of Analysis

The results of this study were analyzed by separating the data into five sections, corresponding to the five research questions. Data on the first two questions were derived from the CEQ's and were analyzed by calculating: (1) a receipt factor ratio describing the proportion of subjects who received the message, (2) the mean time-lag between initiation and receipt of each message, and (3) the mean number of elements correctly identified for each message by each unit. Analysis of the third research question consisted of making comparisons between the two units on receipt factors, mean time-lag between initiation and receipt of each message, and the mean number of message elements identified correctly. In order to accomplish these comparisons an

analysis of variance (ANOVA) was utilized to compare the receipt factors and a t-test was employed to compare the mean time-lags and the mean number of elements correctly identified. Data on the fourth research question were analyzed qualitatively and descriptively by classifying the information obtained through interviews and observations according to those factors that influenced the transmission of messages in the units. Visual observations were made of specific activities that occurred in each of the units while the investigator was administering the Communication Efficiency Questionnaires. The particulars of the activity were recorded at the time the activity occurred. Explanations of visual observations were utilized to substantiate the qualitative data and to propose assumptions concerning those factors that seemed to influence the serial transmission of messages. Analysis of the fifth research question consisted of charting the message transmission patterns for each of the four messages by department. These patterns indicate whether a subject received the message, and if so, from who he received it and to whom he passed it. This information was also obtained from the CEQ's. Utilizing the data indicating to whom each subject passed a message, prototype diagrams were drawn depicting the general network of each unit by message. Each diagram is also accompanied by a brief explanation of its basic characteristics.

### Results

The results from this study may be summarized as follows:



1. Within the Fire Department, 100 percent of the subjects received messages 1 and 2, but only approximately 85 percent received message 3, and only 45 percent received message 4.
2. Within the Fire Department, an increase in the mean amount of time-lag between initiation and receipt for message 1 through message 4 occurred. Message 1 required 19 minutes for transmission, whereas, message 4 required 47 minutes.
3. Within the Fire Department, the largest number of correct elements were identified for messages 1 and 2 (4.69 out of 5), and message 4 had the least number of elements identified correctly (3.40 out of 5).
4. Within the Street Department, approximately 70 percent of the subjects received messages 2 and 4, approximately 60 percent received message 1, and less than 30 percent received message 3.
5. Within the Street Department, the least amount of time-lag between initiation and receipt was for message 4; it required 1 hour and 16 minutes. Message 2 required approximately the same amount of time. However, a large increase in time was required for the transmission of messages 1 and 3, approximately 2 1/2 hours.
6. Within the Street Department, the largest number of correct elements were identified for message 2 (4.22 out of 5), and message 3 had the least number of elements identified correctly (3.20 out of 5).

7. The analysis of variance on receipt factors between the units revealed that an F of 2.536 was significant at the .20 level of confidence.
8. The t-test was found to indicate significant differences among means of the units on the amount of time-lag between initiation and receipt of all four messages. The highest level of significance, .001, was for message 1. The lowest level of significance, .20 was for message 4.
9. The t-test was found to indicate significant differences among means of the units on the number of correct elements identified for all four messages. The highest level of significant, .05, was for message 1. The level of significance for messages 2, 3, and 4 was 20.
10. Oral, face-to-face interaction was the primary means of transmitting messages utilized within the Fire Department. Within the Street Department, the memo and oral face-to-face interaction were the primary means of transmitting messages.
11. Reading posted memos was the secondary means of receiving information in the Fire Department. The Street Department utilized no secondary means of receiving information.
12. Subjects from the Fire Department received messages while performing normal duties at various locations within the fire station or during their morning coffee break.
13. Subjects from the Street Department received messages while performing normal duties both away from and in the area of the garage, or during their lunch break at the lunch room in the garage.

14. Results of this study indicate that subjects felt the serial transmission of messages was influenced by personal attitudes and organizational factors.
15. Results of this study indicate that subjects felt omissions, additions, and distortions do occur in the serial transmission of messages.
16. The communication networks of the Fire Department seem to fit best the wheel and cluster type structures, and include nearly all members of the unit.
17. The communication networks of the Street Department seem to vary between modified cluster, probability chain, and single-strand type structures, all of which were incomplete in reaching members of the unit.

### Conclusions

The conclusions, which follow, based on the results of the investigation, should be interpreted in terms of the context, circumstances, and limitations of the study: the organization and its two units studied, the research methods, and the researcher's personal, subjective perceptions.

The sample consisted of two units of a city government that were selected on the basis of rated efficiency in communicating; such criteria represents a potentially biased method of selecting a sample. If the units typify city governmental units in general, the conclusions may be considered applicable to other similar units in cities of

similar size. These conclusions apply, in an unrestricted sense, however, only to the specific units studied.

The conclusions are limited, in addition, by the research method employed. Although the research instruments utilized in the study had been tested in other contexts, their specific applications under the conditions of this study may not warrant generalizing too broadly without appropriate precautions. Finally, it must not be overlooked that the researcher's personal perceptions and skills in data-gathering and in interpreting the data may have influenced the investigation.

Conclusions that can be drawn from the results of this study are:

1. Within the Fire Department, the accuracy of message receipt (receipt factor) diminished (beginning with message 2) with each succeeding message.
2. Within the Fire Department, the mean time-lag between initiation and receipt of a message increased with each succeeding message.
3. Within the Fire Department, the mean number of elements correctly identified diminished with each succeeding message, after message 2.
4. The longer it took for a message to be transmitted through the Fire Department, the fewer subjects it reached, and the lower were the scores in identifying message elements correctly.

5. Within the Street Department, the accuracy of message receipt (receipt factor) alternated with each succeeding message, as messages 2 and 4 were received by more subjects than messages 1 and 3.
6. Within the Street Department, the main time-lag between initiation and receipt of a message alternated with each succeeding message, as messages 2 and 4 required less time for transmission than messages 1 and 3.
7. Within the Street Department, the mean number of elements correctly identified alternated with each succeeding message, as more elements of messages 2 and 4 were identified correctly than in messages 1 and 3.
8. The longer it took for a message to be transmitted through the Street Department, the fewer subjects it reached, and the lower were the scores in identifying message elements correctly.
9. On the basis of receipt factors it is concluded that the Fire Department was more efficient than the Street Department in transmitting messages to the appropriate receivers.
10. On the basis of mean scores, it is concluded that the Fire Department transmitted messages more quickly than the Street Department.
11. On the basis of mean scores it is concluded that the Fire Department processed messages more accurately than the Street Department.

