VARIABLES AFFECTING THE COMMUNICATION OF AGRICULTURAL TECHNOLOGY: EFFECT OF VARIOUS FORMS OF ENCODED MESSAGES ON FIDELITY OF DECODING BY FARM DECISION MAKERS

A Thesis
Presented to the Faculty of the Graduate School of Cornell University for the Degree of Doctor of Philosophy

by
Jogindar Singh Dhillon
May, 1972
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VITA

The author was born in Jagdeo Kalan, Punjab, on December 22, 1930. He graduated from the high school of Punjab University in 1947. He holds the degrees of: Bachelor of Science in Agriculture from the Punjab University, 1951; Bachelor of Teaching, also from the Punjab University, 1952; Master of Education from the University of Rajasthan, 1959; and the Master of Science in Extension Education from the Punjab Agricultural University, 1963.

The author taught agriculture at the second school level for five years. For three years he taught at a Teachers Training Institute as a lecturer in Education and Agriculture. Later, at Punjab Agricultural University, he taught graduate and undergraduate classes as a lecturer and assistant professor in extension education.

The author enrolled in Cornell University in 1966 to pursue graduate studies leading to the Ph.D. degree with a major in Extension and Continuing Education, and minors in Development Sociology and Research Methods. In 1968, he returned to India to do the field work for his thesis research under a grant from Cornell's International Agricultural Development Program.

In February 1970, he joined North Carolina Central University, as a visiting scholar, where he taught graduate and undergraduate courses in Sociology and Research Methods. He joined Florida A&M University in September 1970 as an Assistant Professor in Sociology, a position which he still holds.
While at Cornell, the author held a graduate assistantship in the Division of Extension and Continuing Education in the Department of Education.

He is married to Baldev Goraya, and they have three daughters—Ripple, Lovely and Dimple.
DEDICATION

To my fathers: one, natural, who brought me into this world and built the foundations for my achievements; the other, academic, who helped me achieve my educational aspirations.
ACKNOWLEDGMENTS

The author wishes to express deep gratitude and appreciation to Professor J. Paul Leagans, Chairman of his Special Faculty Advisory Committee. Dr. Leagans had great influence on the author's thinking and development and on the direction and reporting of this study. Thanks are also extended to Professor Harold R. Capener and Professor Ward W. Bauder, the other members of the author's Special Committee, who gave generously of their time and contributed valuable suggestions for the planning of this investigation. Professor William W. Reeder is to be thanked for his valuable assistance while substituting for Professor Capener, during his sabbatical leave.

Grateful acknowledgment is expressed for the financial support provided by Cornell's International Agricultural Development Program which made it possible for the author to return to India to do the field work for this study.

The author is indebted to several people at the Punjab Agricultural University and District Development Staff of Ludhiana District, who served as members of a panel of consultants during the field work. Thanks are also due the farmers, village sarpanches, lumbardars and field extension staff who willingly cooperated in the execution of the research.

Mrs. J. Paul Leagans deserves special thanks for her concern and generous hospitality extended to the author and his family during their stay at Cornell University. Thanks are due Mrs. Carol Anne Spadolini.
for typing the final draft of the manuscript. To my wife, Baldev, are
extended grateful thanks for her patience, support and continued interest
in the progress of this report and for typing the first draft of the
manuscript.
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CHAPTER I

NATURE OF THE STUDY

Introduction

"In modern technology lies the potential for millions to overcome ignorance, poverty, and disease, and to attain economic and social well-being."\(^1\) New and significant technological break-throughs in the field of agriculture are now occurring in India. "Transmission of this technical information to cultivators at highest levels of fidelity is needed for acceleration of modernization process."\(^2\) The present study addresses itself to this problem of improving the effectiveness of communication with Indian farmers. The overall purpose of the study is to identify guidelines that may be used by extension officers and others in their efforts to communicate technical messages to farm decision makers in India.

The investigation was carried out in Ludhiana district of the Punjab State under relatively well controlled conditions. Two independent variables pertaining to the structural aspects of a technical message,\(^3\) viz., "message complexity" and "message organization," were identified and their effect on the dependent variable, the fidelity of decoding, was studied. Social and psychological variables, including adoption status, level of aspiration, attitude toward agricultural innovations,


\(^2\) J. Paul Leasag in a personal conference; also, the source of idea for this study.

\(^3\) Operational definitions of technical terms used in this study are given on pages 16-18 of this Chapter.
age and formal education were used as intervening variables. The data for the investigation were collected by exposing the farm decision makers to tape recorded messages treated at various levels of encoding complexity and encoding organization. Statistical analyses were made to discern the significance of differences in variously treated messages, vis-à-vis the fidelity of decoding.

The focus of this study throughout was at the micro level. The central effort was not to formulate "recipes" for effective communication, but to identify basic "anchor-points" which may be useful to extension educators in structuring their agricultural messages for faster and more efficient transmission to farmers. This study, therefore, is exploratory in nature, rather than exhaustive and definitive. It is an initial step toward a systematic analysis of decoding behavior of rural respondents in India.

The Problem

Interdependence of nations, once a distant cry, has become a reality. Modernization of traditional societies has become a concern not only of national government and also an important area of interest to the developed countries.

"Modernization is essentially a communication process."¹ The demands on communications are proportionately greater at this juncture of change than any other stage of social evolution. "Communication is asked to help survey a new environment, raise people's aspirations, guide and control a dynamic process, teach new skills, and socialize

citizens to a new and different society that is still in the process of becoming."

Communication aimed at change must reach the audience through a symbol system understandable to them. "A series of costly and avoidable failures have shown the planner that even well-drawn projects of modernization fail to register with the people and to produce the desired results unless they are supported by an imaginative, adequate and effective communication program." Hapgood asks the question, "Is the farmer approached in language he understands, in terms that are relevant to his experience and desires?" Dube, while discussing the planned change programs in India, observes that "Literary language and urban idiom and style of the extension workers have been the greatest impediments in their effective communication with the village people." Umali and Feliciano in a recent study found that 73 percent of their respondents could not understand the language (technical) used by the extension communicators. This type of inefficient communication may greatly retard, if not paralyze, the change process, and, thus, lead to frustrating developmental experiences with far-reaching consequences.

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2 S. C. Dube, "A Note on Communication in Economic Development," Communication and Change in Developing Countries, ibid., p. 93.


4 Loc. cit., p. 156.

5 D. L. Umali and G. D. Feliciano, "A Socio-Economic Study of Selected Barrios in Land Reform Area, Bulacan" (University of the Philippines, College of Agriculture, Laguna, 1964), p. 3. ( Mimeographed.)
An extension educator in developing societies, often does not have reliable and valid criteria to guide him in structuring his messages for effective communication. He is exposed to theoretically oriented communication principles, if at all, in his training programs. The assumption made is that principles derived from common types of communication (e.g., official, social, affective, etc.) could, also, apply to technical communication. But, as observed by Parry, "There is a big difference between the two types of communications ... (and) little seems to have been done in the communication of technology."\(^1\) The extension communicator, therefore, in the absence of any clear-cut guidelines with respect to his encoding procedures resorts to his own personal insights. The result often is inefficient communication of critical technical information. It seems entirely appropriate, under the circumstances, that empirical research should be undertaken to investigate the kinds of variables that influence the decoding behavior of farmers in India. A small but significant segment of variables, from a wide span of them, has been selected to study if they have a significant effect on the fidelity of message decoding.

The extent to which encoded information is not decoded by the receiver as intended by the communicator, there is a gap. This gap may be called the decoding deficit. The greater the decoding deficit the lower will be the fidelity of decoding and vice versa. This means that the fidelity of decoding has an inverse relationship with the decoding deficit.

Decoding deficit may result not only from the communicator's inefficient encoding procedures but, also, from inefficient decoding on the

part of the receiver (a function of the state of his decoding equipment in general, and the evoked functional aspect of it in that particular situation), or, as usually is the case, it may be the consequence of interaction of the two. Whatever the case may be, it is important to analyse the variables which may be significantly related to the decoding deficit, and thereby the fidelity of decoding. This study focuses on this analysis.

The extension educator's primary responsibility is to communicate useful technology to his clientele in such a way that the least distortion in interpretation of the message is possible. "Once the message is encoded and transmitted, it becomes independent of him." Interpretation of the message, then, lies with the receiver. He can, however, help that interpretation through his treatment of the message. What factors other than technical context of the message should enter its treatment is not fully known, except through sporadic and incidental observations made in some of the studies (the subjects of whom are mostly school and college students).

Proper treatment of the message plays an important role in the transmission of technical information. Two major elements, recognized to be of great significance in message treatment, viz., message complexity and message organization, have been selected to be investigated in this study. Answers to questions like the following are sought: Is fidelity of decoding significantly affected by various levels of message treatments? Is the decoding deficit of the receiver reduced when the message has a low level of complexity and vice versa? Will fidelity of decoding be higher, when the message is explicitly treated than when it is explicitly treated? What is the nature of relationship, if any, between

---

these two variables with respect to fidelity of decoding?

Extension clientele are of a relatively heterogeneous nature with varying degrees of inner and outer resources. Their knowledge, attitudes, and skills level vary greatly from one person to another. They are, also, a voluntary group of people on whom an extension communicator cannot impose his ideas. Since extension messages are of a transient nature, those who can decode them accurately will be more likely to use them, and, also, find satisfaction from the communication act. Whereas, those who cannot decode them properly may feel frustrated and, thereby, develop feelings of indifference, if not of hostility, toward the extensionist and all that he represents.

Numerous studies on the adoption of improved agricultural practices\(^1\) have shown that farmers with high adoption status have superior knowledge, attitudes and skills (KAS) than farmers with medium and low adoption statuses; and farmers with medium adoption status have a higher level of KAS than farmers with low adoption status. It seems reasonable to assume from this, that high adoption status farmers are likely to have greater message decoding ability at higher levels of fidelity than medium and low status farmers. Chena points out that "there is a tendency for persons with more education and more worldly experience to grasp media content and expand their knowledge and skills at a far greater rate than persons of lesser education."\(^2\) Advancing technology, therefore, may tend

---


to make the able more able. This would result in a widening gap in the
KAS levels of high, medium, and low adoption status farmers with serious
economic, social and political repercussions. "Conceivably, research might
help uncover media approaches which would counteract this tendency for the
knowledge gap to widen—there is a need to study message technique."\(^1\)

Farm decision makers in India can be grouped into the categories,
as mentioned above, on the basis of their adoption status, viz.,

a. High adoption status (HAS)

b. Medium adoption status (MAS)

c. Low adoption status (LAS)

By using these adoption statuses of farmers, along with their attitudes
toward improved agricultural practices, their levels of aspirations and
such demographic characteristics as age and education in the selection
of respondents for this study, answers to the following questions may be
found: What are the effects of message complexity on the fidelity of de-
coding of high adoption status, medium adoption status and low adoption
status farmers? Does organization of the message affect significantly the
fidelity of decoding of the farmers with different adoption statuses? Does
age, education, level of aspiration, and attitudes toward agricultural
practices have a significant relationship with the fidelity of decoding by
a farmer, irrespective of his adoption status? And, finally, what are the
interrelationships of these variables with respect to fidelity of decoding?

Face-to-Face Oral Communication

Before concluding this section, the author would like to explain

\(^1\)Ibid.
the rationale behind the use of face-to-face oral communication as the "medium" in this investigation.

A large majority of people in developing countries are illiterate.¹ Even in the United States of America with less than 2 percent illiteracy, 75 percent of the working day is used in speaking and listening.² Oral communication is still by far the most widely used medium of communication, and it is particularly so in developing countries. "The written material is of little value to the majority of (Indian) villagers."³ Dube points out that "The program (extension and community development) has rightly emphasized the use of face-to-face oral communication as the principal vehicle for the promotion of innovations."⁴ Amaya, while writing about problems in communicating government action programs to rural masses observes: "By using the media of mass communication, the government reaches the urban sector and only a directing and privileged minority of the rural sector. The message is lost to those the government seeks most to inform and influence for the well-known reasons of illiteracy, physical isolation and the lack of radio and television sets in the rural areas."⁵ Khan points out that "Extension education, particularly in the earlier stages, takes place largely through face-to-face interaction, which for the most part utilizes verbal communication."⁶ It is because of these considerations and the fact that

¹Ibid., p. 156.
⁴S. C. Dube, "A Note of Communication and Economic Development," *Communication and Change in Developing Countries*, op. cit., p. 94.
persuasive communication for adoption of technology is most effective when undertaken through face-to-face oral contacts that the medium for the exposure of respondents to test-messages was oral communication.

Another important characteristic of this study is its experimental approach to the problem. Experimentation in communication research is a relatively new phenomenon. Munnally thinks that "because of the complexity of variables in many communication situations, there is an unfortunate tendency to forsake experimentation for after-the-fact description."¹ However, there seems to be an awareness of this tendency and "the current emphasis is upon empirical research."² But most of this empirical work in communication research is concentrated on captive audiences in classroom situations. Experiments on non-captive audiences in real-life situations are few and far between. The author was fully aware of the difficulties and limitations of experimental work in field situations and particularly with rural people in an underdeveloped country, like India. But, because of the dire need for experimental work in understanding the decoding behavior of rural people, and at the encouragement of his Committee Chairman, Professor J. Paul Leigens, the author decided to undertake this endeavor.

Statement of the Problem

The task is to determine which treatments of a message, varied on complexity and organization dimensions, are meaningfully related to fidelity of decoding of oral agricultural messages by farm decision


makers in India. Personal characteristics like adoption status, age, education, attitudes toward agricultural practices, and level of aspirations will, also, be investigated vis-à-vis fidelity of decoding.

**Objectives of the Study**

The general purpose of this study, as already pointed out, is to experimentally investigate the influence of various message treatments on the fidelity of decoding of audio-messages by farm decision makers in India. Within this overall purpose, specific objectives of the study are:

1. To investigate the effect of encoding complexity of selected agricultural messages on the fidelity of message decoding by farm decision makers in India.

2. To investigate the effect of encoding organization of selected agricultural messages on the fidelity of message decoding by farm decision makers in India.

3. To identify the influence of varying encoding treatments of selected agricultural messages on the fidelity of decoding as related to different categories of farm decision makers in India.

4. To determine the relationship of the following personal attributes of respondents with the fidelity of message encoding:
   a. Formal education
   b. Age
   c. Attitudes toward agricultural practices
   d. Level of aspirations
Hypotheses

The following primary hypotheses are purported to be tested in this study:

1. The fidelity of message decoding is inversely and significantly related to encoding complexity.

2. The fidelity of message decoding increases with explicit encoding organization and decreases with implicit encoding organization.

3. The fidelity of message decoding decreases with the decreasing adoption status of the farm decision makers.

4. Formal education and age of the respondents are significantly correlated with the fidelity of decoding, with education having a direct correlation and age having an inverse correlation.

5. Favorable attitudes toward agricultural practices and higher levels of aspirations of farm decision makers are positively and significantly correlated with the fidelity of message decoding.

Variable Map

The variables manipulated in this experimental investigation are as follows:

Independent Variables

Message Treatment

1. Encoding Complexity
   a. High
   b. Low
2. Encoding Organization
   a. Implicit
   b. Explicit

Intervening Variables:

1. Adoption Status
   a. High
   b. Medium
   c. Low

2. Attitude toward agricultural practices

3. Level of aspirations

4. Formal Education
   a. Illiterate or semi-literate (under fourth standard)
   b. Literate (up to eighth standard)
   c. Educated (high school and over)

5. Age
   a. Under 25 years
   b. Between 25–40 years
   c. Over 40 years

Dependent Variable:

Fidelity of Message Decoding

Experimental Design

The most appropriate experimental design for the purposes of this study is similar to Campbell and Stanley's¹ design Number 9. A diagrammatic representation of this design is given below:

---
Figure 1. Experimental Design

$O_1 M_1 O_1 \quad X_1 M_2 O_2$

$O_1 = \text{pre-test for messages I and II}$
$X_1 = \text{Treatment I}$
$M_1 = \text{Message I}$
$M_2 = \text{Message II}$
$O_1 = \text{Observation (Post-test) for Message I}$
$O_2 = \text{Observation (Post-test) for Message II}$

Since, pre-test, exposure to experimental treatment, and post-test were all administered in the same session, no control groups were used.

**Experimental Treatments**

There are two major independent variables (encoding complexity and encoding organization) each at two levels. This means, in all there are four experimental treatments, which are as follows:

<table>
<thead>
<tr>
<th>Encoding Organization</th>
<th>Implicit</th>
<th>Explicit</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>$T_1$</td>
<td>$T_2$</td>
</tr>
<tr>
<td>Low</td>
<td>$T_3$</td>
<td>$T_4$</td>
</tr>
</tbody>
</table>

Figure 2. Experimental Treatments

$T_1 = \text{High level of encoding complexity + implicit encoding organization}$
$T_2 = \text{High level of encoding complexity + explicit encoding organization}$
$T_3 = \text{Low level of encoding complexity + implicit encoding organization}$
$T_4 = \text{Low level of encoding complexity + explicit encoding organization}$
There are four experimental groups (each consisting of 50 individuals); one experimental treatment was administered to one experimental group. Details of sample selection, group structure, and treatment administration are given in Chapter III.

**Description of Experimental Factors**

**Encoding Complexity**

Flesch’s formula\(^1\) for determining the difficulty level of a message was used to develop messages with high and low encoding complexity. High encoding complexity according to this formula consists of:

1. Long sentences
2. Redundant words with affixes
3. Small number of personal references
4. Low frequency technical words\(^2\)

Low encoding complexity consists of:

1. Short and simple sentences
2. Concrete and simple words
3. Large number of personal references
4. High frequency colloquial words\(^2\)

**Encoding Organization**

Implicit encoding organization consists of:

1. Arrangement of the subject matter irrespective of logical and psychological order
2. No explicit statement of the objectives

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\(^2\)This item is not included in Flesch’s formula, but it is considered to be relevant for the purpose of this study.
3. Not relating the subject matter to previous knowledge of respondents.
4. Importance of the subject matter to the respondents left implicit.
5. Few explanations by way of examples, contrasts, and analogies.
7. No particular emphasis on important points.
8. No repetition of the ideas in different words.
9. No recapitulation or summary at the end of presentation.
10. No appeals for action.

Explicit encoding organization consists of:
1. Arrangement of the subject matter in logical and psychological order.
2. Clear statement of objectives.
3. Clear statement of importance of the subject matter to respondents.
4. Relating the subject matter to previous knowledge of respondents.
5. Extensive explanations by way of examples, contrasts, and analogies.
7. Emphasis on important points.
8. Repetition of main ideas in different words.
9. Summary at the end.
10. Appeals for action.

Assumptions

The following basic assumptions have been made in this study:

1. Decoding of a message is a psychic process. Like the measurement of attitudes, it can be measured only indirectly. It is, therefore,
assumed that the recall questions asked at the post-test stage reflect the fidelity of message decoding.

2. The taped-experimental messages do not have a reactive effect with the tape-recorder as a medium of communication, and therefore, do not affect the fidelity of decoding.

3. Perception of the researcher by the respondents does not react with their decoding behavior.

4. The variables not controlled in the experimental situation had but little or no effect on the fidelity of message decoding.

5. The respondents extended their full psychic cooperation to the researcher.

**Operational Definition of Terms**

It is important that major concepts and basic terms used in this study be operationally defined. This should reduce the chances of misconceptions. Definitions are given below in alphabetical order.

**Adoption status**—relative position of a farm decision maker with respect to others on the basis of his adoption of improved agricultural practices.

**Attitude**—a mental set for or against an object in focus. A person may have a neutral attitude toward something, when he is neither for nor against that thing.

**Channel**—any medium used by the communicator to convey his message to the person he is communicating with. (For example, face-to-face communication, radio, books, and newspapers—to mention only a few.)
Communication—"the process by which two or more people exchange ideas, facts, feelings or impressions in ways that each gains a common understanding of the meaning, intent, and use of messages."

Decoding—a psychic process through which the receiver of information (farm decision maker in this study) interprets the audio-visual symbols used by the communicator.

Decoding equipment—all those psycho-social and psychological characteristics of the receiver which affect his decoding behavior.

Encoding—the process used by the communicator to transform his ideas, feelings, and intentions into a symbolic system which can be transmitted to the receiver.

Encoding complexity—structural difficulty of the encoded message as explained under "Description of Experimental Factors."

Encoding organization—structural organization of the encoded message as explained under "Description of Experimental Factors."

Encoding procedures—conscious techniques used by the communicator to encode information that he wants to communicate to the receiver.

Farm decision maker—the family member who makes all or most of the decisions pertaining to the management of the family farming unit.

Fidelity of decoding—accuracy with which the message is interpreted by the receiver the way it was intended by the communicator.

High frequency words—those words which are more frequently used by people in everyday communication.

Level of aspiration—level of future performance in a familiar task which an individual aspires to achieve.
Low frequency words—those words which are less frequently used by people in everyday communication.

Message—information pertaining to an improved agricultural practice which an extension worker wants to communicate to his clients.

Message treatment—preparing the message for transmittal in such a way that it would be easier to comprehend by the receiver.

Noise—anything which interferes with reception of messages by the receiver. It could be channel noise, semantic noise, or psychic noise.

Symbol—something that carries the idea of representativeness as well as of agreed usage.

Technical message—information pertaining to an improved agricultural practice.

Limitations of the Study

The study has the following limitations of which the author is fully cognizant.

1. The intelligence of a person could affect his ability to decode a technical message. The respondents of this study, however, were not administered any type of intelligence test either for matching various treatment groups or to study the correlation of this variable with the fidelity of message decoding. This could not be done, firstly, because no such test standardized on rural people in Punjab was available to the author; and secondly, the effect of intelligence on fidelity of message decoding when tested through recall type questions, as done in this study, is still a controversial matter, as is discussed in Chapter II.
2. All respondents were exposed to the treated message through spoken language only. Spoken and written versions of the same message, however, may have given interesting patterns with respect to fidelity of message decoding. It has been pointed out in some studies (not done in India) that some persons are "ear-men" and some are "eye-men." "Ear-men" listen better and "eye-men" see better, from the point of view of remembering. But here again, no reliable information about the audio and visual habit patterns of Punjab farmers was available to the author which could have been utilized in this study.

3. It is recognized that each language has its unique structure. English and Punjabi (the language in which test messages were developed and administered) are vastly different semantically as well as acoustically. Flesch's formula\(^1\) used in this study to determine the complexity of a message was developed in English and standardized on English-speaking people. In Punjabi language, however, no such formula was available. So the basic principles of Flesch's formula were used to determine the encoding complexity of messages in this study. A panel of judges (as explained in Chapter III) was, also, used to evaluate the message written in Punjabi on the complexity (along with encoding organization) dimension.

\(^{1}\text{Loc. cit.}\)
CHAPTER II

THEORETICAL FRAME OF REFERENCE

Scheme of the Chapter

The focus of deliberations in this chapter is primarily theoretical. Both macro- and micro-level approaches to discussions are made in three main sections. The concept of human communication is examined in the first section from a theoretical point of view. Significance of the concept in extension education is brought out in the later part of this section. In the second section, fidelity of message decoding is explained and derivation of the concept is considered in the light of information theory. Significance of the fidelity of message decoding in extension education is also discussed. The second part of this section deals with measurement of fidelity of message decoding, and the approach used for this purpose in this study. Major factors associated with the fidelity of message decoding are detailed in the third section. Treatment of message, though one of the elements of communication process, is explained and discussed in a separate section because of its importance as an independent variable in this study. Elements of message complexity and message organization are described in detail in this section. Review of pertinent studies from the literature is all along made in the chapter.
Concept of Human Communication

The phenomenon of human communication must have existed with the first man on the earth, and will most likely exist until the last man alive. Dewey, taking note of this, writes that "society exists in and through communication; common perspectives—common cultures—emerge through participation in common communication channels. It is through social participation that perspectives shared in a group are internalized. ... Each social world is a culture area, the boundaries of which are set neither by territory nor by formal group membership but by the limits of effective communication."¹ Technological developments have extended the limits of man's communication field. The significance of communication in modern times is reflected in Thayer's observation that "there are perhaps few phenomenon of man's life which are of greater concern to more of his number than communication."² Communication is, therefore, right under investigation by "rhetoricians, linguists, reading experts, listening specialists, journalists, broadcasters, public relations and advertising experts, artists, general semanticists, communication engineers, and administrators."³ DeFleur and Larsen's quip that "Man the talking animal not only talks, but he talks about his talking,"⁴ seems appropriate.

Communication: A Definition

The word communication originating in the Latin word "communis"

¹Quoted by Anselm L. Strauss, Mirrors and Masks: The Search for Identity (Glencoe, Ill.: The Free Press, 1959), p. 186.
meaning common, has been defined by Webster as "a transmitting, a giving, or giving and receiving of information, signals or messages by talk, gestures, writing, etc., a means for communicating: especially a system for sending and receiving messages as by telephone, telegraph, radio, etc."¹ Several other authors have expounded definitions of communication, which vary slightly from one another in their specificity and inclusiveness. It seems appropriate here to examine some of them.

Clevenger makes a fairly general statement to define communication as "a term used to refer to any dynamic, information sharing process."² Browne is, however, more explicit when he states that "communication is the process of transmitting ideas or thoughts from one person to another for the purpose of creating understanding in the thinking of the person receiving the communication."³ Ayer's definition of communication is still more inclusive:

... the connecting thread appears to be the idea of something's being transferred from one thing, or person, to another. We use the word "communication" sometimes to refer to what is so transferred, sometimes to the means by which it is transferred, sometimes to the whole process. In many cases, what is transferred in this way continues to be shared, if I convey information to another person, it does not leave my own possession through coming into his. Accordingly, the word "communication" acquires also the sense of participation. It is in this sense, for example, that religious worshippers are said to communicate. ... The type of communication that I particularly wish to discuss is the transference of information, in a very broad sense of the term, which may be taken to include not merely the imparting of news, in a factual sense, but also the expression of feelings, wishes, commands, desires, or whatever it may be. It covers all deliberate uses of

language by human beings as well as voluntary or involuntary exclamations, movements, gestures, singing, crying, laughing, dancing, in so far as they are informative.¹

The common theme running through the above definitions is that communication is not a passive process of "pouring information" by one person into another; rather, it is a dynamic process which involves active participation of those communicating. Mechanical transfer of information, unless it is understood, does not constitute communication. Communication, therefore, is "the process by which two or more people exchange ideas, facts, feelings, or impressions in ways that each gains a common understanding of the meaning, intent, and use of messages."² "You want to duplicate the ideas in your mind in the minds of other persons."³

Communication Process

Communication is an intricate and complex process. "Like an iceberg, communication reveals only about 1/3rd of itself at a level where it will be amenable to manipulation, observation and measurement of a sort."⁴ There are innumerable variables which interact with the elements of communication making prediction of communication results so difficult. Leagans notes that "communication is complex because human behavior which it seeks to change is complex; technology, the object of behavioral change, is complex; message formation and transmission are complex."⁵

⁵Leagans, loc. cit., p. 8.
Elements of Communication

A complete and intimate knowledge of all the elements, which "duplicate" message in the mind of receivers, and their relationships among themselves is still being formulated. However, major key elements, which constitute the communicative act, have been recognized.

Berlo\(^1\) identifies six elements of communication: the source; the encoder; the message; the channel; the decoder; and the receiver. In most of the communication work with rural people in developing countries, the communication source and the encoder are the same person, as are the decoder and the receiver. Even in other types of human communication situations, it is hard to differentiate between a decoder and a receiver, unless, of course, decoding and encoding are considered in a mechanical sense, like telephone, telegraph, etc.

According to Leagans\(^2\) there are at least three elements which are central in each act of communication: expression, interpretation, and response. The quality of these elements is critical in communication. If the expression is unclear, the interpretation inaccurate, and the response inappropriate, one's efforts to communicate will not succeed. Leagans further identifies five key elements which articulate the above-mentioned basic elements of communication. These are: communicator; message (content); channel; message treatment; and audience. A brief mention of each as given by Leagans seems relevant.\(^3\)


\(^3\)Ibid., pp. 140-143.
1. Communicator. A key factor influencing the effectiveness of communication is the person who originates and sends the message. The credibility of a communicator, as perceived by his audience, is a powerful determinant in communication. The content of a message is made more believable when it is linked with a credible source.

Audience perception of the expertise exhibited by a communicator is influenced by numerous factors. Among these are technical training, experience, age, values, interests, group affiliations, and perception of recipient needs. . .

In addition to technical competency, the effects of a message are modified by the attitudes an audience holds toward the communicator, such as feelings of affection, admiration, awe, and fear—based on perception of his power to reward or punish, or on trust and confidence in his knowledge, intelligence, and sincerity. . . Hence, to develop and maintain an effective level of credibility, change agents need adequate technical knowledge, skill in dealing with people, and proficiency in the educational process. They must demonstrate confidence, humility, persistence, empathy, integrity and flexibility.

2. Message (content). A message is the information a communicator wishes his audience to receive, understand, accept, and act upon. Message may consist of statements of scientific facts, descriptions of actions being taken, reasons why certain actions should be taken, or steps necessary in taking action. Potential messages range as widely as the content of programs. Messages are not, however, the same as the subject matter or technology involved. They are generalized ideas based on the subject matter; for example, "Fertilizer must be used properly to attain maximum results," or "Food combinations are closely related to the quality of nutrition." . . Messages must be clear, significant to the needs and interests of the audience, specific, accurate, timely, and manageable by the communicator and his audience. Messages carry relevant cargo to be carried to an audience through channels of communication.

3. Channels. Senders and receivers of messages must be "tuned" to each other. Channels provide the physical bridges between the sender and the receiver of messages—the avenues or media used to transmit messages to and from an audience. A channel may be anything used by a sender of messages to connect him with intended receivers—radio, books, bulletins, letters, newspapers, group meetings, and personal contacts of many kinds are commonly used channels.

4. Message treatment. Treatment has to do with the way the message is handled to get the information across to an audience. It relates to the technique—details of procedure or manner of performance essential to expert presentation. It includes the appeals which are used, and the various techniques of writing, speaking, visualizing, or acting. The purpose of good treatment is to make the message clear,
understandable, and realistic to the audience. Designing treatment requires knowledge of subject matter, insight into the principles of human behavior, and skill in creating and using refined techniques of presentation. Fuzziness in treatment is sure death to a message. People respond best to messages that are reliable, realistic, relevant, and understandable.

5. Audience. An audience is the intended receiver of messages, and also the intended respondent to message-sending. It may consist of one or many people. A communicator must accept an audience as he finds it; he then attempts to move people toward his objective. Audience response to a message usually varies widely in understanding, acceptance, and action. Influencing the desired response through communication is a complicated phenomenon, because success in programs of planned change comes only when people move in desirable directions. Preparing the messages involved in modernizing agriculture and distributing them to millions of farmers in developing countries pose a paramount challenge to change agents and all others included in the process.

In an effective act of communication, these elements interact dynamically to produce the desired result of fidel message decoding by the audience and, thereby, effectuate change in their knowledge, attitudes, and skills.

Communication does not necessarily have a one-to-one correspondence, i.e., one person trying to convey his message to another person. A communication target may be an individual, group, institution, or even a culture, as is shown in Figure 3.

<table>
<thead>
<tr>
<th>Communication Initiator</th>
<th>Communication Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Individual</td>
</tr>
<tr>
<td>Group</td>
<td>Group</td>
</tr>
<tr>
<td>Institution</td>
<td>Institution</td>
</tr>
<tr>
<td>Culture</td>
<td>Culture</td>
</tr>
</tbody>
</table>

Figure 3. Various Levels of Communication
However, as the focus of communication increases in dimension from one individual to a group—an institution or a culture—the social/economic/political/religious position of the person initiating communication also usually goes up. For example, the President of the United States of America has a much higher communicational field than the president of a small local firm. This network of communication channel plays an important role in societal functioning. The role of extension communicator as an individual, and in conjunction with other extension communicators as a team, can be located at each one of these levels of communication.

Major Models of Communication

In scientific language a model is a visual representation of the actual phenomena which facilitates understanding. It is "a symbolic picture" and is "virtually important in scientific work...and in any intellectual endeavor."\(^1\) It provides a useful frame of reference for consideration of the original phenomena. It is considered relevant here to present and discuss some of the major models of communication as related to this investigation.\(^2\)

Aristotle's Model of Communication^3

Aristotle saw communication as a dynamic process and in his writing he focused upon those forms of public communication which were the chief means of achieving social consensus in his time: pleading in the courts,

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\(^2\)For an extensive discussion of communication models see Khan, op. cit., pp. 33–88.

deliberation in the legislative setting and celebration of men and events in popular assemblies.

Aristotle identified three key elements in communication as the speaker, the speech, and the listener(s). He seems to view communication as a unidirectional phenomenon, and the flow of information being from the speaker to the listener—the speaker knowing all the answers, the listener would have need for. Aristotle, however, does recognize the need for preparation of the message for delivery. The four stages of preparation and delivery are: invention, arrangement, style, and delivery. Since the Aristotelian view of communication was for persuasion, at the invention stage of speech preparation he emphasized the inclusion of logical, emotional, or ethical proofs in the speech in addition to facts on the subject matter. At the arrangement stage, he was concerned with ordering the elements chosen in the most effective pattern in terms of demands of the subject, the audience, and other factors in the setting. The style and delivery involved attention to ensuring maximum clarity and impact of the language employed.

Whereas Aristotle's rhetoric model does have certain limitations in modern day human communication, it seems to have something of relevance to communication in extension education. The main objective in extension education is to influence the behavior of people to bring about changes in their knowledge, attitude and skills. This requires a persuasive strategy of communication based on demonstrable technical information, rather than any imposition of ideas. The four processes of invention, arrangement, style, and delivery, identified by Aristotle, seem
to have a message for the extension communicator in structuring his technical messages. This investigation is concerned with discovering the effect of arrangement and style processes on decoding behavior of the farmers.

Shannon-Weaver Model of Communication

This model of communication, also called the information theory model, focuses on the transmission of information from one source to another source and its measurement in mathematical terms. Shannon and Weaver define information as reduction of the degree of uncertainty or entropy. A diagrammatic representation of this model is given in Figure 5.

This model was originally devised to explain transmission of information through electro-magnetic mechanical systems, like telephone,

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1Tbid., p. 10.

Figure 5. Shannon-Weaver Model of Communication

etc. In spite of usefulness of the above model in identifying various elements of communication, this seems to have limited validity in extension education programs where source and encoder is one and the same person, as are decoder and destination. The concept of noise (to be explained in the later part of this chapter), however, seems to have relevance for the extension communicator.

Other Communication Models

Many social scientists interested in the study of human communication, have developed their own models of communication; among them are Litterer,1 Westley and Maclean,2 Fano,3 Schramm,4 and Berlo,5 to name

4Berlo, op. cit., pp. 2-4.
only a few. But almost all of them seem to be slight variations of the Shannon and Weaver model of communication, and therefore, suffer from limited utilitarian value in extension education.

Rogers and Yost\(^1\) have designed a two-step model of communication specifically for application in agricultural extension work.

![Diagram of Rogers and Yost's Model of Communication](image)

Figure 6. Rogers and Yost's Model of Communication

But this model seems to be overly simplified and shows only the direction of flow of information from agricultural scientist to the farm people. It does not attempt to explain the phenomenon of communication.

Leagans' Model of Communication

Leagans' model of communication\(^2\) is an outcome of his professional experience in both developed and developing countries, is not radically different from communication models built by Fano, Schramm and Berlo, mentioned earlier. However, it has two unique elements which have not

\(^{1}\)E. M. Rogers and M. D. Yost, Communication Behavior of County Extension Agents (Wooster, Ohio: Ohio Agricultural Experiment Station Research Bulletin 850, 1960).

Figure 7. Lea and Derry's Model of Communication

- Source
- Message
- Channel
- Audience
- Audience Response
- Treatment of Message
- Decoding
- Feedback
- Encoding
- Communicator

Noise
been brought out explicitly by the afore-mentioned communication models. They are: message treatment and audience response. By incorporating audience response (feedback) as an integral part of communication process, Leagans seems to take note of cyclical nature of communication. Linearity of communication might be conceived under extreme situations of captive-audience-communication (for example, conditioning or brain-washing, etc.), but certainly not under non-captive-persuasive-communication situations. The communicator for effective performance has to have knowledge of the impact his message is producing on the audience, and in the light of this information to structure his subsequent messages at a different level.

Message treatment is an important distinguishing characteristic of Leagans' model. Other models do not seem to give due recognition to this important element of communication process. It helps "make the message clear, understandable, and realistic to the audience."¹

Because of its appropriateness to the present study, Leagans' model of communication has been used as the basic theoretical frame of reference. Discussion of the elements of this model has already been presented in this chapter.

Communication as a Behavioral Transaction²

Under normal circumstances the concepts of cost and reward seem to apply to an attempted and consummated act of communication almost the same way as they do in an economic transaction, though they differ in nature in each case.³ An act of communication is attempted and consummated only if the perceived reward is more than the perceived cost on

¹Ibid., p. 15.
³Reward and cost in a communication act may be thought of in terms of physical, social, psychic, moral, political, spiritual, intellectual, etc.
the part of each—the communicator as well as the communicatee. As soon as the perceived cost increases the perceived reward, communication breaks down, either physically or psychologically, or both. It is illustrated below:

Perceived Cost > Perceived Reward → Break down in Communication

Perceived Cost ≤ Perceived Reward → Communication Continues

The greater the discrepancy between perceived cost and perceived reward in favor of the latter, on the part of both the communicator and communicatee, the more satisfying and effective that communication act will be, and vice versa. However, if the cost is more for the communicator than the communicatee, there would not be any communication, since the former would not initiate the communication act, and vice versa. On the other hand, if cost is more for the communicatee than the communicator, there still would not be any communication, since either the former could not participate in the communication act physically or he would tune himself out, psychologically. For the maintenance of communication, the communicator must aim at reducing the perceived cost and increasing the perceived reward of the communicatee.

In extension education, the perceived reward of the extension agent is supposed to be greater than his perceived cost in an act of communication with his clientele; it may not be necessarily so on the part of his clients, however. Extension communicators, by consciously manipulating communication elements, can help increase the perceived reward on the part of farmers. How can he do so? By having ideas useful to his audience, selecting the right type of communication channel, encoding the message in a way which makes decoding at the highest level
of fidelity possible, by motivating people to adopt and practice those ideas. The farmers have to find satisfaction from the communication act, before they can adopt those ideas. "The payoff in agricultural development comes only when people act on new knowledge, not when they merely have been exposed to them. Diffusing technology is a relatively easy task; getting people to understand, accept and apply it is the difficult one. At this point the skillful communicators are separated from the ineffective ones."¹ Skillful communicators manage to maximize the perceived reward of the audience and minimize the perceived cost in a communication situation.

Communication as Social Interaction

Some authors ² explain communicative act as a symbolic interactionist performance by participants as social actors. It is contended by them that "the social act (communication) is not explained by building it up out of stimulus plus response; it must be taken as a dynamic whole—as something going on—no part of which can be considered or understood by itself... we get at the social process from the inside as well as from the outside."³ According to Rucle ² basic components of a social act are: motivating stimulus, covert-rehearsal, instrumental act, environmental event and goal response. He, therefore, regards any act of human communication as a kind of social act.

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¹Leagans, Behavioral Change, op. cit., p. 139.
It is not intended here to go into the details of these theories, since they do not completely fit into the theoretical framework used in this study. However, the author recognizes their existence.

Psychological Bases of the Communication Cycle

Barnouw⁴ in describing the communication cycle, gives six distinct steps, viz., expectation, attention, emotion, information, idea, and action. A brief mention of each step is made below.

1. **Expectation**: An individual at any one moment has a set of feelings and expectations which are at or near the surface and can play an immediate role in the receiving of communication. This is "why he is interested in that communication."

2. **Attention**: It is active participation of feelings. It stimulates an individual, and may be thought of as an amplifier in the mind. Signals from the world, no matter how shrill, will have little impact unless the amplifier is brought into the circuit.

3. **Emotion**: Active attention prepares for deeper emotion, and it yields more readily to dramatization than to narration. The involvement of these unconscious forces heightens the mind for the next stage.

4. **Information**: The information that crosses the gap between the communicator and audience—via paper, film, air—is grasped and remembered only if it serves needs and wants. "Nothing is more unassimilable than information unrelated to needs and wants. Nothing is more easily assimilated than needed, wanted information."

5. **Idea:** Implicit or explicit ideas play a part in all communication. A communication usually has a dominant idea. Most people feel their actions are determined by their ideas.

6. **Action:** The drives awakened through communication demand expression through action. Immediate action not only satisfies but clinches the effects of communication.

Barlow in integrating the elements of the communication cycle gives the following definition of the cycle: In a particular state of feeling and expectation certain incoming signals ignite one's attention, then tap his hidden power line of emotion, stepping up the voltage of related information and impelling one to the formation of an idea, thereby driving one toward action. Communication, therefore, pushes people toward action, and is successful to the extent that it produces action.

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**Basic Tools of Communication**

The central purpose of extension education is to effect change in people's behavior. Communication and change are interdependent. All types of human communication is done through symbols. "... human beings are the only creatures that have, over and above that biological equipment which we have in common with other creatures, the additional capacity for manufacturing symbols and systems of symbols" for the extensive purpose of transferring meanings from one individual to another. Gorman expresses a similar thought when she defines man "as a symbol-making and

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1 Ibid., p. 5.
symbol—using highly complex organism of electro-collodial structure, interacting upon and being acted upon by a world in process."¹

An overview of the basic tools used in human communication is given below as Figure 8. A brief description of each will follow.

![Figure 8. Basic Tools of Human Communication](image)

**Signs, Symbols and Signals**

Dictionaries define a sign as "any mark used to mean, represent, or point out something; motion or gesture intended to express or convey an idea, etc."³ A symbol is defined as "something that stands for or represents something else; emblem; sign; etc."⁴ Whereas it appears that the dictionary meanings of sign and symbol are almost identical, Parry distinguishes between the two, saying that "sign carries suggestion of meaning or content—symbol carries the idea of representativeness as well as of agreed usage; thus when it is said that the rose is a symbol of love, something more than a convenient substitution of one term for another is

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²"Verbal" in some dictionaries means "oral, spoken," but strictly speaking, "verbal" means "in words" which may be spoken or written (see, for example, Thorndyke-Barnhart Comprehensive Desk Dictionary, ed. Clarence L. Barnhart (Garden City, N.Y.: Doubleday and Company, 1969), p. 550 and 854). It is in the spoken sense that the word "verbal" is used in this study.