12. In total, this study suggests that in terms of communication efficiency, that is, the speed and accuracy with which messages were transmitted to subjects of the unit, the Fire Department was more efficient than the Street Department. This conclusion confirms the ratings of the two departments received as part of the sample-selection procedure. It appears, also, that perceptions of speed and accuracy of message transmission by individuals outside a unit can represent quite accurately the actual circumstances within the unit.
13. Results indicated that the serial transmission of a message in both the Fire and Street Departments was affected by a number of organizational factors, including:
  - a. The media employed to transmit the message.
  - b. The location of intended receivers.
  - c. The type of activity subjects were engaged in at the time they received the message.
14. This study tends to support previous studies by Newman, Allport and Postman, and Tresselt and Spragg, in revealing that the serial transmission of messages is often seriously influenced by personal attitudes as well as organizational factors. The difference between units in the number of people receiving a message and the time-lag between initiation and receipt of a message could very well be the result of several factors, including:
  - a. The meaningfulness assigned to the message by subjects,

- b. Subjects' interest in and agreement with the message, and
  - c. The expectations of subjects toward the speed with which routine messages were to be transmitted in the unit.
15. This study tends to support Davis' contention that the formal communication network is largely determined by the chain of command and/or by formal procedures of the unit. Where the work of the unit drew its members away from the headquarters area, the networks were seriously incomplete.

#### Implications

The following implications seem to be warranted by the results and conclusions of this study:

1. The fact that the longer it took for a message to be transmitted through the two units, the lower were the scores in identifying message elements correctly, implies that the more time involved in getting messages to units, the greater is the possibility of inaccuracies creeping into the information transmission process. Units should seek ways of reducing the length of time it requires to get a message from the Mayor to the on-line operator.
2. The fact that the longer it took for a message to be transmitted through the two units, the fewer subjects it reached, implies that the more time involved in getting messages through units, the greater is the possibility of large numbers of personnel failing to receive the information. Units should seek ways of insuring that messages reach all members.

3. The results of this study indicate quite clearly that the fastest way of transmitting information to members of work units is through oral, face-to-face means. The implication here is that if it is desired to transmit information by the fastest means available, the oral, face-to-face medium should be utilized.
4. The results of this study also indicate that the most accurate way of transmitting information to members of work units is by means of oral, face-to-face, interactions followed by the posting of a memo. The implication here is that if it is desired to transmit information by the most accurate means available, oral announcements should be utilized in conjunction with the posting of a memo which contains the message to be transmitted, which the personnel can scrutinize at various times of the day.
5. Since the results indicate that personnel of both departments received a large portion of their information from memos posted on the bulletin boards, another implication is that perhaps personnel of such work units should be required to read the bulletin board twice daily, once in the morning before going on duty and once in the afternoon prior to coming off duty.
6. If the handling of message 4 during the emergency situation is typical of the manner in which a non-emergency message is treated, another implication is that perhaps all such non-emergency messages should be held for transmission until the unit returns to its normal, daily activities.



7. The failure of many subjects to receive messages implies that the City Government ought to investigate the possibility of taking steps to improve the processes of message transmission in this organization. Both personal and organization factors that influence the transmission process ought to be analyzed in greater depth.

#### Suggestions for Further Research

The conclusions of this study raise a number of speculations. Should further research be conducted in the area of serial transmission of messages within functioning organizations, the following speculations might be pursued:

1. Since the media utilized in the transmission of messages varied with each unit, it appears safe to assume that such differences had an effect on the speed and accuracy with which messages were transmitted. In order to ascertain the importance of the media on the kind of results observed, a new study could be conducted involving two similarly structured units that employ distinctly different media.

2. Since the location of intended receivers varied with each unit, it appears safe to assume that such differences had an effect on the speed and accuracy with which messages were transmitted. In order to ascertain the importance of location and proximity on the kind of results observed, a new study could be conducted involving two similarly structured units that place their members at different distances and locations from the source of messages.

3. Since the activity subjects were engaged in at the time they received a message varied with each unit, it also appears safe to assume that such differences had an effect on the speed and accuracy with which messages were transmitted. In order to ascertain the importance of activity on the kind of results observed, a new study could be conducted involving two similarly structured units that utilize members in different activities.

4. In view of the fact that unsatisfactory data was obtained to answer the fourth research question, it appears that a specific analysis in a field situation needs to be undertaken to determine what factors actually influence the serial transmission of specific messages. Such a study would need to employ message tracing techniques whereby personnel of the unit under study would be requested to reproduce the messages.

5. Another study could be concerned with the quantity of information (number of message elements) that remain in a message after serial transmission through a set number of "links" within similarly structured units. This study would also be concerned with determining what factors account for any difference that might exist between the two units in the serial transmission of a message.

The paucity of studies in the area of serial reproduction within formal organizations is obvious. Although the potential difficulty of such a study is great, there is a definite need for more research in this area, and as this study indicated, there are formal organizations willing to commit themselves and their organizations to such investigation.

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## APPENDIXES



**University of Montana**  
**Missoula, Montana 59801**

APPENDIX A

(406) 243-0211

LETTER REQUESTING PERMISSION FOR STUDY

The Honorable Richard G. Shoup  
Mayor of Missoula  
Drawer 11  
Missoula, Montana 59801

Dear Mayor Shoup:

I am requesting official permission to conduct research toward my thesis within the local city government of Missoula. My thesis is entitled: "A Comparative Study of Communication Efficiency in Two Units of Local City Government." It is planned to distribute a very brief questionnaire to fifteen individuals selected randomly from personnel employed within City Hall. From their response, two units (departments) will be selected for the actual study. Four messages pertaining to actual policy or information you desire transmitted to employees of said units will be studied to determine how efficiently each was transmitted. Items of efficiency include the speed and accuracy of transmission. In essence, does the correct person receive the message and if so, how much of it?

The actual time spent on gathering data is figured at four hours for the initial questionnaire and one, eight-hour day for the transmission of each message. Total time figured for gathering data is thirty-six hours. It is noted that during this time the usual operating procedure will not be interrupted; however, I will be present to observe and administer questionnaires.

Individuals responding to the initial questionnaire will not be identified by name. Two units studied will be reported as units A and B and actual identification concerning findings will be kept confidential. A final copy of the data will be provided you in the form of a copy of my thesis.

Thank you very much for your cooperation in this matter.

Sincerely,

Joseph F. Connors

APPENDIX B

RICHARD G. SHOUP  
Mayor

LETTER GRANTING PERMISSION FOR STUDY

Mr. Joseph F. Connors  
University of Montana  
Speech Communication Department  
Missoula, Montana 59801

Dear Joe:

This is to acknowledge receipt of your letter of April 20, 1970, requesting permission to conduct research for your thesis within the city administration.

I hereby grant you permission to do the above-mentioned. I will notify all department heads of your intentions and instruct them to cooperate with you to the fullest regarding this matter.

Sincerely,

Richard G. Shoup  
Mayor

RGS/jmc



APPENDIX C

SELECTION OF SAMPLE RATING SHEET

The questionnaire that follows is to be answered anonymously: You are not asked to sign your name, and no one will know how you as an individual answered. Please read the instructions and respond as quickly and accurately as you can.

Five departments are listed below. Please answer the following four statements by selecting that department you feel is most representative of the statement and place that department name in the blank space provided.

Police Department  
Fire Department  
Street Department  
Park and Recreation Department  
Library Department

- 
1. Which department communicates the quickest? \_\_\_\_\_
  2. Which department communicates the slowest? \_\_\_\_\_
  3. Which department communicates with the most accuracy? \_\_\_\_\_
  4. Which department communicates with the least accuracy? \_\_\_\_\_

APPENDIX D

MESSAGE NUMBER ONE

Instructions

Please read the entire message as it appears on the paper. Transmit it by the media (vehicle) you feel most appropriate whether it be face-to-face, telephone, or special office-to-car radio. It needs to be transmitted to the Fire Chief and the Street Superintendent at the same or approximately the same time.

Message

Subject: Defensive Driver Classes

To: Bob or Ray (whichever is appropriate)

I have some information I want passed on to all employees within your department. I want you to inform me of the nature of their responses.

The City of Missoula is presently contemplating for employees that drive city vehicles, the establishment of defensive driver classes. All employees driving a city vehicle anywhere outside of the immediate confines of their shop will receive such training. July 1, 1970, has been tentatively set for the starting of such classes. These classes are being considered due to recent accidents involving city vehicles.

Thank you--

APPENDIX E

MESSAGE NUMBER TWO

Instructions

Please read the entire message as it appears on the paper. Transmit it by the media (vehicle) you feel most appropriate whether it be face-to-face, telephone, or special office-to-car radio. It needs to be transmitted to the Fire Chief and the Street Superintendent at the same or approximately the same time.

Message

Subject: City Telephones

To: Bob or Ray (whichever is appropriate)

I have some information I want passed on to all employees within your department. I want you to inform me of the nature of their responses.

All employees need to take note that city telephones are not to be used for personal matters, except in case of emergency. This policy applies wherever a telephone, paid for by the city, exists. This non-use of city telephones for personal matters is to become effective immediately. This policy is being put into effect because it has been brought to my attention that citizens have been unable to contact city officials because of such usage.

APPENDIX F

MESSAGE NUMBER THREE

Instructions

Please read the entire message as it appears on the paper. Transmit it by the media (vehicle) you feel most appropriate whether it be face-to-face, telephone, or special office-to-car radio. It needs to be transmitted to the Fire Chief and the Street Superintendent at the same or approximately the same time.

Message

Subject: Exemption Status

To: Bob or Ray (whichever is appropriate)

I have some information I want passed on to all employees within your department. I want you to inform me of the nature of their responses.

Those city employees encountering change in withholding exemptions are directed to fill out a new W-4 form obtained from Donna in the City Clerk's Office. This information is applicable wherever a fulltime or parttime employee is concerned. Such action needs to be taken immediately upon encountering a change. Such action should be taken to allow you to receive your appropriate "take home" salary.

APPENDIX G

MESSAGE NUMBER FOUR

Instructions

Please read the entire message as it appears on the paper. Transmit it by the media (vehicle) you feel most appropriate whether it be face-to-face, telephone, or special office-to-car radio. It needs to be transmitted to the Fire Chief and the Street Superintendent at the same or approximately the same time.

Message

Subject: Traffic Laws

To: Bob or Ray (whichever is appropriate)

I have some information I want passed on to all employees within your department. I want you to inform me of the nature of their responses.

All employees that drive city vehicles are directed to pay more rigid attention to local traffic regulations. Observation and compliance with traffic regulations is necessary whenever and wherever you are when driving a city vehicle. Effective June 1, 1970, city employees noted violating traffic regulations will be reported to their supervisor for appropriate action. Recent voiced public concern over a growing number of such violations of this nature necessitates this new procedure.

APPENDIX H

COMMUNICATION EFFICIENCY QUESTIONNAIRE #1

A study is being made in the interest of furthering scientific understanding of one aspect of human behavior in organizations -- communication. You have been selected as part of a sample and your cooperation in the study will enable us to obtain an accurate picture of how people communicate in this organization.

The questionnaire that follows is to be answered anonymously; you are not asked to sign your name and no one will know how you as an individual answered.

Please Follow These Directions:

1. Read each question.
2. Mark your answer as directed, pay attention to examples and qualifers.
3. If you want to change an answer, draw a single line through your first answer.
4. Please answer the questions as accurately as you can.

PART I

Fill in the Blank Questions: From your present state of knowledge provide the following information.

- A. Did you know by \_\_\_\_\_ o'clock today that the city of Missoula is contemplating defensive driver classes: Answer yes - no (circle one)
- B. Where were you physically located when you received this information?  
Answer \_\_\_\_\_
- C. Who passed this information to you? Answer \_\_\_\_\_

D. How was this information passed to you (by telephone, face-to-face, memo, some other specific means)?

Answer \_\_\_\_\_

E. Who did you pass the information on to?

Answer \_\_\_\_\_

PART II

Multiple Choice Questions: Answer these questions from your knowledge about the city's policy concerning defensive driver classes. Check your choice in space provided.

A. Who does the information pertain to?

1. \_\_\_\_\_ All employees of the city that drive.
2. \_\_\_\_\_ All employees of the street department that drive city vehicles.
3. \_\_\_\_\_ All employees that drive city vehicles.
4. \_\_\_\_\_ All employees of the fire department that drive.