³Ibid., p. 719.

⁴Ibid., p. 783.
intended."¹ There are several other authors who, on the other hand, use "signs" and "symbols" synonymously.² All agree, however, that signs or symbols do not "transmit any message in the sense of possessing a given content."³ They "are merely representatives of events,"⁴ and are, therefore, only "vehicles for the conception of objects."⁵ Thus, they act as a substitute for the event or object referred to. "Our sign system is merely a shorthand. The coder has to be able to write the shorthand and the decoder to read it."⁶ But, unfortunately, no two individuals read exactly the same system of shorthand, "because it is impossible for two individuals to have the same psycho-physiological structure and history. A person knows a word if his semantic reaction is somewhat similar to the reaction of the others in the speech group, who react in a similar way—a major part of the reality of language lies not in external signs but in the experience of human beings by whom the signs are produced and received."⁷ A mistake is, therefore, quite possible in the interpretation of signs and symbols. Those symbols to which individuals are conditioned to respond in similar ways are less likely to be misunderstood.

A "signal" is defined by Barnhart as "sign giving notice of something; ... any impulse, sound, etc., transmitted or received, ... make

¹Parry, op. cit., p. 41.
²See for example, Gorman, op. cit., p. 28; Schramm, The Process and Effects of Mass Communication, op. cit., p. 7.
⁴Thompson, op. cit., p. 11.
⁶Schramm, loc. cit.
known by a signal or signals.¹ A signal, therefore, is the dynamic aspect of a symbol. Unless a symbol becomes a signal for a person, it may be useless from the communication point of view, since it would not be perceived by the receiver. Bright colored flickering neon lights installed by stores and restaurants significantly increase the signal intensity of symbols meant for communication. A symbol transmitted through a more potent signal has a better chance of being perceived than the one transmitted through a less potent one.

Words and Meanings

Some authors use "words" rather than "signs," "symbols" or "signales" when they write about basic tools of communication in their works.² Cherry says, "words are signs which have significant by convention. . . . we may unconsciously regard the word as being a part and parcel of the thing it represents—the referent,"³ which it is not. "Words standing alone have no meaning, . . . or more precisely, have no one meaning. Dictionary definitions are derived from the contents in which the word occurs. . . . There is a common belief that to define a word is to give its meaning. It is healthier to say that by defining the word we substitute one verbal pattern for another."⁴ Lost someone should think that words are evil little things, Parry says, "Words are not little demons with blow pipes and poisoned darts, but instruments of thought and expression which can be used well or ill according to the user's percipline."⁵

¹Barnhart, op. cit., p. 719.
⁴Miller, op. cit., p. 12.
⁵Parry, op. cit., p. 59.
Although the words do not have any meaning inherent in them, they help convey meaning through their association with our experience of "things" they signify. Diack explains this more succinctly:

"Your words have no significance for me unless I am able to relate them to some "thing" and I can only do that if somehow or other I have had experience—it may be second-hand—of that "thing" in association with the word. In order that I should be able to think of the same "thing" as you are when you use the word, I must have learned to associate with your words experiences not too different from those you have associated with the words. So, when you address words to me, I am able to refer to my past experiences, and the experiences I select in the process of reference are sufficiently similar to yours."

Osgood defines meaning as "that distinctive mediational process or state which occurs in the organism whenever a sign is received (decoded) or produced (encoded)." "Meanings are not in messages, but in receivers. As the sender is the source of messages, the receiver is the source of meanings." From the receiver's point of view, therefore, message reception is "the ordering of incoming data in ways that are classifiable in terms of his existing data. It is this capacity for prior storage and classification of data which allows a receiver to assign meanings to messages and which shapes the conditions that bring about decisions to act in certain ways." So, there is a greater meaning ambiguity in case of words and messages with which the receiver is not familiar. "... the power to extend thought and experience has to be purchased at the risk of ambiguity." There are words, however, which

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4. Ibid.
denote unique referents, for example names of people, reference numbers of library books, automobile makes and models, etc. These denotative words as referents carry less meaning ambiguity. But the frequency of their occurrence in everyday communication is very much limited.

Types of Communication

Two major types of communication can be identified: verbal and non-verbal. A brief description of the two is given here.

Verbal Communication

"Stimuli used in communication are primarily verbal symbols,"¹ commonly known as language. "Language is the most explicit type of communication behavior that we know of."² It is an aspect of culture through which man establishes relationship to his environment and other human beings. But its structures include features that make for faulty transmission. Cherry observes, "Language makes a hard mistress, and we are all her slaves. It is difficult to exaggerate the influence which she exerts upon our lives, . . . ".³

Verbal communication may be classified as oral (spoken) and written or both. The problem in each case is "to get the right goods to the right places. Oral messages, however, are more likely than written ones to be damaged or lost in transit."⁴ Maurier writes, "Language spoken is a poor thing. You fill your lungs with wind and shake a little slit

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³Cherry, op. cit., p. 77.
in your throat and make mouths, and that shakes the air; and the air
shakes a pair of little drums in my head . . . and my brain seizes your
meaning in the rough. What a roundabout way and what a waste of time."  
In spite of all these problems, "... spoken language is the most com-
plete form of communication, even though it is "highly complex; certain
of its most elemental aspect are not yet well understood."
"It is a
joint game between the talker and the listener against the forces of
confusion." Also, in oral face-to-face communication, unlike written
communication, the listener has to keep pace with the speaker, otherwise
he will be lost in semantic imbrigli. On the other hand, oral commu-
nication involves more sense modalities than any other type of communi-
cation. "The receiver can (therefore) clear impressions he gets through
one sense with those he gets through another." Another advantage is
that the communicator gets immediate feedback which he can use to modify
his communication behavior for greater impact of the message on the
receiver.

Non-Verbal Communication

There is a proverb in Punjabi language which more or less means
"communication through eyes is much more effective than communication
through words." Davis quoting Freud writes, "No mortal can keep a secret.

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1 George du Maurier, quoted by Flora Davis, "How to Read Body
2 Aranguren, op. cit., p. 43.
of Phonetics, ed. L. Kaiser (Amsterdam: North Holland Publishing Com-
4 Norbert Weiner, The Human Use of Human Beings (Boston: Houghton
5 Westley, op. cit., p. 37.
If his lips are silent, he chatters with fingertips; betrayal oozes out of him at every pore.\(^1\) Non-verbal elements of communication have been considered to be very effective in the expression of emotional content of message, and in conjunction with verbal communication it can increase total impact of the message on the audience. Cross-cultural interpretability of non-verbal gestures is usually more difficult than that of the verbal part of communication. Every culture has its own non-verbal language and its nuances have to be learned along with spoken language.

In this research, no use was made of the non-verbal part of communication, since the respondents were exposed to tape-recorded verbal test messages. The quality of voice which may, strictly speaking, be considered as non-verbal, was, however, controlled in taping the messages. The rhythm, pitch and tonality of the taped voice might have had some effect on the receivers, but none was discovered.

**Communication in Extension Education**

Although the significance of communication as a change facilitator and its importance as an area of research in extension education has been given in Chapter I, it seems appropriate to present the theoretical relevance here.

Synonymous with agricultural modernization is change in production and marketing patterns from the traditional to those that incorporate modern science and technology. Achievements in this direction are ultimately dependent on behavioral innovations by cultivators and leaders in the hierarchy who influence them. Purposeful extension education is the variable in the suggested modernization package which focuses specifically on repatterning human behavior utilizing the power of education as its activating force. It proceeds on the assumption that status quo can and should be changed.\(^2\)

\(^1\) *Davis, op. cit.*, p. 129.

\(^2\) *Leagans, Behavioral Change, op. cit.*, p. 122.
To disrupt this status quo, at least four major steps are necessary:

"(1) Introduce forceful new (change) incentives ..., (2) strengthen change incentives already present, (3) improve the complimentarity of the change incentives, and (4) weaken or remove the change inhibitors present in the situation."¹

Successful communication lies at the heart of each of these major steps. "Communication is the fundamental social process and the art and science of engineering change in human behavior."² Persuasive communications facilitate the accomplishment of permanent changes. But "persuasive communication is rarely easy."³ "It does not consist merely of giving orders, or even imparting knowledge, but of creating understanding and helping people make use of that knowledge."⁴

Communication in extension education is "the flow of research findings from agricultural scientists to farmers; the movement of knowledge to achieve some useful results ... "⁵ Communication is not simply talking, it is to talk with some effect. In some cases, however, talking is equated with persuading and hearing with understanding and accepting. Unless communication in extension education brings about some change in the recipient, it falls short of its objective. "The payoff in agricultural development comes only when people act on new knowledge, and not when they merely have been exposed to it. Diffusing technology is a relatively easy task; getting people to understand,

¹Ibid., p. 127.
³Ibid.
⁵Leavens, "What is This Thing Called Communication?", op. cit., p. 2.
accept, and apply it is the difficult one. At this point skillful
communicators are separated from the ineffective ones.\textsuperscript{1}

Skillful communicators are a scarce resource in developing coun-
tries. It is imperative that a large body of trained and effective
communicators be developed in these countries to undertake the gigantic
task of effecting changes in the behavioral patterns of people. The
trainers of extension workers can rightly look to the researcher for
guidance with respect to reliable and valid criteria derived from empir-
ical studies which they could use to design their communication training
programs. The guidelines made available to the trainers in the past may
already be out of date and so irrelevent now. It seems a realistic assump-
tion that as the nature of technical information to be transmitted to rural
people increases on the dimension of complexity (as is now true in India),
there has to be a corresponding qualitative increase in the encoding pro-
cedures of the communicator. Communication intake capacity of the farmers
is likely to be strongly affected by these procedures. Beltran underscores
the need for this when he says, "Organize and foster research in communi-
cation so that planners have reliable information about which developmental
messages, transmitted through which channels are more likely to be effec-
tive with which audiences."\textsuperscript{2}

\textbf{Communication Research}

Communication research has broadly been categorized into three
levels.\textsuperscript{3} They are: the technical level, the semantic level, and the
strategic level. Technologists, sometimes called information-theorists,

\textsuperscript{1}Leagans, \textit{Behavioral Change}, \textit{op. cit.}, p. 139.
\textsuperscript{2}Beltran, \textit{op. cit.}, p. 18.
\textsuperscript{3}Parry, \textit{op. cit.}, p. 28.
study technical level problems, like how can the symbols be transmitted accurately, how to increase the channel capacity, and to reduce extraneous noise. Linguists have focused their attention mainly on the semantic problems of communication, i.e., to study the structural characteristics of a language which facilitate the transfer of accurate meaning to the receiver. Psychologists, who are concerned with the strategic problems of communication, are interested in studying the relationship of symbols (both verbal and non-verbal) used by the communicator and the effect they produce on the receiver, and how best they can be managed to produce the maximum desired effect on the receiver.

Katz and Lazarsfeld,¹ identify three major areas of communication research, which are not very much different from the above. These areas are:

1. **Audience research**—the study of how many of what kind of people attended to a given communication or medium—historically the earliest of the divisions, and still the most prolific.

2. **Content analysis**—comprising the study of the language, the logic, and the lay out of communication messages.

3. **Effect analysis**—the study of communication impact.

Petrie² classifies communication research under the following four headings, and sub-headings under each:

1. **The message**—meaningfulness, style and difficulty, verbal emphasis, development of main ideas, organization.

2. **The speaker**—speaker credibility, delivery.


3. The listener—hearing acuity and auditory discrimination, personality attributes, intelligence, scholastic achievement, verbal ability, vocabulary, listening experience, note-taking, motivation, organizational ability.

4. The environment.

The present study, the primary focus of which is to determine the effect produced by a message on the listeners, could be located under (1) and (3) of the above.

Most of the research in the field of communication has been done on students in high schools and colleges. Out of 136 studies catalogued by Petrie, none of them was done on farmers, even in the United States. The results of classroom experimentation in communication may, however, have low external validity when used as guidelines for communication programs in extension education.

Communication Research in Extension Education

Systematic study of communication as an area of research in extension education has relatively short history. Leagans at Cornell for several years has been interested in this area, and several of his doctoral students have done good work in communication research. It will be appropriate to briefly mention a few of them.

After an examination of various communication models, Khan synthesized a model of communication specifically for extension education. Khan notes that extension communication is a social act in which communicator and communicatee both initiate the communication process "but they pass through them in their own peculiar way." He recognizes that

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1 Khan, op. cit.
2 Ibid., p. 228.
effectiveness of communication in extension very much depends upon feedback.\footnote{Ibid.}

\textbf{Patel}\footnote{Ishwerlal C. Patel, "Communication Behavior of Village Level Workers in Surat and Mahesana Districts, Gujarat State, India" (unpublished Ph.D. thesis, Cornell University, Ithaca, New York, 1967).} in his study focuses on the communication behavior of village level workers in India. The central objective of his study was to identify the communication patterns and procedures associated with level of effectiveness of the village level workers. On the basis of his findings, Patel developed a profile of an effective village level worker, which included characteristics like ability to empathize with farmers, years of service on the job, use of several communication channels, and ability to use "language of the people."

\textbf{Sharma}\footnote{D. K. Sharma, "Information Sources and Communication Channels Related to Farm Practice Adoption in Central India" (unpublished Ph.D. thesis, Cornell University, Ithaca, New York, 1967).} studied information sources and communication channels related to farm practice adoption in India. He found that mass media were used by relatively small percentages of respondents. By and large, oral communication in face-to-face situations played a more important role at each stage of the adoption process than communication through impersonal media, which was apparently less effective. In general, farmers were found to learn new things by hearing, seeing, and doing through interpersonal contacts.

Communication and socio-economic variables related to fertilizer use by Indian farmers were studied by Singh.\footnote{Raghubar Singh, "Communication and Socio-Economic Variables Related to Fertilizer Use by Indian Farmers" (unpublished Ph.D. thesis, Cornell University, Ithaca, New York, 1967).} He also found that informal personal communication sources were most important at each stage of adoption, and especially at the evaluation stage.
There are several other investigations conducted by experienced researchers and graduate students in extension education regarding the phenomenon of communication in the United States, India and other countries of the world. But almost all of them were designed and conducted through field survey research technique. The author, through his search of the literature, did not find a study which was carried out experimentally to analyze the impact effectiveness of extension messages on the farmers.

The Concept of Fidelity of Decoding

Oral communication, as pointed out earlier, is undertaken through word symbols. "Word symbols to which an audience is unable to attach meaning do not communicate."¹ Thus, the message sent is not the message received. "Intention or design exists only in the emitter of the communication, and in the receptor so far as he is able to put himself in the emitter's place, assume his role and guess what are his real intentions."² Talking, therefore, should not be equated with persuasion, and hearing with understanding or acceptance.

The receiver attaches meaning to all that he receives from the communicator in the light of his own field of experience. It becomes hard for him to understand what the communicator is trying to communicate if that does not have resemblance to the receiver's general experiential level. Schramm points out that "the source can encode and the distinction can decode in terms of the experience each has had. If the fields of experience of the encoder and decoder have much in common,

¹Leagans, Communication Process, op. cit., p. 8.
²Aranguren, op. cit., p. 19.
communication is going to be very difficult to get an intended meaning across from one to the other.\textsuperscript{1} Parry points out that "In human communication a great deal of failure comes about not because information has been lost in transmission, but because the sender is unable to express what he has to say, or because the receiver is unable to interpret the message in the way that is intended."\textsuperscript{2}

Two important points stand out from the above quotations: (1) The communicator should have a thorough knowledge of the receiver's life style, his environment—physical, social, economic, political and religious . . . , if not self experientially at least empathically, and (2) he should know the most effective encoding procedures and be capable of utilizing them in his communication activities. The effectiveness of his communication should be greatly improved as a result of this. His audience should, thereby, be able to decode the messages transmitted by him at a high level of fidelity.

Berlo defines fidelity of decoding as "the accuracy with which an encoded message is decoded by the audience."\textsuperscript{3} The higher the fidelity of decoding, the more effective the communication act is, and vice versa. Krech et al. observe that "communication accomplishes its purpose accurately if the message is interpreted in the same way by the communicator and by the recipient of the communication."\textsuperscript{4} Effectiveness of a communication activity, therefore, is represented by the extent to which change has been effected in the behavior of the receiver.

\begin{footnotesize}
\begin{enumerate}
\item Schramm, \textit{op. cit.}, p. 7.
\item Parry, \textit{op. cit.}, p. 29.
\item Berlo, \textit{op. cit.}, p. 41.
\end{enumerate}
\end{footnotesize}
There are several factors, besides the two already noted, which seem to affect the fidelity of message decoding on the part of receivers. The important ones will be considered in the next section under "Factors Affecting Fidelity of Decoding." Here, however, a conceptual derivation of fidelity of decoding will be diagrammatically presented.

Derivation of the Concept

As already pointed out, Leagans' model of communication is used as the theoretical frame of reference for this study. In order to explain the concept of fidelity of decoding, it seems appropriate to introduce two additional concepts to Leagans' model. They are encoded information and decoded information. There is, of course, nothing new in these two concepts. However, in the interest of clarity of discussion to be subsequently made in this study, they seem relevant.

![Diagram of Communication Model]

Com. = Communicator
M = Message
H.T. = Message Treatment
Ch. = Channel
A = Audience
A.R. = Audience Response

Figure 9. Model of Communication in Extension Education

Encoded information is the information in terms of verbal and non-verbal symbols which result from interaction of the content of the message and the message-treatment techniques of the communication, and thus represents all that is to be transmitted to the receiver. Decoded
information represents meaning of the message received by the communicater, irrespective of its accuracy or inaccuracy from the point of view of the communicator. It is on the basis of this meaning that the receiver makes a response, which Lezans calls "audience response."

Encoded information and decoded information under ideal circumstances should have a linear relationship, as shown in Figure 10. This means that the amount of transmitted encoded information is equal to the amount of decoded information—the communicater received all information the communicator wanted him to receive in exactly the way it was intended. In this hypothetical communication situation, therefore, there is no communication deficit, and so the fidelity of decoding is 100 percent.

Figure 10. Illustrative Diagram Showing the Relationship of Encoded Information, Decoded Information, and Decoding Deficit.
Realistically speaking, however, this ideal situation seldom exists. Information theorists hold that some information is always lost in the process of transmission (because of extraneous environmental noise and/or semantic noise); some information may, even, be adventitiously or inadvertently distorted by the receiver. (This is often characterized as propaganda). This tantamounts to saying that, in real life communicational situations, a certain amount of decoding deficit nearly always exists. Fidelity of decoding, therefore, is reduced to the extent of this deficit. This does not, however, mean that a decoding deficit is something of a fixed nature in every information situation. It varies from communicator to communicator, receiver to receiver, message to message, and even for the same communicator, the same receiver, and the same message from time to time. This, also does not mean that nothing can be done to reduce the magnitude of decoding deficit and thereby, increase fidelity of decoding. An alert and skillful communicator can decrease this deficit by "sending a useful message through proper channels effectively treated to an appropriate audience." 

The central purpose of this study, as mentioned in Chapter I, is to determine how the fidelity of message decoding varies with varying message treatments.

**Measurement of Fidelity of Decoding**

Since the purpose of communication in extension education is to bring about changes in the behavior of rural people, the effectiveness of communication efforts is gauged by the extent to which farmers adopt

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2. Leagans, Communication, op. cit., p. 10.
improved agricultural practices. Scores of investigations undertaken by researchers in extension education as well as in rural sociology have studied the role of various communication channels in the adoption of farm practices. Some authors have developed profiles of effective extension workers based on their findings. But none of them seems to have high level reliability.¹ Moreover, the approach followed by most of these researchers has been such that permitted the interaction of variables other than the communicator whose communication effectiveness was being studied. Contado in his study recognizes this problem when he says, "For practical purposes, the best that could be done in this study was to ask the farm respondent where he learned the practice in question. Responding to this question the farmer named the source or sources, which were recorded in the proper column in the instrument. This information was used in approximating (emphasis is present author's) what portion of the total farmer's response could be attributed directly or jointly to the FMT (extension worker) and to other sources."²

Because of limitations of studies, like the one mentioned above, a more direct approach was followed in this investigation to measure the fidelity of decoding of the farm decision makers in India.

The respondents were exposed to test messages under as similar conditions as possible, and with the help of a post-test the information decoded by them was measured. (Details of this measurement are given in the chapter on methodology.) This constituted post-test score or the gross fidelity of decoding. Net fidelity of decoding for a respondent was found by subtracting his pre-test score (determined on the content

¹Patel, op. cit., p. 16.
of the test message before exposing the respondent to the test message) from the post-test score. These scores formed raw data for determining the effect of varying message treatments on the fidelity of message decoding.

Factors Affecting Fidelity of Message Decoding

Under realistic life situations, choice of exposure\(^1\) to incoming information is controlled by the communicator. There are several factors—some conscious, some unconscious, some known some still under investigation—which make him exercise this control, and thereby affect his fidelity of message decoding. It is proposed to discuss some of the important ones in this section. They are classified under the following six categories: **general**, **receiver characteristics**, **communicator characteristics**, **message characteristics**, **channel characteristics**, and factors pertaining to treatment of message. Factors falling under the last category are considered in the next section of this chapter, since they constitute independent variables in this study and demand detailed theoretical attention.

**General**

Some of the factors under this category may technically be considered under audience characteristics, but because of their general nature they are discussed here.

**Perception**

Such defines perception as "a process whereby sensory cues and relevant past experiences are organized to give us the most structured,  

\(^1\)Exposure here refers to physical as well as psychic.
meaningful picture under the circumstances."\textsuperscript{1} It is, therefore, not a point-for-point representation of the reality. It is the best guess of the perceiver on the basis of available sensory data and his past experiences. "Perception is a kind of transaction between subject and object."\textsuperscript{2}

Lee and Lee using an analogy of decoding process and responding to an ink-blot say that "in each case, the respondent sees what he wants to see. Some see the total stimulus, others see parts related to the total, still others see only parts."\textsuperscript{3}

Incoming information is, also, selectively perceived by the communicators. However, higher intensity symbol-signals have a better chance of being perceived than symbol-signals with low intensity.\textsuperscript{4} "We scan our communication environment like an index, selecting among cues and concentrating our attention on the signs associated with the cues that specially attract us."\textsuperscript{5} Schramm further notes that "experimental work on this index function is in very early stages, and the process is not wholly understood as yet."\textsuperscript{6}

According to Litterer there are three mechanisms which constitute perception of information. "The first is selectivity, in which certain pieces of information are separated for further consideration by thresholds. The second is closure, where the bits of information are compiled into a meaningful whole. The third is interpretation, where previous

\textsuperscript{1}Floyd L. Ruch, Psychology and Life (7th ed.; Glenview, Ill.: Scott, Foresman and Company, 1967), p. 300.
\textsuperscript{2}Parry, op. cit., p. 36.
\textsuperscript{4}Intensity here refers to meaningfulness of the signal from the receiver's point of view.
\textsuperscript{5}Schramm, The Process and Effects, op. cit., p. 29.
\textsuperscript{6}Ibid.
experiences aid in judging the information collected. Information admitted by selectivity is given meaning by either closure or interpretation, or both; and of course, both feedback to determine what information will be selected.\(^2\)

In a face-to-face interpersonal communication situation, the whole phenomenon of perception becomes much more complex. There are several elements which the communicator is perceiving simultaneously in a typical communication situation (Figure 12). The communicatee draws upon his past experiences with respect to each one of these elements, and their stimuli creating characteristics in the present situation actively interact to create a highly complicated mechanism. In spite of all these risks of error, the messages must be decoded by the communicatee through selective perception.

\(^{1}\) Litterer, op. cit., p. 64.
\(^{2}\) Ibid., pp. 63-64.
Most previous research has supported the theory of selective perception that a person usually hears what he wants to hear, and that he usually wants to hear messages which reinforce his existing attitudes and produce a feeling of consonance. Klapper, who has summarized much of the existing evidence for this generalization, points out, however, that there have been a number of exceptions to this principle of selectivity.\footnote{Joseph T. Klapper, The Effects of Mass Communication (Glencoe, Ill.: The Free Press, 1960), pp. 21-23, 25, 64-65.}

A communicator, who knows his audience—their needs, interests, attitudes, values, past experiences with the type of information planned to be communicated, etc.—can so organize the perceptual elements in the communication situation through his encoding procedures that maximum fidelity decoding results.

In the present research, efforts were made to control as many variables from the perceptual field of the communicatee as possibly could be. Thus, with respect to the four perceptual elements (Figure 12), all the respondents were exposed to tape-recorded messages taped in the same voice and played back through the same tape recorder. The investigator himself administered the pre- and post-tests, and also played the test-messages under more or less similar physical situations where no one...
else was observing. Also, the content of message was controlled; the only variation was in the treatment of the messages, which, of course, is the primary focus of this study.

Listening

It is "the process of using the ears, the eyes, and the brain to seek out the meanings and the feelings behind what the speaker is saying."\(^1\) Listening, to Hayakawa, means "trying to see the problem the way the speaker sees it—which means not sympathy, which is feeling for him, but empathy, which is experiencing with him. Listening requires entering actively and imaginatively into the other fellow's situation and trying to understand a frame of reference different from your own. This is not always an easy task."\(^2\) Some authors call this type of listening perceptive listening,\(^3\) which is very much different from hearing, a physical activity. Perceptive listening is, therefore, a dynamic process which not only involves sensory stimulation, by way of discriminating between auditory signals, but also psychic stimulation. "Hearing is something that comes naturally, while listening is a skill that has to be developed."\(^4\)

Attreyva classifies barriers to effective listening as external, internal and semantic. Among external barriers, he lists impaired hearings, fatigue, distractions (heat, noise, glare, interruptions).\(^5\) Among internal barriers are listed factors like mental attitudes, self-centeredness, prejudices, prejudging, modified forms of prejudice (avoid

\(^1\) N. H. Attreyva, The Executive Skill of Persuasive Listening (Bombay: MHC School of Management, 1969), p. 35.
\(^2\) Hayakawa, op. cit., pp. 32-33.
\(^3\) Attreyva, loc. cit., p. 39.
\(^4\) Ibid., p. 32.
\(^5\) Ibid., p. 54.
listening and dwell on the inadequacies of the speaker), social distance
(normally we tune ourselves to the speaker when we respect the authority
and tradition behind him), status, the cultural barrier, tendency to inter-
rupt the speaker, preoccupied in ourselves, assume (what the speaker is
going to say), passive indifference, impatience, and status quo (when we
do not like the ideas, we want to preserve our own). Semantic barriers
are those which arise from the inappropriate use of language.¹

Listening may be adversely affected if the rate of incoming infor-
mation is too slow. "... human channel possesses a lower as well as an
upper limit to its capacity. ... it is as though the nervous system
requires a minimum supply of information at all times; where a task fails
to provide this, the system will try to make good the defect from its
own resources or from irrelevant sources in the environment."² This prob-
lem is caused by the fact that we think much faster than we talk. "The
average rate of speech for most Americans is around 125 words per minute,"³
and for Indians it is around 130 words per minute.⁴ It has been found that
"people can comprehend speech as much as 400 words per minute without
significant loss."⁵ This means that while listening to a message spoken
at a normal speed, human brain has time for side-tracks. Unless the
communicator consciously structures his message in such a way that the
receiver feels impelled to listen, the latter may find himself switching
on and off with the resultant reduced impact of the message.

¹Ibid., pp. 56-63.
²Parry, op. cit., p. 43.
⁴Atthreya, op. cit., p. 40.
⁵Ibid.
It is assumed that because of the absence of high intensity noise producing sources in Indian villages, the hearing acuity of Indian farmers is not impaired, so they possess a fairly reasonable ability of auditory discrimination of acoustic signals produced by the communicator. Moreover, to account for individual differences in hearing ability, the volume of tape-recorder was set at a comfortable hearing level of the respondents before exposing him to the test-message. Also, tests were administered to respondents when they were not overly fatigued, and efforts were made to ensure that the situational distractions were minimum. It is believed that all these precautions reduced the external barriers to effective listening to the minimum.

In a country like India, where rate of literacy is rather low, people have been using the word of mouth to pass down their heritage to progenies. Among other things, this requires good listening ability. So there is reason to believe that Indian farmers are not bad listeners.

The above factors have direct implications for this study in the sense that the farm decision makers to whom test-messages were administered listened to them.

Attention

"Attention is the taking possession by the mind, in clear and vivid form, of one out of what seems several simultaneously possible objects or trains of thought. Focalization, concentration of consciousness are its essence. It implies withdrawal from some things in order to deal effectively with others." Vohs defines attention as "an act of response

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1 This assumption is supported by Dr. T. Walter Carlin, Director, Speech Clinic, Ithaca, College, Ithaca, New York. Dr. Carlin through his work with South American peasants finds support for this assumption.


selectivity under conditions of multiple stimulation." Stimuli which are not relevant to the needs or interests of the listener are either ignored or suppressed. "It is a commonplace of recent research that communications are received and attended to in so far as they tend to gratify various needs of the personality." This selective nature of attention has prompted some authors to speak of "selective attention," rather than attention alone. The fact of ignoring certain phenomena has been referred to as "selective inattention" by Sullivan.

Physical cues, like speaker's voice familiarity, idiosyncrasies of his speech, their spatial location, their intensities, etc., play a significant part in selective attention or inattention of the listener. Similarly, psychological cues, like relevance of the message to the needs of the listener, his emotional make up at the moment, previous familiarity with the subject matter, etc., also affect attention span of the receiver.

This conception of attention may be applied to the process of oral communication, where the receiver is exposed to numerous stimuli in addition to the communicator and his message. "Presumably these various kinds of competing or distracting stimuli affect the reception of the message, and similarly certain variables in the communication process should increase the likelihood that the listener will respond (i.e., attend) selectively to the speaker and not to the extraneous stimuli. How these factors function is hard and indeed impossible to

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measure, unless one makes some appropriate assumptions."\(^1\) The assumption made in the present study with respect to this problem, was that the respondent attends to the message and not to other extraneous stimuli which, as pointed out earlier, were controlled as far as possible.

Vohs, also, found that "good delivery helps to offset distractions and helps maintain the hearer's attention."\(^2\) It can be concluded from this statement that effective encoding procedures of the communicator have a significant relationship to the reception of the message by the communicatee. This point will be elaborated further in the message treatment section of this chapter.

Empathy

Speroff defines empathy as "the ability to put yourself in the other person's position, establish rapport, and anticipate his feelings, reactions, and behavior."\(^3\) Leagans says that "when a person experiences empathy, he feels as if he were experiencing somebody else's feelings as his own. He sees, feels, responds, and understands as if he, in fact, was the other person."\(^4\)

Empathy plays an important role in face-to-face oral communication. It requires that the communicator have a complete knowledge of the communicatee for developing empathic relationship and effective communication. The process of empathy, therefore, is sine qua non for communication directed at behavioral change. Speroff points out that

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\(^1\) Vohs, op. cit., p. 355.  
\(^2\) Ibid., p. 350.  
One of the gravest faults of communication has been the total lack of orienting the information to the background of either the problem discussed or the persons involved in the discussion. It is the intent of the empathic response to overcome this error by a systematic evaluation of the experience and educational history of the person for whom the communication is intended, and by orally or in writing setting down the communication orienting it in words and terminology based upon the appraisal of the person's background.¹

Empathy is a skill which can be consciously learned. It requires "physical, social and psychic propinquity" of the communicator to the communicatee. Unfortunately in developing countries "the empathic gap between farmers and government officials is often of such magnitude that essential program content is not transferred through education from "paper plans" to the minds and actions of farmers."²

The determination of relationship of empathy to the fidelity of message decoding was not a direct concern of this study. However, a relationship between explicit message organization and fidelity of decoding may reveal an indirect relationship with empathy.

Noise

According to Parry, noise, when applied to communication theory, means any unwanted stimuli which interfere with the reception of communication.³ The origin of noise may be in the physical environment in which communication takes place, in the psyche of the communicatee in terms of unwanted associations or distortions, or in the word symbols in terms of semantic noise. Whatever the origin of noise, it is something which reduces the efficiency of communication.

²Leagans, loc. cit., p. 144.
³Parry, op. cit., p. 40.
Thompson says that "Just as meaning of a message resides in a given receiver, so, too, does the meaning of noise. One person's noise may be another's message. Noise is relative to a given receiver."\(^1\) One or another form of noise always exists in every communication situation. Its magnitude can, however, be "reduced by coding messages in various forms."\(^2\) Four different forms of message coding procedures were used in this research to determine which procedure proved more efficient from the communication effectiveness point of view. Noise was, however, not one of the directly manipulable variables.

Feedback

Berlo defines the concept of feedback in communication as when "a communicator source decodes the message that he encodes . . . we have feedback."\(^3\) Leagans\(^4\) calls it audience response which can be decoded by the communicator in terms of action taken by the communicatee as a consequence of the act of communication. Feedback not only provides evidence to the communicator regarding the level of decoding of the message by the receiver, but is also important to the latter in terms of assurance from the former that the message was properly decoded.

In the present study, responses by the audience to the post-test administered after exposure to the message may be regarded as feedback.

Physical Environment

It is a matter of common sense that the physical environment in which communication takes place may affect the reception of information.

\(^1\) Thompson, op. cit., p. 14.
\(^3\) Berlo, op. cit., p. 103.
by the communicatee. But several authors, who have investigated this phenomenon, seem not to have found consistent results.

Nichols¹ found that environmental distractions influence negatively the comprehension of "poor" listeners. Ventilation and temperature of the room were inversely associated with comprehension of the subject matter. Irvin² found that the time of day when respondents were exposed to the messages did not affect comprehension. Petrie concludes that "the limited experimental evidence available suggests that the physical environment may not significantly influence listening comprehension."³ On the strength of observations like these, it was assumed in this research that the physical environment does not significantly affect the fidelity of message decoding of the respondents.

Receiver Characteristics

Effectiveness of communication is measured in terms of the effect it produces on the communicatee. This effect seems to be significantly influenced by personal characteristics of the receiver. Ruch says, "what we perceive depends not only on the characteristics of the stimulus situation but also on our tendency . . . to try to 'make sense' out of incoming stimulation. Thus, such individual factors as past experience, organic condition, and personal needs and values are important determinants of what we perceive and often produce striking differences in what two people will perceive in the identical situation."⁴ Petrie,

³Petrie, op. cit., p. 85.
⁴Ruch, op. cit., p. 308.
also, observes that, ". . . the degree of comprehension depends in part
upon such listener characteristics as the ability to hear the signal and
knowledge of the code in which the message is sent." Wilkening recog-
nizes the following characteristics of the people which he thinks might
affect their receptivity to communications: 
"(1) demographic character-
istics, (2) interests and aspirations, (3) level of knowledge and sophisti-
cation, and (4) predisposition toward change—attitudes, value orienta-
tions relevant to information receiving." It is recognized in this research
that such factors may affect the fidelity of message decoding by farm
decision makers in India. A brief discussion of the most important re-
ciever characteristics, relevant to this study, is given below.

Previous Knowledge and Adoption Status

Present adoption status of the farmers reflects their previous
knowledge of improved agricultural practices in a general way. Respond-
ants of this study were classified into three broad categories on the
basis of their adoption of recommended agricultural practices. These
categories were: high, medium, and low. Criteria for this classifica-
tion is explained in Chapter III.

Several studies have shown that prior knowledge of the subject
matter or even vague familiarity with it by the communicant has a posi-
tive correlation with the absorption of information from a communicational
message related to this subject matter. Norman, for example, says "that
stimulus for which we are predisposed requires less time than a like
stimulus for which we are unprepared, to produce its full conscious

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1Petrie, op. cit., p. 82.

2Eugene A. Wilkening, "Selecting, Defining, and Conceptualizing
Research Problems in Communication," First Interamerican Research Symposium,
op. cit., p. 18.
effect." Miller notes that the "familiar materials convey less new information per symbol to the learner . . ., and the interference effects among the parts of the learning seem far less severe for familiar materials."  

Waples believes that, "previous knowledge of the topic may determine not only what meanings he (receiver) will take from the content but also how he will react to them." Carter, on the other hand, in his study on the comprehension of stories by high school students, found no significant correlation between the background of respondents and the comprehension of story elements. Notwithstanding the finding of the last mentioned study, it seems logical that the past knowledge of respondents which is related to test messages, would have a significant correlation with fidelity of message decoding. In this study, each respondent was administered a pre-test to determine the level of his familiarity with the content of the messages, and they were also classified, as mentioned earlier, into high, medium, and low adoption status categories, to discover the nature of relationship, if any, with the fidelity of message decoding.

Intelligence

Any mental activity depends, at least in part, on the individual's intelligence, and thus it appears that a close relationship should exist between intelligence and listening comprehension. Petrie, through

5Petrie, op. cit., p. 83.
an analysis of several studies, found that "correlations between measures of intelligence and listening ability, depending on the tests used and the subjects tested, range widely from +.05 to +.78. Peripheral to these results is the finding that the more intelligent persons appear to comprehend better what they read than what they hear. Intelligence probably is a constituent of aural comprehension, but the correlation is too low for it to serve as an accurate predictor of listening ability. The author did not come across any study in the literature in which intelligence of the farmers was determined through direct administration of intelligence tests. Moreover, there are very few standardized tests of intelligence available in India, and most likely none has been specifically designed and standardized to determine the intelligence of farmers. Moreover, it may not be possible in practice to subject a busy and down-to-earth farmer to intelligence tests.

Some studies have shown that intelligence does not play a major role if tests administered to measure comprehension are of a multiple-choice or true and false type and not recall type tests.

The post-test items in this study were of a multiple-choice type, and so the assumption made is that the variable of intelligence did not have a significant influence on the fidelity of message decoding of the farm decision makers.

\[ \text{Attitudes} \]

Initial attitude of the communicatee toward the content of the message seems to have a relationship with the acceptance or rejection of

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information. A negative attitude raises the threshold of acceptance and a positive attitude lowers the threshold of acceptance of incoming information. Edwards found the positive effect of initial attitude to remember the material. Dickens and Williams, however, did not find a significant relationship between attitude toward the topic and comprehension.

Some statements designed to measure the attitude of respondents toward improved agricultural practices were incorporated in the research instruments, with the objective of discovering the relationship of attitudinal sets of the respondents to their fidelity of message decoding.

Aspirations and Interest

The important role which rising aspirations play in the acceptance of new information is recognized by Lerner. Interest in the subject matter is also considered important from the comprehension point of view by several authors. There are others, however, who did not find any significant difference between interest in the topic and the amount of recall of information after exposure to it.

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6See for example, Petrie, op. cit., p. 84.
In this study, level of aspirations of respondents was incorporated as a variable; interest, however, was not. It is assumed that adoption status of the farm decision makers reflects their interest in agricultural technology.

Biographic Factors

Only two such factors, viz., age and education, which have been shown in other studies to be significantly related to communication behavior of people have been included in this study. Sharma\(^1\) found education, among others, an important factor affecting the use of modern means of communication by Indian farmers. Tito\(^2\) also found that level of education of farmers is significantly related to their communication fidelity.

Communicator Characteristics

Perception of the communicator by the communicatee is believed to affect the receptivity of the latter to the message. Two of the important characteristics of the communicator which may have relationship with reception of information are: communicator credibility and the quality of speaker's voice. The encoding procedures, important from the message decoding point of view, are considered separately in the message treatment section.

Communicator Credibility

Leagans says, "A key factor influencing the effectiveness of communication is the person who originates and sends the message. The credibility of the communicator, as perceived by the audience, is a powerful

\(^1\) Sharma, \textit{op. cit.}

\(^2\) Tito, \textit{op. cit.}, p. 260.
determinant in communication."\(^1\) Klapper, also found that "sources regarded as credible, trustworthy, and the like facilitate persuasion, while other sources which the audience regards negatively confer a handicap. . . ."\(^2\)

Hovland et al. conclude that "the research evidence indicates that the reactions to a communication are significantly affected by cues as to the communicator's intentions, expertness, and trustworthiness. The very same presentation tends to be judged more favorably when made by a communicator of high credibility than by one of low credibility. Furthermore, in the case of two of the three studies on credibility, the immediate acceptance of the recommended opinion was greater when presented by a highly credible communicator."\(^3\)

There are some studies, however, which report lack of any significant relationship between the source credibility and impact of the message. Petrie says "... there is little experimental support for the assumption that source credibility or source sincerity influences the amount of information learned and retained from an informative speech."\(^4\)

Tompkins and Samover found that, "the credibility of the speaker does not affect learning. . . ."\(^5\) Similarly, Norman McKown reached the conclusion that "source credibility did not influence retention of the message's factual content."\(^6\)

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\(^1\) Leagans, _The Communication Process_, op. cit., p. 10.
\(^2\) Klapper, op. cit., p. 101.
\(^3\) Hovland et al., op. cit., p. 35.
The subjects of all these studies which did not find any relationship of information effectiveness with source credibility were college students, who it is conjectured were more concerned with the factual content of the message than with credibility of the source. In countries like India where "authority" is supposed to have all the answers (particularly among illiterate people in the rural area), it is believed that source credibility has a positive correlation with the fidelity of message-decoding by the farmers.

Communicator credibility, though an important variable from a research point of view, was not an active independent variable in this study. The respondents were asked, only after exposure to the test messages, "whose voice (official level of the speaker) they think that was." The hypothesis was that messages treated at high difficulty and implicit organizational levels would be attributed to higher level officials, and messages with low difficulty and explicit level treatments would be attributed to lower level government officials.

Voice

Quality of the speaker's voice is also believed to be associated with communication effectiveness. But it has not been proven to be so by several studies.¹ Petrie says, "Moderately poor vocal quality, poor pitch patterns, non-fluency, and even stuttering . . . do not interfere significantly with comprehension."² Here again the subjects were college students, for whom voice quality of the speaker was probably of little

²Petrie, op. cit., p. 81.
concern. What effect voice quality has on the retention of information by the farmers does not seem to have been studied. The voice was, again, not one of the variables in this study, though to offset any effect it might have on the decoding of messages, all the test messages were recorded in the same voice.

**Message Characteristics**

Meaningfulness of the message from the communicatee's point of view is likely to affect positively the fidelity of message decoding. This assumption is substantiated by Hovland and Petrie. Petrie, for example, says, "Meaningful messages are learned more easily and retained better, than are presentations with less meaning."

Meaningfulness of the same message will vary from individual to individual and from time to time. Although the messages selected for this study were such that they had relevance to all the farmers, the perceived relative importance and meaningfulness of these messages may have varied for the respondents at various levels of adoption.

**Channel Characteristics**

Evidence is available in the literature, that the same message presented through different channels will have different impacts on the audience. For example, Harwood found that difficult messages were comprehended better when heard than when read. Mass media are less effective in persuasion than is oral face-to-face communication.

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2. Petrie, op. cit., p. 79.
In the present study, only an oral channel of communication was used, and the messages were tape recorded. The tape recorder, for most of the respondents was something novel, and its novelty might have reacted with the reception of the messages. But the use of tape recorder could not be avoided, since it was the only feasible way of controlling the message exposure to the respondents on an individual basis. Efforts were made to minimize the presence of the tape recorder.

**Treatment of Message**

Communication is not a mechanical transfer of information. Skill of the communicator in phrasing and organizing the message plays an important role in determining how his message will be perceived and interpreted. Leagans who introduced the term "treatment of message" in the literature says, "treatment has to do with the way a message is handled to get the information across to an audience. It relates to the techniques, details of procedures, or manner of performance essential to expert presentation."¹ Communicators have been aware of this variable since the invention of language for communication purposes. Formal recognition of this is over 2,000 years old. It is alluded to by Plato, Aristotle, and Saint Augustine among others. "Plato in his classic theory of dialectical rhetoric recognizes fully that a rhetorician should be technically proficient. He should have knowledge of human psychology and should have mastered the medium of language. But he believes that these technical skills should be regarded as a means to an end and not an end in themselves."² Aristotle emphasizes message preparation through invention, arrangement, style and delivery. Treatment of message has become a major

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area of concern of communicators in every field. As human culture and society are becoming more complex, demands on the communication specialists are increasing for identifying guidelines for faster and efficient "transportation" of information to the rightful consumers. Techniques of encoding messages have, therefore, become a specialized field.

Most of the research in this area has been done in the developed countries, and mostly on captive audiences. In developing countries, after "a series of costly and avoidable failures" in communication programs, national governments seem to be seriously concerned about the development of "imaginative, adequate and effective communication programs." The role of communication as a multiplier of resources cannot be underestimated in those countries. And the role of treatment of messages cannot be underestimated in the process of communication.

Communication researchers have used several different forms of message treatment. For the purposes of this research, by combining several individual procedures of message treatment, two major variables were developed, viz., message complexity and message organization. These two served as the independent variables and each had two levels, which will be explained shortly.

Message Complexity

Message complexity refers to structural difficulty of the message. Flesch, on the basis of his extensive studies, identifies the following main structural components of language which constitute message complexity:¹

1. Sentence length
2. Number of affixes
3. Number of personal references.

¹Flesch, op. cit., p. 58.
Simple language, according to this criteria consists of short sentences, few affixes, and many personal references. Complex language on the other hand consists of long sentences, many affixes, and few personal references. On how to compute the difficulty score of a message, Flesch gives the following method:

First take the average length of the sentences and multiply it by .1338. Then take the number of affixes per 100 words and multiply it by .0645. Add these two figures. Next multiple the number of personal references in 100 words by .0659 and subtract the result from the sum of the first two figures. Finally, subtract .75. The result is your difficulty score, which is apt to be a figure between 0 and 7.

Table 1 shows the relationship between difficulty level and difficulty score as computed by Flesch.

<table>
<thead>
<tr>
<th>Difficulty Level</th>
<th>Difficulty Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very easy</td>
<td>Up to 1</td>
</tr>
<tr>
<td>Easy</td>
<td>1 to 2</td>
</tr>
<tr>
<td>Fairly easy</td>
<td>2 to 3</td>
</tr>
<tr>
<td>Standard</td>
<td>3 to 4</td>
</tr>
<tr>
<td>Fairly difficult</td>
<td>4 to 5</td>
</tr>
<tr>
<td>Difficult</td>
<td>5 to 6</td>
</tr>
<tr>
<td>Very difficult</td>
<td>6 or more</td>
</tr>
</tbody>
</table>

To avoid much figuring in arriving at the difficulty score of a message, Flesch gives an alternate formula.

1Ibid.
2Ibid.
3Ibid.
Take the average number of affixes per 100 words, subtract the average number of personal references in 100 words, and divide by two. Then add the average number of words per sentence. Check the result (against Table 2).¹

**TABLE 2**

**FLESCH'S ALTERNATE NORMS OF DIFFICULTY LEVEL AND DIFFICULTY SCORE**

<table>
<thead>
<tr>
<th>Difficulty Level</th>
<th>Difficulty Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very easy</td>
<td>Up to 13</td>
</tr>
<tr>
<td>Easy</td>
<td>13 to 20</td>
</tr>
<tr>
<td>Fairly easy</td>
<td>20 to 29</td>
</tr>
<tr>
<td>Standard</td>
<td>29 to 36</td>
</tr>
<tr>
<td>Fairly difficult</td>
<td>36 to 43</td>
</tr>
<tr>
<td>Difficult</td>
<td>43 to 52</td>
</tr>
<tr>
<td>Very difficult</td>
<td>52 or more</td>
</tr>
</tbody>
</table>

Flesch does not explain in his book *The Art of Plain Talk* how he arrived at the above formula. He simply says, "This is not a place for detailed explanation; briefly it is a way of grading material for school children."³

This formula seems to have been well accepted not only by communicators, but also by researchers.⁴

As mentioned in Chapter I, Flesch's formula, in a slightly modified form, was used in this research to determine the level of complexity of the test messages. The modification consisted of the addition of a fourth element to the formula, besides the three elements given above. This element was the use of high frequency words versus low frequency words.

¹Ibid., p. 64.
²Ibid.
³Ibid., p. 124.
⁴This formula has been regarded as "the best publicized formula" (see Miller, *op. cit.*, p. 135).
words. The rationale for doing so will be discussed shortly. How the complexity of test messages for this study was determined will be explained in Chapter III. At this stage it seems relevant to examine the elements of the formula.

According to Flesch, language consists of sentences. "Most people would say off hand that language consists of words rather than sentences; but that's looking at it the wrong way. We do not speak by forming one sentence after another from words we have in mind and tell it in sentences."¹ "A sentence expresses one thought . . . . You can also work more ideas into a sentence by putting in more phrases or words . . . (but then) it is liable to become a net of criss-crossing strings that have to be unraveled before we can understand what it says . . . . the best plan is to write short sentences so that the reader, or listener, gets enough chances for breathing spells and doesn't get caught in invisible strings between words."²

For calculating the sentence length, Flesch suggests two things: "First, sentence length is measured in words, because they are the easiest units to count: you just count everything that is separated by white space on the paper. . . . second, count two sentences where there are two even if there is no period between them but only a semicolon or colon."³ The difficulty of the message on the basis of sentence length alone can be seen from Table 3.

Cowing notes that, "Children in the 8th grade can easily read sentences that average 17 words. The average adult in the United States

¹Ibid., p. 31.
²Ibid., pp. 32-33.
³Ibid., p. 38.
TABLE 3

DIFFICULTY LEVEL AND AVERAGE SENTENCE LENGTH IN WORDS

<table>
<thead>
<tr>
<th>Difficulty Level</th>
<th>Average Sentence Length in Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very easy</td>
<td>8 or less</td>
</tr>
<tr>
<td>Easy</td>
<td>11</td>
</tr>
<tr>
<td>Fairly easy</td>
<td>14</td>
</tr>
<tr>
<td>Standard</td>
<td>17</td>
</tr>
<tr>
<td>Fairly difficult</td>
<td>21</td>
</tr>
<tr>
<td>Difficult</td>
<td>25</td>
</tr>
<tr>
<td>Very difficult</td>
<td>29 or more</td>
</tr>
</tbody>
</table>

has had about 8–9 years of schooling. *Time* and *Reader's Digest* use the 17-word sentence length as standard of what an average reader can read easily."\(^2\)

Second element in Flesch's formula is the number of affixes per 100 words. Flesch calls them language gadgets.\(^3\) He says:

Language gadgets . . . are of two kinds: words by themselves, . . . and parts of words (affixes) . . . The more harmful of the two for plain talk are the affixes, since the reader or hearer cannot understand what the gadget does to the sentence before he has disentangled it from the word it is attached to. Each suffix burdens his mind with two jobs: first, he has to split up the word into its parts and, second, he has to rebuild the sentence from these parts. To do this does not even take a split second, of course; but it adds up.

If you want to measure word difficulty, therefore, you have to count affixes . . . you count every affix, . . . every prefix, suffix, or inflectional ending. . . . To simplify a given passage, count first the number of affixes; then replace affix words systematically by root words, or at least by words with fewer affixes, until you arrive at the level you want to reach.

\(^1\)Ibid.
\(^3\)Flesch, loc. cit., p. 42.
\(^4\)Ibid., pp. 42-43.
The relationship between difficulty level and number of affixes per 100 words, as calculated by Flesch, is given in Table 4.

<table>
<thead>
<tr>
<th>Difficulty Level</th>
<th>Number of Affixes Per 100 Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very easy</td>
<td>22 or less</td>
</tr>
<tr>
<td>Easy</td>
<td>26</td>
</tr>
<tr>
<td>Fairly easy</td>
<td>31</td>
</tr>
<tr>
<td>Standard</td>
<td>37</td>
</tr>
<tr>
<td>Fairly difficult</td>
<td>42</td>
</tr>
<tr>
<td>Difficult</td>
<td>46</td>
</tr>
<tr>
<td>Very difficult</td>
<td>54 or more</td>
</tr>
</tbody>
</table>

Davis suggests that one should use short and effective words in plain talk and goes on to give examples of words which should be used: ask for inquire; welcome for offer hospitality; buy for purchases; steal for misappropriate; learn for gain knowledge; hearing for aural perception, etc.  

The number of personal references in a message is the third component of Flesch's formula. Flesch thinks that human interest makes for easier reading. "Scientific tests show that people are better at reading about other people than about anything else. Why is this so? Probably because man knows nothing so well as men. His thinking and his language started out as simple talk about what he and people around him were doing."

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1 Ibid., p. 43.
3 Flesch, op. cit., p. 48.
Flesch concludes: "... you have to keep talking about people" in plain talk. How do it? Flesch suggests the following:

First count all names of people. If the name consists of several words, count it as one, ... Next, count all personal pronouns except those that refer to things and not to people. Then count the human interest words in this list:

Man, woman, child, boy, girl, baby, gentleman, lady, sir, mister, madam (es), miss, guy, dame, lad, lass, kid.

Father, mother, son, daughter, brother, sister, husband, wife, uncle, aunt, cousin, nephew, niece, family; parent; sweetheart; dad, daddy, papa, mamma.

People (not peoples), folk, fellow, friend. Count also combinations of these words with each other and with grand-, great grand-, step- and in-law, and familiar forms of them like grandpa.

Table 5 shows the relationship of personal references per 100 words with the level of difficulty.

**TABLE 5**

<table>
<thead>
<tr>
<th>Difficulty Level</th>
<th>Number of Personal References Per 100 Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very easy</td>
<td>19 or more</td>
</tr>
<tr>
<td>Easy</td>
<td>14</td>
</tr>
<tr>
<td>Fairly easy</td>
<td>10</td>
</tr>
<tr>
<td>Standard</td>
<td>6</td>
</tr>
<tr>
<td>Fairly difficult</td>
<td>4</td>
</tr>
<tr>
<td>Difficult</td>
<td>3</td>
</tr>
<tr>
<td>Very difficult</td>
<td>2 or less</td>
</tr>
</tbody>
</table>

1Tbid., p. 49.
2Tbid., p. 55.
3Tbid., p. 56.
Flesch points out that "The standard of 6 personal references per
100 words is found, for instance, in feature article in popular magazines.
... Very difficult scientific material, of course, may be written with-
out mentioning any persons at all."¹

As already pointed out, a fourth element, high frequency collo-
quial words versus low frequency technical words was added to Flesch's
formula. It has been observed by many specialists² in India as well as
abroad, that extension workers have a tendency to use technical words
which have very low frequency of usage by rural people and that it hin-
ders understanding of the messages. Some years ago people in rural areas
of the Punjab preferred listening to Pakistan radio programs from Lahore,
rather than radio programs from All India Radio, Jullundur or Delhi. The
most obvious reason, often vocalized by people, was that All India Radio
programs are hard to understand. Under the zeal of academizing Indian
languages and their diffusion to the masses, there was a discernible
trend in the language used for the programs toward sophistication, and
thereby adding a complexity element to the messages which made people
prefer Pakistan radio programs with simpler language. This trend over
All India Radio now seems to have been reversed. Because of such like
considerations, it was considered appropriate, to include this component
in the complexity dimension of test messages.

Although not much experimental work has been done to determine
how the complexity of the message affects its comprehension by the lis-
teners, there are some studies which have attempted this. A brief men-
tion of their findings with respect to this variable seems appropriate.

¹Ibid.
²See page of Chapter I.
Black, in his study on aural perception of sentences of different lengths, found that short sentences produced more comprehension than long sentences.\(^1\) Beighley, who used difficulty of material as one of the variables in his study on listener comprehension found that "easy material is better comprehended than hard material."\(^2\) His criteria for the difficulty of material included vocabulary and sentence length. Kibler's\(^3\) subjects who were exposed to easy message style significantly varied with respect to impact of the message from those subjects who were exposed to difficult message style. Miller writes the following:

"Writers and talkers vary widely in their willingness to use short sentences. In one count of popular magazines the median number of syllables per sentence ranged from 13 for All-Story Magazine to 33.5 for Review of Reviews. The Saturday Evening Post was near the middle of the range with 21 syllables per sentence. Similar large differences are found in the writing of different authors. Sir William Petty used about 60 words per sentence, while Macaulay scraped by on 22. Comic strips use about 8 words between periods.\(^4\)

It is better to count the number of words or the number of syllables in the sentences. It can be shown that passages with a large number of prepositional phrases are more difficult than passages with few prepositional phrases.\(^5\)

Vernon, however, seems to take a dim view of this, when he says, "... difficulty of material cannot be decided entirely by a formula tied only to the grammatical factors of the language... interest aroused by a talk (particularly among average and dull listeners) greatly outweighs in importance any factors of style or language."\(^6\) He concludes,

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5. Ibid., p. 134.
"Clearly a talk is far more than a passage of reading material, a whole which is more than the sum of its parts."¹ About words, Vernon writes, "Difficulty of the words lies more in the multiple response interpretations, rather than the words themselves."² Miller says, "... the word is not the appropriate unit for measuring the psychological length of a sentence."³

In the face of conflicting findings, it may be useful to see whether complexity of material is associated with the fidelity of message decoding of Indian farmers.

**Message Organization**

Message organization has all along been regarded as an important variable which significantly affects the effectiveness of communication. With advances in knowledge of human learning, "a number of recent studies have emphasized the role of organization in the learning of verbal material. These studies appear to provide us with a link between the limitations of primary memory and the large capacity of secondary memory through the mechanism of proper and efficient organization."⁴ A general principle which seems to be emerging is that people group and organize the material they intend to learn. If this organizational element is provided by the speaker, it should facilitate learning on the part of the receiver. "The penetration of the message depends on the content of the message and the way it was presented."⁵

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¹Tbid., p. 58.
³Miller,
⁴Norman, *op. cit.*, p. 119.
Norman, in summarizing his discussion on organization, emphasizes internal and external organization of material. By internal organization, he means that "the sections must be organized so that the various parts fit together in a logical, self-ordering structure," and external organization means "establishing a relationship between the material to be learned and material which has already been learned, so that one fits neatly within the other." Various authors have similarly emphasized various techniques in organizing the material. Martin says, "Perhaps the most important strategy for inducing comprehension is providing useful associations between new ideas and familiar ideas. This is done chiefly by means of examples and illustrations designed to relate the new instance to other familiar instances already categorized. A second strategy for inducing comprehension is explicitness. Studies of the relative effectiveness of stating one's conclusions versus allowing the reader or listener to draw the conclusion himself have shown that, in so far as comprehension is concerned, it is invariably better to state the conclusion explicitly. Especially when listeners are less intelligent and where the issue is complex, unless the communicator states his propositions explicitly, they will be missed." Klapper supporting what has been suggested by Martin, says, "Persuasive communications which explicitly state conclusions are more likely to be effective than those which allow audience members to draw their own conclusions . . . Action recommendations, also, seem more likely to be followed as they are more specific and explicit. . . . Repetition, particularly repetition with variation, has been found to

1 Norman, op. cit., p. 122.
2 Ibid.
increase the efficiency of persuasion."\(^1\) Mudd and Sillars writing about the deductive pattern of speech say that, "the speaker states his proposition in the introduction of his speech and then develops a series of supporting arguments in the body. The main idea is revealed from the very beginning, and the logical and emotional motivations are developed and heightened by building up sub-points. The speech concludes with an appeal for acceptance of the proposition stated in the introduction."\(^2\) They, also, exhort to present a summary at the end of the speech.\(^3\) Soper's conclusions with respect to organization are: "(1) summarize or reclassify, (2) heighten interest, (3) add meaning and significance, (4) develop appropriate moods, (5) direct appeals for action."\(^4\)

**Items for encoding organization, the second independent variable in this study, were selected from the above statements, and they are given under implicit organization in Chapter I. Findings of some of the studies with respect to this variable are given below.**

Smith studied the effect of speech organization upon attitudes of college students, and found that overall organization of the speech is an important factor in persuasion.\(^5\) Parker found that when the respondents were tested immediately after exposure to the test messages, the use

\(^1\) Klapper, *op. cit.*, pp. 130-131.


\(^3\) Ibid., p. 9.


of topic sentences in organization of the speech significantly increased comprehension.\(^1\) Laird \textit{et al.}, also discovered that organization of material significantly increased learning and retention of the subject matter.\(^2\) Petrie states that "Although the amount of research dealing directly with the organization of informative speeches has been slight, the fact that many experimental studies demonstrate the general superiority of organized learning over that which is poorly organized suggests that the better the organization of an informative speech the more will be comprehended and retained."\(^2\)

From findings of the above studies, even though their subjects were college students, it is hypothesized that explicit encoding organization is positively correlated with the fidelity of message decoding by farm decision makers in India.


\(^{3}\)Petrie, \textit{op. cit.}, p. 80.
CHAPTER III

STUDY DESIGN AND METHODOLOGY

Scheme of the Chapter

The central purpose of this chapter is to present a coherent picture of the study design used in this investigation, and describe the strategies used to develop research instruments for the collection of valid and reliable data. The chapter is divided into five major sections. A brief description of the study locale with reasons for its selection are given in the first section. The stages of sample selection and development of experimental groups are explained in some detail in the next section. The third section focuses on the selection of experimental messages and their preparation for various treatments. It also includes taping of the test messages, description of other measuring instruments, and try-out of both. Procedures followed in collecting data are given in the fourth section, and validity and reliability of the data are discussed in the final section. Other procedures are discussed elsewhere in this presentation.

Study Locale

The Area

The study was conducted in Ludhiana district of the Punjab State in India. Punjab is traditionally known as the "granary" of India, and it has maintained this status even after successive partitions—first in
Figure 13. Maps Showing Location of Study Area and Sample Villages
1947 with the division of India, when the Western part of the State with a well-developed canal irrigation system went to Pakistan, and the second time in 1967 when its Eastern half was carved out as a separate state, called Haryana, and the Northern part was merged with another state, called Himachal Pradesh.

Ludhiana is one of the eleven districts of the reorganized Punjab State, and is located more or less in the center of the State. Soils of the district are alluvial in origin, varying from sandy to clay loam. Sand dunes are common and subsoil is invariably heavier than top soil.

Ludhiana district, covering an area of 3,427 square kilometers, has been divided into ten extension blocks. Total population of the district is 1,022,519 (with 69 percent living in rural areas) giving a density of 298 persons per square kilometer. There are about 45,000 farm families inhabiting 988 villages. Total cultivated area is about 774,000 acres, but the total cropped area is 1,035,000 acres, thus giving 134 percent intensity of cropping. About three-fourths of the total cropped area is irrigated through various means of irrigation. Major crops of the district are wheat, corn, peanut, cotton and sugar cane. The temperature in winter sometimes goes down to the freezing point and in summer may go as high as 120° F.

The People

The people of Punjab, in general, stand taller, work harder, and live longer as compared to other Indians. They tend to be change oriented, and are generally regarded as skilled farmers, better drivers, and best soldiers. Punjabi is the spoken language, and most of the people (about 95 percent of the farmers in Ludhiana district), belong to Sikh religion.

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They are deeply religious and value work. Nucleated family structure is becoming popular, though some families still prefer to manage their farms cooperatively through the extended family unit. The oldest male member of the family unit in such cases is, also, usually the farm decision maker. In more progressive families, it is the person who is more educated and who has achieved higher social status in the community and has developed working relationship with government officials, who makes farm decisions.

Why Ludhiana District Was Selected for the Study?

The main reasons for selecting Ludhiana district in which to conduct this study are:

1. In social science experimentation, the subjects being not inert manipulable bodies, the experimenter effect is of considerable significance. The way experimental subjects perceive the experimenter may substantially affect the outcome of the experiment. The variables pertaining to the experimenter which seem to play an important role in his perception by the study subjects in India are: socio-cultural and ethnic background, sex, language and accent, and any overt identification of religious background. The greater the perceived discrepancy on these dimensions between the experimenter and the experimentee, the more pronounced is likely to be the reactive effect on the latter in terms of outcomes of the experiment.

Since the experimental approach was followed in this study, so the factors just mentioned were of great concern to the author. Therefore, by selecting Ludhiana (a district within the central part of the Punjab, where the author comes from), congruency between the investigator and the study subjects on the perceptual variables mentioned above was
maintained. The author comes from the same socio-cultural and ethnic stock as the respondents, speaks the same language with the same accent, and belongs to the same religion.\footnote{Sikh religion to which about 95 percent of the farm decision maker of Ludhiana district belong. Overt religious symbols (unshorn hair, beard and turban), make identification of the followers very easy.}

2. Ludhiana is also the home base of Punjab Agricultural University, where the author taught before coming to the United States for higher studies. Professional consultation facilities were needed in the selection, development, and production of test materials, which Punjab Agricultural University provided.

3. Ludhiana is the only district in the Punjab where the Extension Agricultural District Program was initiated by a grant from the Ford Foundation in 1961. With the initiation of this program, reliable and more current data about the farmers of this district was subsequently collected as benchmark information. The author needed such information about the potential respondents for equation of treatment groups.

4. Well-developed communication system in terms of access roads to almost all villages in Ludhiana district exists. This was a facility useful to the investigator.

5. "Dhillon", the family name of the author is fairly common in Ludhiana district. It conveys the following information to the rural people: the incumbent is Sikh by religion, comes from central Punjab, and belongs to an agricultural family. In establishing rapport with the respondents, it proved to be very helpful.

Experimental Requirement vis-à-vis Sample Selection

The basic design of the experiment has been given in Chapter I. In this section, therefore, only the experimental requirements from the sample selection point of view will be discussed.
The primary objective of this study is to identify the effect of various message treatments on the fidelity of decoding. This can be done only if the most important variables pertaining to the respondents which could influence fidelity of message decoding are controlled, and only the message treatment variable is allowed to vary. Since there were four distinct experimental treatments (see Chapter I), four equated groups of respondents matched on selected dimensions were required. The most important dimension selected for equation of the treatment groups was adoption status of the respondents, though age and education were also used in this process. The rationale used for selection of this variable in the equation process was:

The adoption of improved agricultural practices is in itself a consequence of certain biographic, psychic social and economic characteristics of a respondent, as has been shown by several studies both in the United States and in India.\(^1\) The adoption status of a respondent,\(^2\) therefore, is a good reflection of his several more or less predictable characteristics, i.e., all the high adoption status farmers are similar in several ways, as are the medium and low adoption status farmers. So, when adoption status of a respondent is used as a criterion for the formation of treatment groups, several types of respondent-variables are represented in the process.

It was ensured in the matching process that the same number of respondents from each of the three adoption status categories were represented in each experimental cell.\(^3\)

---


\(^2\)How the adoption status of respondents of this study was determined will be explained in a later section of this chapter.

\(^3\)How this was actually achieved is explained later in this section.
Experimental Treatment

<table>
<thead>
<tr>
<th></th>
<th>$T_1$</th>
<th>$T_2$</th>
<th>$T_3$</th>
<th>$T_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC x IO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{11}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{12}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{13}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC x IO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{21}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{22}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{23}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC x EO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{31}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{32}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{33}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{41}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{42}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G$_{43}$</td>
<td>(17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>51</td>
<td>51</td>
<td>51</td>
</tr>
</tbody>
</table>

HC = High encoding complexity
IO = Implicit organization
LC = Low encoding complexity
EO = Explicit organization

Figure 14. Treatment Groups and Sub-Groups

Numerically, therefore, experimental group $T_1$ was equal to other experimental groups $T_2$, $T_3$, and $T_4$, i.e., $(G_{11} + G_{12} + G_{13}) = (G_{21} + G_{22} + G_{23}) = (G_{31} + G_{32} + G_{33}) = (G_{41} + G_{42} + G_{43} + G_{44})$. Also, $G_{11} = G_{12} = G_{13}; G_{11} = G_{21} = G_{22} = G_{23}; G_{31} = G_{32} = G_{33};$ and $G_{41} = G_{42} = G_{43}$.

Size of the Sample

For an alpha level ($\alpha$) of .01 and power of the test at 90 percent, the sample size was computed to be 200 respondents, i.e., 50 respondents in each of the four treatments; which means 17 respondents in each of the 1.7 experimental cells, giving a total of 204 respondents. Actually, however, for reasons explained later, 177 respondents were exposed to test messages.

Sampling Frame

All but one extension block of Ludhiana district were included in the sampling frame. The block excluded from the sampling frame was
"Ludhiana block." This block is attached to the Punjab Agricultural University for all development work. The extension education department of the university, through its students majoring in extension education, has almost saturated this block with all types of research surveys and other contacts with people of the block. This block and its people, therefore, were considered atypical, and so left out of the sample frame. Consequently, the nine blocks given below formed the sampling frame.

1. Dehlon
2. Doraha
3. Jagraon
4. Machhiwara
5. Mangat
6. Pakhowal
7. Samerala
8. Sidhwan Bet
9. Sudhar

Sample Selection

Selection of Sample Villages

Keeping in view the time limitations, it was decided that nine respondents—three from each of the three adoption categories mentioned earlier—would be selected from every sample village. This meant that 22 villages were to be selected out of nine extension blocks and about 890 villages.

Every block has five agricultural extension officers (AEOs) each with his own circle of about 20 villages. Two AEO circles from each one of the five blocks, and three AEO circles from each one of the remaining four blocks were selected to give a total of 22 circles. This selection was done randomly from the lists supplied by the office of the Pilot Project Officer, Ludhiana.
Letters were sent by the Pilot Project Officer to all the nine Block Development and Panchayat Officers requesting cooperation with the investigator. Contact with the AEOs whose circles were selected in the sample was established at the respective headquarters through their Block Development and Panchayat Officers. Lists of villages in their respective circles were obtained from them, and each AEO was asked to identify atypical villages\(^1\) or very small villages (with number of farm families less than 30). The names of such villages were removed from the selection list. From the remaining villages (345), 22 villages (one village from each of the 22 AEO circles already selected), were randomly picked. These 22 villages constituted the sample villages from which respondents were finally selected. Table 6 depicts the step-wise sample village selection process.

**TABLE 6**

**STAGES OF SAMPLE SELECTION**

<table>
<thead>
<tr>
<th>Sampling Frame</th>
<th>Sampling Stage</th>
<th>Sampling Unit</th>
<th>Number Selected</th>
<th>Sampling Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ludhiana District</td>
<td>I</td>
<td>Block</td>
<td>9 out of 10</td>
<td>Purposive</td>
</tr>
<tr>
<td>Block</td>
<td>II</td>
<td>AEO circle</td>
<td>2 AEO circles out of 5 for each of the 5 blocks; 3 AEO circles out of 5 for each of the 4 blocks</td>
<td>Random</td>
</tr>
<tr>
<td>AEO circle</td>
<td>III</td>
<td>Village</td>
<td>1 (out of about 20)</td>
<td>Purposive</td>
</tr>
<tr>
<td>Village</td>
<td>IV</td>
<td>Farm decision maker</td>
<td>9</td>
<td>Stratified Random</td>
</tr>
</tbody>
</table>

Total number of villages in the sample = 22

\(^1\)There are villages in almost every district which are either very progressive or very backward. The selection of such villages in the sample was avoided.
Selection of the Decision Makers

A farm decision maker was defined as the person who makes farm management decisions in a farm family. He was invariably, also, the head of the household. As described earlier, from each sample village nine farm decision makers were selected as respondents—three of the nine with high adoption status, three with medium adoption status and three with low adoption status.

To categorize the farm decision makers into high, medium, and low adoption statuses the ideal method would have been to administer an adoption scale to potential respondents, analyze the results and then determine their adoption status. This in itself would have been a full-fledged study. Therefore, keeping in mind the time and resource limitations, an alternate method described below was adopted for the purpose. However, before actually using it for classification purposes this method was discussed with the consultants and all of them approved it. The method is described below.

In an intensive agricultural district, like Ludhiana, village level workers (VLWs) work in close collaboration with farmers, and transfer from one area to another in case of these village level workers are very infrequent. Moreover, the farmers arrange their supplies pertaining to improved agricultural practices through their VLW. This functionary of the extension department, therefore, develops a reliable knowledge of the adoption status of farmers from the villages assigned to him.

In addition to the VLW, there are two other key persons from the village itself who have good information about the adoption level of farmers. These two persons are: the village sarpanch (the head of the village government) and the village lambardar (the person who collects
and revenue from farmers). Moreover, in an Indian village, almost everybody has sufficient information about everybody else to classify a particular farm family on the basis of its adoption status, and broad categories of age and education.

For the purpose of selecting respondents, therefore, the VLWs of the 22 sample villages were contacted through their AEOs. Objectives of the study were explained to them in general terms. They were asked to classify the farm families in their respective villages into three broad categories, viz., high adoption status, medium adoption status, and low adoption status. Since every VLW in an intensive agricultural district program area maintains a list of heads of farm families in the villages assigned to him, it was not hard for them to make this classification.

Next step in this selection process was to contact the sarpanches and lambardars of the respective villages and obtain information about potential respondents with respect to their adoption status, age, and education. Since these two village functionaries did not have lists of the farmers, the author read out names from the lists supplied by the VLWs, and they gave the necessary information. The village sarpanch and lambardar were contacted separately (though not necessarily on separate days) so that their categorization of farmers would not be influenced by each other's rating. They were also asked to give the name of the farm decision maker, if different from the name read out to them. It was noted that in almost every case the head of the household was also the farm decision maker.

The author thus had needed information about 984 farm decision makers in 22 villages with respect to their adoption status, age, and education.
Equation of Treatment Groups

The next important step (back in the office) was to equate treatment groups on the basis of adoption status of farm decision makers. Because of the large size of "respondent pool" (984) from which the final selection of 204 respondents was to be made, no serious problem was experienced in matching. The author's previous experience in equating groups, also, proved to be helpful at this stage.¹

The first step in the matching process was to identify names of those farm decision makers from each village on whose adoption status there was lack of consensus among the VLWs, the sarpanch, and the lambardar. Names of such farmers were removed from the selection lists. The remaining names, thus left, were those farm decision makers about whose adoption status there was consensus among VLWs, the sarpanch, and the lambardar.

The second step, in the equating process was to match the respondents on the dimension of age and education within each adoption category. The 204 farm decision makers, thus selected, formed the final respondents of this study.

Selection of Experimental Messages

Two messages from among those on the approved list for release in the field were to be selected. It was decided that one message would pertain to an agricultural production practice, and the other message would pertain to an agricultural non-production practice.

¹In this study "Group Rorschach as a Tool for Investigating Personality Differences Between Intellectually Above-Average and Below-Average Students" (unpublished M.Ed. thesis, Rajasthan University, Jaipur, India), the author had to select four equated groups of 25 respondents each out of 500 students.
Selection Criteria

The following criteria were used in the selection of experimental messages:

1. Proneness of the message to be treated with selected message treatments.
2. Measurability of the subject matter at finer levels of distinction among various respondents.
3. Relevance of the message content to all types of farm decision makers.
4. Relevance of the message at the time of field work.
5. Within the physical and economic reach of all types of farm decision makers.

Selection of the Tentative Practices

The author personally contacted the following officers of the Punjab Agricultural University and the Intensive Agricultural District Program (IADP) for suggestions with respect to the possible messages which could be used in the study:

Extension specialists in the subject matter areas of extension, agronomy, entomology, soils, and farm management; the Pilot Project Officer; the District Development Officer; and some of the Block Development and Panchayat Officers.

Surprisingly, not very many messages which previously had not been released in the field were suggested by these officials. However, a list of the relatively new messages based on their suggestions was developed, and is given below:
1. First irrigation to dwarf wheats after 3 weeks rather than 4-5 weeks
2. Berseem (alfa-alfa) seed inoculation
3. Late sowing of wheat S-308
4. Treatment of sugar cane sets with agl01
5. Use of 2-4D herbicide to control weeds in wheat
6. Use of Di-ammonia-phosphate fertilizer
7. Safe storage of food grains
8. Control of field rats
9. Earthing up of hybrid maize (corn)
10. Mechanical harvesting of wheat and/or groundnut (peanut)

Selection of Final Practices

The above-mentioned ten practices were given for evaluation to the persons whom the author had originally contacted for suggestions of tentative messages, and also to a panel of judges consisting of the staff members of the Department of Extension Education at Punjab Agricultural University and the field staff of IADP. They were also given the selection criteria mentioned above, and were requested to rank these practices according to their criteria.

The rank orders of responses of these persons were pooled and averaged, and a final rank order of practices established. Table 7 shows this ranking.

Both the practices with rank orders 1 and 2 pertained to non-production aspects. The design of the study, however, required that one message pertain to an agricultural production practice and the other to
<table>
<thead>
<tr>
<th>Name of Practice</th>
<th>Rank Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Irrigation to dwarf wheat</td>
<td>4</td>
</tr>
<tr>
<td>2. Berseem inoculation</td>
<td>7</td>
</tr>
<tr>
<td>3. Late sowing of S-308</td>
<td>5</td>
</tr>
<tr>
<td>4. Aglol treatment</td>
<td>10</td>
</tr>
<tr>
<td>5. Use of 2-4D</td>
<td>3</td>
</tr>
<tr>
<td>6. Di-ammonia-phosphate</td>
<td>8</td>
</tr>
<tr>
<td>7. Storage of food grains</td>
<td>2</td>
</tr>
<tr>
<td>8. Control of field rats</td>
<td>1</td>
</tr>
<tr>
<td>9. Earthing up hybrid maize</td>
<td>6</td>
</tr>
<tr>
<td>10. Mechanical harvesting of wheat and peanut</td>
<td>9</td>
</tr>
</tbody>
</table>

A non-production practice. This dilemma was solved by rejecting the practice with rank order 2, and selecting the practice with rank order 3. This practice, the use of 2-4D herbicide to control weeds in wheat crop, satisfied the "production" requirement of the study.

The two practices selected for developing experimental messages, therefore, were:

1. Control of Field Rats. This was the practice ranked number 1 by the extension specialists and panel of judges. Since field rats had become a menace to the crops, people as well as the field staff of LADP were very much concerned about this problem.

2. Use of 2-4D herbicide to control broad leaf weeds from wheat fields was the second practice selected. This practice was fairly new, and a message on this practice was also timely.
The appropriateness of these two practices for experimental purposes was well considered by the author in the light of selection criteria previously mentioned.

**Preparation of Messages for Treatments**

After selecting the two messages, the next step was to prepare them for experimental treatments according to the prescribed criteria. Several sub-steps were involved in this phase. A brief description of each is given below.

**Written Version of the Messages**

All relevant information available about the two selected messages was collected. It was analyzed into "bits" of information, each "bit" representing a certain amount of information, for example, "best time of application of 2-4D," "effect of late application of 2-4D," "name of the sprayer," etc. (See Appendix A and B for bits of information pertaining to message I and II, respectively.) Since each experimental treatment was to be matched for the parity of content, this approach in preparing written version of the messages proved very helpful.

Eight versions of the two messages, four for each message, were written. In preparing these versions, criteria of encoding complexity (high or low) and encoding organization (implicit or explicit) were kept in mind. Fleish's formula for determining the level of complexity of a message, even though standardized in English language with English-speaking population, was used to determine the complexity of experimental treatments. This was done because no such formula was available in the literature which was developed primarily for Punjab farmers in Punjabi.
language, or even for Indian farmers in Hindi language. In the absence of such a formula, it was assumed that Flesch's formula would have cross-cultural validity so far as the difficulty level of a message is concerned.

A professor of Punjabi language,¹ who has done considerable work in studying the structural aspects of the Punjabi language, was, however, consulted before developing the written version of the messages. He observed that length of sentences and number of personal references, components of Flesch's formula, would probably be equally applicable in Punjabi language. Regarding the number of affixes in a message, the third component of the formula under reference, may not have an equal amount of validity in Punjabi, according to him. English, he said, is a highly complex and sophisticated language, so the number of affixes and suffixes with English words would be many times more than with Punjabi words. He said, "Punjabi is a folk language at a much simpler level of structural make up, and it may take a long time before it becomes a truly academic language with all the complexities of other advanced languages." To confirm this, several written Punjabi messages from books were analyzed and substantiation was found for the above generalization. However, efforts were made to incorporate as many words with affixes and suffixes in the high complexity version of messages as possible. But still the number of affixes per 100 words could not be completely matched with Flesch's norms at an equivalent level of difficulty.

¹Dr. Jaswant Singh Jas, Government Teachers Training College, Jullundur, Punjab, India.
### TABLE 8

**ANALYSIS OF TEST MESSAGES ON THE DIMENSION OF STRUCTURAL COMPLEXITY**

<table>
<thead>
<tr>
<th>Structural Variable of Message</th>
<th>Treatment 1 HC X IO</th>
<th>Treatment 2 HC X EO</th>
<th>Treatment 3 LC X IO</th>
<th>Treatment 4 LC X EO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Message 1</td>
<td>Message 2</td>
<td>Message 1</td>
<td>Message 2</td>
</tr>
<tr>
<td>1. Sentence length</td>
<td>35.3</td>
<td>37.5</td>
<td>28.7</td>
<td>31.8</td>
</tr>
<tr>
<td>2. Number of personal pronouns per 100 words</td>
<td>1.4</td>
<td>1.6</td>
<td>2.3</td>
<td>1.7</td>
</tr>
<tr>
<td>3. Number of affixes per 100 words</td>
<td>36.0</td>
<td>38.3</td>
<td>33.8</td>
<td>35.0</td>
</tr>
<tr>
<td>4. Number of low frequency (technical) words</td>
<td>9.0</td>
<td>12.0</td>
<td>12.3</td>
<td>14.4</td>
</tr>
<tr>
<td>5. Number of high frequency (non-technical) words</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6. Total number of words</td>
<td>1150</td>
<td>1018</td>
<td>1725</td>
<td>1407</td>
</tr>
<tr>
<td>7. Duration of the taped message (in minutes)</td>
<td>9</td>
<td>7.8</td>
<td>14.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

**HC** = High Encoding Complexity  
**LC** = Low Encoding Complexity  
**IO** = Implicit Encoding Organization  
**EO** = Explicit Encoding Organization
Evaluation of the Written Version of the Treatment Messages

After initial development, the eight versions of the two messages were given to a panel of judges selected from the extension staff, Punjab Agricultural University, and field staff of IADP. Each judge was to assess every written version of the messages on the dimensions of complexity and organization using a common set of criteria. Some slight modifications in the wording of some sentences were made as a consequence of this assessment.

One version each of the two messages with high encoding complexity and implicit encoding organization is given below. Other versions of the two messages are given as Appendices I and J. As already pointed out, the original messages were written and produced in Punjabi. The message texts which appear here and in the Appendices are the English translations, which were done as accurately as possible in order to maintain the sense of the originals in tact.

Message I: Use of 2-4D Herbicide to Control Weeds in Wheat

Treatment I: High Encoding Complexity and Implicit Encoding Organization

2-4D, a herbicide, is a new chemical which is used for controlling broad leaved weeds from thin and long leaved crops, like cereals, millets, maize and sugar cane. Weeds, it has been estimated by agricultural scientists in India, cause 5-50 percent reduction in yield of food crops, a loss more than that caused by plant diseases and insect-pests combined. Not only obstacles are created by weeds in successful crop production, but also optimum efficiency of fertilizers and irrigation, the two scarce and
valuable agricultural resources is reduced. 2-4D is a selective and trans-
located herbicide, which is absorbed by leaves of a plant and then carried
to other parts where it stimulates unusually rapid rate of growth, thus
making it virtually impossible for roots to cope up with this growth,
which ultimately results in death of the plant within a few days. In
spite of the fact that 2-4D is a more efficient and less expensive method
of weed control from wheat crop, Indian farmers in other parts of the
country still seem to prefer the traditional hand and tool method of weed
control, which is not very effective and is relatively expensive. 2-4D
can be obtained from any of the two following sources without any pre-
arrangement in terms of getting a license etc. etc. from any government
functionary of any department whatsoever. The village level worker
assigned to the village you live in is one source and the other is any
Burmah Shell petrol pump in the area.