B. What does the information specifically deal with?

1. \_\_\_\_\_ Contemplated establishment of defensive driver classes.
2. \_\_\_\_\_ Merits of defensive driver classes.
3. \_\_\_\_\_ Location of defensive driver classes.
4. \_\_\_\_\_ Review of previous defensive driver classes.

C. Where does the information have application?

1. \_\_\_\_\_ Anywhere in the metropolitan area.
2. \_\_\_\_\_ Anywhere outside the immediate confines of the shop.
3. \_\_\_\_\_ Anywhere within the city.
4. \_\_\_\_\_ Anywhere in the city and county.

D. When does the information go into effect?

1. \_\_\_\_\_ June 1, 1970.
2. \_\_\_\_\_ July 1, 1970.

3. \_\_\_\_\_ June 15, 1970.

4. \_\_\_\_\_ July 15, 1970.

E. Why does the information necessitate being put into effect?

1. \_\_\_\_\_ Due to recent accidents involving city vehicles.

2. \_\_\_\_\_ Due to careless driving.

3. \_\_\_\_\_ Due to high probability of future accidents involving city vehicles.

4. \_\_\_\_\_ Due to city employees being responsible for recent accidents.

At approximately what time today had you first heard about defensive driving classes? \_\_\_\_\_

PLEASE PLACE THIS QUESTIONNAIRE BACK INTO THE ENVELOPE. KEEP IT WITH YOU. IT WILL BE COLLECTED PRIOR TO YOUR LEAVING WORK.

Thank you-----



APPENDIX I

COMMUNICATION EFFICIENCY QUESTIONNAIRE #2

A study is being made in the interest of furthering scientific understanding of the aspect of human behavior in organizations -- communication. You have been selected as part of a sample and your cooperation in the study will enable us to obtain an accurate picture of how people communicate in this organization.

The questionnaire that follows is to be answered anonymously; you are not asked to sign your name and no one will know how you as an individual answered.

Please Follow These Directions:

1. Read each question.
2. Mark your answers as directed, pay attention to examples and qualifiers.
3. If you want to change an answer, draw a single line through your first answer.
4. Please answer the questions as accurately as you can.

PART I

Fill in the Blank Questions: From your present state of knowledge provide the following information.

- A. Did you know by \_\_\_\_\_ o'clock today of a message concerning city telephones? Answer yes - no (circle one)

- B. Where were you physically located when you received this information? Answer \_\_\_\_\_
- C. Who passed this information to you? \_\_\_\_\_
- D. How was this information passed to you (by telephone, face-to-face, memo, some other specific means)? Answer \_\_\_\_\_
- E. Who did you pass the information on to? Answer \_\_\_\_\_

PART II

Multiple Choice Questions: Answer these questions from your knowledge about the city's policy concerning city telephones. Check your choice in space provided.

- A. Who does the message pertain to?
1. \_\_\_\_\_ All employees working at City Hall.
  2. \_\_\_\_\_ Administrative personnel only.
  3. \_\_\_\_\_ All employees.
  4. \_\_\_\_\_ All full-time employees.
- B. What does the message specifically deal with?
1. \_\_\_\_\_ New telephone system for inter-department offices.
  2. \_\_\_\_\_ Cost for use of city telephones.
  3. \_\_\_\_\_ How to use city telephones in case of emergency.
  4. \_\_\_\_\_ City telephones being used for personal matters.
- C. Where does the message have application?
1. \_\_\_\_\_ Wherever a telephone paid for by the city exists.
  2. \_\_\_\_\_ Anywhere within the city.
  3. \_\_\_\_\_ At City Hall.
  4. \_\_\_\_\_ Wherever a telephone within the city exists.

D. When does the message go into effect?

1. \_\_\_\_\_ The first of next month.
2. \_\_\_\_\_ When notified by supervisor.
3. \_\_\_\_\_ Immediately.
4. \_\_\_\_\_ Next Monday.

E. Why does the message necessitate being put into effect?

1. \_\_\_\_\_ Because of complaints by citizens.
2. \_\_\_\_\_ Because citizens have been unable to contact city officials.
3. \_\_\_\_\_ Because citizens have been unable to contact City Hall.
4. \_\_\_\_\_ Because employees need to use the telephone for emergencies.

At approximately what time today had you first heard about telephone use at City Hall? \_\_\_\_\_

PLEASE PLACE THIS QUESTIONNAIRE BACK INTO THE ENVELOPE. KEEP IT WITH YOU. IT WILL BE COLLECTED PRIOR TO YOUR LEAVING WORK.

Thank you

APPENDIX J

COMMUNICATION EFFICIENCY QUESTIONNAIRE #3

A study is being made in the interest of furthering scientific understanding of one aspect of human behavior in organizations -- communication. You have been selected as part of a sample and your cooperation in the study will enable us to obtain an accurate picture of how people communicate in this organization.

The questionnaire that follows is to be answered anonymously; you are not asked to sign your name and no one will know how you as an individual answered.

Please Follow These Directions:

1. Read each question.
2. Mark your answer as directed, pay attention to examples and qualifiers.
3. If you want to change an answer, draw a single line through your first answer.
4. Please answer the questions as accurately as you can.

PART I

Fill in the Blank Questions: From your present state of knowledge provide the following information.

- A. Did you know by \_\_\_\_\_ o'clock today of a message concerning exemption status? Answer yest - no (circle one)

- B. Where were you physically located when you received this information? Answer \_\_\_\_\_
- C. Who passed this information to you? Answer \_\_\_\_\_
- D. How was this information passed to you (by telephone, face-to-face, memo, some other specific means)? Answer \_\_\_\_\_
- E. Who did you pass the information on to? Answer \_\_\_\_\_

PART II

Multiple Choice Questions? Answer these questions from your knowledge about the city's policy concerning exemption status? Check your choice in space provided.

- A. Who does the message pertain to?
1. \_\_\_\_\_ City employees.
  2. \_\_\_\_\_ Employees encountering change.
  3. \_\_\_\_\_ City employees encountering change.
  4. \_\_\_\_\_ All employees.
- B. What does the message specifically deal with?
1. \_\_\_\_\_ Filling out a new W-4 form.
  2. \_\_\_\_\_ Review of procedure filling out W-4 form.
  3. \_\_\_\_\_ The new W-4 form.
  4. \_\_\_\_\_ Contemplated changes in exemption status.
- C. Where does the message have application?
1. \_\_\_\_\_ Anywhere within city.
  2. \_\_\_\_\_ Wherever a full-time or part-time employee is concerned.