In the Punjab the losses due to weeds in wheat crop, a very im-
portant crop from the farmers' point of view, have been reported to be
between 20-45 percent by the agronomists on the basis of experimental
studies conducted at selected farms. Weeds, the undesirable plants in
crops, compete for moisture, nutrients, space, light and air with the
main crop sown for gainful purposes. 2-4D is available in three formu-
lations, the first being sodium salt which is white water soluble powder
with a typical odor; the second is amine salt which is a light brown
liquid with water soluble physical properties and is almost odorless;
the third formulation is ether salt which is a colorless but volatile
liquid and forms emulsion with water. To make a mixture of 2-4D for
spray purposes, 125-150 gallons of water would be needed and any of the
three formulations could be used to control weeds from wheat crop. Best
time of application, Punjab agronomists say, is between 40-50 days after
sowing wheat, since weeds at that stage are neither so hard that they
would not be killed by 2-4D, nor they are ungerminated that they will
escape eradication. Moreover in late application, ears of wheat crop
are also likely to be deformed by the herbicide which will in turn affect
adversely yield of the crop. One hectare of crop can be sprayed in a day
of nine hours by two men, one of whom sprays and the other arranges for
the supplies. To spray one hectare of wheat crop, 2.50 pounds of sodium
salt, or 1.75 pounds of amine salt or 1.25 pounds of ester salt will be
required. A larger quantity of the chemical than recommended, could re-
sult in stunted growth of the crop and deformation of the ears, and a
smaller quantity may prove to be ineffective in killing all the weeds.
The name of the sprayer used for spraying 2-4D is Knap-Sack sprayer and
may be purchased, in case you do not own it or are unable to borrow it
from the local village level worker, for about 200 rupees from either
Bharat Plant Protectors, Municipal Gardens near G.T. Road Ludhiana or
from Sigma Distributors, Miller Ganj, Ludhiana.

All the weeds associated with wheat crop, like bathu, karari, pit-
papra, jangligobhi, pohli and krund, all those which usually germinate
after three weeks of sowing, can be effectively controlled with 2-4D
without any harmful side-effects to the main crop. Also all the three
formulations are non-poisonous, inflammable and noncorrosive, so mixture
with water for spraying can be made without undue precautions.

Spraying should not be done on a cloudy and windy day, otherwise
rain may wash the chemical down before proper absorption and wind may
disseminate it to the adjoining fields where it may harm broad leaved
crops like cotton, tomatoes and grapes. Since humidity decreases evaporation thus reducing loss of the chemical from evaporation, so it is suggested that spray should be done after irrigation to the crop. Best time for spray is on a sunny day between nine in the morning to one in the afternoon, when the temperature is neither very low nor very high, because at low temperatures absorption of 2-4D is slow and at high temperatures quick evaporation before proper absorption is possible. Monetary expenses which include the price of the chemical, labor costs, and sprayer depreciation charges, come to about 75 rupees to spray one hectare of wheat crop. If loss due to weeds is put at 25 percent, a figure within the range of estimates given by Punjab agronomists, per hectare increase in yield of wheat would come to 10-15 quintals, thereby adding 1000 to 1500 rupees to your gross income, taking sale price of wheat at 100 rupees per quintal, and the net profit will be around 925 to 1425 rupees per hectare.

If some one does not know the use of sprayer, the village level worker may be requested to demonstrate. Further information about the herbicide, if needed, may be obtained through the village level worker. Thank you for listening to this innovative practice.

(Please see Appendix I for the other three treatments of this message.)

Message II: Control of Field Rats

Treatment I: High Encoding Complexity and Implicit Encoding Organization

Out of the dim dark ages, up to this 20th century of progress, rats have ever plagued man, yet rat menace has never been seen as a problem that must be solved by intelligent and systematic exercise along the lines of scientific research, but they have been considered as more or less of a
necessary evil and that, what cannot be cured must be endured. This ignominious creature consumes, pollutes and destroys crores of rupees worth of food and other cash crops, which would well nourish the impoverished people and increase the profits. Not only that, rats are also vehicles of several formidable diseases like plague, typhus fever and rat-bite fever, thus being responsible for more human illness and deaths than any other group of mammals.

It has been estimated that there are eight rats per human being in the rural areas of this country and each rat consumes food grains worth 15 rupees per year and destroys crops ten times that much, all of which according to the same estimate comes to 7 billion rupees per year. Rats multiply at a prodigious rate throughout the year with peaks in spring and fall. One pair of rats, it is believed, produces 6 litters of about eight offspring each, which reach maturity in 100 days and start breeding, and so by the end of the year the number reaches 1500.

Rats are sociable among themselves, live in colonies, fight with members of other colonies and have been known to leave en-masse from a haunt where the morality from poisoning had been great. There are brown, black and grey rats, but brown rat who digs deep burrows, is found in the fields. Active burrows usually have a pile of newly excavated material at the entrance along with fresh droppings and gnawed plants whereas dead burrows have only cobwebs, dry dust, and old gnawed plants. Home range of a field rat is between 100-150 feet and for every rat seen during the day there are probably 15-20 more rats in the vicinity.

Use of poisons is more common in the control of rats than that of predators, simply because in the long run poisons are relatively less expensive and more feasible as compared to predators. Among poisons zinc
phosphide, a greyish black powder, is more population because of its high effectiveness, insolubility in water, easy commercial availability and lack of strong odor and taste.

Winter is the best time to poison rats because of minimum breeding activity at this time and the fact that population poisoned in winter takes 12 months to return to normal whereas population poisoned in summer takes only six months.

To make poison baits, take one part of poison, ten parts of molasses and 24 parts of wheat flour, mix them well to even the poison in the entire mixture and make 80–90 baits out of one pound of mixture by using small quantity of water. Since this poison is toxic to human beings and domestic animals, take full precautions to handle it carefully, and keep baits where children and animals would not eat them. In case some one eats a bait by mistake administer copper sulphate, and lots of water but no fats or oils or milk. Forty milligrams of poison is sufficient to kill a rat in less than an hour, but lesser amounts may take 2–3 days. Fresh baits, which are eaten well by the rats, should be wrapped in 4” x 4” paper to increase bait acceptability and put them near fresh burrows on a clear evening. Hands should be thoroughly washed with soap along with all the utensils used in the preparation of baits. Because this poison is cheap and easy to obtain and also more effective, therefore, its use should be preferred over others by obtaining it from the village level worker or any insecticide shop in a nearby town.

(Please see Appendix J for the other three treatments of this message.)

Tape Recording of the Messages

Several copies of written versions of the messages were made.

Four persons considered to be typical of the field staff of IADP were
selected for the verbal production of messages according to prescribed criteria for each treatment. The author assisted these persons in the verbal preparation, particularly with respect to the rate of speech per minute. One hundred and thirty words per minute, as found by Arthreya with Indian population was accepted as the rate of speech per minute for taping purposes of the test messages. After several days of preparation, the messages were taped on a Panasonic portable tape recorder which has fairly high fidelity of sound production.\(^1\)

Four sets of tapes were thus prepared, one for each producer. These sets of tapes were given to the same panel of judges, as before, for selecting one set which they thought was the best with respect to the quality of voice. The quality of voice was judged on a seven-point rating scale on these six dimensions:\(^2\) Pronunciation, resonance, pitch, loudness, articulation and vocal variety. On the basis of judges' ratings, one set of tapes was finally selected. As mentioned before, it was considered important to keep the voice variable constant, i.e., to tape all of the test messages in the same voice.

**Measuring Instruments**

The following measuring instruments were developed and used in the study:

1. **Pre-test schedule:** Since the level of previous knowledge of a respondent with respect to the subject matter of a test message may affect its fidelity of decoding, a pre-test was designed.

---

\(^1\) The same tape recorder was later used in playing the messages back to the respondents.

It contained items to test the general level of familiarity of respondents with the subject matter of the two selected messages (Appendix C).

2. **Post-test schedule**: Two post-test schedules were designed, one for each of the two selected messages. At least one test-item was developed around each "bit of information." (For the two schedules, see Appendices D and E.)

3. **Attitude scale**: A five-point attitude rating scale with ten pertinent statements was developed to identify the attitude of farm decision makers toward improved agricultural practices (see Appendix F). The objective, as previously stated, was to determine if the attitude of a person and his ability to decode a message have any relationship. Some items on the bio-data of respondents formed part two of this schedule.

4. **Level of aspiration**: "Self-anchoring" scale technique developed and used by Hadley Cantril\(^1\) in his cross-cultural studies was used to determine the level of aspiration of a respondent at the end of two post-tests (Appendix C). This scale was very appropriate for the purpose and has been successfully used, even with illiterate respondents.

---

**Try-Out of Test Messages and Measuring Instruments**

Before going to the field with test materials, one of the important phases is to try out the schedules with non-sample respondents who otherwise are similar to the sample respondents. It may be called "dress-

rehearsal" with an opportunity to make appropriate changes, if any, in the test material or strategies of data collection.

The try-out of test messages and measuring instruments developed for this study were done with the farm decision makers from Ferozepur district, who were attending a training course at Punjab Agricultural University at the time. These farmers represented high and medium adoption status categories. The fact that low adoption status category farmers were not represented in the "try-out" respondents, was taken note of. But the purpose of the try-out stage was to assess the operational aspects of the test materials, rather than the outcome as measured by them. Since these respondents were from another district, there was no likelihood of their "polluting" the target respondents by pre-informing them about the content of the messages.

Try-out of the test materials was done procedurally the same way as it was planned to be done with the target population. As a consequence of this, it was discovered that rather than keeping the volume of the tape recorder constant for all the respondents, every person should be asked in the beginning if the volume was at his comfortable level of listening. The second change suggested by the try-out was that instructions about listening to the message and what would happen after that listening should not be recorded on the tape. It was done so, that all respondents would listen to exactly the same instructions, but it appeared as though the "try-out" respondents had a tendency to associate the taped voice with that of the author.¹ This observation gave rise to speculation that such association might affect the fidelity of decoding, because of transference of source credibility. Another strategic point suggested

¹It was found out when some persons at the end of the tape complimented the author for clear voice and good pronunciation.
by the try-out was that a respondent at the time of his exposure to the message should be alone. The presence of another person, even though sitting quietly, sometimes made the respondent look at that person and smile, or just try to guess what he was thinking about the message. It was felt that this condition interfered with reception of the message. No other changes in either the test messages or the measuring instruments were suggested by the try-out.

Data Collection

The data were collected by administering the test materials to the respondents individually. Initial contact with the respondents was made through the respective village level workers or the village sarpanches before the day of test administration. Arrangements with respect to date, time and place for the tests were discussed in that meeting.

Most of the respondents kept the appointments, those who could not, were tested later at a mutually convenient time. It was made certain that at the time of test administration only the author was present with the respondent. Whenever it was not possible, the respondent was suggested to take a ride with the author on his motor-bike and go to a place where privacy could be assured. Efforts were made to conduct the tests at the households of the respondents in the afternoon, when they had finished most of their daily work routines. In some cases, however, tests were administered at the farm or in the panchayat house. Some respondents had to be transported by the author from their fields where they had been working to their houses for the purposes of test administration.

Before the tests were administered, it was made sure that the respondent was at ease and not anxious in any way. Purposes of the study
were explained in general terms and all the queries whatsoever were answered to the satisfaction of the respondent. The test instructions were well memorized by the author, and they were narrated immediately before the tests. It was also ensured that the test situation was not perceived by the respondent as an examination-type-threatening-situation.

In the series of tests, the pre-test (Appendix C) was administered to the respondent first. Instructions with respect to the first message were given thereafter, and the respondent was exposed to the experimental treatment. 1 Immediately after the message was over, post-test pertaining to the first message was administered. After an interval of about five minutes the respondent was exposed to the second message. Post-test for the second message was administered at the end.

Information with respect to the other test measures, namely, attitude and bio data schedule, and level of aspiration scale, was collected after the second post-test.

In order to keep test situations from one respondent to another as similar as feasible, the following precautions were taken:

1. As pointed out earlier, at the time of actual test administration, only the author was present with the respondent. The author intentionally wore similar type of casual dress throughout the test-administration period. So whatever reactive effect the respondents had in the test situation in human form was from perceiving the author, who was not a variable, but the same person throughout.

2. The same tape recorder (with good fidelity of sound production) was used throughout the experiment.

1 Assignment of respondents to various experimental treatments was done beforehand.
3. The test administration was done under a physical setting with which the respondent was quite familiar. The distracting influence of the environment, if not all together eliminated this way, was at least reduced to the minimum.\(^1\)

Therefore, out of the major perceptual objects in the communication test situation—the tape recorder (channel), the speaker (taped voice), the communicatee (respondent), the message (information bits), the message treatment (experimental treatment), the physical setting (not a variable from respondent's point of view because of the familiarity element), the author (same person similarly dressed throughout the test period)—only the message treatment in the form of experimental treatment and the respondent varied. It is not claimed here that variables other than the two just mentioned were perfectly controlled.

4. Most of the test administrations were done in the afternoons. But there were some which were done either in the mornings or evenings. It may be surmised that this could have had a differential effect on the outcome of the experiment. But there is no reliable evidence to suggest that respondents exposed to messages at different times of the day vary significantly on their performance.\(^2\)

5. The author made it a point not to look at the respondent as he was being exposed to the message for fear of making him self-...

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\(^1\) It has been found that under familiar physical environmental settings, extraneous noises resulting from familiar objects, have a very low auditory distraction potency. See, for example, Petrie, op. cit., p. 85.

\(^2\) See, for example, P. J. Holloway, "The Effect of Lecture Time on Learning," British Journal of Educational Psychology, 36, No. 3 (November, 1966), pp. 255-258.
conscious or interfering in his listening which could have affected the experimental outcome.

6. Volume of the tape recorder was adjusted to the comfortable level of auditory discrimination of verbal sounds for the respondent. Too high or too low sounds could have affected the listening of the respondent.

7. The respondents were not hurried to respond to the post-test items, and were permitted to take their own time.

**Validity and Reliability of the Data**

The goal of every investigator is to obtain data which have high degrees of validity and reliability. Whereas ensuring reliability of data may not necessarily mean high validity, the reverse is generally true. Every effort made to increase validity, internal as well as external, contributes to reliability.

**Validity**

The following steps were taken to ensure validity of data:

1. The research design was thoroughly discussed with the special graduate advisory committee of the author at Cornell, and "snags" were removed.

2. Bandwidth of variables was intentionally kept small in the interest of maximizing experimental fidelity.

3. Both probability and non-probability sampling techniques were used in the selection of respondents. The experimental groups were carefully developed, taking into account the matching factors.

4. Selection of the test messages and written and taped versions of
various experimental treatments was done with the assistance of a panel of judges.

5. The author knows the local language well (it being his mother-tongue) and on account of the factors already mentioned was able to establish good rapport with the respondents before exposing them to the test materials.

6. Changes suggested by the try-out of the test material were incorporated.

7. The tape recorder used for playing back the test messages to the respondents had high fidelity of sound reproduction.

8. Standard explanations, well memorized by the author were given to all respondents (Appendix H).

9. Reactive effect of objects or conditions in the micro-test situation on the respondents may also impair validity of the data. Several precautions were taken with respect to this factor.

10. It has been observed with students that those "taking the test a second time, or taking an alternate form of the test, etc., usually do better than those taking the test for the first time." All respondents of this study took the post-test only once, though at one stage it was planned to be administered a second time after a lapse of some days, but the idea was left because of reasons like the one given above. The pre-test administered before the treatment contained items only of a general nature as related to the subject matter of test messages.

---

11. Isolation of the respondents is another feature which may affect the validity of an experiment. Thus, those experimental units (farm decision makers in this case) which have been exposed to a treatment by coming in contact with those who have not been exposed, may adversely affect validity of the experiment. In the present research, because of this very reason, the sample was selected from a geographically wide area—the whole district of Ludhiana covering an area of 3,247 square kilometers, and the physical mobility being very much localized, there were very few chances of "contamination." The try-out of the test materials was done with a group of farm decision makers from another (Ferozepur) district, with a remote possibility of their "polluting" the experimental sample.

12. History,¹ events affecting respondents between the first and the second observation, is one of the major invalidating variables in an experiment. Even the difference of one day between pre-test and post-test may produce changes in the respondents which may not have been caused by the treatment. "History becomes a more plausible rival explanation of change the longer the 0₁ (pre-test) - 0₂ (post-test) time lapse, and might be regarded as a trivial problem in an experiment completed within a one- or two-hour period."² In this investigation the time lapse between pre-test was only the duration of treatment (test-message).

So, there was hardly any chance of extraneous variables causing any change in the post-test scores of the respondents other than the experimental treatment to which they were exposed.

¹Campbell, op. cit., pp. 5 and 6.
²Ibid., p. 7.
13. The rate of speech for the presentation of test messages was 130 words per minute, as found by Atthreya on Indian population. So, the rate of speech was neither fast nor slow, and it was controlled for all the treatments.

14. The communication of ideas from a speaker to a listener is the result of acoustic waves. The listener should be able to discriminate between acoustic waves of different frequencies for intelligibility of speech. Two sonograms (acoustic measurement of speech sounds) from two randomly selected points on the tapes used for treatment messages were made (see Figures 15 and 16) and it was found that both of them had uniformly good frequencies, and therefore, were acoustically intelligible. (In the sonograms, time is portrayed along the horizontal axis, and frequencies on the vertical axis. The frequencies are well within the range of 2,000-4,000 cycles per second—the optimum threshold of sound detectability.)

Reliability

Whereas with all the features built into this research to maximize validity, the reliability is supposed to be fairly high, still another method was used to determine this.

Three methods have been suggested to determine the reliability of data in a research study. They are:

1. Test and re-test method

2. Alternate form method

1 Atthreya, op. cit., p. 40.
2 Dr. T. Walter Carlin, Chairman, Department of Audiology and Director, Speech Clinic, Ithaca College, Ithaca, New York, very kindly helped in this.
3 Miller, op. cit., pp. 47-63.
Figure 16. Sonogram of the Words Meaning "keep this thing in mind."
3. Split-half design method

Methods (1) and (2) could not be used in this study because of reasons already explained. The split-half design method was, therefore, used to establish reliability. The procedure adopted is explained below.

One treatment group (treatment 3) out of four was randomly selected. Like every other treatment group of this study, this group had three sub-groups of 15 respondents each. Each sub-group represented one of the three adoption status levels—high, medium and low. The respondents of each sub-group were randomly divided into two equal sections, after randomly discarding one case from each adoption status level. A correlation (τ = tau) was calculated for the two sections thus constituted for the three sub-groups on their net-fidelity scores. The results are given in Table 9.

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Correlation Coefficient</th>
<th>Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>.75</td>
<td>.86</td>
</tr>
<tr>
<td>Medium</td>
<td>.73</td>
<td>.84</td>
</tr>
<tr>
<td>Low</td>
<td>.67</td>
<td>.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.84</td>
</tr>
</tbody>
</table>

As can be seen from Table 9, the reliability coefficient for high, medium, and low adoption status groups who were exposed to experimental

1Reliability coefficient was computed by the formula \( \frac{2r}{1+r} \) as given by James E. Wert et al., Statistical Methods in Educational and Psychological Research (New York: Appleton-Century-Crofts, 1954), p. 332.
treatment three is .86, .84 and .80 respectively. The overall reliability coefficient is .84, which is fairly high. A part of this high reliability coefficient may be attributed to effective equation of groups on the basis of adoption status of the respondents.

Analysis of Data

The following procedures were used to analyze the data.

Computation of Gross and Net Fidelity of Message Decoding Scores

Pre-test schedules of respondents were scored as follows: Three points were awarded for every correct answer; two points for a partly correct answer, and one point for an incorrect answer. Zero was given for a "don't know answer." The total of these points for all items on the pre-test constituted a respondent's score on the pre-test schedule. It should be pointed out here that respondents were not given a choice to select from a number of possible answers to a particular question at this stage. This was done to avoid their sensitization to the correct answer at the message exposure stage and thus affect their fidelity of message decoding at the post-test stage.

Scoring of the post-test schedule was done as follows: Four points were awarded for free recall of an answer, three for a correct aided recall of the answer, two for a partly correct answer, one for an incorrect answer and zero for no answer—"don't know." The total of scores for all items constituted gross fidelity of message decoding scores of an individual.

Net fidelity of message decoding score for a respondent was obtained by subtracting his total score for the pre-test schedule from
the total score for the post-test schedule. Net fidelity of message decoding score thus obtained was used for all the computations later on.

Statistical Computations: Most of the statistical computation work was done on an IBM 360 computer, using SPSS and TSAR systems. Computation of 't' tests was done on the "Wang-Electronic" desk calculator.

Level of Significance: .01 and .05 levels of probability were used as the basic levels of significance for the acceptance of statistical differences between and among various groups. A .01 level of significance was used to reject a null hypothesis, and .05 level was used as an inconclusive evidence of significance of difference.
CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

This chapter is divided into eight main sections. In the first section characteristics of the respondents constituting various experimental groups are analyzed and discussed. The effect of various experimental treatments per se on the fidelity of message decoding is analyzed and discussed in the second section. Findings pertaining to the fidelity of message decoding as affected by message complexity and organization separately and in conjunction with personal characteristics of respondents are presented and interpreted in the third and fourth sections respectively. In the fifth section, effect of personal characteristics in themselves on the fidelity of message decoding is analyzed. Simultaneous interactive effects of message complexity, encoding organization and adoption status are discussed in the sixth section. Correlation of independent and intervening variables with the fidelity of message decoding and regression analysis of data are presented in the final section of this chapter. Cross interpretation references with respect to various variables wherever necessary are given throughout the chapter.

Characteristics of the Respondents

As already mentioned, the primary sampling technique used in this study was stratified, since the design required the selection of equated
experimental groups. To achieve this equation from a randomly selected finite population within the limited resources of time and finances is often hard. It is particularly so in the case of human beings who because of the fixed nature of their personal characteristics cannot be instantaneously manufactured with desired specifications. Efforts, therefore, were made to select as homogeneous experimental groups based on the dimensions of a few but highly significant independent variables as was feasible. As will be seen from the tables presented in this section, the total number of respondents in this study is 177, and not 204 as originally planned. This decrease in number resulted from the unavailability of respondents with desired characteristics from the group equation point of view from within the sampling frame. The investigator, in the interest of precision of the experiment, preferred not to compromise the selection criteria. Moreover the size of 15 respondents in each experimental cell was quite adequate for valid statistical treatments.

Characteristics of the respondents on the basis of their adoption status, age, education, attitudes and levels of aspiration are described in the following pages.

Adoption Status

Adoption status is the major intervening variable in this investigation. Each status of adoption, viz., high, medium, and low is represented by 59 respondents. Their further distribution into various experimental treatments is shown in Table 10.

1See pp. 99-100 for the criteria used to determine adoption status of respondents.
TABLE 10
DISTRIBUTION OF RESPONDENTS ACCORDING TO ADOPTION STATUS AND EXPERIMENTAL TREATMENTS

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>$T_1$ (HC X IO)</th>
<th>$T_2$ (HC X EO)</th>
<th>$T_3$ (LC X IO)</th>
<th>$T_4$ (LC X EO)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>14</td>
<td>59</td>
</tr>
<tr>
<td>Medium</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>14</td>
<td>59</td>
</tr>
<tr>
<td>Low</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>14</td>
<td>59</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>45</strong></td>
<td><strong>45</strong></td>
<td><strong>45</strong></td>
<td><strong>42</strong></td>
<td><strong>177</strong></td>
</tr>
</tbody>
</table>

HC = High complexity  
IO = Implicit organization  
LC = Low complexity  
EO = Explicit organization

Nine experimental cells out of 12 have 15 respondents each. The remaining three cells under $T_4$ have 14 cases each. The reason for this is that one respondent from the high adoption status category after his exposure to the first message could not finish the first post-test and also take the remaining tests, because of an emergency. It was decided not to administer to him the tests afterwards. Since this incident could have interfered with his fidelity of decoding (which is, as discussed in Chapter II, strongly influenced by the psychic state of a person). In order to keep parity in the number of respondents in each adoption category, one person from either of the two adoption statuses from the fourth experimental treatment had to be dropped.

Age

The frequency distribution of respondents into three categories 13-14.

1For the description of experimental treatments see supra, pp. 13-14.

2His two-month-old calf had fallen into the well, and he had to organize rescue operations.
of age, viz., under 25 years, between 25-40 years, and over 40 years is shown in Table 11. As can be seen in the table, the number of respondents in various age categories is not the same. There are 24 persons (13.6%) under 25 years, 99 (55.9%) between 25-40 years, and 54 (30.5%) over 40 years of age. This disproportionality could not be helped, because an equal number of cases in the three age groups who would also be equi-distributed in the three adoption status categories could not be found in the sampling frame. This was so, because adoption status of respondents was the main criterion of selection, and not many younger persons (under 25 years) with low adoption status and many older persons (over 40 years) with high adoption status were available in the sampling universe.\footnote{Incidentally, this fact supports the finding of innumerable adoption studies that age and adoption of improved agricultural practices are positively and significantly correlated.} The distribution of respondents within contingent categories of age, adoption status, and treatments was, however, maintained more or less equal, as can be seen from Table 11.

**Education**

The three levels of education identified for the purposes of this study were: illiterate (no formal education at all or less than fourth grade), literate (formal education up to eighth grade), educated (high school or over). The number of respondents in these categories of education, is again disproportionate. Twelve (6.8%) respondents fall in the illiterate category, 98 (55.4%) in the literate category and 67 (37.8%) in the educated category. The reasons for this disproportionality are the same as given in the case of the age variable.
<table>
<thead>
<tr>
<th>Table 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQUENCY DISTRIBUTION OF RESPONDENTS ACCORDING TO AGE, ADOPTION STATUS AND EXPERIMENTAL TREATMENTS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experimental Treatment</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_1$</td>
<td>$T_2$</td>
<td>$T_3$</td>
<td>$T_4$</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 25 years</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>25-40 years</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>14</td>
</tr>
</tbody>
</table>
As can be seen from Table 12, there is no respondent who has high adoption status and is also illiterate. On the other hand, there are 15 low adoption status individuals who have studied up to high school or more. Maximum number of respondents from the medium and low adoption statuses fall in the literate category of education, whereas the maximum number for the high adoption status respondents is from the educated category. This again supports the evidence usually brought out by adoption studies that education and adoption of farm practices are positively and significantly correlated. It may also be noticed (Table 12) that relative disproportionality in the number of respondents in various cells is more in education than in the age variable. This is so because education is the third contingent variable in the equation of experimental groups, the first two being adoption status and age.

**Attitudes Toward Improved Agricultural Practices**

Attitudes of respondents toward improved agricultural practices as an intervening variable was included in the study with two main objectives. Firstly, to investigate the relationship, if any, of attitudes of respondents with the fidelity of message decoding. Secondly, through post facto analysis to identify prevailing attitudes of respondents in various experimental groups, and to see if they significantly differ among themselves on this dimension. The results with respect to the former objective will be presented in a subsequent section of this chapter, the findings with respect to the latter objective are presented as follows.
<table>
<thead>
<tr>
<th>Experimental Treatment</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T₁</td>
<td>T₂</td>
<td>T₃</td>
<td>T₄</td>
</tr>
<tr>
<td>Illiterate</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Literate</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Educated</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>14</td>
</tr>
</tbody>
</table>
The maximum score a respondent could get on the ten attitudinal items (Appendix F) was 50, and the minimum score was 10. The mean scores obtained by respondents and the significance of these differences is given in Table 13.

**TABLE 13**

**MEANS AND SIGNIFICANCE OF ATTITUDE SCORES OF TREATMENT GROUPS**

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>N</th>
<th>Mean Attitude Score</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_1$</td>
<td>45</td>
<td>37.62</td>
<td>7.65</td>
</tr>
<tr>
<td>$T_2$</td>
<td>45</td>
<td>37.93</td>
<td>7.93</td>
</tr>
<tr>
<td>$T_3$</td>
<td>45</td>
<td>39.16</td>
<td>7.79</td>
</tr>
<tr>
<td>$T_4$</td>
<td>42</td>
<td>37.79</td>
<td>8.31</td>
</tr>
<tr>
<td>Total Sample</td>
<td>177</td>
<td>38.12</td>
<td>7.87</td>
</tr>
</tbody>
</table>

**'t' Test Matrix**

<table>
<thead>
<tr>
<th></th>
<th>$T_1$</th>
<th>$T_2$</th>
<th>$T_3$</th>
<th>$T_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_1$</td>
<td>-</td>
<td>.19</td>
<td>.94</td>
<td>.10</td>
</tr>
<tr>
<td>$T_2$</td>
<td></td>
<td>-</td>
<td>.75</td>
<td>.08</td>
</tr>
<tr>
<td>$T_3$</td>
<td></td>
<td></td>
<td>-</td>
<td>.80</td>
</tr>
<tr>
<td>$T_4$</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

None of the differences is significant at .05 level of probability.

An examination of Table 13 shows that $T_3$ group has the maximum mean attitude score (39.16) whereas $T_1$ group has the minimum mean attitude score (37.62). Mean attitude score for the entire sample is 38.12. These differences in attitude scores of various treatment groups, however, are statistically not significant, as can be seen from 't' test matrix given above. The value of 't' in order to be significant between any two groups
even at .05 level for 88 degrees of freedom ought to have been at least 1.99. The computed 't' values in the above matrix are far below the significant value of 't'. This means that the experimental treatment groups have more or less the same type of attitudes toward improved agricultural practices. The equivalence of various experimental groups is, therefore, established on the attitudinal dimensions.

Attitude and Adoption Status

The mean attitude scores of respondents based on their adoption status are given in Table 14. The mean attitude score of HAS is 46.15, which is the highest when compared to the other two groups, viz., MAS and LAS. LAS group has the lowest attitudes score with a mean of 30.63, whereas HAS group has a mean of 37.72. The differences in mean attitude scores between these adoption groups are statistically significant at .01 level. This means that respondents of this study with high adoption status have more favorable attitudes toward agricultural practices than do the medium and low adoption status farm decision makers, and the low adoption status respondents have the least favorable attitudes as compared to the other two categories of farmers.

According to the findings of this study, therefore, the adoption status and attitude of a person toward improved agricultural practices are positively and significantly associated.
TABLE 14
MEANS AND SIGNIFICANCE OF ATTITUDE SCORES OF RESPONDENTS ACCORDING TO ADOPTION STATUS

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>N</th>
<th>Mean Adoption Score</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAS</td>
<td>59</td>
<td>46.15</td>
<td>3.06</td>
</tr>
<tr>
<td>MAS</td>
<td>59</td>
<td>37.72</td>
<td>4.67</td>
</tr>
<tr>
<td>LAS</td>
<td>59</td>
<td>30.63</td>
<td>5.83</td>
</tr>
<tr>
<td>Total Sample</td>
<td>177</td>
<td>38.12</td>
<td>7.87</td>
</tr>
</tbody>
</table>

't' Test Matrix

<table>
<thead>
<tr>
<th></th>
<th>HAS</th>
<th>MAS</th>
<th>LAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAS</td>
<td>-</td>
<td>11.55*</td>
<td>18.26*</td>
</tr>
<tr>
<td>MAS</td>
<td>-</td>
<td>-</td>
<td>7.54*</td>
</tr>
<tr>
<td>LAS</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

HAS = High adoption status  
MAS = Medium adoption status  
LAS = Low adoption status  
*Significant at .01 level

Attitudes and Age

Table 15 presents the mean attitude scores of respondents according to the three age groups.

Farm decision makers of this study who are under 25 years of age have more favorable attitudes as compared to those who are older (41.46 versus 39.50 and 34.33). However, they do not significantly differ from those respondents who are between 25-40 years old with respect to their attitudes—the value of 't' is only 1.03 for 120 degrees of freedom.
TABLE 15
MEANS AND SIGNIFICANCE OF ATTITUDE SCORES
OF RESPONDENTS ACCORDING TO AGE

<table>
<thead>
<tr>
<th>Age Category</th>
<th>N</th>
<th>Mean Attitude Score</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25 years</td>
<td>24</td>
<td>41.46</td>
<td>8.46</td>
</tr>
<tr>
<td>Between 25-40 years</td>
<td>98</td>
<td>39.50</td>
<td>7.79</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>55</td>
<td>34.33</td>
<td>6.28</td>
</tr>
<tr>
<td>Total Sample</td>
<td>177</td>
<td>38.16</td>
<td>7.87</td>
</tr>
</tbody>
</table>

't' Test Matrix

<table>
<thead>
<tr>
<th></th>
<th>Under 25 Years</th>
<th>Between 25-40 Years</th>
<th>Over 40 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25 years</td>
<td>-</td>
<td>1.03</td>
<td>3.69*</td>
</tr>
<tr>
<td>Between 25-40 years</td>
<td>-</td>
<td>-</td>
<td>4.04*</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Significant at .01 level.

These two groups (under 25 years and between 25-40 years) have significantly more favorable attitudes when compared with older farm decision makers who are over 40 years of age.

The findings reveal that though age and attitudes of farm decision makers toward improved agricultural practices have an inverse relationship, this does not become significant until after 40 years of age. This tantamounts to saying that as a farm decision maker gets older a weakening of his attitude toward improved practices sets in.

Attitudes and Education

Mean attitude scores of the respondents according to their education are given in Table 16.
TABLE 16
MEANS AND SIGNIFICANCE OF ATTITUDE SCORES
OF RESPONDENTS ACCORDING TO EDUCATION

<table>
<thead>
<tr>
<th>Education Category</th>
<th>N</th>
<th>Mean Attitude Score</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>12</td>
<td>35.33</td>
<td>5.43</td>
</tr>
<tr>
<td>Literate</td>
<td>97</td>
<td>38.39</td>
<td>7.26</td>
</tr>
<tr>
<td>Educated</td>
<td>68</td>
<td>38.32</td>
<td>8.99</td>
</tr>
<tr>
<td><strong>Total Sample</strong></td>
<td>177</td>
<td><strong>38.16</strong></td>
<td><strong>7.87</strong></td>
</tr>
</tbody>
</table>

't' Test Matrix

<table>
<thead>
<tr>
<th></th>
<th>Illiterate</th>
<th>Literate</th>
<th>Educated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>-</td>
<td>1.77*</td>
<td>1.57</td>
</tr>
<tr>
<td>Literate</td>
<td>-</td>
<td>-</td>
<td>.05</td>
</tr>
<tr>
<td>Educated</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Significant at .05.

The literate group of respondents has the highest mean attitude score (38.39) and the illiterate group has the lowest score (35.33). The difference in scores between the literate and educated category is only .07, in favor of the former. Although from the above mean scores it appears as though illiterate respondents have less favorable attitudes toward improved agricultural practices, these differences are statistically significant at only .05 level.

The non-existence of conclusively significant differences between the attitude scores of respondents on the dimension of their educational status is somewhat surprising, since it was expected that education favorably orient a farmer toward an improved agricultural practice. Possible
explanations of this may be that either the categories of education developed for grouping the respondents\textsuperscript{1} in this study are not discriminatory, or formal education does not in effect produce a discernible change in the attitudes of farm decision makers—the former is suspect.

Aspirations

Aspirations of respondents were measured on a ten-point scale (Appendix C) with three temporal levels—past (5 years ago), present, and future (5 years hence). The results are presented in Table 17.

Overall mean aspiration scores for the entire sample pertaining to the past, present and future are 5.4, 3.9 and 7.5 respectively. The difference between these mean scores are significant at .01 level. The respondents thus, are dissatisfied with the present, when compared to the past and future. The past seems to have an aura of "those good old days," whereas the future seems to assure brighter prospectus as compared to the present.

No significant difference in the mean scores of various experimental groups has been detected in the three temporal levels of aspirations as can be seen from 't' test matrix in Table 17. This fact again, like the mean attitude scores, confirms the equality of experimental groups on the variable of aspiration.

Another variable found not to be significantly differentiative between respondents on the basis of their aspirations is age. Future aspirations of the younger farm decision makers though at a higher mean score level (7.9 versus 7.4 and 7.6) than the other two groups are statistically not significant. Older respondents (over 40 years), however,

\textsuperscript{1}Illiterate = education up to fourth standard; literate = education up to eighth standard; educated = education up to high school or over; see page 11.
### TABLE 17

Mean Scores of past, present, and future oriented aspirations of respondents according to experimental treatment, adoption status, age, and education.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable Level</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>Mean</th>
<th>S.D.</th>
<th>Mean</th>
<th>S.D.</th>
<th>T&lt;sub&gt;1&lt;/sub&gt;</th>
<th>T&lt;sub&gt;2&lt;/sub&gt;</th>
<th>T&lt;sub&gt;3&lt;/sub&gt;</th>
<th>T&lt;sub&gt;4&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
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<td>43</td>
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<td>1.01</td>
<td>4.09</td>
<td>1.59</td>
<td>7.58</td>
<td>1.50</td>
<td>-</td>
<td>0.54</td>
<td>0.31</td>
<td>0.33</td>
</tr>
<tr>
<td>Treatment</td>
<td>T&lt;sub&gt;2&lt;/sub&gt;</td>
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<td>5.54</td>
<td>1.01</td>
<td>4.00</td>
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<td>7.42</td>
<td>1.44</td>
<td>-</td>
<td>0.07</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>T&lt;sub&gt;3&lt;/sub&gt;</td>
<td>45</td>
<td>5.29</td>
<td>0.97</td>
<td>3.80</td>
<td>1.46</td>
<td>7.44</td>
<td>1.32</td>
<td>-</td>
<td>0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T&lt;sub&gt;4&lt;/sub&gt;</td>
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<td>-</td>
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<td><em>t</em> Test Matrix for Future Aspirations</td>
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</table>

High | Medium | Low

Adoption Status

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<tbody>
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<td>N</td>
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<td>59</td>
<td>59</td>
</tr>
<tr>
<td>Mean</td>
<td>5.12</td>
<td>5.49</td>
<td>5.61</td>
</tr>
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<td>S.D.</td>
<td>0.67</td>
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<td>6.18*</td>
<td>17.01*</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>*Significant at .01 level</td>
</tr>
</tbody>
</table>

Age

<table>
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<tr>
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<th>Under 25</th>
<th>25-40</th>
<th>Over 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
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<td>98</td>
<td>55</td>
</tr>
<tr>
<td>Mean</td>
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<td>6.00</td>
</tr>
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<td>0.82</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>3.25</td>
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<td></td>
<td>7.92</td>
<td>7.37</td>
<td>7.56</td>
</tr>
<tr>
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<td>1.47</td>
<td>1.52</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1.59</td>
<td>0.18</td>
<td>-</td>
</tr>
<tr>
<td></td>
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<tr>
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<td>Not significant</td>
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</tbody>
</table>

Education

<table>
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<tr>
<th></th>
<th>Illiterate</th>
<th>Literate</th>
<th>Educated</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>12</td>
<td>97</td>
<td>68</td>
</tr>
<tr>
<td>Mean</td>
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<td>5.47</td>
<td>5.03</td>
</tr>
<tr>
<td>S.D.</td>
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<td>0.73</td>
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<td>4.07</td>
<td>3.32</td>
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<td>1.38</td>
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<td>7.22</td>
<td>8.00</td>
</tr>
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<td>1.20</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td>-</td>
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<td>-</td>
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</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>*Significant at .05 level</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Illiterate | Literate | Educated
have a higher mean score for the present level of aspirations than the other two groups, signifying that they are more satisfied with the present than those respondents who are younger. They also seem to be more nostalgic about their past than the other two groups.

Adoption status and future aspirations of farm decision makers have significant differences. High adoption status farm decision makers (FDMs) expect to reach the 8.7 point level (10 points being the maximum) in the next five years as compared to 7.8 and 6.7 points of the medium and low adoption status FDMs. There is a difference of 5.6 points (3.1-8.7) between the present level and future level of aspirations of high adoption status FDMs. The same differences for medium and low adoption status FDMs are of the magnitude of 4.2 and 0.9 points respectively. This shows that low adoption status FDMs are the least aspirous and the high adoption status FDMs are the most aspirous. Although the past is more satisfying than the present to all the FDMs, it is particularly so for the low adoption status farmers and least satisfying to the high adoption status farmers (5.6 score for the former versus 5.1 score for the latter). The latter are also least satisfied with their present lot with a score of 3.1 against 3.6 and 5.2 scores of medium and low adoption status FDMs respectively.

The interpretation of these results is that high adoption status farmers went more out of life than they presently get, and are hopeful of achieving that in the future. Medium adoption status farmers have a similar pattern of expectations, but to a lesser degree than the high adoption status FDMs. Low adoption status FDMs on the other hand, seem to be relatively more static in their expectations.
The variable of education has a similar type of relationship with aspirations of respondents as the adoption status (Table 17). The past and future level of aspiration of respondents in the illiterate category is the same, i.e., 7.0. The present level of aspiration in their case is, also, not very different (6.3) from past and future levels. However, their level of future aspirations is not significantly different from the future aspirations of literate group ('t' value is only 0.5). These differences are significant between illiterate and educated, and literate and educated groups at .01 level of probability. Also, like the high adoption status FDMs, the educated group of FDMs, when compared to the illiterate and literate groups, are the least satisfied with their present and past levels of aspirations, and are the most hopeful group for the future.

A possible interpretation of these findings is that the educated FDMs are in a non-equilibrium state of affairs in the present, but are hopeful of achieving much more in the future. The illiterate FDMs seem to be in a more or less status quo situation with respect to their past, present and future aspirations. The literate group is like the educated group but to a lesser extent.

Pre-Test Scores

Test items constituting the pre-test were not the same as in the post-test, though they were related to the subject matter of the message exposed to the respondents. The maximum possible score on the pre-test was 19 and the minimum was six.
The results are shown in Table 18. The overall pre-test mean score for the entire sample is 13.8 with a standard deviation of 2.3.

**TABLE 18**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean Score</th>
<th>S.D.</th>
<th>'t' Test Matrix</th>
</tr>
</thead>
<tbody>
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<td>T1</td>
<td>45</td>
<td>13.64</td>
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</tr>
<tr>
<td>Treatment</td>
<td>T2</td>
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<td>13.80</td>
<td>2.37</td>
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<td>T3</td>
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<td>13.88</td>
<td>2.19</td>
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<td>13.82</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Significant at .01 level of probability</td>
</tr>
<tr>
<td>Age</td>
<td>Under 25</td>
<td>24</td>
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<td>Over 40</td>
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<td>12.86</td>
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<td>Under 25</td>
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<td>*Significant at .01 level of probability</td>
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<tr>
<td>Education</td>
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<td>0.95</td>
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<td>Literate</td>
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<td>12.95</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Significant at .01 level of probability</td>
</tr>
<tr>
<td>Total Sample</td>
<td>177</td>
<td>13.79</td>
<td>2.30</td>
<td></td>
</tr>
</tbody>
</table>


Pre-Test Scores and Treatment Groups

The difference between the maximum and minimum mean pre-test scores for various experimental groups is only 0.24 (13.6, the minimum mean score, is of T_1 group and 13.9 the maximum mean score is for T_3 group). The between group mean differences, as can be seen from Table 18 't' test matrix, for experimental treatment variable are not significant. It means that any observable differences in pre-test mean scores of various treatment groups are due to chance, and that the groups do not vary in their knowledge of the subject matter of the test message before they were actually exposed to various treatments.

Pre-Test Scores and Adoption Status

The high adoption status FDMS have the highest pre-test mean score (15.9) and the low adoption status respondents have the lowest mean score (11.7). The score of medium adoption status farmers is 13.7. These differences in mean scores are significant at .01 level of probability (Table 18). This means that the high, medium, and low adoption status FDMS were differentially pre-disposed to the subject matter of the test message, with maximum favorable predisposition on the part of high adoption status FDMS and minimum predisposition on the part of LAS farmers.

Pre-Test Scores and Age

As can be seen from Table 18, the youngest age group FDMS have the highest mean score (15.3) and the oldest age group FDMS have the lowest mean score (12.9) on the pre-test. The middle group (25-40 years) of respondents has a mean of 13.9. These differences are significant at .01 level of probability.
The interpretation of these results with respect to the age variable is similar to that of the adoption status variable. The farmers who are below 25 years of age possess more knowledge of the subject matter to which they were later exposed through test message than do the older farmers. The "over 40 years" group possesses the least amount of prior knowledge of the subject matter when compared to the other two younger groups. This interpretation runs parallel to what was discovered for the age groups in attitude and aspiration variables.

Pre-Test Scores and Education

The mean scores for the education variable are also shown in Table 18. The FDMs who are illiterate have the lowest pre-test mean score (11.0), next comes the literate groups with 12.9 scores, and finally the educated group with 15.5 scores. These differences between the three groups are statistically significant at .01 level of probability. The interpretation is that the more educated a farmer is, the more knowledge he will possess about the agricultural messages and vice versa.

Summary

The personal characteristics of respondents, namely adoption status, age, education, attitudes toward improved agricultural practices, aspirations and previous knowledge of the subject matter of test messages, all constituting intervening variables in this study, were analyzed and discussed. Data pertaining to adoption status, age and education of respondents were presented first and their implications in terms of equation of groups were explained. Results with respect to attitudes, aspirations and previous knowledge of respondents were presented thereafter,
and interpretations from them made in the light of adoption status, age and education variables. A summary of these interpretations is given in Table 19 so that the reader may conveniently make comparison of findings pertaining to various variables.

**Fidelity of Message Decoding and Experimental Treatments**

There were four experimental treatments, each with a high or low level of complexity and an implicit or explicit level of encoding organization. The questions to be answered in this section are: "Do these message treatments significantly affect the fidelity of decoding, and if so, do all treatments have the same type of differentiating effect?"

The results for message one are shown in Table 20. An inspection of this table reveals that there are 11.1 percent of the respondents with over 200 fidelity of decoding scores for $T_1$ which has high level of complexity and implicit encoding organization. For $T_2$, also with high level of complexity, but with explicit encoding organization, this percentage increases to 26.7—a difference of 15.6 percent from $T_1$. Similarly $T_3$ and $T_4$, which both have a low level of complexity, but different levels of encoding organization, the difference in percentage scores for the same category rises to 21.3 percent (52.4 percent for $T_4$; 31.1 percent for $T_3$). When $T_1$ and $T_3$ are compared, which differ between themselves on the dimension of complexity (high for $T_1$ and low for $T_3$) but have the same level of organization, the difference in percent of respondents with over 200 fidelity of decoding scores jumps to 20 points (from 11.1 to 31.1 percent) in favor of $T_3$. In the same way, the difference between $T_2$ and $T_4$ scores
<table>
<thead>
<tr>
<th>Variable</th>
<th>Attitude</th>
<th>Aspiration</th>
<th>Pre-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Treatment</td>
<td>No significant difference between various treatment groups was found; equation of groups on these dimensions in addition to adoption status, age and education is reflected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adoption Status</td>
<td>Differences between high, medium and low adoption status farm decision makers are significant at .01 level of probability. All scores are in favor of high adoption status FDMs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Younger FDMs have more favorable attitudes as compared to &quot;25-40&quot; and &quot;over 40&quot; years age groups. Differences between &quot;under 25&quot; and &quot;25-40&quot; years groups not significant, others significant at .01 level of probability.</td>
<td>Differences in aspiration scores of various age groups not found to be significant, even though younger respondents have higher level of future aspirations.</td>
<td>Significant differences .01 level for all the age groups. Younger FDMs have more previous knowledge pertaining to the subject matter of test messages.</td>
</tr>
<tr>
<td>Education</td>
<td>Although educated and literate groups have almost identical scores and the illiterate group has relatively low mean scores, these differences are not significant. Education does not seem to be critically influencing attitudes of respondents toward agricultural practices.</td>
<td>Significant difference at .05 level between illiterate and educated groups, but not between illiterate and literate groups. Education does not seem to be a very important factor in influencing aspirations of respondents.</td>
<td>Differences for all the age groups significant at .01 level. Education an important factor in determining previous knowledge of agricultural messages.</td>
</tr>
</tbody>
</table>
TABLE 20

RELATION BETWEEN EXPERIMENTAL TREATMENTS AND FIDELITY OF DECODING

<table>
<thead>
<tr>
<th>Experimental Treatment</th>
<th>Fidelity of Decoding Score</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 100</td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;1&lt;/sub&gt; (HC X IO)</td>
<td></td>
<td>5</td>
<td>11.1</td>
<td>13</td>
<td>28.9</td>
<td>22</td>
<td>48.9</td>
</tr>
<tr>
<td>T&lt;sub&gt;2&lt;/sub&gt; (HC X EO)</td>
<td></td>
<td>2</td>
<td>4.4</td>
<td>11</td>
<td>24.4</td>
<td>20</td>
<td>44.4</td>
</tr>
<tr>
<td>T&lt;sub&gt;3&lt;/sub&gt; (LC X IO)</td>
<td></td>
<td>2</td>
<td>4.4</td>
<td>8</td>
<td>17.8</td>
<td>21</td>
<td>46.7</td>
</tr>
<tr>
<td>T&lt;sub&gt;4&lt;/sub&gt; (LC X EO)</td>
<td></td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>9.5</td>
<td>16</td>
<td>38.1</td>
</tr>
</tbody>
</table>

Total Sample           |                            | 9      | 5.1      | 36     | 20.3     | 79     | 44.6     | 53      | 29.9     | 177     | 100.0   |

\[ \chi^2 = 23.17; \ p = 0.01; \ \text{d.f.} = 9 \]
is of the magnitude of 25.7 percent (26.7 percent for \( T_2 \) and 52.4 percent for \( T_4 \)). On the other hand, percentages of respondents with less than 100 fidelity of decoding (FD) scores decline from 11.1 percent for \( T_1 \) to 0 percent for \( T_4 \). If the number of FD score categories is reduced from 4 to 2 (i.e., up to 150 scores and more than 150 scores) by pooling the percentages, the differences in percentages become more marked. Figure 17 shows how the number of respondents decreases from "up to 150" scores category and increases in "over 150" score category from \( T_1 \) to \( T_4 \). The value of \( \chi^2 \) (Table 20) is 23.2 with 9 degrees of freedom. Since the tabular value of 21.7 at .01 level of probability is less than the computed value, it may be said that there is a significant association between the fidelity of decoding and various message treatments. However, this association does not seem to be very strong, as can be seen from the difference in the computed and tabular value of \( \chi^2 \) (23.2 - 21.7 = 1.5).

To explore the nature of this relationship in depth, a 't' matrix for various treatments was computed. Table 21 shows the mean scores and standard deviations for various treatments along with the 't' matrix. The mean scores show the same pattern as was revealed by Table 20, in terms of percentages of respondents in various categories of FD scores. The 't' test matrix, however, shows a somewhat different picture. Whereas differences in mean FD scores between \( T_1 \) (high complexity and implicit encoding organization) and \( T_3 \) (low complexity and implicit encoding organization), and \( T_2 \) (high complexity and explicit organization) and \( T_4 \) (low complexity and explicit organization) and \( T_1 \) and \( T_4 \) are statistically significant at .01 level of probability; these differences between
Figure 17. Fidelity of Decoding and Distribution of Respondents According to Experimental Treatments
### TABLE 21
**MEAN FIDELITY OF MESSAGE DECODING SCORES FOR VARIOUS EXPERIMENTAL TREATMENTS**

<table>
<thead>
<tr>
<th>Experimental Treatments</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁ (HC X IO)</td>
<td>45</td>
<td>158.16</td>
<td>38.49</td>
</tr>
<tr>
<td>T₂ (HC X EO)</td>
<td>45</td>
<td>172.82</td>
<td>34.68</td>
</tr>
<tr>
<td>T₃ (LC X IO)</td>
<td>45</td>
<td>177.20</td>
<td>32.73</td>
</tr>
<tr>
<td>T₄ (LC X EO)</td>
<td>42</td>
<td>191.43</td>
<td>25.11</td>
</tr>
</tbody>
</table>

**'t' Test Matrix**

<table>
<thead>
<tr>
<th></th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
<th>T₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>-</td>
<td>1.88*</td>
<td>2.53**</td>
<td>4.68**</td>
</tr>
<tr>
<td>T₂</td>
<td>-</td>
<td>-</td>
<td>0.61</td>
<td>2.88**</td>
</tr>
<tr>
<td>T₃</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.24*</td>
</tr>
<tr>
<td>T₄</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

HC = High complexity  
LC = Low complexity  
IO = Implicit organization  
EO = Explicit organization  
* Significant at .05 level  
** Significant at .01 level

between T₁ and T₂, and T₃ and T₄ are significant only at .05 level of probability. No significant difference was found to exist between T₂ and T₃.

The logical interpretation from these results is that messages which vary on the dimensions of complexity and organization have a differentiating
influence on the fidelity of decoding of respondents. Of these factors, message complexity seems to be more crucial than encoding organization, as is seen from .01 level of significance between $T_1 - T_3$ and $T_2 - T_4$ which vary on the dimension of complexity, and .05 level of significance between $T_1 - T_2$, and $T_3 - T_4$ which vary on the dimension of organization. This fact, however, should not let one overlook the importance of organization. The difference between $T_2$ and $T_3$, with a shift from high complexity to low complexity was statistically not significant even at .05 level as was expected from the $T_1 - T_3$, and $T_2 - T_4$ pattern of relationships. The factor of organization seems to have caused this insignificance. $T_2$ with high complexity is accompanied by explicit organization, whereas $T_2$ with low complexity is accompanied by implicit organization. This implies that a change in complexity in itself is not sufficient to result in significantly high level of fidelity of decoding, unless it is accompanied by a corresponding change in organization.

Another interesting interpretation of the data in Table 21 can be made from the decreasing amount of variability from $T_1$ to $T_4$ as reflected by standard deviation. This seems to indicate that there is a greater likelihood of high complexity and implicitly organized message being misinterpreted (low level of fidelity of decoding) than those messages which have low complexity and explicit encoding organization.

The answer to the questions posed in the beginning of this section is "yes"—messages which vary on the dimensions of complexity and organization do significantly affect the fidelity of decoding. Of these two factors, message complexity seems to be more important in this respect than message organization.
Fidelity of Message Decoding and Message Complexity

Message complexity as an independent variable has two levels: high and low. What constitutes high and low complexity, and how it was determined for various experimental treatments has already been explained. The following questions will now be answered in the light of findings: Do high and low levels of message complexity significantly affect the fidelity of message decoding? How does message complexity affect the fidelity of message decoding in terms of adoption status, age, education, attitude toward improved agricultural practices and future aspirations of FDMs?

Table 22 shows the frequency distribution of respondents into various fidelity of decoding categories for high and low levels of complexity. As can be seen from Table 22, there are 18.9 percent of the respondents whose FD scores are over 200 in the high complexity level versus 41.4 percent respondents in the low complexity level. On the other hand, there are 7.8 percent respondents with scores less than 100 in the high complexity level against 2.3 percent scores in the low complexity level. In the intervening score categories (101-150 and 151-200) the percentage for the two levels of complexity are also higher for the high complexity level. If these score categories are reduced to two rather than four—with scores up to 150 and over 150—these percentages for the high complexity level become 34.4 for the former and 65.5 for the latter category versus 16.1 and 83.9 for the low complexity level for the same categories. The value of \( X^2 \) is 13.9, which shows a significance of difference between the two levels of complexity at 1 percent level of probability.

The same significance of difference between high and low levels of message complexity is obtained by using the mean scores of respondents and computing the value of 't', as is shown in Table 23.
TABLE 22

RELATION OF MESSAGE COMPLEXITY AND FIDELITY OF DECODING

<table>
<thead>
<tr>
<th>Level of Complexity</th>
<th>Under 100</th>
<th>101-150</th>
<th>150-200</th>
<th>Over 200</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>High</td>
<td>7</td>
<td>7.8</td>
<td>24</td>
<td>26.6</td>
<td>42</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>2.3</td>
<td>12</td>
<td>13.8</td>
<td>37</td>
</tr>
<tr>
<td>Total Sample</td>
<td>9</td>
<td>5.1</td>
<td>36</td>
<td>20.3</td>
<td>79</td>
</tr>
</tbody>
</table>

\[X^2 = 13.86; \text{d.f.} = 3; \text{Level of significant} = .01\]
TABLE 23
MESSAGE COMPLEXITY AND MEAN FIDELITY OF DECODING
SCORES OF RESPONDENTS

<table>
<thead>
<tr>
<th>Level of Complexity</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>'t' Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>90</td>
<td>165.49</td>
<td>1381.57</td>
<td>3.69</td>
</tr>
<tr>
<td>Low</td>
<td>87</td>
<td>184.60</td>
<td>899.80</td>
<td>Significant at .01 level of probability</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td>174.62</td>
<td>1225.07</td>
<td></td>
</tr>
</tbody>
</table>

There is a difference of 18.6 FD scores between mean scores of the two groups of respondents exposed to messages with high and low levels of complexity. The mean score for the high complexity group is 165.5, and for the low complexity group it is 184.1. This difference is statistically significant at .01 level of probability. As may be noted from Table 23, the variance for high complexity group is much more than that for the low complexity group.

On the basis of the above findings it may be concluded that the same agricultural message structured at a high level of complexity, as defined in this study will result in lower fidelity of decoding than when it is structured at a low level of complexity. The probability of this conclusion being invalid is 1 in 100 cases. Greater variance in the fidelity of decoding scores for the more complex message (1381.6 versus 899.8) seems to imply that certain other respondent variables interact with the message complexity to influence the fidelity of decoding. Some of these variables will be considered in the following pages. The relative contribution of each variable to the fidelity of decoding vis-a-vis message...
complexity will be considered in the regression analysis section of this chapter.

**Effect of Adoption Status and Message Complexity on the Fidelity of Message Decoding**

The adoption status of farm decision makers is an important intervening variable in this study. It was, also, the primary variable used to equate the treatment groups. The results pertaining to this variable are presented in Table 24.

As can be seen from Table 24 (columns 3 and 6), low complexity FD scores are more than the high complexity FD scores for all the three adoption status groups. These differences, as revealed by the value of 't' in column 9, are statistically significant at 1 percent level of probability. The interpretation is that no matter what the adoption status of a FDM is, his decoding fidelity of a message with low level of complexity will be more than from a message with high level complexity. The chance of this not happening is one out of every 100 such message exposures. This finding is consistent with that of Feliciano's \(^1\) who found that among his respondents almost one-third of the message was not understood because of the use of technical terms by the extension officials. Usage of technical terms in the high complexity message was, however, one component which determined message complexity in this study.

Another interesting observation may be made from column 8, Table 24. The differences in mean FD scores of high complexity and low complexity messages for every level of adoption status are shown in this column. These differences increase with the decreased adoption status. For the high

\(^{1}\text{Op. cit., p. 3.}\)
**TABLE 24**

MEAN FIDELITY OF DECODING ACCORDING TO ADOPTION STATUS AND MESSAGE COMPLEXITY

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>High Complexity</th>
<th>Low Complexity</th>
<th>Difference in Mean</th>
<th>Value of 't'</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>High</td>
<td>30</td>
<td>183.03</td>
<td>709.90</td>
<td>29</td>
<td>195.97</td>
</tr>
<tr>
<td>Medium</td>
<td>30</td>
<td>170.37</td>
<td>1040.25</td>
<td>29</td>
<td>186.59</td>
</tr>
<tr>
<td>Low</td>
<td>30</td>
<td>143.07</td>
<td>1626.69</td>
<td>29</td>
<td>169.66</td>
</tr>
</tbody>
</table>

Total Score for Complexity | 90 | 165.49 | 1381.57 | 87 | 184.07 | 899.80 | 18.58 | 3.69 | .01 |
adoption status groups this difference is 12.9 points, for the medium status groups it is 16.2 points, and for the low adoption status groups it is 26.5 points. If this difference is considered among the three adoption statuses, it is 3.2 (16.2-12.9) points for the high and medium status groups, and it increases to 10.4 (26.6-16.2) points between the medium and low status groups. The latter difference is more than three times the former difference. These findings, as such, mean that whereas a low complexity message, as compared to a high complexity message, significantly increases the fidelity of message decoding of farm decision makers of every adoption status, i.e., this increase increases with the decreasing adoption status, and it becomes much more pronounced in the case of low adoption status farmers. Stated differently, it means personal references, more abstract and technical words,¹ hamper accurate understanding on the part of low adoption status farmers much more than it does for the medium and high adoption status farmers.

It is, also, seen from columns 4 and 7 of Table 24, that variance is smaller for high adoption status groups than it is for the medium and low adoption status groups. It is largest for the low adoption status groups and smallest for the high adoption status groups. This pattern holds for both the high complexity and the low complexity messages. The explanation of this seems to be that fidelity of message decoding increases with an increase in the adoption status of a farm decision maker resulting in small group variability and it decreases with a decrease in his adoption status resulting in large group variability.

¹All constituting the element of message complexity in this study.
If adoption status is controlled and only complexity is let vary, corresponding figures in columns 4 and 7 of Table 24 reveal that greater variability exists for a high complexity message than for a low complexity message. This seems to imply that fidelity of message decoding, irrespective of the adoption status of a farmer, decreases with an increase in message complexity and vice versa.

To see how adoption status affects the fidelity of message decoding, when message complexity is controlled, values of 't' for various adoption statuses were computed for both high and low complexity messages and are given in the form of matrices in Table 25.

### Table 25

*'t' Test Matrices showing the significance of difference among various adoption status groups for high and low complexity messages*

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Level of Complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>HAS</td>
</tr>
<tr>
<td>HAS</td>
<td>-</td>
</tr>
<tr>
<td>MAS</td>
<td>-</td>
</tr>
<tr>
<td>LAS</td>
<td>-</td>
</tr>
</tbody>
</table>

*Significant at .01 level of probability
**Significant at .05 level of probability

It can be observed from values of 't' in Table 25 that high complexity message does not significantly differentiate between the decoding fidelity of high and medium adoption status respondents. However, both high and medium adoption statuses exhibit significantly higher fidelity of decoding as compared to the low adoption status group. This finding
supports the interpretation made earlier that a high complexity message
hinders the fidelity of decoding of low adoption status respondents
more than it does for the other two groups.

**Effect of Age and Message Complexity on the Fidelity of Message Decoding**

The three levels of age, one of the intervening variables are:
"under 25 years," "between 25-40 years," and "over 40 years." The re-
sults are presented in Table 26. Out of 24 respondents under 25 years
of age, half were exposed to the high complexity message and the other
half to the low complexity message. The mean MD score for the high com-
plexity group is 201.8 against 208.1 of low message complexity group.
The difference of 6.3 points between the two groups is significant at
.05 level of probability. For the age group 25-40 years, the mean MD
scores for the high and low complexity messages are 189.1 and 196.2
respectively, thus giving a difference of 16.1 points between the two.
This difference in mean scores is almost ten points more than the same
difference for the younger age group. However, unlike the difference of
that group, this difference is significant at 1 percent. The oldest age
groups, with over 40 years of age, have a mean of 123.8 and 151.8 for
the high complexity and low complexity messages respectively, thus giving
a difference of 28.1 points between the two complexity levels. This is
the largest difference when compared to that of the other two groups. A
't' value of 3.8 makes this difference statistically significant at .01
level of probability.

The above results reveal higher fidelity of decoding scores for
the low complexity message than the high complexity message for all the
<table>
<thead>
<tr>
<th>Age Category</th>
<th>High Complexity</th>
<th>Low Complexity</th>
<th>Difference in Mean</th>
<th>Value of 't'</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Under 25</td>
<td>12</td>
<td>201.75</td>
<td>81.30</td>
<td>12</td>
<td>208.08</td>
</tr>
<tr>
<td>25-40</td>
<td>50</td>
<td>180.14</td>
<td>512.63</td>
<td>48</td>
<td>196.19</td>
</tr>
<tr>
<td>Over 40</td>
<td>28</td>
<td>123.79</td>
<td>805.14</td>
<td>27</td>
<td>151.85</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>165.49</td>
<td>1381.57</td>
<td>87</td>
<td>104.07</td>
</tr>
</tbody>
</table>
age groups. This seems to mean that no matter how old a farm decision maker is, he will decode more from a message with low level of complexity and vice versa. Relative gain in the fidelity of decoding from a message with low level of complexity will, however, be more for the older farm decision makers and less for the "under 25 years" FDMs. This tantamounts to saying that message complexity from the fidelity of decoding point of view, though important for the younger FDMs, is not as important as for the other two age groups. It is the most important factor for the oldest age group, who would, according to the findings of this study, decode less amount of information at a fidelity level from a complex message when compared to the younger FDMs.

The amount of variability within the age groups (as can be seen from columns 4 and 7 of Table 26) is more for the high complexity message than for the low complexity message. This finding seems to indicate that with the reduction of level of complexity in a message in terms of shorter sentences, more personal pronouns, more concrete and colloquial words, many more FDMs from every age group have a tendency to score more close to the group mean than they would from a message with high level of complexity. This, in other words, seems to imply that there would be less misunderstanding with respect to the meaning of low complexity message than would be in the case of a high complexity message.

If message complexity is controlled and only age is let vary, the results thus obtained are given in the form of a 't' matrix in Table 27.

The 't' values for the three age groups are significant at .01 level of probability for both high and low complexity messages. This shows that no matter what the level of complexity of a message is, the
TABLE 27
'T' TEST MATRICES SHOWING THE SIGNIFICANCE OF DIFFERENCES AMONG VARIOUS AGE GROUPS AND HIGH AND LOW COMPLEXITY MESSAGES

<table>
<thead>
<tr>
<th>Age Category</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under 25</td>
<td>25-40</td>
</tr>
<tr>
<td>Under 25 years</td>
<td>-</td>
<td>3.18*</td>
</tr>
<tr>
<td>25-40 years</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Significant at .01 level of probability.

FDMs who are younger than 25 years will get more out of an agricultural message than those between 25-40 years, and they, in turn, will decode a message at a higher level of fidelity than the "over 40" years age group FDMs. This finding is consistent with the generally held belief that recall of information efficiency has a negative correlation with age.

Effect of Education and Message Complexity on the Fidelity of Message Encoding

Education has been considered to be an important variable related to the acquisition and acceptance of new knowledge. In the present study, results pertaining to this variable are shown in Table 28. The three categories of education were functionally defined as educated, literate and illiterate.

The mean FD score of the educated group for the high complexity message is 197.9 and for the low complexity message it is 205.2 a difference of 7.3 points over the former. High complexity and low complexity FD scores for the literate group are 152.0 and 177.8 respectively, with a
<table>
<thead>
<tr>
<th>Education Category</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>Difference in Mean Scores</th>
<th>Value of 't'</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educated</td>
<td>34</td>
<td>197.91</td>
<td>94.30</td>
<td>34</td>
<td>205.18</td>
<td>39.85</td>
<td>7.27</td>
<td>3.68</td>
<td>.01</td>
</tr>
<tr>
<td>Literate</td>
<td>50</td>
<td>152.04</td>
<td>883.00</td>
<td>47</td>
<td>177.79</td>
<td>595.33</td>
<td>25.75</td>
<td>4.67</td>
<td>.01</td>
</tr>
<tr>
<td>Illiterate</td>
<td>6</td>
<td>93.83</td>
<td>199.37</td>
<td>6</td>
<td>133.67</td>
<td>388.28</td>
<td>19.84</td>
<td>2.00</td>
<td>.05</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>165.49</td>
<td>1381.57</td>
<td>87</td>
<td>184.07</td>
<td>899.80</td>
<td>18.58</td>
<td>3.63</td>
<td>.01</td>
</tr>
</tbody>
</table>
difference of 25.6 points in favor of the low complexity message. The illiterate group has FD score means of 93.8 and 113.7 for the high complexity and low complexity messages respectively, and the difference in scores between the two complexity groups is 19.8. Whereas the educated and literate groups of respondents have a significant difference of 1 percent probability between the high and low complexity message score, the illiterate group has this difference significant at 5 percent probability. These results signify that FDs in all the three categories of education get more information from messages treated at low levels of complexity than from messages treated at high levels of complexity. However, this seems to be more true of the educated and literate groups than the illiterate category of respondents.

This finding is surprising and is inconsistent with the general expectation. A net gain of 19.8 points in mean FD scores between high complexity and low complexity messages for this category is more than 2.5 times the gain of 7.3 points for the educated category which has a significant difference between high and low complexity message scores at .01 level of probability. The explanation for this discrepancy seems to be a large variability for the illiterate category between the high complexity as well as the low complexity message scores as compared to the same variability for the other two groups, and also a much smaller number of respondents in this category--6-6 versus 50-47 and 34-34 for the literate and educated categories respectively in both high complexity and low complexity groups. The sample variability increases as size of the sample decreases. "Given a universe with variance, $\sigma^2$, the larger the $n$, the size of the sample, the smaller the variance of the sample mean."\(^1\) The variance and

size of the sample both are used in computation of the value of 't', and a smaller sample size and a larger variance mean a larger denominator with which the difference between the two means is divided, and thus lowering the value of 't'. In the present instance this seems to have caused the lowered value of 't' (2.00) and thus the lower level of significance (.05) when compared to the other two categories of education.

The effect of education on the fidelity of message decoding within the two levels of message complexity is shown in Table 29 through 't' matrices. It can be seen from Table 29 that all of the differences among different categories of education for high complexity as well as low complexity messages are statistically significant at .01 level of probability. This means that education, as a variable, is an important factor which affects the fidelity of message decoding by FDNs. Chena says that, "There is a tendency for persons with more education and more worldly experience to grasp media content and expand their knowledge and skills at a far greater rate than persons of lesser education."¹ The findings of this study support this contention.

Effect of Attitude of Farm Decision Makers Toward Improved Agricultural Practices and Message Complexity on the Fidelity of Message Decoding

It has been suggested that a favorable attitude toward incoming information lowers the threshold for its acceptance.² The hypothesis, "attitudes of farm decision makers toward improved agricultural practices significantly affect the fidelity of message decoding" was devised along these lines. An additional facet of this hypothesis is: how does message

¹Chena, op. cit., p. 156.
²Sherif and Byrne, op. cit., p. vi.
### Table 29

*T* test matrix showing the significance of difference between various categories of education for high and low complexity messages

<table>
<thead>
<tr>
<th>Education Category</th>
<th>Level of Complexity</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Educated</td>
<td>Literate</td>
<td>Educated</td>
</tr>
<tr>
<td>Educated</td>
<td>-</td>
<td>8.59*</td>
<td>-</td>
</tr>
<tr>
<td>Literate</td>
<td>-</td>
<td>-</td>
<td>4.65*</td>
</tr>
<tr>
<td>Illiterate</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Significant at .01 level*

Complexity interact with the attitudes of FDMs to affect the fidelity of message decoding? So, in fact there are two questions to be answered in this section: does favorable attitude of FDMs significantly affect their fidelity of message decoding, and, do high and low complexity messages significantly affect the fidelity of message decoding when the variable of attitudes is controlled?

As previously mentioned, the maximum attitude score a respondent could get was 50, and the minimum was 10. The cutting point for "more-favorable" and "less-favorable" attitudes was put at 35. Logically it should have been at 30 (\(\frac{50-10}{2}\) + 10 = 30), but after studying the distribution of respondents in under 30 and over 30 categories, it was decided to keep it at 35. Even then there is a left skewness in distribution of respondents between the "under 35" and "over 35" score categories, but it is smaller than had the cutting point been at 30.

The results pertaining to high and low complexity messages for...
the "more favorable" and "less favorable" categories of attitudes are shown in Table 30.

"More favorable" attitude groups of respondents have 168.8 and 196.3 FD scores for high and low complexity messages respectively, thus giving a difference of 27.5 scores between the two means. This difference is significant at .01 level. Even the less favorable attitude groups have a difference of 21.9 points in their means (175.5-153.6) which is also significant at .01 level. Thus it can be said from these results, that low complexity messages, no matter what the attitude of a respondent toward agricultural practices is, increase the fidelity of his message decoding as compared to a high complexity message. However, this increase in fidelity of decoding is likely to be of a smaller magnitude for the "less favorable" attitude group, than for the "more favorable" attitude group (7.3 versus 2.9). This gives an inkling of the reactive effect of attitudes with message complexity.

This reactive effect was further explored by controlling the variable of complexity and varying the attitude level. This was done by computing 't' values for the "more favorable" and "less favorable" attitude groups for high complexity as well as low complexity messages. It can be seen from Table 30, that more favorable attitude groups score higher than less favorable attitude groups for both high and low complexity messages. There is a difference of 15.2 points for the former pair of groups and 20.7 points for the latter pair of groups. Though these two differences are significant, the difference for high complexity "more" and "less" favorable attitude groups is significant at .05 level, whereas for the low complexity groups it is significant at .01 level. The interpretation
### Table 30

FIDELITY OF DECODING SCORES ACCORDING TO ATTITUDES AND MESSAGE COMPLEXITY

<table>
<thead>
<tr>
<th>Attitude Category</th>
<th>High Complexity</th>
<th>Low Complexity</th>
<th>Difference in Mean Score</th>
<th>Value of 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td>N</td>
</tr>
<tr>
<td>More favorable</td>
<td>62</td>
<td>168.80</td>
<td>536.47</td>
<td>57</td>
</tr>
<tr>
<td>Less favorable</td>
<td>28</td>
<td>153.63</td>
<td>1018.34</td>
<td>30</td>
</tr>
<tr>
<td>Difference in mean scores</td>
<td></td>
<td>15.15</td>
<td></td>
<td>20.74</td>
</tr>
<tr>
<td>Value of 't'</td>
<td></td>
<td>2.26**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .01 level.

**Significant at .05 level.
of these results is that incoming information is decoded with greater fidelity by a respondent whose attitudes towards that information are favorable, though high complexity messages may reduce this advantage of attitude favorableness. This finding, therefore, supports Edwards' results that positive initial attitude favorably affects the recollection of material. It is, however, at variance with Dickens and Williams' finding. They did not discover any significant relationship between attitude toward the topic and its comprehension. Further studies may be undertaken to conclusively establish the relationship of attitudes toward technical messages and fidelity of decoding.

**Effect of Aspirations of Farm Decision Makers and Message Complexity on the Fidelity of Message Decoding**

Lerner recognizes the effect of receiver's aspirations on his comprehension and acceptance of new information. In this study, also, a similar view is taken and it is hypothesized that there is a positive and significant correlation between the aspirations of a FDM and his fidelity of message decoding. A corollary of this hypothesis is that message complexity significantly interacts with the variable of aspiration in the process of message decoding. The results are presented in Table 31.

The high aspiration group which was exposed to high complexity message has a mean of 185.2 FD scores, as compared to 200.4 FD scores of a high aspiration group exposed to low complexity message. This

---

2 Dickens and Williams, *op. cit.*, p. 108.
3 Lerner, *op. cit.*
<table>
<thead>
<tr>
<th>Aspiration Category</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>Difference in Mean Scores</th>
<th>Value of 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher aspiration</td>
<td>67</td>
<td>185.23</td>
<td>882.67</td>
<td>66</td>
<td>200.37</td>
<td>333.38</td>
<td>15.14</td>
<td>3.54*</td>
</tr>
<tr>
<td>Lower aspiration</td>
<td>23</td>
<td>157.58</td>
<td>646.12</td>
<td>21</td>
<td>172.46</td>
<td>549.73</td>
<td>14.88</td>
<td>2.02**</td>
</tr>
<tr>
<td>Different between high and low aspiration scores</td>
<td></td>
<td>27.65</td>
<td>27.91</td>
<td></td>
<td>27.65</td>
<td>27.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of 't'</td>
<td></td>
<td>4.31*</td>
<td></td>
<td></td>
<td>5.59*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .01 level
**Significant at .05 level
difference of 15.1 scores between the means of two groups is significant at .01 level. For the low aspiration group, the fidelity of decoding scores are 157.5 for the high complexity message and 172.5 for the low complexity message, with a difference of 14.9 scores between the means of two groups.

This difference, however, is significant at .05 level. This implication of these results is that low complexity messages significantly increase the fidelity of decoding of respondents no matter what their level of aspirations is. From the magnitude of differences between the mean scores of high and low aspiration groups for high complexity and low complexity messages (15.1 for the former and 14.9 for the latter) and from the values of 't' (3.5 and 2.0) there does not appear to be an inconsistent effect of the complexity variables on the fidelity of decoding of high and low aspiration groups, as was discovered in the case of variable of attitudes.

Differences in mean scores of high and low aspiration groups, when message complexity is controlled, are quite large. For the high complexity message, the difference is 27.6 scores and for the low complexity message it is 27.9 scores. These differences are significant at .01 level. Farm decision makers with high level aspirations, therefore, according to these data receive more information from an agricultural message than do farm decision makers with low levels of aspiration. Petrie, however, did not find any significant relationship with respect to this variable.

\textbf{Fidelity of Message Decoding and Encoding Organization}

Encoding organization, as discussed in Chapter II, is one of the important variables the significance of which, from the decoding

\footnote{Petrie, \textit{op. cit.}, p. 84.}
point of view, has all along been recognized. After careful study of the literature, two levels of encoding organization were identified for the purposes of this study: implicit encoding organization and explicit encoding organization. The results pertaining to both of these levels of message organization will be presented and discussed in this section.

The primary hypothesis with respect to this independent variable was that the fidelity of message decoding increases with explicit encoding organization and decreases with implicit encoding organization. The results to test this hypothesis are presented in Table 32.

Table 32 shows that 7.8 percent of the FDs scored less than 100 points for implicit encoding organization versus 2.3 percent less than 100 points for explicit encoding organization. Percentages for respondents scoring over 200 FD points are 21.1 and 39.1 for implicit and explicit encoding organization respectively. If the number of FD score categories is reduced from four to two, i.e., FD scores "up to 150" and "over 150," the distribution of respondents for implicit and explicit organization becomes 31.1 percent and 19.5 percent for the "up to 150" score category, and 68.9 percent and 80.5 percent for the "over 150" score category respectively. This shows that a larger percentage of respondents who were exposed to explicitly organized message received higher FD scores than those who were exposed to implicitly organized messages.

The value of \( X^2 \) for the two levels of encoding organization is 8.6 with 3 degrees of freedom, which is significant at .05 level of probability. Fidelity of message decoding, therefore, is significantly associated with encoding organization. However this significance is not

\footnote{Unlike the variable of message complexity which has come into focus more recently.}
TABLE 32

RELATION OF ENCODING ORGANIZATION AND FIDELITY OF MESSAGE DECODING

<table>
<thead>
<tr>
<th>Level of Encoding Organization</th>
<th>Fidelity of Message Decoding Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under 100</td>
</tr>
<tr>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Implicit</td>
<td>7</td>
</tr>
<tr>
<td>Explicit</td>
<td>2</td>
</tr>
<tr>
<td>Total Sample</td>
<td>9</td>
</tr>
</tbody>
</table>

$X^2 = 8.59; \text{d.f.} = 3; \text{level of significance} = .05$
as high as was discovered for message complexity (Table 22). The nature of this relationship is further explored by computing 't' test from the group means.

**TABLE 33**

**ENCODING ORGANIZATION AND MEAN FIDELITY OF DECODING SCORES**

<table>
<thead>
<tr>
<th>Level of Encoding Organization</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>Value of 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit</td>
<td>90</td>
<td>167.68</td>
<td>1353.79</td>
<td>2.72</td>
</tr>
<tr>
<td>Explicit</td>
<td>87</td>
<td>181.81</td>
<td>1001.47</td>
<td>Significant at .01 level</td>
</tr>
</tbody>
</table>

**Total Sample** | 177 | 174.62 | 1225.07 |

As can be seen from Table 33, the mean FD score of respondents exposed to implicitly organized messages is less than the mean FD score of respondents exposed to explicitly organized messages (167.8 versus 181.8). This shows a difference of 14.1 scores in favor of the latter groups.\(^1\) This difference is statistically significant at .01 level of probability. Obviously, it is inconsistent with the significance level discovered by \(X^2\) (.05). However 't' test, which is computed from group means and variances, as compared to \(X^2\) which is computed from frequency distributions, is more refined and reliable. Therefore, one is unjustified in saying that explicit encoding organization, in fact, results in higher fidelity of message decoding than does implicit encoding organization. The chances of this not happening are one percent. The null hypothesis can, therefore, \(^1\)The same difference for high and low message complexity groups was 18.58.
be rejected and the hypothesis as stated for this study that the fidelity of message decoding increases with explicit encoding organization and decreases with implicit encoding organization is accepted.

Parker,1 who studied some organizational variables and their effect on comprehension, also, found that organization of speech significantly increased comprehension of the subject matter. Petrie's conclusion that the "better the organization of an informative speech, the more will be comprehended and retained"2 is also in line with the present finding.

Another facet of the present findings is that the amount of variance is more for the implicitly organized message than it is for the explicitly organized message (Table 33). This pattern was detected in the case of message complexity as well. A feasible explanation of this seems to be that explicit encoding organization makes the meaning of the message clearer and more specific, thus being instrumental in greater fidelity of decoding, and resulting in lesser variability within the group. The opposite, probably, happens in implicitly encoded messages. Another explanation of this may be that certain variables of respondents which interact with implicit and explicit message organization may cause this incongruency in variability. It will further be looked into in the section of this chapter dealing with regression analysis.

Fidelity of Message Decoding as Affected by Encoding Organization and Adoption Status of Farm Decision Makers

The results pertaining to the variable of adoption status of FDMs and encoding organization are presented in Table 34.

The high adoption status FDMs have the highest FD scores as

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1Parker, op. cit., p. 32.
2Petrie, op. cit., p. 80.
<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Implicit</th>
<th></th>
<th></th>
<th>Explicit</th>
<th></th>
<th></th>
<th>Difference in Mean Scores</th>
<th>Value for ‘t’</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N 2</td>
<td>Mean 3</td>
<td>Variance 4</td>
<td>N 5</td>
<td>Mean 6</td>
<td>Variance 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>30</td>
<td>183.73</td>
<td>645.03</td>
<td>29</td>
<td>195.24</td>
<td>330.00</td>
<td>11.51</td>
<td>2.00</td>
<td>.05</td>
</tr>
<tr>
<td>Medium</td>
<td>30</td>
<td>171.70</td>
<td>1021.95</td>
<td>29</td>
<td>185.21</td>
<td>705.05</td>
<td>13.53</td>
<td>1.77</td>
<td>.05</td>
</tr>
<tr>
<td>Low</td>
<td>30</td>
<td>147.60</td>
<td>1787.29</td>
<td>29</td>
<td>164.97</td>
<td>954.39</td>
<td>17.37</td>
<td>1.81</td>
<td>.05</td>
</tr>
<tr>
<td>Total Score for Organization</td>
<td>90</td>
<td>167.68</td>
<td>1353.79</td>
<td>87</td>
<td>181.81</td>
<td>1003.46</td>
<td>14.13</td>
<td>2.72</td>
<td>.01</td>
</tr>
</tbody>
</table>
compared to the other groups for both implicitly and explicitly organized messages. However, explicitly organized message, when compared to the implicitly organized message adds 11.5 points to their mean FD score. This difference for the medium adoption status groups is 13.5 and for the low adoption status groups it is 17.4. This means, that whereas, explicit encoding organization increases the fidelity of decoding of all the adoption status groups, it contributes most in the case of low adoption status respondents and least in the case of high adoption status FDMs, i.e., encoding organization is not as crucial for high adoption status farmers as it is for low adoption status farmers. As can be seen from Table 34, all of these differences between implicit and explicit organization messages for the three adoption groups are significant at .05 level and not at .01 level, as in the case of message complexity. This implies that, from the fidelity of message decoding point of view, message complexity is more important than encoding organization for all types of farm decision makers who were respondents in this study.

Another observation can be made from columns 4 and 7 in Table 34. The magnitude of group variance increases with the decreased adoption status of FDMs. Also, it is more for the implicitly organized messages than for the explicitly organized messages. This result is similar to that found in the variable of message complexity, thus, adding weight to the interpretation that fidelity of message decoding and adoption status of FDMs have a positive correlation. Association of implicit organization with increased variance seems to imply that greater inaccuracy in the interpretation of the message occurs in this case than it would occur in explicit organization.
In Table 35, the significance of differences between adoption status groups when the encoding organization factor is controlled, are presented.

**TABLE 35**

*t* TEST MATRICE SHOWING THE SIGNIFICANCE OF DIFFERENCES AMONG VARIOUS ADOPTION STATUS GROUPS FOR IMPLICIT AND EXPLICIT ENCODING ORGANIZATION

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Implicit</th>
<th>Explicit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HAS</td>
<td>MAS</td>
</tr>
<tr>
<td>HAS</td>
<td>-</td>
<td>1.59*</td>
</tr>
<tr>
<td>MAS</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LAS</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Not significant
** Significant at .01 level of probability
*** Significant at .05 level of probability

It can be seen from Table 35 that, for both implicit and explicit encoding organizations, the fidelity of message decoding of high and medium adoption status groups of FDMs is not significantly different, even though high adoption status respondents have higher FD mean scores than the medium status respondents (Table 34). For implicitly organized messages, both high and medium adoption status FDMs have significantly higher (at .01 level) fidelity of message decoding than the low adoption status FDMs. On the other hand, for explicitly organized messages, high and low adoption status groups differ in their fidelity of message decoding at 1 percent level and medium and low adoption status groups differ at 5 percent level.
Encoding organization, therefore, though important for the fidelity of message decoding, does not significantly differentiate between all the three adoption status groups at a respectable level of significance at 1 percent on the basis of their fidelity of decoding. This finding is somewhat dissimilar to the one for message complexity (Table 25). The explanation of this, again, could be a lesser degree of interaction between the adoption status and encoding organization than that which existed in message complexity and adoption status.