3. \_\_\_\_\_ Anywhere the employee is located.
  4. \_\_\_\_\_ Wherever changes are contemplated.
- D. When does the message go into effect?
1. \_\_\_\_\_ Immediately upon encountering a change.
  2. \_\_\_\_\_ July 1, 1970.
  3. \_\_\_\_\_ Immediately.
  4. \_\_\_\_\_ June 1, 1970.
- E. Why does the message necessitate being put into effect?
1. \_\_\_\_\_ To allow the employee to receive the benefits.
  2. \_\_\_\_\_ To provide you with more income.
  3. \_\_\_\_\_ To provide the employee with current changes in tax exemptions.
  4. \_\_\_\_\_ To allow you to receive your appropriate "take home" salary.

At approximately what time today had you first hear about exemption status? \_\_\_\_\_

PLEASE PLACE THIS QUESTIONNAIRE BACK INTO THE ENVELOPE. KEEP IT WITH YOU. IT WILL BE COLLECTED PRIOR TO YOUR LEAVING WORK.

Thank you-----

APPENDIX K

COMMUNICATION EFFICIENCY QUESTIONNAIRE #4

A study is being made in the interest of furthering scientific understanding of one aspect of human behavior -- communication. You have been selected as part of a sample and your cooperation in the study will enable us to obtain an accurate picture of how people communicate in this organization.

The questionnaire that follows is to be answered anonymously; you are not asked to sign your name and no one will know how you as an individual answered.

Please Follow These Directions:

1. Read each question.
2. Mark your answer as directed, pay attention to examples and qualifiers.
3. If you want to change an answer, draw a single line through your first answer.
4. Please answer the questions as accurately as you can.

PART I

Fill in the Blank Questions: From your present state of knowledge provide the following information.

- A. Did you know by \_\_\_\_\_ o'clock today of a message concerning traffic laws: Answer yes - no (circle one)

- B. Where were you physically located when you received this information?  
Answer \_\_\_\_\_
- C. Who passed this information to you? Answer \_\_\_\_\_
- D. How was this information passed to you (by telephone, face-to-face, memo, some other specific means)? Answer \_\_\_\_\_
- E. Who did you pass the information on to? Answer \_\_\_\_\_

PART II

Multiple Choice Questions: Answer these questions from your knowledge about the city's policy concerning traffic laws. Check your choice in space provided.

- A. Who does the message pertain to?
1. \_\_\_\_\_ All employees that drive city vehicles.
  2. \_\_\_\_\_ All employees that drive.
  3. \_\_\_\_\_ All drivers of city vehicles.
  4. \_\_\_\_\_ New employees that are to drive city vehicles.
- B. What does the message specifically deal with?
1. \_\_\_\_\_ Violations of local traffic laws.
  2. \_\_\_\_\_ Failure to stop and speeding, the two laws most often violated by city employees.
  3. \_\_\_\_\_ Paying more rigid attention to speed limits.
- C. Where does the message have application?
1. \_\_\_\_\_ Wherever and whenever you drive a city vehicle in the city.
  2. \_\_\_\_\_ Anywhere outside of the immediate confines of the shop.
  3. \_\_\_\_\_ Whenever and wherever you are when driving a city vehicle.
  4. \_\_\_\_\_ Anywhere in the city.



D. When does the message go into effect?

1. \_\_\_\_\_ June 1, 1970.
2. \_\_\_\_\_ June 15, 1970.
3. \_\_\_\_\_ July 1, 1970.
4. \_\_\_\_\_ July 15, 1970.

E. Why does the message necessitate being put into effect?

1. \_\_\_\_\_ Because of recent voiced public concern.
2. \_\_\_\_\_ Because of complaints by citizens.
3. \_\_\_\_\_ Because of city employees being involved in accidents.
4. \_\_\_\_\_ Because of recent accidents involving city vehicles.

At approximately what time today had you first heard about traffic laws?

\_\_\_\_\_

PLEASE PLACE THIS QUESTIONNAIRE BACK INTO THE ENVELOPE. KEEP IT WITH YOU. IT WILL BE COLLECTED PRIOR TO YOUR LEAVING WORK.

Thank you----

APPENDIX L

COMMUNICATION INTERVIEW GUIDE

Date \_\_\_\_\_

Time \_\_\_\_\_

I. Introduction

- A. Opening comments to establish rapport. Introduce self, graduate student doing research at U of M toward degree, locate private place to talk.
- B. Purpose of Interview: build a better theoretical understanding of organizational behavior; that is, how people in a department such as this one communicate.
- C. Security and anonymity: everything said will be confidential, interested in general summaries and group data in which no names, levels, titles or other identifying information will be used.
- D. Request permission to take notes.
- E. Eight areas will be covered in this interview.
- F. Comments to build confidence and a desire to cooperate.

II. Orientation Questions

- A. Engage in small chit-chat.
- B. John Wilson, a noted author, has said that 75% of a man's day is spent in communication in one way or another with others. What do you think about this statement?
- C. When a person engages in communication he is considered to be passing on information. A common way of passing on information within the city government is the message (written and/or oral). Last week, messages were sent out on the topics of defensive driver classes, city telephones, exemption status, and traffic laws. Do you recall them?

Would you please reproduce to the best of your ability, on the card the message concerned with

C. (Continued)

(If S is a non-writer, I will write message from his dictation and read it back to him asking for changes and confirmation).

III. Speed and Accuracy of Reception and Transmission of Message.

A. How long after a message is sent from the Mayor do you feel it should take to get to you? Explain your answer.

B. How long after you receive a message do you feel it should be before you pass it on? Explain your answer. (Liaison personnel only).