**Table 25**

The effect of implicit and explicit encoding organization on the fidelity of message decoding by various age groups of FDMs is shown in Table 36.

The "under 25 years" age group of respondents has the highest mean FD score for implicit as well as explicit encoding organization. The latter type of organization increases FD scores by 5.2 scores as compared to the former type of organization. The difference in mean scores for implicit and explicit encoding organization for "25–40 years" age group is 10.9 scores which is a little more than twice the difference for the "under 25" years group. For the "over 40" age group this difference increases to 23.2 scores which, as can be seen from Table 36, is the highest among the three groups. The increase in mean score differences from the "under 25" to "over 40" years groups is also accompanied by a corresponding increase in variance which in turn is more for the implicit organization category than for the explicit organization category for all three age groups.
### TABLE 36

**FIDELITY OF DECODING SCORES ACCORDING TO AGE OF RESPONDENTS AND ENCODING ORGANIZATION**

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Level of Encoding Organization</th>
<th>Implicit</th>
<th></th>
<th>Explicit</th>
<th></th>
<th></th>
<th></th>
<th>Difference in Mean Scores</th>
<th>Value of 't'</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td>Scores</td>
<td>Value of 't'</td>
<td>Significance</td>
</tr>
<tr>
<td>Under 25</td>
<td>Implicit</td>
<td>12</td>
<td>202.47</td>
<td>72.71</td>
<td>12</td>
<td>207.67</td>
<td>27.89</td>
<td>5.20</td>
<td>1.79</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Explicit</td>
<td>50</td>
<td>182.66</td>
<td>445.47</td>
<td>48</td>
<td>193.56</td>
<td>278.17</td>
<td>10.90</td>
<td>2.84</td>
<td>.01</td>
</tr>
<tr>
<td>Over 40</td>
<td>Implicit</td>
<td>28</td>
<td>126.14</td>
<td>891.02</td>
<td>27</td>
<td>149.41</td>
<td>1150.64</td>
<td>23.27</td>
<td>2.69</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Explicit</td>
<td>90</td>
<td>167.68</td>
<td>1353.79</td>
<td>87</td>
<td>181.81</td>
<td>1003.46</td>
<td>14.13</td>
<td>2.72</td>
<td>.01</td>
</tr>
</tbody>
</table>

**Note:** The table presents the fidelity of decoding scores according to age of respondents and encoding organization. The data includes the number of participants (N), their mean scores (Mean), variance, and differences in mean scores. The significance level is indicated for the value of 't'.
Implicitness and explicitness make a statistically significant difference for every age group, though for the "under 25" years age category the significance is at 5 percent level. It is at 1 percent level of probability for the other two age groups.

Encoding organization for the variable of age, as the above results reveal, affects significantly the fidelity of message decoding of respondents. Explicit encoding organization interacts most with the fidelity of message decoding of the "over 40" years age group (as shown by the difference in mean scores), and much less with the "under 25" years age group. This means that, for the younger respondents, encoding organization does not make much difference in their fidelity of message decoding. However, as a respondent gets older he needs agricultural information presented to him in an explicitly organized form. Relatively smaller variances for explicit encoding organization, seem to mean that it makes the meaning of the message come through more clearly than does implicit encoding organization. Further support for the above interpretation was obtained by computing values of 't' for the pairs of various age groups for implicit as well as explicit encoding organization.

As can be seen from Table 37, all of the differences between the three age groups for both types of encoding organizations are significant at .01 level. This clearly supports the previous interpretation, that age is an important variable which interacts significantly with the method of message organization and thus affects the fidelity of message decoding.
TABLE 37

' t ' TEST HATRICE SHOWING THE SIGNIFICANCE OF DIFFERENCES AMONG VARIOUS AGE GROUPS FOR IMPLICIT AND EXPLICIT ENCODING ORGANIZATION

<table>
<thead>
<tr>
<th>Level of Encoding Organization</th>
<th>Implicit</th>
<th></th>
<th></th>
<th>Explicit</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
<td>Under 25</td>
<td>25-40</td>
<td>Over 40</td>
<td>Under 25</td>
<td>25-40</td>
<td>Over 40</td>
</tr>
<tr>
<td>Under 25</td>
<td>-</td>
<td>3.09*</td>
<td>8.45*</td>
<td>-</td>
<td>2.84*</td>
<td>7.44*</td>
</tr>
<tr>
<td>25-40</td>
<td></td>
<td>-</td>
<td>9.61*</td>
<td></td>
<td>-</td>
<td>5.76*</td>
</tr>
<tr>
<td>Over 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level.

Fidelity of Message Decoding As Affected by Encoding Organization and Education of Farm Decision Makers

The results pertaining to the variable of education of respondents as affecting the fidelity of message decoding, and mediated through implicit and explicit organization, are given in Table 38.

Explicit encoding organization makes a difference of 7.5 scores in the fidelity of message decoding of "educated" respondents when compared to implicit encoding organization for the same group (an FD mean of 204.6 for the former and 197.5 for the latter level of organization). The mean FD score for explicit encoding organization for the literate group is 173.4, which is 18.1 scores more than the mean for implicit encoding organization. This difference is more than twice the same difference for the educated group. The illiterate group of respondents, having the lowest mean FD scores for implicit as well as explicit encoding organization, as compared to the other two groups, shows a difference of 15.2 scores between the two means pertaining to implicit and explicit encoding.
<table>
<thead>
<tr>
<th>Education Category</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>Difference in Mean Scores</th>
<th>Value of 't'</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educated</td>
<td>34</td>
<td>197.47</td>
<td>86.18</td>
<td>34</td>
<td>204.62</td>
<td>56.45</td>
<td>7.15</td>
<td>3.49</td>
<td>.01</td>
</tr>
<tr>
<td>Literate</td>
<td>50</td>
<td>155.26</td>
<td>938.37</td>
<td>47</td>
<td>173.38</td>
<td>692.28</td>
<td>18.12</td>
<td>3.12</td>
<td>.01</td>
</tr>
<tr>
<td>Illiterate</td>
<td>6</td>
<td>95.61</td>
<td>298.27</td>
<td>6</td>
<td>110.83</td>
<td>404.98</td>
<td>15.22</td>
<td>1.41</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>167.68</td>
<td>1353.79</td>
<td>87</td>
<td>181.81</td>
<td>1003.46</td>
<td>14.13</td>
<td>2.72</td>
<td>.01</td>
</tr>
</tbody>
</table>
organization. When the statistical significance of difference between implicit and explicit encoding organization for the three education groups was computed, it was found, as shown in the last column of Table 12, that the differences for the educated and literate groups are significant at .01 level, and are not significant for the illiterate group.

The above results mean that whereas explicitness, when compared to implicit encoding organization, does increase the fidelity of message decoding of the educated and literate groups of FDMs, it does not seem to do so for the illiterate group, even though there is an increase in FD scores in favor of the explicit encoding organization as is shown by the mean difference in scores. This finding is somewhat surprising, since it was expected that explicit encoding organization would significantly increase the FD scores of illiterate FDMs as compared to their scores for the implicit encoding organization. However, these results, at least in nature, seem to be consistent with the results obtained for the high and lower complexity messages for the same education category, i.e., illiterate (Table 28). There, the difference between high-complexity and low-complexity messages for this category of education was significant at .05 level as compared to the significance of difference for other groups at .01 level. The same explanation seems to be relevant for explaining this discrepancy, i.e., larger variance for the illiterate FDMs and smaller group size (6) as compared to the other two groups.

The significance of fidelity of message decoding differences between the three categories of education of FDM, was tested through "t" test matrix, given in Table 39.
### Table 39

't' TEST MATRICE SHOWING THE SIGNIFICANCE OF DIFFERENCES AMONG VARIOUS EDUCATION GROUPS FOR IMPLICIT AND EXPLICIT ENCODING ORGANIZATION

<table>
<thead>
<tr>
<th>Education Category</th>
<th>Implicit</th>
<th></th>
<th></th>
<th>Explicit</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Educated</td>
<td>Literate</td>
<td>Illiterate</td>
<td>Educated</td>
<td>Literate</td>
<td>Illiterate</td>
</tr>
<tr>
<td>Educated</td>
<td>-</td>
<td>7.89*</td>
<td>15.90*</td>
<td>-</td>
<td>6.43*</td>
<td>19.80*</td>
</tr>
<tr>
<td>Literate</td>
<td>-</td>
<td>4.52*</td>
<td></td>
<td>-</td>
<td></td>
<td>5.60*</td>
</tr>
<tr>
<td>Illiterate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level of probability.

All of the differences in fidelity of message decoding between the three categories of education for implicit as well as explicit encoding organization are statistically significant at .01 level. The values of 't', as can be seen from Table 39, are fairly high as compared to the tabular values of 't' for .01 level of significance. The variable of education, therefore, according to the findings of this study, is an important variable which makes a pronounced difference in the fidelity of message decoding by the farm decision makers, no matter what the level of encoding organization is.

**Fidelity of Decoding as Affected by**

**Encoding Organization and Attitude of Respondents toward Improved Agricultural Practices**

Table 40 presents the results showing the effect of attitudes of respondents toward improved agricultural practices and implicit and explicit encoding organization on the fidelity of message decoding.
TABLE 40
FIDELITY OF DECODING SCORES ACCORDING TO ATTITUDES OF RESPONDENTS TOWARD IMPROVED AGRICULTURAL PRACTICES AND ENCODING ORGANIZATION

<table>
<thead>
<tr>
<th>Attitude Category</th>
<th>Level of Encoding Organization</th>
<th>Implicit</th>
<th></th>
<th></th>
<th>Explicit</th>
<th></th>
<th></th>
<th>Difference in Mean Scores</th>
<th>Value of 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More favorable</td>
<td>71</td>
<td>171.43</td>
<td>955.29</td>
<td>63</td>
<td>195.18</td>
<td>763.46</td>
<td>23.75</td>
<td>4.69*</td>
<td></td>
</tr>
<tr>
<td>Less favorable</td>
<td>19</td>
<td>154.89</td>
<td>881.68</td>
<td>24</td>
<td>179.21</td>
<td>649.23</td>
<td>20.32</td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td>Difference between group means</td>
<td></td>
<td>16.54</td>
<td></td>
<td></td>
<td>15.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of 't'</td>
<td></td>
<td>2.14**</td>
<td></td>
<td></td>
<td>2.55*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level
** Significant at .05 level
Groups of respondents with more favorable attitudes score higher than do the groups with less favorable attitudes. Groups of respondents who were exposed to explicitly organized messages score higher than those exposed to implicitly organized messages, irrespective of their attitudinal standing. There is a difference of 23.8 scores between the mean fidelity of message decoding for implicit and explicit encoding organization of the groups having more favorable attitudes. For the "less favorable" attitude groups, the same difference is 20.3 scores. These two differences are statistically significant at .01 level, meaning thereby that explicit encoding organization significantly increases the fidelity of message decoding of the respondents who have more favorable as well as less favorable attitudes toward improved agricultural practices. The factor of low message complexity also made a significant difference at .01 level in the fidelity of decoding of the respondents of more favorable and less favorable attitudinal groups (Table 30).

The mean fidelity of decoding score differences between more favorable and less favorable attitude groups, who were exposed to implicit and explicit encoding organization, are 16.5 and 15.9 respectively. The same differences for high and low message complexity were 15.1 and 20.7 scores. These figures, as such, seem to show that low complexity made a greater difference in mean scores of the two attitude groups than did explicit encoding organization, and thus, probably, is more important than explicit encoding organization. Statistical significance of the "more favorable" and "less favorable" attitude groups who were exposed to implicitly organized message is at .05 level, and of those who were exposed to explicitly organized message is at .01 level. Thus, though
the favorable attitudes of a farm decision maker toward agricultural practices do increase his fidelity of message decoding, as compared to a farm decision maker with less favorable attitudes, the chances are that explicit encoding organization will make a greater difference than implicit encoding organization.

**Fidelity of Decoding as Affected by Encoding Organization and Aspirations of Respondents**

The results pertaining to aspirations of respondents and encoding organization and their effect on the fidelity of message decoding are given in Table 41.

Respondents with high aspirations have mean fidelity scores of 193.7 and 203.5 for implicit and explicit encoding organization respectively. The difference between the two means, 9.8 scores, is significant at .05 level. For respondents with low aspirations, the means for implicit and explicit encoding organization are 161.3 and 178.2 scores respectively, thus giving a difference of 16.8 scores between them. This difference is also significant at .05 level. The groups of respondents with low level aspirations have relatively large variance for the small number of respondents in them, and that is the reason why, in spite of the mean difference of 16.8 scores between the two groups, the value of 't' for this pair of groups is smaller than the value of 't' for the high aspiration pair of groups which has only a mean difference of 9.8 scores. However, even the 5 percent level of significance for implicit and explicit encoding organization means, that explicitness in comparison to implicitness in message organization increases the fidelity of message decoding of respondents, no matter what their level of aspirations is.
<table>
<thead>
<tr>
<th>Aspiration Category</th>
<th>Implicit</th>
<th>Explicit</th>
<th>Difference in Mean Scores</th>
<th>Value of 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Variance</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>74</td>
<td>193.72</td>
<td>907.29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>69</td>
<td>203.47</td>
<td>543.31</td>
<td>9.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.19**</td>
</tr>
<tr>
<td>Low</td>
<td>16</td>
<td>161.33</td>
<td>850.58</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>178.15</td>
<td>694.20</td>
<td>16.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.76**</td>
</tr>
<tr>
<td>Difference in high and low aspiration mean scores</td>
<td>32.39</td>
<td>25.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of 't'</td>
<td>4.00*</td>
<td>3.72*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level
** Significant at .05 level
When the level of aspirations is varied by controlling encoding organization, it is found that the differences in mean scores of high and low aspiration groups, for both implicit and explicit encoding organization, are significant at .01 level of probability. High level aspirations, therefore, increase the fidelity of message decoding by farm decision makers. The same result was shown in Table 31, when findings pertaining to message complexity and aspirations were presented.

**Effect of Personal Characteristics of Farm Decision Makers on the Fidelity of Message Decoding**

In the previous sections the role of personal characteristics of farm decision makers as mediated through experimental treatments, message complexity and encoding organization in affecting the fidelity of message decoding was discussed. The main question was: Do these personal characteristics, in conjunction with the corresponding message treatment, affect the fidelity of message decoding? In the present section, the question posed is: How do the selected personal characteristics of the farm decision makers affect the fidelity of message decoding? The hypothesis pertaining to particular personal characteristics is given under each sub-section.

**Effect of Adoption Status on the Fidelity of Message Decoding**

The hypothesis with respect to adoption status and fidelity of decoding is that adoption status of farm decision makers significantly and positively affects the fidelity of message decoding—the higher the adoption status of an FDM the higher his fidelity of message decoding would be, and vice versa. The results are presented in Tables 42 and 43.
### TABLE 42

**DISTRIBUTION OF RESPONDENTS (IN PERCENTAGES) ACCORDING TO ADOPTION STATUS INTO VARIOUS CATEGORIES OF FIDELITY OF DECODING**

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Fidelity of Decoding Category (In Scores)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 100</td>
</tr>
<tr>
<td>High</td>
<td>-</td>
</tr>
<tr>
<td>Medium</td>
<td>-</td>
</tr>
<tr>
<td>Low</td>
<td>15.3</td>
</tr>
<tr>
<td>Total Sample</td>
<td>5.2</td>
</tr>
</tbody>
</table>

\[ X^2 = 30.85; \text{ d.f.} = 6; \text{ Level of significance } = .01 \]

### TABLE 43

**EFFECT OF ADOPTION STATUS ON THE FIDELITY OF MESSAGE DECODING**

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>'t' Test Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td>59</td>
<td>189.39</td>
<td>22.71</td>
<td>-</td>
</tr>
<tr>
<td>Medium</td>
<td>59</td>
<td>178.34</td>
<td>29.96</td>
<td>-</td>
</tr>
<tr>
<td>Low</td>
<td>59</td>
<td>156.14</td>
<td>41.48</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td>174.62</td>
<td>35.00</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level
** Significant at .05 level
As can be seen from Table 42, no respondent from high and medium adoption status categories has an FD score less than 100. However, 15.3 percent of the low adoption status FDMS are in this category. In the "over 200" FD score category 44.1, 32.2 and 13.6 percent of the respondents are from high, medium and low adoption groups. Percentages of respondents getting over 150 FD scores for the high, medium and low adoption groups are 88.2, and 78.0 and 57.6 respectively; whereas percentages of respondents obtaining up to 50 FD scores for the high, medium and low adoption statuses are 11.8, 22.0 and 43.2 respectively. Clearly, higher FD scores are obtained by a larger percentage of respondents from the high adoption group and the lowest by low adoption group. FD scores of the medium adoption group are in between the two adoption groups.

The value of $X^2$ is 30.8 which is significant at .01 level for 6 degrees of freedom. Adoption status of FDMS, therefore, according to the findings of this study is significantly associated with the fidelity of message decoding. How this association varies within the three adoption groups, is studied through results presented in Table 43.

Although there is a difference of 11.0 points in the mean FD scores of high and medium adoption status groups, this difference is significant at .05 level. However, mean FD score differences between medium and low, and high and low adoption status groups are significant at .01 level of probability. This means that farm decision makers who have high adoption status, will have higher fidelity of message decoding in 95 cases out of 100, when compared to the medium adoption status FDMS and in 99 cases out of 100 when compared to low adoption status groups. The latter relationship also holds between medium and low adoption status FDMS. On the basis of these findings the study hypothesis is accepted.
with some reservations. The adoption status of FDMs affects the fidelity of message decoding, though conclusive evidence of this for the high and medium adoption status groups is not provided by the results of this study.

**Effect of Age on the Fidelity of Message Decoding**

The study hypothesis designed for this variable is that age is inversely and significantly associated with the fidelity of message decoding. Relevant results to test this hypothesis are given in Tables 44 and 45.

An inspection of Table 44 shows that 83.3 percent of the "under 25" years respondents obtain "over 200" FD scores as compared to 32.7 and 1.8 percent of "25-40" and "over 40" years groups. "Over 40" years age group has the maximum number of respondents (16.4%) with FD scores up to 100 points. By combining the adjoining FD score categories, it is found that 100 percent of the respondents in the "under 25" years age group score over 150 FD scores against 92.9 percent and 30.9 percent of the "25-40" and "over 40" years age groups. The relevant percentages for up to 150 FD scores for "under 25," "25-40" and "over 40" are groups are 0, 7.1, 69.1 percent respectively. From these results, it is quite apparent that younger age group respondents have higher FD scores and older age group respondents have lower FD scores. The value of $X^2$ is 111.7, which is significant at .01 level. The null hypothesis, therefore, is rejected and the hypothesis is accepted that age has a significant and inverse association with the fidelity of message decoding by FDMs.
### TABLE 44

**DISTRIBUTION OF RESPONDENTS (IN PERCENTAGES) ACCORDING TO AGE INTO VARIOUS CATEGORIES OF FIDELITY OF DECODING**

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Fidelity of Decoding Category (Scores)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 100</td>
<td>101-150</td>
</tr>
<tr>
<td>Under 25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25-40</td>
<td>-</td>
<td>7.1</td>
</tr>
<tr>
<td>Over 40</td>
<td>16.4</td>
<td>52.7</td>
</tr>
</tbody>
</table>

| Total        | 5.2       | 20.3    | 44.6    | 29.9     | 177     | 100.0  |

$X^2 = 111.7$; d.f. = 6; **Level of significance = .01**

### TABLE 45

**EFFECT OF AGE ON THE FIDELITY OF MESSAGE DECODING**

<table>
<thead>
<tr>
<th>Age Category</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>'t' Test Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Under 25</td>
</tr>
<tr>
<td>Under 25</td>
<td>24</td>
<td>204.92</td>
<td>7.48</td>
<td>-</td>
</tr>
<tr>
<td>25-40</td>
<td>98</td>
<td>188.00</td>
<td>19.74</td>
<td>-</td>
</tr>
<tr>
<td>Over 40</td>
<td>55</td>
<td>137.56</td>
<td>33.72</td>
<td>-</td>
</tr>
</tbody>
</table>

| Total        | 177 | 174.62| 35.00|                |

*Significant at .01 level
However, to study the nature of relationship between various age groups, 't' values were computed and results are presented in Table 45. A mean of 204.9 points for the "under 25" years group is the highest among the three groups and a mean of 137.6 points for the "over 40" years group is the lowest. The "25-40" age group has a mean of 188.0 points which is 16.9 scores less than the "under 25" years group and 50.4 scores more than the "over 40" years age group. The difference between the means of "under 25" and "over 40" years age groups is 67.3 points. All of these mean differences are significant at .01 level of probability. It may be concluded from these results that all three age groups significantly differ from each other in terms of the fidelity of message decoding. This provides added weight to the interpretation made above that age is significantly and inversely related to the fidelity of message decoding.

Effect of Education on the Fidelity of Message Decoding

Education as an intervening variable in this study is hypothesized to be significantly and positively related to the fidelity of message decoding. Tables 46 and 47 present the results to test this hypothesis.

An interesting pattern of percentages in various FD categories is shown by Table 46. Out of 68 respondents in the "educated" category no one scored less than 150 FD points, and of the 12 "illiterate" respondents none scored more than 150 FD points. Only "literate" respondents (97) are represented in all the FD categories, with 3.1 percent obtaining up to 100 scores and 7.2 percent obtaining over 200 scores. The value of $X^2$, which is significant well beyond the level of .01, is 140.7. The
TABLE 46
DISTRIBUTION OF RESPONDENTS (IN PERCENTAGES) ACCORDING TO EDUCATION INTO VARIOUS CATEGORIES OF FIDELITY OF DECODING

<table>
<thead>
<tr>
<th>Education Category</th>
<th>Fidelity of Decoding Category (Scores)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 100</td>
<td>101-150</td>
</tr>
<tr>
<td>Educated</td>
<td>-</td>
<td>32.4</td>
</tr>
<tr>
<td>Literate</td>
<td>3.1</td>
<td>30.9</td>
</tr>
<tr>
<td>Illiterate</td>
<td>50.0</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Total               | 5.2       | 20.3     | 44.6     | 29.9     | 117   | 100.0 |

\[ \chi^2 = 140.79; \text{ d.f.} = 6; \text{ Level of significance} = .01 \]

TABLE 47
EFFECT OF EDUCATION ON THE FIDELITY OF MESSAGE DECODING

<table>
<thead>
<tr>
<th>Education Category</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>'t' Test Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Educated</td>
</tr>
<tr>
<td>Educated</td>
<td>68</td>
<td>201.54</td>
<td>8.91</td>
<td>-</td>
</tr>
<tr>
<td>Literate</td>
<td>97</td>
<td>164.52</td>
<td>30.05</td>
<td>-</td>
</tr>
<tr>
<td>Illiterate</td>
<td>12</td>
<td>103.75</td>
<td>19.35</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td>174.62</td>
<td>35.00</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .01 level
null hypothesis is, therefore, rejected, and it is concluded that education and fidelity of decoding are positively and significantly related. The more educated an FDM is, the higher his fidelity of message decoding is likely to be, controlling for all other variables.

The significance of FD differences "between" various education categories is shown in Table 47. A mean FD score of 103.7 points for the "illiterate" category of education is the lowest, and a FD score of 201.5 points for the "educated" category is the highest. The FD score difference between these two groups is 97.7 points, which is the highest for any two extreme categories of even adoption status and age variables. The "literate" group with a mean of 164.5 FD scores exceeds the mean of "illiterate" group by 63.7 points, but is short of the "educated" group mean of 37.0 points. All the 't' values for different combinations of these groups are significant at .01 level.

It is therefore, conclusively established from the above results that education is an important variable which positively affects the fidelity of message decoding. The study hypothesis with respect to this variable is, therefore, accepted.

**Effect of Attitudes Toward Improved Agricultural Practices on the Fidelity of Message Decoding**

Favorable attitudes of respondents toward improved agricultural practices are hypothesized to significantly and positively increase the fidelity of message decoding, as compared to the less favorable attitudes. Since there are only two levels of this variable, the significance of difference between the two—more favorable and less favorable attitudes groups can be tested from results in Table 48.
TABLE 48
EFFECT OF ATTITUDES TOWARD AGRICULTURAL PRACTICES
ON THE FIDELITY OF MESSAGE DECODING

<table>
<thead>
<tr>
<th>Attitude Category</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>Value of 't'</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>More favorable</td>
<td>126</td>
<td>189.73</td>
<td>802.66</td>
<td>5.59</td>
<td>.01</td>
</tr>
<tr>
<td>Less favorable</td>
<td>51</td>
<td>161.34</td>
<td>984.21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The "more favorable" attitude group of FDMs has a mean FD score of 189.7, as compared to the mean of 161.3 scores of the "less favorable" attitude group. There is a difference of 28.3 scores between the two groups, and it is significant at .01 level of probability. The null hypothesis of no difference is, therefore, rejected, and the study hypothesis accepted. The attitude of a farm decision maker toward agricultural practices significantly and positively increases his fidelity of message decoding. The more favorable the attitude, the higher is likely to be his fidelity of decoding.

Effect of Aspirations on the Fidelity of Decoding

The study hypothesis pertaining to this variable is that level of aspirations of a farm decision maker is significantly and positively related to the fidelity of his message decoding. The results are presented in Table 49. Since this variable has only two levels, like the variable of attitudes, the significance of difference between the two can be directly seen from the value of 't'.

Farm decision makers with relatively high level of aspirations have a mean FD scores of 197.4 and those with low aspirations have a mean
TABLE 49

EFFECT OF ASPIRATIONS ON THE FIDELITY OF MESSAGE DECODING

<table>
<thead>
<tr>
<th>Aspiration Category</th>
<th>N</th>
<th>Mean</th>
<th>Variance</th>
<th>Value of 't'</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>135</td>
<td>197.45</td>
<td>135.29</td>
<td>5.55</td>
<td>.01</td>
</tr>
<tr>
<td>Low</td>
<td>42</td>
<td>169.32</td>
<td>789.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

of 169.3. These two means give a difference of 28.1 scores between the two groups. The value of 't' (5.6) is significant at .01 level of probability. This means that those FIDMs who have higher aspirations are likely to get more out of agricultural messages than those who have low aspirations. Interactive effects of level of aspiration, message complexity and encoding organization with the fidelity of message decoding, as already discussed, show similar results.

**Interactive Effects of Message Complexity, Encoding Organization, and Adoption Status on the Fidelity of Message Decoding**

Individual effects of message complexity, encoding organization and adoption status have already been examined. In this section the interactive effects of these three factors will be presented and discussed. Effects of other variables—age, education, attitudes and aspirations—on the fidelity of message decoding have previously been discussed separately with message complexity and encoding organization. Their interactive effects with message complexity and encoding organization simultaneously cannot be discussed here. Inequality in the number of cases in the levels of the variables under reference makes it statistically unwise to use analysis of variance techniques to study simultaneous interactions with message complexity and encoding organization. However,
their significance with respect to fidelity of message decoding will be reflected from multiple regression analysis to be discussed in the later part of this chapter.

The analysis of variance (Table 50) presenting the interactions between message complexity, encoding organization and adoption status is given below. These interactions were computed from 12 base cells, each with 15 respondents. Since there were 14 respondents in three out of 12 cells, equality in respondent numbers was achieved through respective cell mean interpolations.

It can be seen from Table 50 that all the interactions are significant at .01 level. Message complexity and adoption status in conjunction with each other ('F' value 5.7) increase fidelity of message decoding more than do encoding organization and adoption status taken together ('F' value 4.9). However, best results in increasing fidelity of message decoding can be achieved through a combination of message complexity and encoding organization ('F' value 7.7). Even a combination of all three factors—message complexity, encoding organization and adoption status—has a considerably significant effect on the fidelity of message decoding. To supplement these findings, mean FD scores for these factors in combination with each other are given in Table 51.

Explicitness of encoding organization at high level of message complexity as compared to low level of message complexity is more important for high and medium adoption status farm decision makers than it is for low adoption status farm decision makers. Differences in mean scores at high level of message complexity for high medium adoption status respondents for low message complexity in column 7 are 10.1 and 13.7 respectively.
TABLE 50
ANALYSIS OF VARIANCE OF FIDELITY OF MESSAGE DECODING SCORES
AND MESSAGE COMPLEXITY, ENCODING ORGANIZATION, AND ADOPTION
STATUS OF FARM DECISION MAKERS

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>Value of F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Message complexity x Encoding organization</td>
<td>1</td>
<td>6538.63</td>
<td>7.17</td>
<td>.01</td>
</tr>
<tr>
<td>2. Message complexity x Adoption status</td>
<td>2</td>
<td>5156.97</td>
<td>5.67</td>
<td>.01</td>
</tr>
<tr>
<td>3. Encoding organization x Adoption status</td>
<td>2</td>
<td>4518.85</td>
<td>4.96</td>
<td>.01</td>
</tr>
<tr>
<td>4. Message complexity x Encoding organization x Adoption status</td>
<td>2</td>
<td>6126.14</td>
<td>6.73</td>
<td>.01</td>
</tr>
<tr>
<td>5. Within</td>
<td>171(^1)</td>
<td>910.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This gives a difference of 3.1—(13.3-10.1), for high adoption status and .02—(13.8-13.8), for medium adoption status respondents in favor of high message complexity and explicit encoding organization. However, for the low adoption status farmers, the observed differences are quite the opposite. In their case a difference of 18.3 (column 7) between implicit and explicit encoding organization with low level of message complexity is more by 1.8 points from the difference of 16.9 (column 4) for explicit encoding organization with high level of message complexity. A similar pattern for the three adoption groups for the high and low implicit encoding organization (column 8) and high and low explicit encoding organization (column 9) can be noted from Table 51.

\(^1\)To achieve equality in the number of respondents in all the 12 base cells, substitution of 3 cases through respective cell means was done, thus giving the number of total respondents, in this case, equal to 180, rather than 177, the actual number of respondents.
<table>
<thead>
<tr>
<th>Level of Complexity</th>
<th>High</th>
<th>Low</th>
<th>Difference in High and Low Implicit Org.</th>
<th>Difference in High and Low Explicit Org.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Implicit 2</td>
<td>Explicit 3</td>
<td>Difference 4</td>
<td>Implicit 5</td>
</tr>
<tr>
<td>Adoption Status</td>
<td>High 1</td>
<td>Medium 2</td>
<td>Low 3</td>
<td>High 4</td>
</tr>
<tr>
<td>High</td>
<td>176.40</td>
<td>189.67</td>
<td>13.27</td>
<td>191.07</td>
</tr>
<tr>
<td>Medium</td>
<td>163.47</td>
<td>177.27</td>
<td>13.80</td>
<td>179.93</td>
</tr>
<tr>
<td>Low</td>
<td>134.60</td>
<td>151.53</td>
<td>16.93</td>
<td>160.60</td>
</tr>
<tr>
<td>Total</td>
<td>158.16</td>
<td>172.82</td>
<td>14.66</td>
<td>177.20</td>
</tr>
</tbody>
</table>
The interpretation of these findings is that, relatively speaking, high and medium adoption status farm decision makers benefit more, in terms of their fidelity of message decoding, when they are exposed to a high complexity message treated explicitly than from a low complexity message treated the same way. Explicit encoding organization, therefore, becomes important to them (more so for high than for medium adopters) when the message has high complexity, but does not make that much difference when the complexity level is low. High message complexity in itself, as noted in Table 23, decreases fidelity of message decoding, and when accompanied by implicit encoding organization, which seems to have an additive negative effect on the fidelity of message decoding, even the high adoption status FDMs and to some extent medium adoption FDMs, find it harder to decode the message. Explicit encoding organization, as in this case, compensates to some extent for the high level of message complexity. At low level of message complexity, however, explicitness of encoding organization becomes of secondary importance, since a decrease in the complexity level of the message seems to remove the main decoding handicap. On the other hand, in the case of FDMs with low adoption status, complexity of message, in spite of its accompaniment with explicit encoding organization, still remains a handicap in fidelity of message decoding. When the same message has low level of complexity and is within the decoding range of low adoption status respondents, explicitness becomes an important reactive factor for them in increasing their comprehension of the message. This clearly, once again, underscores the relative important of message complexity as compared to encoding organization in effecting the fidelity of message decoding.
Correlation of Independent and Intervening Variables with the Fidelity of Message Decoding

The significance of association between the criterion variable (fidelity of message decoding), independent (experimental treatments, message complexity, and encoding organization) variables and intervening variables (adoption status, age, education, attitudes, and aspirations) has been discussed in the previous sections. The extent of these relationships and their significance are illustrated in Table 52.

TABLE 52
PEARSON CORRELATION OF INDEPENDENT AND INTERVENING VARIABLES WITH THE FIDELITY OF MESSAGE DECODING

<table>
<thead>
<tr>
<th>Name of the Variables</th>
<th>M</th>
<th>Correlation Coefficient</th>
<th>Significance of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message Treatment</td>
<td>177</td>
<td>0.3308</td>
<td>.001</td>
</tr>
<tr>
<td>Message Complexity</td>
<td>177</td>
<td>0.2661</td>
<td>.001</td>
</tr>
<tr>
<td>Encoding Organization</td>
<td>177</td>
<td>0.2023</td>
<td>.003</td>
</tr>
<tr>
<td><strong>Intervening Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adoption Status</td>
<td>177</td>
<td>0.3889</td>
<td>.001</td>
</tr>
<tr>
<td>Age</td>
<td>177</td>
<td>0.6943</td>
<td>.001</td>
</tr>
<tr>
<td>Education</td>
<td>177</td>
<td>0.7317</td>
<td>.001</td>
</tr>
<tr>
<td>Attitudes Toward Improved Agricultural Practices</td>
<td>177</td>
<td>0.1647</td>
<td>.014</td>
</tr>
<tr>
<td>Aspirations</td>
<td>177</td>
<td>0.0221</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

As can be seen from Table 52, all of the correlation coefficients, except level of aspirations, are significant well beyond the respectable level of significance of .01. The relatively high degree of correlations
of the criterion variable with all but one associated variable may seem somewhat unusual, until it is realized that at the selection stage of these variables only those were selected which were believed to be significantly correlated with the acceptance and comprehension of incoming agricultural information.

Of the three independent variables, message treatments,\(^1\) which in fact are the outcome of complete nesting and crossing of message complexity and encoding organization factors, have the highest degree of correlation (.33), followed by message complexity (.27) and encoding organization (.20). Since there are no comparable norms available to the author from the literature, it is hard to say whether this correlation is high or low. It can, however, be stated that various message treatments, other factors remaining constant, affect the fidelity of message decoding to the extent of 33 percent. It may, therefore, be safely said that treating a message does increase the fidelity of message decoding. The better the message treatment techniques, the higher the fidelity of message decoding will be.

The factor of message complexity, with a correlation of .27 and a significance level of .001, is more important than encoding organization with a correlation and significance level of .20 and .003 respectively. The higher the complexity of an agricultural message, as defined in this study, the lower will be the fidelity of message decoding by farm decision makers. Encoding organization has a similar effect on the fidelity of message decoding, though to a lesser extent.

The findings of this study parallel results of studies in the U.S.A. done mainly with school or college students with respect to message

\(^1\)T\(_1\) (high MC x implicit EO), T\(_2\) (high MC x Explicit EO), T\(_3\) (low MC x implicit EO), T\(_4\) (low MC x explicit EO), where MC = Message Complexity, and EO = encoding organization.
complexity.¹ The factor of message complexity, therefore, seems to have a cross-cultural validity. These findings, as such, conflict with Vernon's statements expressing doubts about the difficulty of material in affecting its comprehension.²

Several authors in the U.S.A. have found significant relationships between organization of material and its comprehension. A brief review of such findings is given in Chapter II. A relatively lesser importance of this factor as compared to message complexity is, however, somewhat surprising. It was expected to be at least equally important as message complexity. But obviously, as shown by this study, it is not. Further studies may be undertaken to verify this fact.

Among the five intervening variables, education has the highest degree of correlation (.73) with the fidelity of message decoding, followed by age (-.69), and adoption status (.39), attitudes (.16) and aspirations (.02) in that order. A fairly high correlation of education with fidelity of message decoding was not unexpected. Education not only broadens the outlook of a person toward his composite environment (social, economic, physical, etc.) but also helps in the development of skills for acquisition of new information. Trenaman³ found a correlation of .65 between education and comprehension of message with adult subjects in England. Several studies⁴ on adoption of improved agricultural practices, which is a consequence of successful decoding of agricultural information, have established that education is one of the important variables in the process of adoption. Contado⁵ found education to be an important variable which is significantly related to the communication fidelity of Philippine farmers.

¹A brief description of some of the studies is given on pp. ²Vernon, op. cit., p. 257. ³Trenaman, op. cit., p. 32. ⁴See, for example, Sharma, op. cit., pp. 145-146. ⁵Contado, op. cit.
Age has a significant but negative correlation \((-0.69)\) with fidelity of message decoding. As a farm decision maker grows older his fidelity of message decoding decreases. The variable of age, like education, has been found to be strongly associated with adoption of innovations. Also, it has been shown that the efficiency in recall of information decreases with age, particularly in the case of people from lower occupational groups.\(^1\)

Adoption status has a correlation of 0.39 with the fidelity of message decoding. Adoption status as a variable is reflective of several personal characteristics of respondents including age, education and attitudes. The correlation of adoption status with fidelity of message decoding, therefore, in a sense, may be considered as a multiple 'r'. Farm decision makers with high adoption status have more knowledge of improved agricultural practices, and so will be more predisposed to decode incoming agricultural information at a higher level of fidelity.

Effect of initial attitudes in the recollection of material has been shown by several authors.\(^2\) Some others, however, did not find a significant relationship between the two.\(^3\) A correlation of 0.16 between attitudes of farm decision makers toward improved agricultural practices and fidelity of message decoding is not very high. Aspirations of farm decision makers have almost no correlation with fidelity of message decoding, which is also somewhat surprising. One explanation of this, may be that the instrument used to measure aspirations,\(^4\) though widely used

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\(^1\)P. E. Vernon, "An Investigation into the Intelligibility of Educational Broadcasts," quoted in Trenaman, op. cit., p. 35.

\(^2\)See, for example, Edwards, op. cit., p. 4.

\(^3\)See, for example, Dickens and Williams, op. cit., p. 108.

\(^4\)Cantril, op. cit., pp. 41-45.
by Cantril in his cross-cultural studies with illiterate rural people, was not very appropriate. However, there are some authors\(^1\) who did not find a correlation with aspirations expressed through interest and retention of the message.

**Multiple Regression Analysis of the Data**

Multiple regression analysis is based on "a linear equation by means of which the values of one variable may be predicted from assigned values of two or more other variables."\(^2\) It is used mainly for two purposes: analysis and prediction. In analysis the purpose is to determine the importance or "weight" of each of a number of variables contributing to some final result. These "weights" may then be used to predict the contribution each variable makes to the criterion variable, other variables remaining constant.

Multiple regression analysis of the variables was, therefore, carried out as a further test to establish the relative importance of the independent and intervening variables in affecting the fidelity of message decoding by farm decision makers. The results are presented in Table 53.

As can be seen from Table 53, the constant in the multiple regression equation is 148.10544. Between the two independent variables, message complexity with a Beta coefficient of 0.26 and net regression coefficient of 18.4, is more important from the fidelity of message decoding point of view by farm decision makers than encoding organization which has Beta coefficient of 0.21 and a net regression coefficient of 14.8. There is not much difference in the standard error of the regression coefficient of the two variables. However, the value of F, which shows the level of

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\(^1\)Petrie, *op. cit.*, p. 84.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta Coefficient</th>
<th>Net Regression Coefficient</th>
<th>Standard Error</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message complexity</td>
<td>0.26481</td>
<td>18.48756</td>
<td>2.21087</td>
<td>69.925</td>
</tr>
<tr>
<td>Encoding organization</td>
<td>0.21237</td>
<td>14.82622</td>
<td>2.20743</td>
<td>45.112</td>
</tr>
<tr>
<td>Adoption status</td>
<td>0.37476</td>
<td>16.01927</td>
<td>1.63054</td>
<td>96.522</td>
</tr>
<tr>
<td>Age</td>
<td>0.40903</td>
<td>22.14300</td>
<td>2.38015</td>
<td>86.549</td>
</tr>
<tr>
<td>Education</td>
<td>0.35278</td>
<td>20.75641</td>
<td>2.59523</td>
<td>63.966</td>
</tr>
<tr>
<td>Attitudes</td>
<td>0.17890</td>
<td>12.73968</td>
<td>2.62917</td>
<td>23.479</td>
</tr>
<tr>
<td>Aspirations</td>
<td>0.04913</td>
<td>5.97953</td>
<td>4.13792</td>
<td>2.088</td>
</tr>
<tr>
<td>Constant</td>
<td>-</td>
<td>148.10544</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

R Square = 0.83184

The significance of the regression coefficient is much more for message complexity (69.9) than it is for encoding organization (45.1). Among the intervening variables, age, with a Beta coefficient of -0.41 and a net regression coefficient of -22.1, is the most important variable which affects the fidelity of message decoding by farm decision makers. It is followed by education, adoption status, attitudes and level of aspirations in their importance of affecting the fidelity of message decoding and as predictor variables. However, adoption status, because of its lowest standard error of regression coefficient (1.63) and highest value of F
(96.52) has the maximum predictive efficiency. The maximum standard error of regression coefficient (4.14) and lowest F value (2.09) is for the variable of aspirations. This variable, therefore, is the least important in influencing the fidelity of message decoding by the farm decision makers and also as a predictor of fidelity of message decoding. R square of 0.83 means all of these variables, independent as well as intervening, explain 83 percent of change in the fidelity of message decoding scores of the farm decision makers, which clearly shows that they are significantly correlated among themselves.

In conclusion, it may be stated that the results of this study show that all of the aforementioned variables except level of aspiration of a farm decision maker are significant (because of relatively low standard error of regression coefficient and relatively high R square) predictors of fidelity of message decoding by farm decision makers who formed the respondents in this study.