C. What do you feel is the fastest way to have information passed to you?

D. What do you feel is the most accurate method to pass information to you?

E. What do you feel is the fastest way for you to pass on information.

1. What are your feelings about calling a meeting?

2. What are your thoughts about making oral announcements?

- F. What do you feel is the most accurate method for you to pass on information?
1. What do you do about "non-readers" when using this method?
  2. What might be some of the consequences of using this method?
- G. As you think of the department in which you work, react in this statement -- "The right people seem to get the right word at the right time." Would you disagree? Why?
- H. Do you feel there are employees who don't seem to understand information transmitted to them very well? Yes - No - Explain.
- I. Do you "handle" different types of messages differently?
1. In terms of speed, how would you handle a message you view as:
    - a. Beneficial to yourself or your employees?
    - b. Hostile or detrimental toward yourself or your employees?
  2. In terms of accuracy, how would you handle a message you viewed as:
    - a. Beneficial to yourself or your employees?
    - b. Hostile or detrimental toward yourself or your employees?

Probes -

Do you mean one type of message might be transmitted quicker?

Do you mean one type of message might be transmitted more accurately?

IV. Methods of Sending Messages

A. When numerous oral messages are used, how are important ones separated from unimportant ones? Can you give me an example?

B. How about written messages. Can you give me an example?

C. How would you expect to receive a message which required immediate action on your part?

D. How would you expect to receive a message that did not require immediate action?

E. How would you expect to be told about an important policy change?

V. Content

A. As a message is passed from person-to-person-to-person, does it undergo change? Yes - No What types of change?

1. Loss of information.

2. Distortion.

3. Change of emphasis.

4. Addition of new details.

B. Would you do anything to a "detailed" message before passing it on?

What?

C. Would you do anything to a message that appears incoherent, illogical, or incomplete before passing it on?

What?

D. Would you do anything to a message that appears disagreeable to the person you are transmitting it to before sending it to him?

What?

#### VI. Technique for Reception and Transmission of Message.

A. What purposes do you feel messages serve?

Elaborate

B. When a message is being transmitted to you orally, what might you do to aid you in getting the basic information so that you will be able to pass it on?

Elaborate

- C. Some people say it is better to ask (or tell) a man to do something only once. After than he is on his own. Others say that anything important needs to be repeated. What do you think? (Probe to see if there are possible points of elaboration)
1. Tell once.
  2. Repeat.
  3. Non-verbal follow-up.
  4. Explanation.
- D. If you don't understand a message that is being passed on to you, what do you do?

(Interpretive or mirror question to be used - example, are you saying you are transmitting, yet he does not speak up?)

VII. Frame of Reference concerning Reception and Transmission of Message

We are now specifically concerned with the messages transmitted last week by the Mayor permitting to traffic laws, exemption status, city telephones, defensive driver classes.

- A. What were you doing at the time you first heard about the message concerned with \_\_\_\_\_.
1. Physically.
  2. Mentally.

Probes - were you really busy?  
- were you able to devote your attention to it without being bothered by other matters?

- B. By what means did you first receive the message?
1. Verbal: face-to-face or telephone
  2. Memo
  3. Letter
- C. Did you receive this message by any other means later?
- D. Was there anything you felt should be done to the message before it was transmitted to others.

Did you do anything to it? If yes, what?

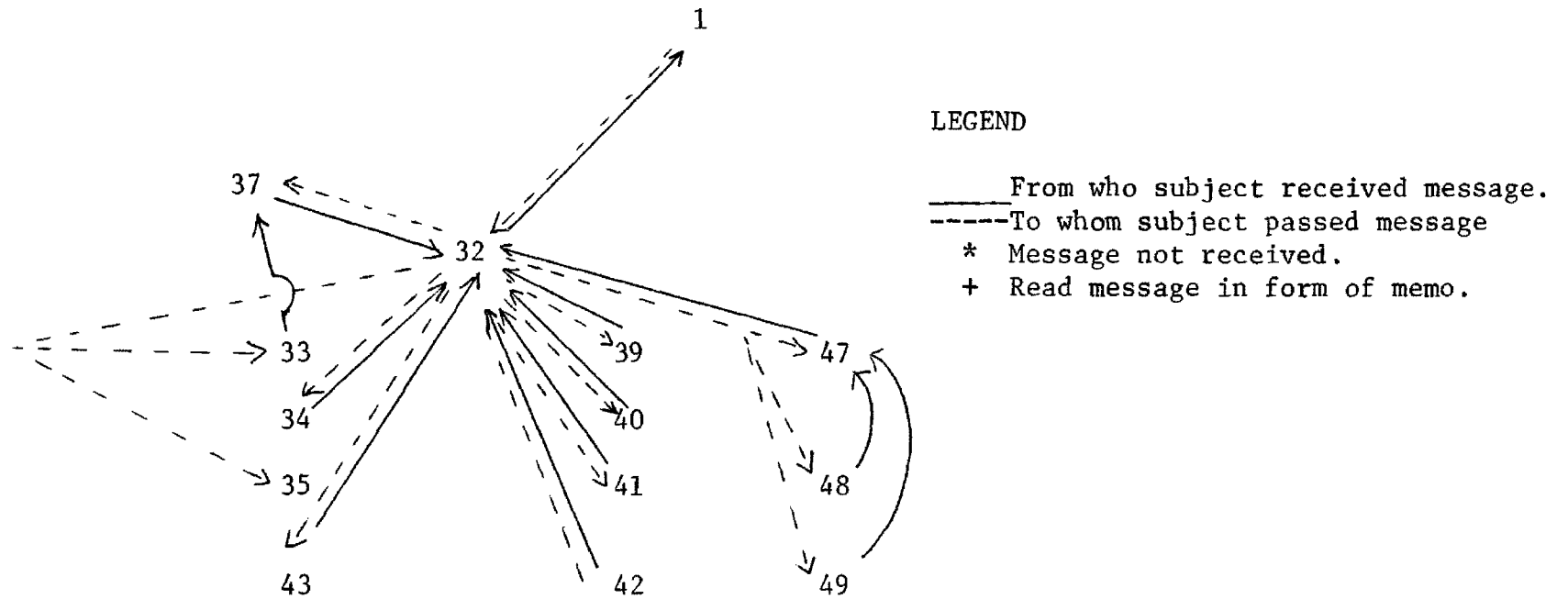
- VIII. This concludes the specific areas I want to cover. Are there any questions you want to cover. Are there any questions you want to raise or any points you want to further discuss?  
Yes - No

Evaluate closing comments in terms of clarifying previous statements or opening door for further areas of discussion.