Fidelity of Message Decoding for Message Two

A Note on Message Two:
"Control of Field Rats"

Message two, as previously mentioned pertained to control of field rats. This message, as rated by the panel of judges had a higher priority than message one. The need for dissemination of information regarding the control of field rats to farmers was strongly felt by the judges as well as the field extension staff. The rats had been doing extensive destruction of crops and causing loss in yield. This message was selected, treated and produced according to the experimental requirements and was administered along with the first message as planned.
When the field work was almost one-third completed, a campaign for the control of field rats was initiated by the Punjab government in all the districts. The investigator first learned about this from one of his respondents, who informed the author that he had "heard talks by government officials about the control of rats from All India Radio, Jullundur a couple of days ago." On further investigation by the author, this information was substantiated by the higher authorities and a systematic plan was discovered to be launched through the use of mass media by the government and the Punjab Agricultural University officials. Efforts were made to get this campaign postponed for some time at least in the Ludhiana district, but they could not succeed.

It was finally decided, because of this development, not to administer the second message. Sixty respondents had been exposed to both the second message up to that time. On later examination of the response questionnaires of these respondents, three questionnaires with doubtful reliability were discarded. The number of respondents, thus, for whom data for the second message is available is 57. Their distribution in the three adoption status groups, viz., high, medium and low is 18, 20 and 19 respondents respectively. Since their distribution in the various levels of other variables (age, education, attitudes and aspirations) was very much skewed, so making unsound statistical comparisons on such a distribution. Results, therefore, for the 57 respondents for message two are given only for the following variables: message treatments per se, message complexity, encoding organization, and adoption status.

1It should be mentioned here that no such plan was talked about at the time of selection of the message.
Effect of Various Message Treatments on Fidelity of Message Decoding of Message Two

The maximum FD score a respondent could get on message two was 245, one point more than that of message one.

The mean scores for various treatments along with their significance of difference are given in Table 54.

<table>
<thead>
<tr>
<th>Experimental Treatments</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁ (HC x IO)</td>
<td>14</td>
<td>169.42</td>
<td>18.48</td>
</tr>
<tr>
<td>T₂ (HC x EO)</td>
<td>14</td>
<td>181.78</td>
<td>15.71</td>
</tr>
<tr>
<td>T₃ (LC x IO)</td>
<td>15</td>
<td>185.31</td>
<td>14.69</td>
</tr>
<tr>
<td>T₄ (LC x EO)</td>
<td>14</td>
<td>194.17</td>
<td>8.53</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>182.67</td>
<td>19.23</td>
</tr>
</tbody>
</table>

't' Test Matrix

<table>
<thead>
<tr>
<th></th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
<th>T₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>-</td>
<td>1.84**</td>
<td>2.48*</td>
<td>4.38*</td>
</tr>
<tr>
<td>T₂</td>
<td>-</td>
<td>.60</td>
<td>2.50*</td>
<td></td>
</tr>
<tr>
<td>T₃</td>
<td>-</td>
<td></td>
<td>1.90**</td>
<td></td>
</tr>
<tr>
<td>T₄</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HC = High complexity  IO = Implicit organization
LC = Low complexity   EO = Explicit organization
* Significant at .01 level
** Significant at .05 level
Table 54 illustrates that mean FD scores for various message treatments have an accretional directionality starting with $T_1$, the lowest FD score of 169.4 and going up to $T_4$ with the largest FD score of 194.2. Mean FD scores for $T_2$ and $T_3$ are 181.8 and 185.3. The incremental trend in mean scores from $T_1$ to $T_4$ is similar to the trend noticed for message one (Table 21). The differences in mean scores between $T_1$ and $T_2$, $T_2$ and $T_3$, $T_3$ and $T_4$ are 12.4, 3.5, and 8.9 respectively. The statistical significance of these differences and those for other combinations of treatments is presented above through 't' matrix (Table 43). Only one difference, between $T_2$ and $T_3$, is not significant, whereas all others are significant at .01 or .05 level of probability. By comparing 't' values given in Table 21 (for message one) with those in Table 54, it can be noticed that they very closely parallel each other. The mean FD differences between $T_2$ and $T_3$ was statistically not significant for message one as it is for message one.

Message treatment components of $T_2$ are high complexity and explicit encoding organization and that of $T_3$ are low complexity and implicit encoding organization. This seems to mean that implicit encoding organization and high message complexity both negatively interact with the fidelity of message decoding and, therefore, do not affect significantly the fidelity of message decoding results. The mean differences between $T_1$-$T_2$, $T_3$-$T_4$ for both messages are significant at .05 level, and mean differences between $T_1$-$T_3$, $T_1$-$T_4$, and $T_2$-$T_4$ are significant at .01 level. Two points by way of conclusion may be made from this presentation of results.
First, messages treated at different levels of complexity and encoding organization do affect the fidelity of message decoding of farm decision makers, though the rate at which they affect fidelity of message decoding may be different for different message treatments and for messages with different subject matter. Second, this differentiating effect on the fidelity of message decoding of various message treatments is likely to prevail irrespective of the nature of the message.

Another conclusion may be drawn by comparing the extent of variability in fidelity of message decoding scores within each treatment for the two messages. The standard deviation in both the messages decreases from $T_1$ with high complexity and implicit encoding organization to $T_4$ with low complexity and explicit encoding organization. This suggests that there is a greater chance of infidel message decoding, or no decoding at all, in case of messages treated at high levels of complexity and implicit encoding organization, and that it increases as the two treatment components of the messages combine with their counterpart—low complexity and explicit encoding organization.

**Effect of Message Complexity on the Fidelity of Message Decoding for Message Two**

The results pertaining to the effect of message complexity on the fidelity of message decoding were presented in Table 23 for message one. The same type of results for message two are presented in Table 22.

Farm decision makers exposed to messages with a high level of complexity have a mean FD score of 175.6 as compared to 189.3 for those
TABLE 55
MESSAGE COMPLEXITY AND MEAN FIDELITY OF MESSAGE
DECODING SCORES FOR MESSAGE TWO

<table>
<thead>
<tr>
<th>Level of Complexity</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>Value of 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>28</td>
<td>175.60</td>
<td>17.21</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>29</td>
<td>189.38</td>
<td>9.38</td>
<td>3.80*</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>182.67</td>
<td>18.25</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level

exposed to messages with a low level of complexity. Standard deviation is high (17.2) for high complexity messages and low (9.4) for low complexity messages. Statistical significance at .01 level means rejection of null hypothesis of no difference between the two levels of message complexity. It may be, therefore, said that message complexity is significantly and positively associated with the fidelity of message decoding. Farm decision makers who are exposed to messages with a low level of message complexity will get more information out of them than those farmers who are exposed to high complexity messages.

A comparison of these findings with those for message one (Table 23), reveals the same pattern. However, the difference between mean FD scores for high and low levels of message complexity for message one was 19.3 and for message two it is 13.8, thereby meaning that the extent of interaction of message complexity with the fidelity of message decoding will, in addition to some other factors (some of them discussed elsewhere in this report), be influenced by the nature of the subject matter of the message. The interpretation of relatively high variance
for high complexity and low variance for low complexity levels of both the messages, once again, highlights the difficulty of respondents to correctly interpret high complexity messages.

**Effect of Encoding Organization on the Fidelity of Message Decoding for Message Two**

The results for this independent variable for message two are presented in Table 56. There is a difference of 10.6 FD points between the mean FD scores of groups of farm decision makers who were exposed to implicitly and explicitly encoded messages. This difference between the two means is significant at .01 level. The standard deviation, as can be seen from Table 56, is 4.5 points more for the implicitly encoded message than it is for explicitly encoded message. The inference from these results is that encoding organization as an independent variable significantly affects the fidelity of message decoding by farm decision makers, with explicit encoding organization increasing the fidelity of message decoding and implicit encoding organization decreasing it. The chances of inaccurate interpretation of the message implicitly organized are more than that of the message which is explicitly organized.

Comparing these results with those for message one (Table 33), it may be noticed that encoding organization in both cases has a similar effect on the fidelity of message decoding. Mean differences between implicit and explicit encoding organization for both messages are significant at .01 level of probability. However, the absolute value of this difference is 14.1 for message one and 10.6 for message two. This might be indicative of the interactive difference of encoding organization
TABLE 56
ENCODING ORGANIZATION AND FIDELITY OF MESSAGE
DECODING SCORES FOR MESSAGE TWO

<table>
<thead>
<tr>
<th>Level of Encoding Organization</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>Value for 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit</td>
<td>29</td>
<td>177.35</td>
<td>16.65</td>
<td></td>
</tr>
<tr>
<td>Explicit</td>
<td>28</td>
<td>187.96</td>
<td>12.13</td>
<td>2.69*</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>182.67</td>
<td>17.82</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .01

with the subject matter of the two messages. The inference drawn from this comparison is that encoding organization does make a significant difference in the fidelity of message decoding by the farm decision makers, and that the extent of its effect may vary with the nature of the subject matter of the message.

Effect of Adoption Status of Farm Decision Makers on the Fidelity of Message Decoding of Message Two

Out of 57 respondents for whom data are available for message two, 18 have high adoption status, 20 medium adoption status and 19 have low adoption status. The results pertaining to their fidelity of message decoding are given in Table 57.

The mean FD score of high adoption status farm decision makers for message two is 198.5, which is 11.9 points more than that of medium adoption status respondents with 189.5 points and 35.5 points more than that of the low adoption status farmers. The standard deviation for the three groups have quite the opposite direction, with lowest deviations
TABLE 57
ADOPTION STATUS AND FIDELITY OF MESSAGE
DECODING SCORES FOR MESSAGE TWO

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>18</td>
<td>198.51</td>
<td>9.86</td>
</tr>
<tr>
<td>Medium</td>
<td>20</td>
<td>186.54</td>
<td>12.07</td>
</tr>
<tr>
<td>Low</td>
<td>19</td>
<td>162.92</td>
<td>20.59</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>182.66</td>
<td>18.75</td>
</tr>
</tbody>
</table>

'T' Test Matrix

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>-</td>
<td>3.24*</td>
<td>6.46*</td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td>-</td>
<td>4.28*</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level

for the high adopters and highest for the low adopters. All the differences in means of these groups are significant at .01 level. Adoption status, therefore, affects significantly the fidelity of message decoding by the farm decision makers.

When data in Table 57 are compared with Table 43, which illustrates effect of adoption on the fidelity of message decoding of message one, it may be noticed that not all the 't' values in that table are significant at .01 level, as is the case in message two. For message one, high and medium adoption statuses affect the fidelity of message decoding by the farm decision makers, but do so only at .05 level of probability.
This slight discrepancy between results of the two messages may be attributed to the nature of the messages.

**Fidelity of Message Decoding According to Adoption Status and Message Complexity for Message Two**

The results pertaining to the fidelity of message decoding of farm decision makers for message two according to their adoption status and message complexity are presented in Tables 58 and 59.

Table 58 illustrates that the mean FD score of high adoption status respondents is higher for both high and low complexity messages as compared to medium and low adoption status groups. Low adoption status farm decision makers have the lowest fidelity of message decoding scores for both levels of complexity when compared to the other two groups. One interesting fact to be noticed from Table 58 is the pattern of difference between high complexity and low complexity mean FD scores for all the three adoption status groups. This difference increases with decreasing adoption status. It is 6.4, 11.4, and 24.6 FD scores for high, medium and low adoption status groups respectively. Exactly the same trend is followed by standard deviations for the three groups. Statistical significance between high complexity and low complexity messages does not exist for the high adoption status groups, since the value of 't' (1.39) is smaller than the tabular value of 't'. For the medium and low adoption status groups however, significance of difference between FD means for high and low complexity messages exists but at varying levels of significance. With 't' values of 2.09 and 2.93 for medium and low adoption groups respectively, the significance is at .05 for the former and .01 for the latter group.
TABLE 58

MEAN FIDELITY OF MESSAGE DECODING ACCORDING TO ADOPTION STATUS AND MESSAGE COMPLEXITY FOR MESSAGE TWO

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>High Complexity</th>
<th>Low Complexity</th>
<th>Difference in Mean Scores</th>
<th>Value of 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
<td>N</td>
</tr>
<tr>
<td>High</td>
<td>9</td>
<td>194.76</td>
<td>9.65</td>
<td>9</td>
</tr>
<tr>
<td>Medium</td>
<td>10</td>
<td>179.41</td>
<td>12.33</td>
<td>10</td>
</tr>
<tr>
<td>Low</td>
<td>9</td>
<td>152.69</td>
<td>19.26</td>
<td>10</td>
</tr>
</tbody>
</table>

* Significant at .01 level
** Significant at .05 level
TABLE 59
'T' TEST MATRICE SHOWING THE SIGNIFICANCE OF DIFFERENCES BETWEEN VARIOUS ADOPTION STATUS GROUPS FOR HIGH AND LOW MESSAGE COMPLEXITY FOR MESSAGE TWO

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Level of Message Complexity</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HAS</td>
<td>MAS</td>
<td>LAS</td>
</tr>
<tr>
<td>HAS</td>
<td>-</td>
<td>2.84*</td>
<td>4.93*</td>
</tr>
<tr>
<td>MAS</td>
<td>-</td>
<td>-</td>
<td>3.12*</td>
</tr>
<tr>
<td>LAS</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Significant at .01 level
** Significant at .05 level

Significance of differences in FD means between various adoption status groups for both levels of message complexity is presented in Table 59. Whereas all the 't' values for high complexity level for various combinations of adoption groups are significant at .01 level, it is not so with respect to low complexity level. Mean differences between high and medium, and medium and low adoption status groups are significant at .05 level. For high and low adoption status groups this difference is significant at .01 level of probability.

From the above results, following interpretations can be made. First, that the effect of high and low message complexity on the fidelity of message decoding by farm decision makers with different adoption statuses is likely to be different. For farm decision makers with high adoption status, complexity of message may not make any significant difference on the fidelity of message decoding, though evidence is available that they will score more on a message with low level of complexity. Message complexity has a significant interaction with fidelity of message.
decoding by medium and low adoption status farm decision makers, and this effect is more pronounced in the case of low adopters. Therefore, if a message with high complexity is presented to the farm decision makers with low adoption status, they will decode much less of that message when the same message is presented to them at a low level of complexity.

A second point of inference from these results is that greater variability in fidelity of message decoding within each adoption status group is more likely to be present in a message with high complexity than in a message with low complexity. Between the three adoption status groups, variability in fidelity of decoding seems to be inversely related to adoption status.

Third, high message complexity interacts with fidelity of message decoding by farm decision makers more importantly than low message complexity. Adoption status becomes a differentiating variable (at .01 level) between the groups of farm decision makers at high message complexity and less so in case of messages with low level of message complexity.

When these results for message two are compared with the corresponding results for message one (Tables 24 and 25), it is noted that findings for the two messages are not altogether consistent. High and low message complexity for each level of adoption in case of message one, significantly affected the fidelity of message decoding (.01 level in each case) by farm decision makers, but it is not so in case of message two, as mentioned above. The effect of message complexity between the adoption groups is not much different for the two messages, except that no significant difference in the fidelity of message decoding between
high and medium adoption status groups for high message complexity is found to exist in message two. These discrepancies in findings seem to reflect the effect on fidelity of message decoding by the nature of subject matter of the message which was not a variable to be examined in this study.

Fidelity of Message Decoding According to Adoption Status and Encoding Organization for Message Two

Tables 60 and 61 illustrate the effect of adoption status and encoding organization on the fidelity of message decoding by the farm decision makers. It can be seen from Table 60, that implicit and explicit encoding organization do not have a consistent effect on fidelity of message decoding by the farm decision makers with different adoption statuses. A difference of 7.8 points between the mean FD scores of high adoption status farm decision makers pertaining to implicitly and explicitly encoded messages is statistically insignificant. However, in case of medium and low adoption status respondents mean FD score differences of 11.3 and 12.8 between implicitly and explicitly organized messages are significant at .05 and .01 level of probability respectively. The variance in FD scores within the adoption status groups due to implicit and explicit encoding organization follows the same trend as for high and low message complexity, i.e., more for the implicitly encoded messages and less for explicitly encoded messages for all the three adoption statuses.

When the significance of FD score differences between the adoption status groups for implicit and explicit organization is examined from 't'
<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Implicit</th>
<th></th>
<th>Explicit</th>
<th></th>
<th>Difference in Means</th>
<th>Value for 't'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>High</td>
<td>9</td>
<td>195.23</td>
<td>10.73</td>
<td>9</td>
<td>202.99</td>
<td>9.45</td>
</tr>
<tr>
<td>Medium</td>
<td>10</td>
<td>182.37</td>
<td>13.29</td>
<td>10</td>
<td>193.68</td>
<td>11.94</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
<td>154.45</td>
<td>15.36</td>
<td>9</td>
<td>167.28</td>
<td>14.29</td>
</tr>
</tbody>
</table>

*Significant at .01 level
**Significant at .05 level
TABLE 61

't' TEST MATRIX SHOWING THE SIGNIFICANCE OF DIFFERENCES
BETWEEN VARIOUS ADOPTION STATUS GROUPS FOR IMPLICIT AND
EXPLICIT ENCODING ORGANIZATION FOR MESSAGE TWO

<table>
<thead>
<tr>
<th>Level of Message Complexity</th>
<th>Implicit</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption Status</td>
<td>HAS</td>
<td>MAS</td>
<td>LAS</td>
<td>HAS</td>
<td>MAS</td>
<td>LAS</td>
</tr>
<tr>
<td>HAS</td>
<td>-</td>
<td>2.18**</td>
<td>6.79*</td>
<td>-</td>
<td>1.76**</td>
<td>5.76*</td>
</tr>
<tr>
<td>MAS</td>
<td>-</td>
<td>-</td>
<td>4.35*</td>
<td>-</td>
<td>-</td>
<td>4.13*</td>
</tr>
<tr>
<td>LAS</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Significant at .01 level
**Significant at .05 level

matrix in Table 61, it is found that mean FD score differences for all the pairs of adoption statuses for both implicit and explicit encoding organization are significant. This significance between high and medium adoption status groups, however, is at .05 level of probability, whereas it is at .01 level of probability for the rest of the pairs of adoption status groups for both types of messages. This finding when compared to the corresponding finding for message one (Table 35), and for complexity of message for message two (Table 58) is not fundamentally different, since all the 't' values in these tables are statistically significant. The only difference in some of the pair-wise comparisons, is in the level of significance.

The inferences which may be drawn from these findings are that implicit and explicit encoding organization, in case of high adoption status, does not make any difference in their fidelity of message decoding. However, explicit encoding organization does increase the fidelity
of message decoding by medium and low adoption status farm decision makers, though the probability of its doing so is more in the case of the latter, and less so in case of the former. Also, the adoption status of a farm decision maker significantly affects the fidelity of message decoding, no matter what the level of encoding organization of the message is. It should be pointed out, however, that significant differences in the fidelity of message decoding of high and medium status farm decision makers may not be found in five out of 100 times.

No basic difference in the effect of encoding organization of fidelity of message decoding by farm decision makers has been found for messages one or two, except that it does not seem to be of great importance for the farm decision makers with high adoption status. For farm decision makers with low adoption status, encoding organization was found to be importantly associated with their fidelity of message decoding. In case of farm decision makers with medium adoption status, the importance of encoding organization has not been conclusively established.

It is also found that for both messages, explicit encoding organization decreases vagueness in accurate decoding of the messages for all farm decision makers, irrespective of their adoption status.

When compared to the effect of message complexity on fidelity of message decoding for message two, it was found that encoding organization is as important in its effect on fidelity of message decoding by farm decision makers as is message complexity (compare 't' values in Tables 58 and 60). This is contrary to what was found in case of message one which was that message complexity was found to be more important than encoding organization (Tables 24 and 34, column 10).
CHAPTER V

CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS
FOR FURTHER RESEARCH

Change is a universal phenomenon. It is essential for solving every problem. Communication lies at the heart of every change. Communication can be persuasive or coercive. Permanent changes can be accomplished only through persuasive communications. Democratic societies, like India, have opted for this approach for their national development.

Persuasive communication can result only from fidel decoding of the message. What factors, other than content of the message itself, enter the fidelity of message decoding are not yet perfectly understood. Very few attempts have been made to analyze the decoding behavior of noncaptive audiences under realistic life situation. Such studies in developing countries like India, are almost non-existent.

The present study was addressed to the important question of "how do encoding complexity and encoding organization of messages affect the fidelity of message decoding by farm decision makers in the Punjab State of India?" Added significance of this study came from the fact that new and dramatic technological breakthroughs are now taking place in India. The transference of this technology to farmers at high levels of fidelity needs effective encoding procedures. Further identification of guidelines founded on empirical research could provide sound bases for encoding messages by extension officials for maximum impact. The conclusions of this
study, implications for action, and suggestions for further research in this area are given in the following.

Conclusions

The following conclusions are drawn from the findings of this investigation.

Fidelity of Message Decoding and Message Treatments

1. The findings show that message treatments which vary on the dimensions of message complexity and encoding organization (as defined in this study) significantly affect the fidelity of message decoding by the farm decision makers who constituted the respondents in this study.

2. It has been found that significant interaction exists between high encoding complexity and implicit encoding organization, and low encoding complexity and explicit encoding organization.

3. The variable of message complexity was found to be more important than the variable of encoding organization, from the point of view of its effect on the fidelity of message decoding.

4. When the effects of various message treatments on the fidelity of message decoding by the farm decision makers of message one and message two are compared the findings suggest that the subject matter of a message also interacts with the fidelity of message decoding. The subject matter of a message which is perceived by the subjects to be of immediate value is likely to be decoded at a higher level of fidelity than a message which may have value
at some later date. The FD scores of farm decision makers on the second message was of greater concern and are relatively higher for all the message treatments than FD scores for message one. Farm decision makers, therefore, are likely to get more information from the messages which are based on their felt needs and are timely.

5. Messages treated with the structural components of high message complexity and/or implicit encoding organization hinder the fidelity of message decoding and/or result in misinterpretation of the messages as compared to the messages with low level complexity and explicit encoding organization, as evidenced by the amount of variance in the respective message treatments.

**Fidelity of Message Decoding and Message Complexity**

1. The hypothesis that the fidelity of message decoding is significantly and inversely related to the encoding complexity has been supported by the findings of this study. Low encoding complexity significantly increases the fidelity of message decoding by farm decision makers as compared to high encoding complexity. The farm decision makers who were exposed to messages with high level complexity were unable to decode 32.2 percent of the first message and 28.3 percent of the second message. On the other hand, farm decision makers who were exposed to messages structured at a low level of complexity were unable to decode 24.3 percent of the first message and 22.6 percent of the second message. The chances
of not finding significant differences between the two levels of encoding complexity are one in 100 cases.

2. Messages structured at high level complexity are more likely to be misunderstood by farm decision makers than messages structured at low level complexity. High level variability in messages with high encoding complexity as compared to low variability in messages with low encoding complexity leads to this conclusion.

3. Adoption status of farm decision makers significantly interacts with message complexity to affect the fidelity of message decoding. Farm decision makers at all levels of adoption status decode more from a message with low level complexity than from a message with high level complexity.

4. Relative gain made in the fidelity of message decoding with a chance from high to low level message complexity was found to be inversely proportional to the adoption status of farm decision makers. When encoding complexity of message one is changed from high to low, the fidelity of message decoding of the high adoption status of farm decision makers increases by 5.3 percent; for medium status farm decision makers it increases by 6.6 percent; and for low adoption status farm decision makers it increases by 10.9 percent, which is almost twice that of high adoption status respondents. The same pattern holds for message two with increases in fidelity of message decoding by 2.6 percent, 4.6 percent and 10.1 percent for high, medium and low adoption status respondents respectively. Farmers with low adoption status therefore, are likely to benefit more from messages structured at
a low level of complexity than farmers with medium and high adoption status. Encoding message complexity, therefore, does not seem to be as critically important for high adoption status farm decision makers as for low adoption status farm decision makers.

5. High encoding complexity, as compared to low encoding complexity, was found to significantly lower the fidelity of message decoding of farm decision makers in all the age groups. However, the level of significance for the "under 25" years age group is at 5 percent level, whereas it is at 1 percent level for the other two age groups, viz., between "25-40" years and "over 40" years.

6. Relative gains in the fidelity of message decoding with a change in the encoding message complexity from high to low level are likely to be more for older farm decision makers than for younger farm decision makers. Low encoding complexity increases the fidelity of "under 25" years respondents by 2.6 percent as compared to 11.5 percent increase for the "over 40" years age group. This increase is 6.5 percent for the "25-40" years age group. Therefore, the results of this investigation suggest that as a farm decision maker gets older the encoding complexity of a message he receives interacts more importantly with his fidelity of message decoding.

7. Level of education of a farm decision maker and encoding complexity of a message communicated to him, significantly interact with the fidelity of his message decoding, though the level of significance in the case of illiterate farm decision makers,
is 5 percent. It may be concluded, therefore, that no matter what the level of education of a farm decision maker is, he is likely to decode more from a message with low level of encoding complexity than from a message with high level of encoding complexity.

8. More educated farm decision makers are likely to gain relatively less in their fidelity of message decoding with a decrease in encoding complexity of a message than less educated farm decision makers.

9. The fidelity of message decoding of farm decision makers who have more favorable attitudes as well as those who have less favorable attitudes toward improved agricultural practices is significantly affected by encoding complexity of a message.

10. Farm decision makers with more favorable attitudes toward improved agricultural practices are likely to gain more from a decrease in the complexity of a message than would farmers with less favorable attitudes.

11. The fidelity of message decoding of farm decision makers with high aspirations is significantly affected by encoding complexity, although in case of farm decision makers with low aspiration levels it is not conclusively established.

12. Relative gains in fidelity of message decoding of farm decision makers with high aspirations and low aspirations with a decrease in encoding complexity are almost the same (6.2 percent for the high aspiration group and 6.1 percent for the low aspiration group).
13. For all the categories of variables of adoption status—age, education, attitudes and aspirations—greater amounts of variability in fidelity of message decoding was found to exist in high encoding complexity than in low encoding complexity. This supports an earlier conclusion that high encoding complexity is likely to result in greater misinterpretation and, thus, lower fidelity of message decoding as compared to low encoding complexity.

14. Several studies in the U.S.A. and Britain found that high message complexity lowers the comprehension of a message. The findings of this study support the results of those investigations. It may, therefore, be concluded that the inverse relationship of message complexity and fidelity of message decoding has cross-cultural validity.

15. In contrast to most of the studies to investigate the relationship of message complexity and comprehension of a message which used captive audiences, mostly high school and college students as subjects, this study used farm decision makers as respondents and the tests were conducted under realistic life situation rather than in a structured type of classroom situation. It may be concluded, however, that the variable of message complexity is likely to interact with the comprehension of a message in a similar way, even if the structure of the population and test situations are different.
Fidelity of Message Decoding and Encoding Organization

1. Evidence was found to support the acceptance of the hypothesis that "the fidelity of message decoding increases with explicit encoding organization and decreases with implicit encoding organization." Implicit encoding organization decreases the fidelity of message decoding by farm decision makers by 5.7 percent as compared to explicit encoding organization, and the likelihood of finding a difference smaller than this is one in 100 cases.

2. From the relative amount of variability in the fidelity of message decoding by farm decision makers from implicitly and explicitly encoded messages, it may be said that implicit encoding organization is likely to produce greater misinterpretation of a message than explicit encoding organization.

3. By comparing the results for message one and message two, with respect to encoding organization and fidelity of message decoding by farm decision makers, it was found that the nature of the message does not seem to substantially interact with encoding organization, as was the case in encoding complexity.

4. Although explicit encoding organization as compared to implicit encoding organization increases the fidelity of message decoding of all three categories of adoption status farm decision makers for both messages, not all of the differences were found to be statistically significant. However, overall interaction of encoding organization with adoption status and fidelity of message decoding was found to be significant.
5. Encoding organization, from the fidelity of message decoding point of view, seems to be relatively less important for high adoption status farm decision makers than for medium and low adoption status farm decision makers. For the two messages, relative gain in the fidelity of decoding by high adoption status farm decision makers is 4.7 percent, and 3.1 percent respectively, when the level of encoding organization is changed from implicit to explicit. However, for the medium and low adoption status farm decision makers the same gains are 5.5 percent and 7.1 percent respectively for message one, and 4.6 percent and 5.2 percent respectively for message two.

6. In its effect on the fidelity of message decoding, encoding organization seems to significantly interact with the variable of age, though the level of significance for the "under 25" years age group is at 5 percent level. For the other two age groups the level of significance is at 1 percent.

7. Encoding organization does not seem to make as much difference in the fidelity of message decoding by younger farm decision makers as it does with the older farm decision makers. The differences in fidelity of message decoding for implicit and explicit encoding organization are 2.1 percent, 4.4 percent and 9.5 percent for the high, medium and low adoption status farm decision makers respectively. The relative gain in fidelity of decoding between high and low adoption status farm decision makers was more than four times when a change in encoding organization was made from implicit to experimental level.
8. Encoding organization significantly affects the fidelity of message decoding by "educated" and "literate" groups of farm decision makers, however, it has no significant effect on the fidelity of message decoding by illiterate farm decision makers. This finding is somewhat surprising, but it seems to parallel the finding obtained for this category of the variable of education for encoding complexity. In that case the level of significance for illiterate farm decision makers was .05 as compared to .01 for the other two groups.

9. The relative gains in fidelity of message decoding made by educated, literate and illiterate farm decision makers are 2.9 percent, 7.4 percent and 6.2 percent when the level of encoding organization is changed from implicit to explicit. The literate group of farm decision makers seems to benefit the most and the educated group the least from a change in the level of encoding organization. In spite of a gain of 6.2 percent in fidelity of decoding by illiterate farm decision makers, a statistical difference is not discovered.

10. Explicit encoding organization significantly increases the fidelity of message decoding by farm decision makers, whatever their attitudinal level with respect to improved agricultural practices.

11. Farm decision makers with more favorable attitudes, as well as those with less favorable attitudes, benefit almost equally when the level of encoding organization is made explicit from implicit. The corresponding percentages of gain in fidelity of decoding are 9.7 and 9.9 for farm decision makers with more favorable and less favorable attitudes.
13. Farm decision makers with low aspirations benefit relatively more from explicit encoding organization than do farm decision makers with high aspirations, the corresponding percentages being 6.8 for the former and 4.0 for the latter.

14. A greater amount of variance in fidelity of message decoding was discovered for all categories of intervening variables: adoption status, age, education, attitudes and aspirations, when the level of encoding organization was implicit than when it was explicit. This, as mentioned before with reference to high encoding complexity, might have resulted from greater message distortion in the case of an implicitly organized message.

15. The results of this investigation support the findings of studies done in the U.S.A. and Britain with respect to the positive effect of encoding organization on the comprehension of the message. The variable of encoding organization, therefore, seems to have cross-cultural validation.

**Fidelity of Message Decoding and Personal Characteristics of Farm Decision Makers**

**Fidelity of Message Decoding and Adoption Status of Farm Decision Makers**

The general hypothesis to be tested with respect to adoption status was that a positive association exists between fidelity of message decoding and adoption status of farm decision makers. The findings of this study based on both the messages produce evidence that supports acceptance of this hypothesis. The farm decision makers, with high adoption
status decode agricultural messages at a higher level of fidelity than medium and low adoption status farm decision makers, and the medium adoption status farm decision makers are likely to get more information out of agricultural messages than do the low adoption status farm decision makers. The correlation coefficient of this variable with the fidelity of message decoding was found to be .39. This correlation might have been even higher had the experimental groups not been perfectly equated on the basis of adoption status of farm decision makers. Relative lack of heterogeneity in the independent variable usually depresses the magnitude of correlation of that variable with the criterion variable. However, this variable as a predictor of fidelity of message decoding comes next to the variable of age in importance.

Fidelity of Message Decoding and Age of Farm Decision Makers

The study hypothesis that age is significantly and inversely related to the fidelity of message decoding is supported by the findings of this study. Those farm decision makers who were under 25 years of age could accurately decode 84 percent of the messages, whereas farm decision makers "between 25-40" and "over 40" years of age could decode but 77 percent and 56 percent respectively. Correlation of age with the fidelity of message decoding was found to be .69, and also as a predictor of fidelity of message decoding, it was found to be the most important variable from amongst the variables operative in this study.

Fidelity of Message Decoding and Education of Farm Decision Makers

Education of the farm decision makers is positively and significantly associated with the fidelity of message decoding. Educated, literate, and illiterate farm decision makers could accurately decode 83 percent, 67 percent and 43 percent of the messages, respectively. Although the variable of education revealed a correlation of .73 with fidelity of message decoding, the highest correlation of all the variables, yet, as a predictor of fidelity of message decoding, it is third in importance.

Fidelity of Message Decoding and Attitudes of Farm Decision Makers Toward Improved Agricultural Practices

The attitudes of farm decision makers toward improved agricultural practices have found to be positively and significantly associated with the fidelity of message decoding. The more favorable the attitude of a farm decision maker toward improved agricultural practices, the more he is likely to decode from a message. Seventy-eight percent of the messages were accurately decoded by farm decision makers who had more favorable attitudes as compared to 66 percent by those with less favorable attitudes. The correlation of this variable with the fidelity of message decoding was .16, and, as a predictor, it is the next to last in importance.

Fidelity of Message Decoding and Level of Aspiration of Farm Decision Makers

Farm decision makers with higher levels of aspirations are likely to decode more of an agricultural message than those who have relatively
lower level of aspiration. Farm decision makers with higher aspirations decoded 81 percent of the messages accurately while those with lower aspirations decoded only 69 percent. The correlation of this variable with fidelity of message decoding is .02, which is insignificant and also as a predictor, this variable is least important when compared to the other variables.

General

An interesting finding common to all the operative variables in this study is that vagueness in the accurate decoding of a message by farm decision makers is likely to be more when a message is encoded at a high level of complexity, has implicit encoding organization, and the farm decision maker has low adoption status, is older, less educated, has less favorable attitudes toward agricultural practices and lower level of aspirations.

Prediction of Fidelity of Message Decoding

From among the independent variables, encoding complexity is more important than encoding organization as a predictor of fidelity of message decoding.

The order of intervening variables according to their importance as predictors of fidelity of message decoding is age, adoption status, education, attitudes, and level of aspiration. Adoption status, though second in importance to the variable of age, seems to be the most efficient predictor of fidelity of message decoding, because of lowest standard error and highest 'F' value.
All of the operative variables in this study, independent as well
as intervening, explain 83 percent of change in the fidelity of message
decoding; only 17 percent may be attributed to other variables not in-
cluded in this study.

Methodological

Since the findings of this study are in general consensus with
the results of investigations conducted in this area under structured
types of classroom situations, it may be concluded that effective experi-
mentation can be undertaken under realistic life situations, provided
proper controls are imposed; and that the extraneous environmental fac-
tors which cannot be controlled do not seem to significantly affect the
fidelity of message decoding.

Generalizations

The following generalizations may be drawn from this investiga-
tion:

1. The general principles with respect to message complexity and
message organization derived from common types of communication
(e.g. social, affective, official, etc.) are applicable to techni-
cal communication in agriculture.

2. The effect of message complexity and encoding organization on
fidelity of message decoding has cross-cultural validity.

3. If proper controls are imposed, successful experimentation can
be undertaken on non-captive audiences under realistic life
situations.
4. Fidelity of message decoding by farm decision makers is dependent not only on the encoding complexity and encoding organization of a message but also on their adoption status, age, education, and attitudes toward improved agricultural practices.

5. Eighty-three percent of change in the fidelity of message decoding is produced by the variables of encoding complexity, encoding organization, adoption status, age, education, attitudes and aspiration.

6. Fidelity of message decoding of farm decision makers is increased by lowering the level of message complexity and explicitly organizing a message.

7. Timeliness of message transmission to the farm decision makers will increase the fidelity of message decoding.

8. From the fidelity of message decoding point of view, message complexity is more important than message organization.

9. High message complexity and implicit encoding organization result in loss and distortion of information among all types of farm decision makers. Though it is more so for farm decision makers with low adoption status, and who are older and illiterate.

10. Low message complexity and explicit encoding organization increase the fidelity of message decoding by low adoption status, older, and less educated farm decision makers more than it does for high adoption status, younger and educated farm decision makers.

Implications for Action

1. The findings of this research show that the way an agricultural message is treated affects its fidelity of decoding. High
Encoding complexity and low encoding organization have negative effects on the fidelity of message decoding. The following suggestions are made with respect to this finding:

a. The importance of encoding procedures in the communication of agricultural information should be emphasized with extension officials.

b. Published material explaining how to determine the complexity level of a message, how to decrease it and how to explicitly organize a message should be supplied to extension officials.

c. Special workshops should be arranged in districts to discuss and develop techniques to improve the encoding procedures of extension officials for maximum impact on farmers.

d. Courses on the communication of agricultural information incorporating techniques for developing messages with low encoding complexity and explicit encoding organization should be offered.

2. A separate division in the Department of Agriculture at the state level should be set up with communication specialists, with functions somewhat as follows:

a. Conduct comprehensive experimental research on various types of farmers, through various channels of communication and to identify variables which maximize the impact of agricultural messages on farmers.

b. Publish and supply results of such research to extension officials and key leaders of farmers in local communities.
c. Bring out lists of high frequency words which are used and understood by farmers and supply them to extension subject matter specialists, who often in their communications with farmers use technical words, usually not understood by many farmers.

d. Develop and publish new agricultural messages with low levels of complexity and explicit encoding organization for distribution to farmers through extension officials.

3. Since personal characteristics of farm decision makers affect their fidelity of message decoding, extension officials should have as complete knowledge of their clients as possible.

4. Since timeliness of agricultural messages based on the felt needs of farmers increases the fidelity of message decoding, extension officials should plan their communication activities, keeping these factors in mind.

5. Empathy plays an important role in effective communication. Similarity in experiential levels helps develop empathic feelings. Extension officials with rural agricultural backgrounds, therefore, should be preferred for recruitment for extension jobs over persons with urban and non-agricultural backgrounds.

6. Extension officials should structure and organize their communications much more carefully when their clients have lower adoption status, are relatively older and are less educated.

7. Since education affects the fidelity of message decoding quite significantly, literacy classes for the farmers should be organized by extension officials with the cooperation of the officials of the Education Department.
8. Because of physical, social and psychological propinquity of high adoption status, younger and educated farmers to the farmers with low adoption status, older in age and less educated, the former should be encouraged to discuss new agricultural practices with the latter in informal evening meetings organized by local extension officials.

Suggestions for Further Research

Further research should be undertaken by interested persons on the following allied problems:

1. Studies similar to the present one may be replicated in other parts of the world to validate the findings of this investigation.

2. Comparative studies to determine the effect on the fidelity of message decoding by farmers of the presence or absence of the communicator (e.g., radio) in the communication situation may be undertaken.

3. Only oral medium of communication was used in this investigation. Studies may be undertaken to determine the comparative effect of encoding complexity and encoding organization on the fidelity of message decoding by farmers using oral and written forms of messages.

4. Effect of communicator credibility on the fidelity of message decoding was not studied in this investigation. Research may be undertaken to study the effect of this factor.

5. Only one post-test was administered to the respondents in this investigation, and that was done immediately after exposing them
to the message. It may be worthwhile to study how much information is retained over time by different types of farm decision makers.

6. Effect of each component of encoding complexity (e.g., length of sentences, frequency of the use of personal references and technical terms) and encoding organization on the fidelity of message decoding may be explored separately to investigate the relative contribution made by each to the fidelity of message decoding.

7. Studies may be undertaken to find if there is any difference in the listening habits of farm decision makers who have different personal characteristics.