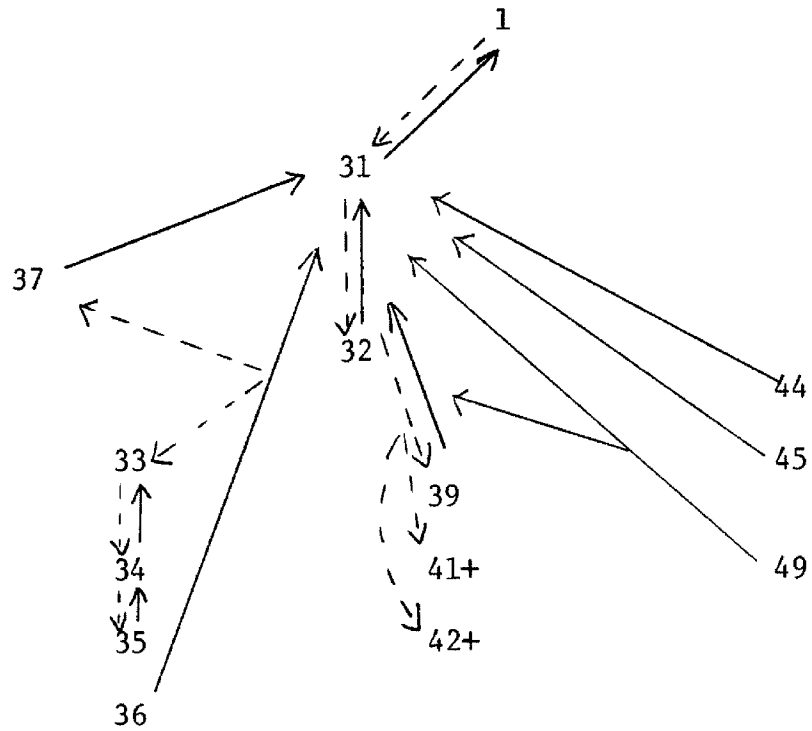




Appendix M--Message Transmission Pattern for Message 1: Fire Department.



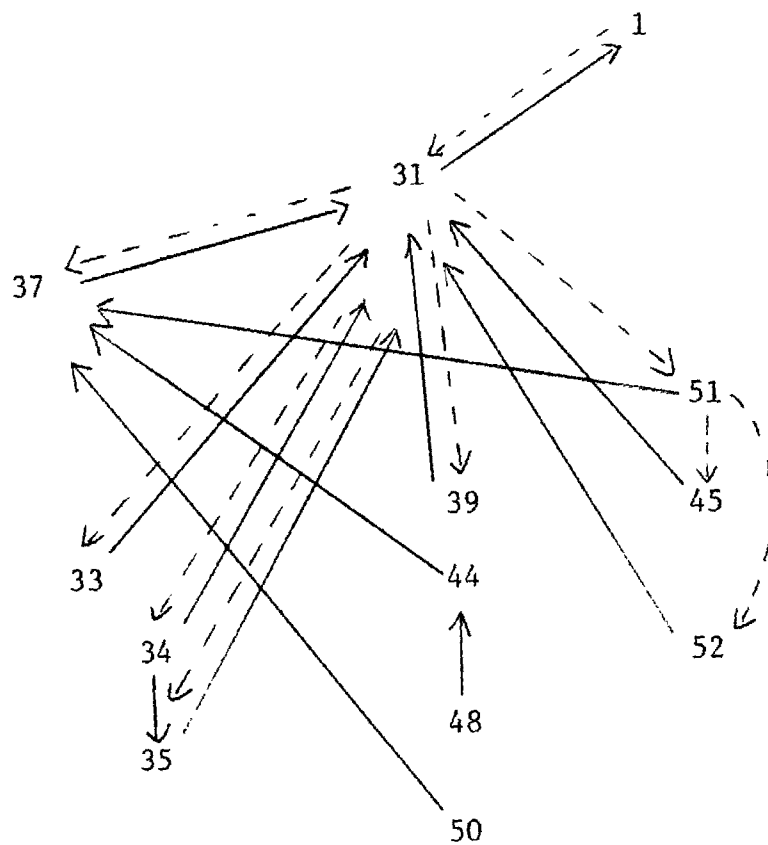
Appendix N--Message Transmission Pattern for Message 2: Fire Department.



LEGEND

- \_\_\_\_\_ From who subject received message.
- To whom subject passed message.
- \* Message not received.
- + Read message in form of memo.

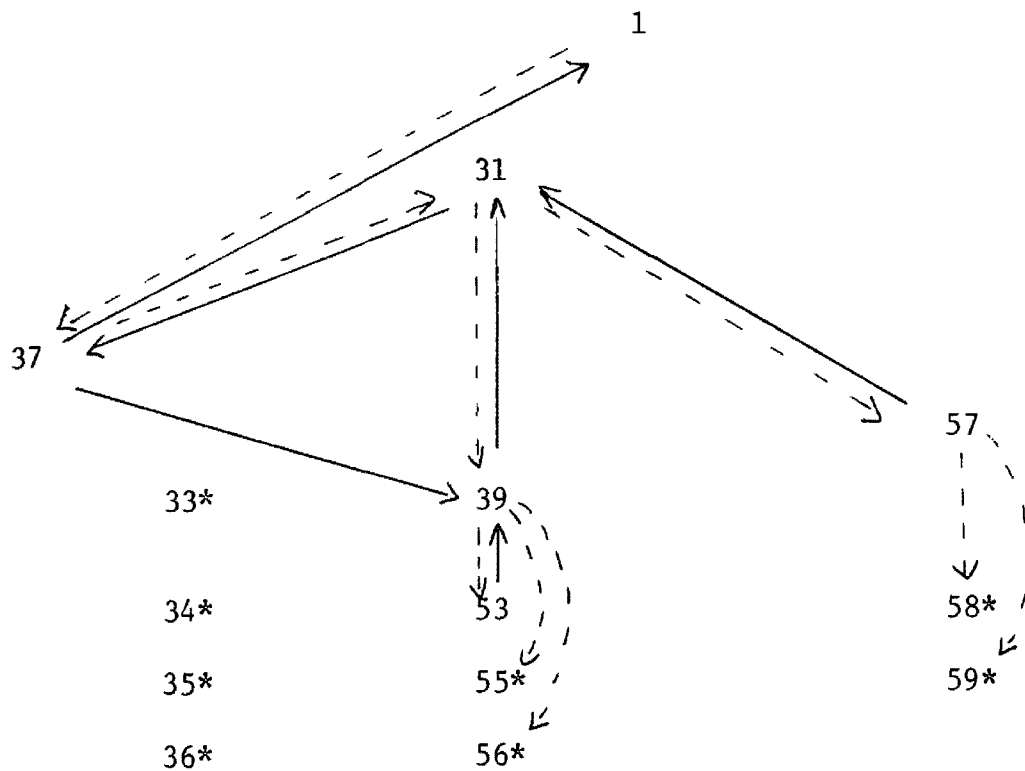
Appendix O--Message Transmission Pattern for Message 3: Fire Department.



LEGEND

- From who subject received message.
- To whom subject passed message.
- \* Message not received.
- + Read message in form of memo.

Appendix P--Message Transmission Pattern for Message 4: Fire Department.



LEGEND

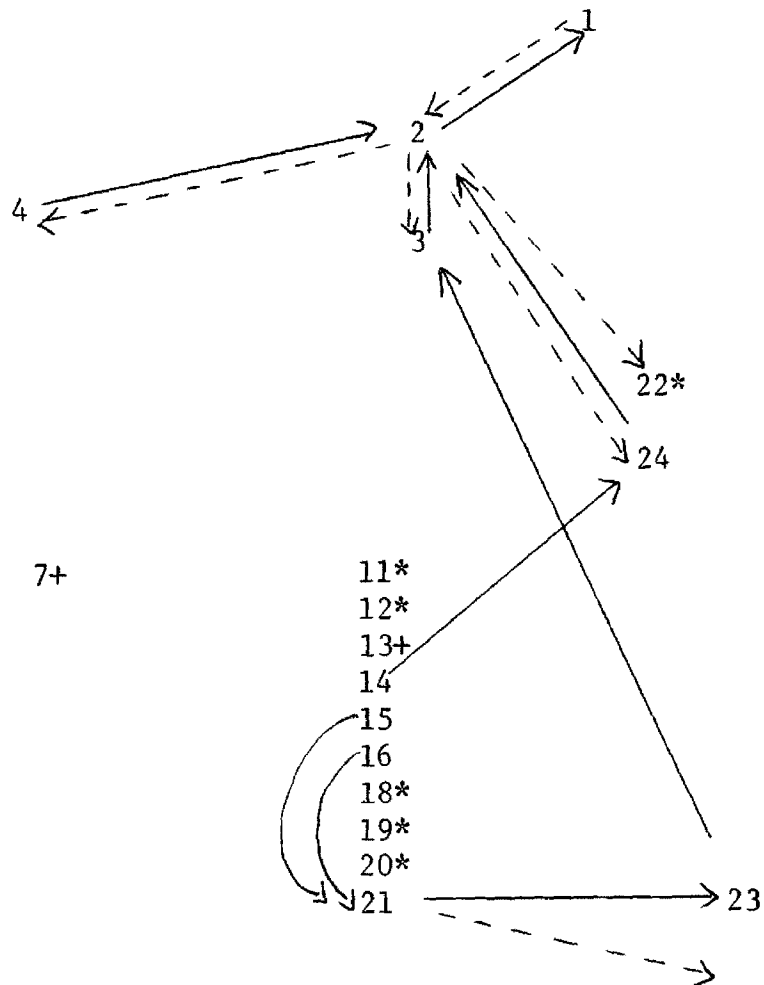
\_\_\_\_\_ From who subject received message.

-----To whom subject passed message.

\* Message not received.

+ Read message in form of memo.

Appendix Q--Message Transmission Pattern for Message 1: Street Department.

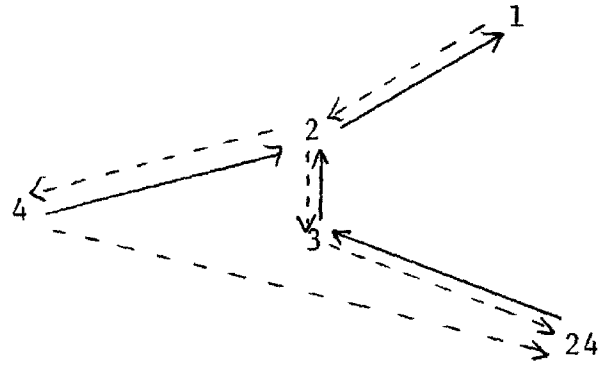


LEGEND

- \_\_\_\_\_ From who subject received message.
- To whom subject passed message.
- \* Message not received.
- + Read message in form of memo.



Appendix S--Message Transmission Pattern for Message 3: Street Department.



LEGEND

- \_\_\_\_\_ From who subject received message.
- To whom subject passed message.
- \* Message not received.
- + Read message in form of memo.

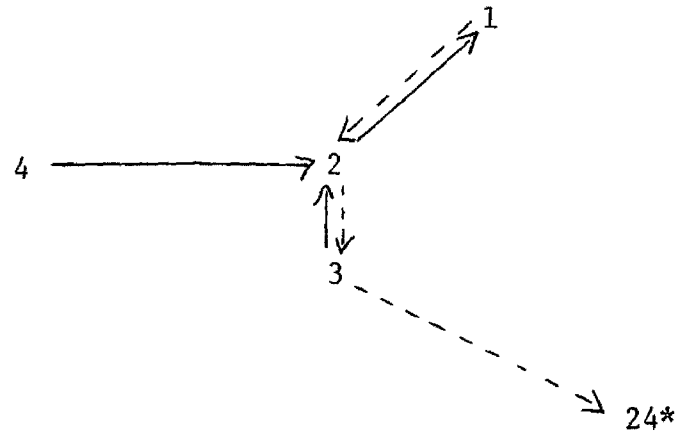
8\*

- 10\*
- 11\*
- 12\*
- 13\*
- 14\*
- 15\*
- 16\*
- 18\*
- 19\*
- 20\*
- 21\*

- 23\*
- 25+



Appendix T--Message Transmission Pattern for Message 4: Street Department.



LEGEND

- \_\_\_\_\_ From who subject received message.
- To whom subject passed message.
- \* Message not received.
- + Read message in form of memo.

8\*

10+  
 11\*  
 12+  
 13\*  
 15\*  
 16\*  
 17+  
 18\*  
 19\*  
 20\*  
 21+

23+

25+