8. Since from the conduct of this study, it seems clear that experimentation is feasible in the area of extension education, experimental approaches are encouraged.
APPENDICES

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APPENDIX A

MESSAGE 1: USE OF 2-4D HERBICIDE

**Information Bits:** Essential contentual points included in the message

1. Herbicide—what it is
2. Name of the chemical
3. Type of weeds controlled by 2-4D
4. How weeds compete with the main crop
5. Estimated reduction in the yield of food crops by weeds
6. Loss by weeds as compared to plant diseases and insect pests combined
7. Scarce agricultural resources mentioned in the talk
8. Losses in wheat crop due to weeds in the Punjab
9. Names of crops for which 2-4D used to control weeds
10. 2-4D as a translocated herbicide
11. 2-4D as a selective herbicide
12. Cost of 2-4D as compared to hand-and-tool methods
13. Number of 2-4D formulations
14. Names of 2-4D formulations
15. 2-4D as non-poisonous, inflammable and non-corrosive
16. Sodium salt—a white powder
17. Amine salt—a brown liquid
18. Ester salt—a colorless volatile liquid

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19. Sodium salt soluble in water
20. Amine salt soluble in water
21. Ester salt emulsifies in water
22. Forms of 2-4D used to control weeds in wheat
23. Weeds in wheat controlled by 2-4D
24. Number of days weeds emerge after sowing wheat crop
25. Best time of application of 2-4D
26. Effect of late application of 2-4D
27. Quantity of sodium salt per hectare/per acre
28. Quantity of amine salt per hectare/per acre
29. Quantity of ester salt per hectare/per acre
30. Quantity of water used with the three salts
31. Harm done by excessive quantity of 2-4D
32. Sources of availability of 2-4D
33. Name of the sprayer
34. Firms which sell the sprayer
35. Cost of the sprayer
36. Use of 2-4D on pure crop of wheat
37. Spray of 2-4D on a calm day
38. Best time of the day to spray 2-4D
39. Why early morning spray of 2-4D not good
40. Spray of 2-4D not done at high temperatures
41. 2-4D spray and rain
42. 2-4D spray and irrigation
43. 2-4D spray and low humidity
44. Number of men needed to spray 2-4D
45. Area sprayed by two men in one day
46. Absorption of 2-4D
47. How 2-4D kills weeds
48. Expenses to spray 2-4D
49. Increase in yield
50. Net profit
51. Further information about 2-4D
APPENDIX B

MESSAGE II: CONTROL OF FIELD RATS

**Bits of Information:** Essential contentual points included in the message

1. Long standing problem
2. Damage done by rats
3. Disease carrier
4. Number of rats per human being
5. Loss of food per year per rat
6. Extent of destruction vs consumption
7. Monetary worth of food damaged in a year
8. Types of rats
9. Rate of multiplication
10. Maturity reached
11. Maximum breeding in a year
12. Number of litters per year
13. Number of offspring per litter
14. Social order
15. Competitiveness
16. Leaving harborage
17. Active versus dead burrows
18. Estimate of number of rats
19. Home range
20. How to control—catching—traps
21. All burrows closed to find active burrows
22. Best time to poison
23. Why
24. Poisoning in winter versus summer
25. Name of poison
26. Lethal dose
27. Color of the poison
28. Odor
29. Taste
30. Solubility in water
31. Other ingredients in the bait
32. Proportion of ingredients
33. How to make baits
34. Importance of mixing
35. Size of bait
36. Bait placement—how
37. Bait placement—where
38. Bait placement—when
39. Why wrap baits in paper
40. How soon kills
41. Why fresh bait
42. How kills
43. Toxic effect on man
44. Toxic effect on domestic animals
45. Antidote
46. Precaution
47. Why this poison mostly used for baits
48. Available from where
APPENDIX C

PRE-TEST: MESSAGES I AND II

1. Which two of the following are more scarce resources in agriculture?
   (a) Labor
   (b) Irrigation
   (c) Fertilizers
   (d) Electricity

2. How do you control weeds in your crops?
   (a) By hand-and-tool methods
   (b) By chemical methods
   (c) By hand and tool and chemical methods

3. If you do not use chemical methods, have you ever heard of a chemical used for controlling weeds?
   (a) Yes
   (b) No
   If yes, name the chemical _______________________

4. Have you ever used a sprayer?
   (a) Yes
   (b) No

5. If yes, name the sprayer _______________________

6. How much loss do you think is done by weeds in wheat crop?
   (a) 10-30%
   (b) 20-40%
   (c) 30-70%

7. How do weeds compete with the main crop?
   (a) _______________________
   (b) _______________________
   (c) _______________________
   (d) _______________________
8. Do weeds cause more, less or about the same loss in yield as caused by plant diseases and insect pests combined?
   (a) More
   (b) Less
   (c) Same

9. Which of the following do you think destroys the crops the most:
   (a) White ants
   (b) Birds
   (c) Field rats

10. Do you think field rats contribute to the spread of a disease?
    (a) Yes
    (b) No

11. Can you name a disease spread by the rats? __________________________

12. How do you think field rats should be controlled? ______________________

13. Can you name a poison which is used to control field rats?
    __________________________
APPENDIX D

POST-TEST: MESSAGE I

Use of 2,4-D Herbicide to Control Weeds from Wheat Crop

Test 2-A

1. What is the name of the chemical mentioned in the talk?
   (a) 2, 2-D
   (b) 2, 4-D
   (c) 4, 2-$

2. What type of weeds is this chemical used to control?
   (a) All type of weeds
   (b) Only thin-leaved weeds
   (c) Only broad-leaved weeds

3. What is a herbicide?
   (a) A chemical used to kill all sorts of plants
   (b) A chemical used to kill only broad-leaved plants
   (c) A chemical used to kill only winter plants

4. How do weeds compete with the main crop?

   They compete with the main crop for:
   (a) Moisture, nutrients, light and air
   (b) Only light and air
   (c) Only nutrients

5. What is the estimated reduction in yield of food crops caused by weeds?
   (a) 20-40%
   (b) 5-50%
   (c) 10-75%

6. Weeds cause (a) more (b) less (c) same loss as caused by plant diseases and insect pests combined?

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7. What are the source agricultural resources mentioned in the talk?
   (a) Irrigation and labor
   (b) Fertilizers and irrigation
   (c) Fertilizers and labor

8. What are the estimated losses due to weeds in the wheat crop in the Punjab State?
   (a) 50-75%
   (b) 20-45%
   (c) 10-30%

9. In which of the following crops 2-4D can be used to control weeds?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar cane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Wheat</td>
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<td></td>
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<tr>
<td>Barley</td>
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<tr>
<td>Gram</td>
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<tr>
<td>Maize</td>
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<tr>
<td>Tomatoes</td>
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<td></td>
<td></td>
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<tr>
<td>Jowar Rajra</td>
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</tbody>
</table>

10. What is meant by "2-4D is a translocated herbicide?"
   (a) It kills the plants on which it falls
   (b) It kills selected weeds in broad leaved crops
   (c) It kills broad leaved weeds in selected crops

11. What is meant by "2-4D is a translocated herbicide?"
   (a) It is translocated from soil to the roots of a plant
   (b) It is translocated from roots to other parts of a plant
   (c) It is translocated from leaves to other parts of a plant

12. As compared to "hand-and-tool methods" of eradicating weeds, 2-4D is:
   (a) More expensive
   (b) equally expensive
   (c) Less expensive

13. In how many formulations is 2-4D available?
   (a) Two
   (b) Three
   (c) Four
14. Identify various forms of 2-4D from the following:

<table>
<thead>
<tr>
<th>Form</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium salt (white powder)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium salt (white powder)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amine salt (brown powder)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium salt (pale powder)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sulphur salt (pale liquid)</td>
<td></td>
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</tr>
<tr>
<td>Ester salt (volatile liquid)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. Is 2-4D:

<table>
<thead>
<tr>
<th>Property</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poisonous</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Corrosive</td>
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<tr>
<td>Inflammable</td>
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</tbody>
</table>

16. Sodium salt of 2-4D is available in liquid form

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

17. Amine salt of 2-4D is available in form of powder

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

18. Ester salt of 2-4D is available in volatile liquid form

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

19. Sodium salt of 2-4D is insoluble in water

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

20. Amine salt of 2-4D is insoluble in water

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

21. Ester salt of 2-4D forms emulsion with water

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

22. All the forms of 2-4D may be used for controlling weeds in wheat

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

23. All the weeds in wheat can be controlled with 2-4D

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
</table>
24. After how many days weeds in crop emerge after sowing?
   (a) 21 days
   (b) 28 days
   (c) 35 days

25. What is the best time of application of 2-4D?
   (a) Between 21-28 days after sowing
   (b) Between 30-40 days after sowing
   (c) Between 40-50 days after sowing

26. What quantity of sodium salt of 2-4D should be used for one hectare or one acre?
   (a) 2 1/2 lbs. per hectare or 1 1/2 seer per acre
   (b) 1 1/2 lbs. per hectare or 1 1/2 seer per acre
   (c) 1 lb. per hectare or 1/8 seer per acre

27. What is the effect of late application of 2-4D?
   (a) It results in partial control of weeds and deformed ears
   (b) It results in partial control of weeds and normal ears
   (c) It results in full control of weeds but deformed ears

28. What quantity of amine salt should be used for one hectare or one acre?
   (a) 3 3/4 lbs. per hectare or per seer per acre
   (b) 23/4 lbs. per hectare or 9 chhanks per acre
   (c) 13/4 lbs. per hectare of 6 chhanks per acre

29. What quantity of ester salt should be used for one hectare or one acre?
   (a) 1 1/2 lbs. per hectare or 4 chhanks per acre
   (b) 2 1/2 lbs per hectare or 8 chhanks per acre
   (c) 3 1/3 lbs. per hectare or 12 chhanks per acre

30. What quantity of water should be used for each form of 2-4D?

<table>
<thead>
<tr>
<th>Sodium salt</th>
<th>Amine salt</th>
<th>Ester salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-150 gals/hectare</td>
<td>150-175 gals/hectare</td>
<td>175-200 gals/hectare</td>
</tr>
</tbody>
</table>
31. How does more quantity of 2-4D harm the crop?

(a) By stunting its growth with deformed ears  
(b) By producing abnormal growth with deformed ears  
(c) By lodging the crop with deformed ears  

32. From which of the following sources 2-4D may be obtained?

(a) Cooperative Store  
(b) Local VLM  
(c) Hospitals  
(d) Burmah Shell  

33. Which sprayer was recommended to be used for spraying 2-4D?

(a) Foot sprayer  
(b) Power sprayer  
(c) Knap-sack sprayer  

34. From which of the following firms knap-sack sprayer may be bought?

(a) Sigma Brothers  
(b) Gill and Company  
(c) Grewal Mechanical Works  
(d) Bharat Plant Protectors  

35. What would be the approximate cost of knap-sack sprayer?

(a) Rs. 200.00  
(b) Rs. 300.00  
(c) Rs. 400.00  

36. 2-4D should be used on pure crop of wheat:

(a) True  
(b) False  
(c) Don't know  

37. Because wind results in quick dissemination of 2-4D, the spraying should be done on windy days:

(a) True  
(b) False  
(c) Don't know  

38. Best time during the day to spray 2-4D is:

(a) Early morning  
(b) Late morning  
(c) Late evening
39. 2-4D is not applied in the early mornings, because:
   (a) It is not absorbed rapidly
   (b) It is not convenient to spray at that time
   (c) It is morally not good to kill something at that time

40. 2-4D should not be sprayed at high temperatures because:
   (a) The men who spray get tired easily
   (b) It decomposes at high temperatures
   (c) It evaporates before absorption

41. Immediate rain after spraying 2-4D is:
   (a) Harmful
   (b) Beneficial
   (c) Of no consequence

42. 2-4D should be sprayed:
   (a) Before irrigation
   (b) After irrigation
   (b) Without any consideration of irrigation

43. What is the effect of low humidity on the effectiveness of 2-4D?
   (a) It increases effectiveness
   (b) It decreases effectiveness
   (c) It does not have any effect

44. What are the minimum number of men needed to spray 2-4D?
   (a) Four
   (b) Three
   (c) Two

45. How much area can two men spray in one day?
   (a) 1 hectare or 2 1/2 acres
   (b) 2 hectares or 5 acres
   (c) 3 hectares or 7 1/2 acres

46. What are the approximate expenses to spray one hectare per acre or wheat crop with 2-4D?
   (a) Rs. 250.00 per hectare or Rs. 100.00 per acre
   (b) Rs. 150.00 per hectare or Rs. 60.00 per acre
   (c) Rs. 75.00 per hectare or Rs. 30.00 per acre
47. How much increase in yields should be expected after application of 2-4D?

(a) 10-15 quintals per hectare or 10-15 mounds per acre
(b) 20-25 quintals per hectare or 20-25 mounds per acre
(c) 30-35 quintals per hectare or 30-35 mounds per acre

48. How much net profit should you expect per hectare per acre?

(a) Rs. 950-1450 per hectare or 350-535 per acre
(b) Rs. 1100-1600 per hectare or Rs. 500-685 per acre
(c) Rs. 1250-1750 per hectare or Rs. 650-835 per acre

49. How is 2-4D absorbed by plants?

(a) It is absorbed through roots
(b) It is absorbed through leaves
(c) It is absorbed through all parts of the plants

50. How does 2-4D kill the plants?

(a) Roots are unable to supply moisture for the abnormal growth
(b) Plants get killed as soon as 2-4D comes in contact with them
(c) 2-4D produces a poisonous gas which kills the plants

51. From whom can you get further information about 2-4D?

(a) From B.D.F.O.
(b) From local VIM
(c) From cooperative inspector

52. You probably have heard several different extension people talk to you about recommended agricultural practices. Who do you think was speaking in this talk.
APPENDIX E

POST-TEST: MESSAGE II

Control of Field Rats

1. The problem of field rats is:
   (a) Very recent
   (b) An old problem
   (c) No problem at all

2. Rats destroy crops in India every year worth:
   (a) 20 billion/arab Rupees
   (b) 7 billion/arab Rupees
   (c) 2 billion/arab Rupees

3. How many rats are there for every human being in rural areas?
   (a) Eight
   (b) Sixteen
   (c) Twenty-four

4. Every year each rat consumes food grains worth:
   (a) 5 Rupees
   (b) 10 Rupees
   (c) 15 Rupees

5. Which of the following diseases are spread by rats:

    |       | Yes | No |
    |-------|-----|----|
    | (a) Malaria       |    |    |
    | (b) Typhus fever  |    |    |
    | (c) Smallpox      |    |    |
    | (d) Pneumonia     |    |    |
    | (e) Plague        |    |    |
    | (f) Rat-bite fever|    |    |
    | (g) Typhoid fever |    |    |

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6. Rats as compared to other mammals kill:
   (a) More human beings
   (b) Less human beings
   (c) About the same

7. As compared to consumption of food grains rats destroy crops:
   (a) Five times
   (b) Ten times
   (c) Fifteen times

8. How many types of rats are there:
   (a) Two
   (b) Three
   (c) Four

9. What type of rats are found in the fields:
   (a) Black
   (b) Brown
   (c) Grey

10. Which type of rat digs deep burrows:
    (a) Black
    (b) Brown
    (c) Grey

11. Do you think rats have a social order?
    (a) Yes
    (b) No

12. Rats live in the field:
    (a) In colonies
    (b) Far away from each other
    (c) Sometimes in colonies, sometimes separately

13. Rats breed:
    (a) Once a year
    (b) Four times a year
    (c) Throughout the year

14. Rats breed maximum in:
    (a) Spring
    (b) Winter
    (c) Fall
    (d) Spring and fall
    (e) Spring and winter
15. In one year, rats produce:
   (a) Four litters
   (b) Six litters
   (c) Eight litters

16. Each litter generally has:
   (a) Four offspring
   (b) Eight offspring
   (c) Twelve offspring

17. Rats reach maturity in:
   (a) 150 days
   (b) 100 days
   (c) 50 days

18. At the end of a year, one pair of rats may produce as many as:
   (a) 2500
   (b) 1500
   (c) 500

19. In case of high mortality rate rats leave:
   (a) emmase
   (b) in small groups
   (c) do not leave

20. Rats have been known to:
   (a) accept
   (b) reject
   (c) be indifferent

   to members of other colonies

21. Active burrows can be distinguished from dead burrows by:
   (a) presence of cobwebs
   (b) freshly dug-out earth
   (c) presence of small ants

22. For every rat you see during the day, there may be about:
   (a) 4-5 rats
   (b) 10-12 rats
   (c) 15-20 rats in the vicinity
23. Home range of rats is usually limited to:
   (a) 100-150 feet
   (b) 50-100 feet
   (c) 10-50 feet

24. Rats can best be controlled by:
   (a) Traps
   (b) Catching
   (c) Poisoning

25. Name of the poison used to kill rats is:
   (a) Sodium sulphide/white powder
   (b) Magnesium sulphate/brown powder
   (c) Zinc sulphide/greyish-black powder

26. This poison is:
   (a) Soluble in water
   (b) Insoluble in water
   (c) Partly soluble in water

27. This poison has:
   (a) Strong smell
   (b) No smell
   (c) Little smell

28. The taste of this poison has been found to be:
   (a) Bitter
   (b) Sour
   (c) No taste

29. This poison is available from the following:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Village patwari</td>
<td></td>
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<tr>
<td>(b) VLM/Gram sevak</td>
<td></td>
</tr>
<tr>
<td>(c) Village school</td>
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<tr>
<td>(d) Druggist/pansari</td>
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<tr>
<td>(e) Petrol pump</td>
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</tbody>
</table>

30. The best time to poison rats is:
   (a) Winter
   (b) Spring
   (c) Summer
31. Why is it better to poison rats in winter than in summer:
   (a) Because breeding activity of rats is low
   (b) To kill rats in winter is no sin
   (c) Rats eat the poison baits better

32. Identify the ingredients used in making poison baits:

   Yes    No
   Rice    __   __
   Gram flour    __   __
   Wheat flour    __   __
   Dry earth    __   __
   Molasses    __   __

33. To make rat baits, in one part of poison, how many parts of wheat flour is required:
   (a) 4 parts
   (b) 14 parts
   (c) 24 parts

34. To make rat baits, in one part of poison, how many parts of molasses are required:
   (a) 5 parts
   (b) 10 parts
   (c) 15 parts

35. What else is needed to make rat baits?
   (a) Milk
   (b) Butter milk
   (c) Water

36. Is this poison harmful to human beings?
   (a) Yes
   (b) No

37. What should you do if someone eats a rat bait by mistake?
   (a) Give him lots of ghee and milk
   (b) Give him water and copper sulphate/mcola-thotha
   (c) Let him take complete rest
38. The rats like:
   (a) Fresh baits
   (b) Stale baits
   (c) Makes no difference

39. How many baits can you make out of one pound of bait mixture?
   (a) 30-40
   (b) 50-70
   (c) 80-90

40. To kill a rat within an hour, how much poison is needed?
   (a) 40 milligrams/one rat
   (b) 60 milligrams/1 1/2 rats
   (c) 80 milligrams/two rats

41. What is the best time to place rat baits?
   (a) In the evening
   (b) In the morning
   (c) At noon

42. What should you do before placing baits near the burrows?
   (a) Close the burrows one day before and place baits near the burrows opened by rats next day
   (b) Fill the burrows with water and let them dry
   (c) Do not do anything, otherwise rats will be scared

43. How should the rat baits be placed:
   (a) One bait near the opening of each burrow
   (b) Wrap them in paper and place near the burrow
   (c) Scatter them all over the field

44. Why is this poison used to kill rats? Because it is:
   (a) Cheap and easily available
   (b) Does not have odor or taste
   (c) Very effective
   (d) All of the above

45. How does this poison kill the rats?
   (a) It destroys their appetite and they starve to death
   (b) It eats into their intestines and they die
   (c) It induces vomiting among them and they finally die
46. What should you do after making poison baits?
   (a) Wash your hands and utensils thoroughly
   (b) Keep at a safe place where children can't reach
   (c) Put them aside and use them when you need
   (d) a and b above
   (e) a and c above

47. Full effect of your rat poisoning should be visible in:
   (a) 2-3 days
   (b) 2-3 weeks
   (c) 2-3 months

48. How soon can you expect population of rats to come back to normal after poisoning in winter?
   (a) 6 months
   (b) one year
   (c) 1 1/2 years

49. How soon can you expect population of rats to come back to normal if you poison them in summer?
   (a) 6 months
   (b) one year
   (c) 1 1/2 years

50. Who can supply you more information about rat poisoning?
   (a) School teacher
   (b) Village patwari
   (c) VLM/gram sevak

51. How will rat control benefit you?
   (a) Financially, by reducing destruction and consumption of crops by rats
   (b) By being able to gain social respect in my community
   (c) By serving my country through saving the destruction of food grains
   (d) All of the above
   (e) None of the above
APPENDIX F

ATTITUDE SCALE AND BIO-DATA OF RESPONDENTS

Part 1. Attitudes of Farm Decision Makers Toward Improved Agricultural Practices

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I shall not adopt recommended agricultural practices under any circumstances.</td>
<td></td>
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<tr>
<td>2. I think to adopt recommended agricultural practices is to be a traitor to our forefathers.</td>
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<tr>
<td>3. I think recommended agricultural practices are not suitable under our conditions.</td>
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<tr>
<td>4. I think recommended agricultural practices are no better than our old practices.</td>
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<tr>
<td>5. I think recommended agricultural practices are alright for others but not for me and my present situation.</td>
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<tr>
<td>6. I will try recommended agricultural practices and if found suitable I might adopt them.</td>
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<tr>
<td>7. Recommended agricultural practices are good, and I would like to know more about them.</td>
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</tr>
</tbody>
</table>

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8. I shall not mind to travel at my own expense to learn about agricultural practices.

9. I am convinced that recommended agricultural practices are good and profitable for our farmers.

10. I think the farmers should immediately adopt a new practice, even before trying it.

Part 2. General Information About the Respondents

Date of Interview __________________________

Name of Village ____________________________

Village Classification:

(a) Native  
(b) Refugee  
(c) Mixed

Name of Respondents __________________________

Age:

(a) Under 25 years  
(b) Between 25-40 years  
(c) Over 40 years

Education:

(a) Illiterate  
(b) Literate  
(c) Educated

Adoption Status:

(a) High  
(b) Medium  
(c) Low
Place of Interview:

(a) Farm
(b) House
(c) Village
(d) Other
APPENDIX G

SELF-ANCHORING ASPIRATION SCALE

"Here is a picture of a ladder. Suppose we say that the top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. Where on the ladder do you feel you personally stand at the present time?" As the investigator spoke, he pointed to the top of the ladder and then to the bottom, and when he came to the question of where the respondent stood then on the ladder, he moved his finger rapidly up and down it.

When the respondent had indicated the appropriate rung, he was asked, "Where on the ladder would you say you stood five years ago?" Then he was asked, "Where do you think you will stand on the ladder five years from now?"

(a) Present
(b) Past
(c) Future

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APPENDIX II

INTRODUCTION AND INSTRUCTIONS TO THE RESPONDENTS
BEFORE ADMINISTRATION OF THE TESTS

"My name is Jogindar Singh Dhillon. My village is Sham Khera in
Ferozepur District (the district next to yours). My father is also a
farmer like you. I am a student in a University (mention of Cornell
and U.S.A. was avoided, so as not to put the respondents in a favorable
or an unfavorable set of mind), and this work is a part of my studies.
I, therefore, have nothing to do with any of the government departments,
including the department of Extension.

"First, let me tell you why you have been selected as a farmer
for me to talk with about a study I am making. Since it is not possible
to talk to all farmers in your block about my study, I selected 22 villages
by lottery. Then I selected nine farmers from each village in the same way.
You happen to be one of those nine farmers in your village.

"The purpose of my visit with you is to find out how much the
farmers like yourself actually get out of the extension talks delivered
by the extension workers. As I have already told you, this study is not
connected with Extension or any other department of the government. Your
suggestions and ideas will be kept confidential and not shown to any one.
I am interested in a summary of the ideas of all the farmers in our sample,
and not those of any one individual. Therefore, you should be frank and
candid in your answers. Your cooperation in this work will be very much appreciated. The findings will be valuable to the extension workers in their efforts to help you and other farmers. Thus, in a way you are participating in a program which will be ultimately useful to the farmers all over the country.

"First I will ask you some general questions about yourself and then I play two talks about improved agricultural practices from this little machine. These talks were recorded by an extension worker. After each talk, I will talk with you about the information given.

"Let us first talk about the first part of the interview. You are welcome to ask any questions you may have." (The investigator at this stage filled the pre-test schedules.)

"Now, I am going to play the first talk. Please listen carefully. After the talk is over, I will ask you some questions about the information given. So, please pay full attention to the recorder talk. Please do not hesitate to stop me and ask me any questions you may have now."

(Post-test questions were asked immediately after the message was over. The questions were asked in an informal manner, ensuring that the respondent was not put in a threatening-examination-situation. After the post-test was over, a rest of about five minutes was given to the respondent before playing the second message. The same instructions as for the first message, were repeated, and the second post-test was administered at the end. In order to control the effect of instructions on all the respondents, the investigator well memorized the above instructions. Of course, it was ensured before starting the tests that the respondent fully understood what was expected of him.)
APPENDIX I

MESSAGE I: USE OF 2,4-D HERBICIDE TO WEEDS FROM WHEAT CROPS

Treatment 2: High Encoding Complexity and Explicit Encoding Organization

Do you want to become a successful farmer with increased income and better utilization of the scarce agricultural resources namely fertilizer and irrigation. If (your) answer to this is yes, which it should be, then listen carefully, since the technique discussed in this talk may not only bring you monetary gains, but also added social prestige. The technique pertains to the control of weeds in wheat crop through the use of a chemical. It may sound ridiculous, but it is true and this practice has been tried successfully in America for several years by American farmers. Problems with expensive and inefficient agricultural labor engaged to control weeds in wheat crop can be avoided through the use of this chemical. Backaches you get after days' of hard work in the field while trying to control weeds with traditional methods can be eliminated.

It will be preposterous to think that you do not know that weeds are undesirable plants in crops which compete with the main crop for moisture, nutrients, space, light and air, and that efforts have all along been made to control weeds with hand-and-tool methods. According to a scientist's estimate weeds in India cause 5-50 percent reduction in the yield of crops, and these losses are more than those caused by insect

1 Treatment 1 for Message I has already been given in the body of the dissertation on pp.

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peats and plant diseases combined. In Punjab losses due to weeds in wheat
crop vary from 20-45 percent as computed by agronomists. They are effi-
cient utilizers of fertilizers and irrigation water, the two valuable
scarce resources in agriculture and also lower the sale price of produce
through mixing with the grains. All this clearly proves that weeds are
a great obstacle in successful and remunerative crop production.

The name of the miracle chemical, also called a herbicide by
agronomists, is 2-4D. It is a selective herbicide since it kills only
broad-leaved plants, and therefore, should not be used for controlling
weeds in crops with broad leaves. 2-4D may be used in relatively thin
and long-leaved crops like cereals, millets, maize and sugar cane. All
the weeds associated with wheat, like bathu, karari, pitpapra, jangli
gobhi, pohli and krund, can be controlled with 2-4D without any harmful
effect to the crop.

2-4D may be obtained in the market in three formulations, namely
sodium salt, amine salt and ester salt. Sodium salt has white color,
has a typical odor and is soluble in water, whereas amine salt is a light
brown liquid—not a powder—and is also soluble in water. Ester salt on
the other hand is a colorless volatile liquid which forms emulsion with
water. Any of these three forms may be used to control weeds in wheat.
Listen the names once again—they are sodium salt, amine salt, and ester
salt.

Next comes the time of application of 2-4D, which is very important
to remember. It is sprayed after second irrigation, i.e., between 40-50
days after sowing; late application may not kill all the weeds, and also
result in deformed ears which will result in reduced yield. If it is
applied before 40 days, all weeds may not have germinated, since weeds
germinate after 3 weeks of sowing of wheat.
Rate of Application of 2-4D

It is also very important to remember, since an overdose may stunt the growth of the crop and also deform the ears, whereas lower dose may not kill all the weeds. Correct dose per hectare for sodium salt, the white powder, is 2.50 pounds; for amine salt, the brown liquid, it is 1.75 pounds, three fourths pound less than the sodium salt, and the amount for ester salt, the colorless liquid is 1.25 pounds, one-half pound less than the amine salt. These amounts are being repeated again—sodium salt 2.50 pounds, amine salt 1.75 pounds and ester salt 1.25 pounds.

Next comes how to spray 2-4D. The chemical is mixed with 125-150 gallons of water per hectare and is sprayed by two men with Knap-Sack sprayer, one may sprays the chemical and the other brings the supplies and together they can spray one hectare in one day. Since the chemical is non-poisonous, non-inflammable, and non-corrosive, no special precautions while mixing it with water have to be taken.

In case the use of sprayer is not known, the village level worker may be asked for a demonstration. If the sprayer is not owned, it may be borrowed from the VLW or purchased for about 200 rupees from one of the following firms in Ludhiana: (1) Bharat Plant Protectors, near Municipal Gardens on G.T. Road; (2) Sigma Distributors, Miller Gang.

It may be asked from where to get 2-4D? Well, either from the local VLW who will get it from the block headquarters or from any Burmah Shell petrol pump in the area.

Before actually spraying wheat crop there are some important points to keep in mind for maximum effectiveness of the chemical:
1. 2-4D is recommended to be sprayed on pure crop of wheat and not mixture with grass, since grass may be harmed by it.

2. Spray may be done on a non-windy day for even distribution and also to avoid any harm to adjoining broad-leaved crops through dissemination of the chemical by wind.

3. Best time for spray is on a sunny day between nine in the morning and one in the afternoon, since before nine temperature will be low and absorption will not be rapid, and after one temperature will be high and 2-4D may evaporate before proper absorption.

4. Probability of rain on the day of spray should be very low, since 2-4D will be washed by rain before proper absorption.

5. For best results spraying should be done after irrigation, because humidity in the field will reduce evaporation of the chemical.

To summarize these precautions, 2-4D should be sprayed on "pure" crop of wheat on a sunny non-windy day in late morning when it is not likely to rain and preferably after irrigation.

Do you now want to know how does 2-4D kill the broad-leaved weeds? Well, it is absorbed through leaves of the plant from where it is translocated to other parts where it stimulates growth of all parts of the plant. The roots find it impossible to supply moisture from the soil for rapid growth with the result that the entire plant dies in a couple of days.

How about the economics of the use of 2-4D? Total cost of spray- ing 2-4D which includes price of the chemical, labor charges, and
depreciation on the sprayer are 75 rupees per hectare. If losses due to weeds are put at 25 percent per hectare, a figure well within the range of estimates computed by Punjab agronomists, increase in yield from control of weeds would come to about 10 to 15 quintals. Taking into account the usual sale price of wheat at 100 rupees per quintal, addition to gross income per hectare would be from rupees 1,000 to 1,500 and addition to net income would be 925 to 1425 rupees per hectare, or to use round figures between 900 to 1400 rupees. It should be borne in mind that this addition is from one hectare of wheat crop, and it may be multiplied by the number of hectares of wheat crop you grow every year. By every account this will be something worthwhile to seriously consider for action this year.

Before concluding this talk the main points are again being recapitulated so listen carefully. 2-4D which kills broad-leaved weeds in wheat crop, is available in three forms, namely, sodium salt—a white powder, amine salt—a brown liquid, and ester salt—colorless liquid. Any one of the three forms may be used to control weeds in wheat between 40-50 days of sowing, after mixing with 125-150 gallons of water. Spraying is done on a calm sunny day in late mornings and to pure crop of wheat. Local VLW or Burmah Shell petrol pump may supply 2-4D for spray with Knap-Sack sprayer. Cost of spray per hectare would be around 75 rupees and addition to net income would be around 900 to 1,400 rupees per hectare.

In your own interest contact the local VLW for any further information you may need about 2-4D, and make plans to use it this year.

Thanks for listening and good luck to you in the use of 2-4D.
Treatment 3: Low Encoding Complexity and Implicit Encoding Organization

2-4D is a herbicide. You can kill weeds with it. It kills broad-leaved weeds. You can control weeds with it from wheat, barley, maize, bajra, jowar and sugar cane. They reduce yield of food crops from 5 paisa to 50 paisa in a rupee. Plant diseases and insect pests cause you less loss. You apply fertilizer and irrigation to your crops. Weeds use them. They create problems in growing crops. 2-4D is absorbed through leaves. Then it goes to other parts of the plant. It makes the plant grow very fast. Roots cannot absorb water so fast for growth. The plant dies in 2-3 days. 2-4D is a cheap method to control weeds. You can use it to kill weeds from wheat crop. Your old methods are more costly. You can buy 2-4D from your gram sevak (village level worker). You can also buy it from Burmese Shell petrol pump. Weed losses in Punjab in wheat crop are from 20-45 paisa in a rupee. Weeds are unwanted plants. They use water, food, space, light and air of your crops. 2-4D comes in three forms. Sodium salt is white powder. It is soluble in water. You can smell it. Amine salt is light brown liquid. You can mix it in water. It has no smell. Ester salt is colorless liquid. It evaporates in air. It forms emulsion with water. You need 25-30 buckets of water to spray one acre with 2-4D. You may use any form of 2-4D to spray wheat crop. It is sprayed between 40-50 days after sowing wheat. Weeds in wheat come up to 21 days. If you spray 2-4D later all weeds will not die. They become hardy. It may also deform ears. If you spray 2-4D earlier, some weeds may germinate later. So you will not kill all weeds. Two men can spray 2 1/2 acres of wheat crop. One may spray, the other man brings supplies. You should use 8 chhatta of sodium salt per acre. Amine salt
should be used 6 chhtaks. You need only four chhtaks of ester salt. You should use sprayer which is put on the back. If you do not have it borrow it from your gram sevak. You may also buy it. Bharat Plant Protectors in Ludhiana have it. Sigma Distributors in Ludhiana also have it. You may buy it for 200 rupees. If you use more salt the crop remains small. Ears, also, will be harmed. Your yield will be reduced.

Weeds of wheat are bathu, karari, pitpapa, jangli gobhi, pohli, and krund. You may kill them with this medicine. If you use small amount of 2-4D, all weeds do not die. 2-4D is not poisonous. It does not catch fire. It also does not eat vessels. You should mix it well with water. You should spray 2-4D on a calm day. Wind spreads it around. Your broad leaf crops in nearby fields will be harmed. Rain washes the medicine down. You should irrigate the field and then spray 2-4D. It decreases evaporation of the medicine. Spray it on a sunny day. You should not spray it early in the morning. Also not in the afternoon. Spray it between breakfast and lunch. Medicine evaporates at high temperature.

You will spend 30 rupees per acre in spraying 2-4D. It includes cost of the medicine. It includes wages of two men. It also includes depreciation of the sprayer. Your loss in field from weeds may be 25 paisa in a rupee. With 2-4D you may get 10-15 pounds more yield per acre. Your profit will be about 400-600 rupees per acre. Subtract your expenses from this. Your net profit will be about 370-570 rupees.

If you cannot use sprayer, ask your gram sevak. Also ask him for more information if you need. Thank you for listening.
Treatment 4: Low Encoding Complexity and Explicit Encoding Organization

Do you want to become successful farmer? Do you want increased income? Do you want to get more from your fertilizer and irrigation water? I know your answer is yes. I will tell you how to do so. It will give you more money. It will add to your social prestige. So, listen carefully.

You can now control weeds from your wheat crop with a medicine (chemical). I am not kidding. It is true. American farmers have done it for many years. You can do it too. You can cut costly agricultural labor used for weeding wheat. And, how about painful backaches you get from weeding wheat with khurpa. Well, they go, too. Let's talk about weed first. You know very well weeds are unwanted. They use our water, food, space, light and air. They reduce crop yield from one fifth to one half. Even insect pests and plant diseases do not cause this much loss. In our state loss is 20 to 45 paise in a rupee. They lower sale price of our produce, also. Aren't they troublesome? Shouldn't we control them well and cheaply? Sure, we should.

What's the name of the medicine? It is a 2-4D, like in 2-4 days. It is a plant killer. Not all the plants. Only those with broad leaves. It does not kill plants with long and thin leaves. It kills all weeds with broad leaves. What are those? They are bathu, karari, pitaspa, bangli gobhi, and kund. All of them you find in wheat crop. You can use 2-4D in barley, bajra, jowar, corn and sugar cane also. All are thin leaved crops. Do not use it on cotton, gram and tomatoes.

1 2-4 days a colloquial way of describing the duration of a problem; here used for associating with name of the chemical implying weed menace can be controlled in 2-4 days.
Like an educated woman, 2-4D has more than one form. It has three forms. One is sodium salt. You can call it white powder. It looks like common salt. But it smells. You can dissolve it in water. Second form is amine salt. Its color is light brown, like "Eab" (a form of molasses). It is liquid. It is also soluble in water. You may call it light brown form. The third form of 2-4D is ester salt. It is a colorless liquid. It evaporates on exposing to air. This colorless form is not soluble in water; white powder and brown liquid are, remember! Listen their names again: white powder, brown liquid and colorless liquid.

Which form to use in weed control, you may ask. Well, you may use any one of them. None of them will produce ill effect on wheat crop.

But. And this but is important. You should use 2-4D at right time, and in right amount.

Right time to use 2-4D is after second irrigation. After 40-50 days of sowing, right. If you spray late, all weeds may not be killed. They become hardier. Also, wheat ears will be harmed. This will reduce our yield. If you spray early all weeds may not have come up. They generally take three weeks after sowing. Best time to spray is 40-50 days after sowing.

How much amount of 2-4D should you use? Let us suppose you want to spray one acre. You should take 8 chhtaks of white powder. If you have brown liquid, take 6 chhtaks. Take only 4 chhtaks of colorless liquid. I will again tell you the quantities. White powder 8 chhtaks; brown liquid 6 chhtaks; colorless liquid 4 chhtaks got it. Now, what happens if you use more quantity? It will shorten the growth of your crop. Ears of wheat may be harmed. It will cost you more. What if you add less quantity? Well, all weeds may be killed. Therefore, you should
Now you want to know how to spray 2-4D. You need two men and one sprayer. One man sprays, and the other brings supplies. You need the sprayer which is put on the back (Knap-Sack). Take the weighed medicine. Dissolve it in 25-30 buckets of water. Use a big "drum" if you have one. One bucket usually contains 5 seers of water. Mix the medicine well. It is not poisonous. It also does not catch fire. It does not erode utensils either. Is it then not safer than other medicine you use to spray cotton?

Your two men can spray 2 1/2 acres of wheat crop in a day.

What is you do not know how to use sprayer? Well, ask your gram sevak (village level worker) to show you this. One of your neighbors may know it. Wait a minute, you say, "I do not have a sprayer." There you are smarty. Your gram sevak has one. Borrow it from him. If you want to buy it, go to one of the following firms in Ludhiana.

1. Bhart Plant Protectors, near Municipal Gardens
2. Sigma Distributors, Miller Gang

It costs about 200 rupees. It will last you for years. You may use it for every spraying purpose.

Didn't I forget to tell you, where to buy 2-4D from? I am absent minded, you see. My wife also complains about this. Well, ask your reliable gram sevak. He will get it for you from block headquarters. You may also buy it from any Burmah Shell petrol pump.

Now a few points to keep in mind before spraying 2-4D:

1. You should not spray 2-4D on "gogi" (mixture of wheat and gram). It may harm grams.
2. Spray the medicine on a "calm" day. It will be evenly distributed. On a windy day it may spread to nearby broad leaved crops. You remember it harms crops with broad leaves.
3. You should spray 2-4D on a sunny day. Not early in the morning. At that time it is not absorbed well by plants. Also do not spray late in the afternoon. At that time it evaporates before absorption. So what is the best time? Start after breakfast and finish before lunch.

4. You should make sure it wouldn't rain after spray. Rain will wash the medicine down. Listen to weather report on the radio. Sometimes it tells the truth.

5. You should try to spray after irrigation. Moist air in the field reduces evaporation of the medicine.

Let me say three points again. You should spray 2-4D on pure wheat crop; on a sunny day; between breakfast and lunch period; after irrigation.

I bet you want to know how 2-4D kills weeds. It is like this. Plant leaves absorb it. They take it to other plant parts. There 2-4D encourages rapid plant growth. Roots are unable to supply water from soil for this growth. Result—the plant dies in 2-4 days. So you see, 2-4D kills weeds in 2-4 days.

What are you thinking now? Are you thinking about the cost and benefit? Well, every intelligent person would do that. Here it is.

Total cost of spraying one acre of wheat with 2-4D is 30 rupees. It includes price of the medicine, labor cost and depreciation of sprayer. Now suppose your increase in yield is 10-15 mounds per acre. Very reasonable figure! Wheat sells around 40 rupees per mound. You add 400 to 600 rupees to your income per acre. Let us deduct your expenses from this. Your net profit per acre is rupees 370-570. Is it not a good amount? I am sure you can use it.
Before I finish, let me summarize what I said. 2-4D kills weeds with broad leaves. It comes in three forms. White powder, brown liquid and colorless liquid. We use 8 chhattaks of white powder, 6 chhattaks of brown liquid and 4 chhattaks of colorless liquid to spray one acre of wheat crop. Dissolve the medicine in 25-30 buckets of water. We spray the crop between 40-50 days of sowing. Calm and sunny day after irrigation is best for spraying. Your gram sevak and Burmah Shell petrol pump can supply 2-4D. Your income will be increased by 370 to 570 rupees per acre. If you cannot use all of this, send half the amount to me.

Don't you think you should contact your gram sevak for more information? You know he will be glad to help you. Make up your mind right now. Spray at least one acre of wheat crop this year. You will be glad that you did. Good luck to you. Thank you for listening.
APPENDIX J

MESSAGE II: CONTROL OF FIELD RATS

Treatment 2: High Encoding Complexity and Explicit Encoding Organization

A farmer has many enemies, but one of the deadly ones is the field rat who has ever been a problem. This problem needs to be solved intelligently and systematically along scientific lines and there is no reason to consider it a necessary evil. The control of field rat, the ignominious creature, will be discussed in this talk, so it should be listened to carefully.

Field rats not only destroy crores of rupees worth of food and other cash crops, which would nourish the impoverish people, but they also spread several formidable diseases like plague, typhus fever, and rat-bite fever. Thus being responsible for more human illness and death than any other group of mammals. By controlling the field rats, a farmer can increase his profits as well as reduce the chances for the spread of plague, typhus fever and rat-bite fever. First, let me talk about the extent of damage they do and their rate of multiplication.

Did you know that according to one estimate there are eight rats per human being in the rural areas of this country and that each rat consumes food grains worth 15 rupees per year and destroys crops ten times that much, and all this comes to about seven arnab rupees per year?

1Treatment 1 of this message is given in the body of the thesis.
This huge amount of money can very well be saved by controlling rats and thus contributing not only to your own welfare but also to that of the country.

A question may be asked at this stage. How fast do rats multiply? At a prodigious rate would be the answer, since they breed throughout the year with peaks in spring and fall, and one pair of rats produces six litters of about eight offspring each. The offspring in turn reach maturity in 100 days and start breeding of their own, and so by the end of the year each pair is likely to produce 1500 rats, which is a lot. To summarize thus far, it may be said that there are eight rats per human being in the rural areas and each rat consumes and/or destroys crops worth 165 rupees, bringing the total loss to seven arab rupees. Rats reproduce throughout the year, each pair producing six litters of eight offspring each, and each offspring reaching maturity in 100 days. Thus producing 1500 rats at the end of the year.

To effectively control rats, we should know about their habits of living. For some of you it may be surprising to learn that rats are sociable among themselves and live in colonies and fight with members of other colonies. It has been observed that if the mortality rate among them increases from poisoning, they leave en masse from a haunt. The home range of a rat is usually between 100-150 feet from its burrow, and the active burrows generally have a pile of freshly excavated material at the entrance along with fresh droppings and gnawed plants; the dead burrows have only cobwebs, dry-dust, and old gnawed plants. There are three main types of rats: brown, black and grey, and it is the grey rat which is found in the fields. For every rat seen during the day, there are probably 15-20 more in that vicinity.
Now about the method of controlling the grey rat which is found in the fields. There are several methods to control rats, but the use of poisons is more common than that of predators and others, simply because in the long run poisons are relatively less expensive and more feasible as compared to predators and other methods. Lime phosphide, among many poisons used for the purpose of controlling rats, is the most popular, because it is relatively more effective. Zinc-phosphide is a greyish black powder, which is insoluble in water, does not have strong odor or taste, and is easily available from druggists or the local village level worker. The rats are known to avoid eating anything which has an odor or taste unfamiliar to them.

Winter is the best time to poison rats, since breeding activity at this time of the year is the minimum and there is greater likelihood of killing more of them during this period of year than any other. A population of rats which is poisoned in winter takes 12 months to return to normal, whereas a population poisoned in summer takes only six months.

The method of making poison baits is not difficulty, though it does require being careful while making them. The ingredients to make poison baits are: one part of zinc-phosphide, 10 parts of molasses, and 24 parts of wheat flour, and these ingredients are mixed well with a small quantity of water. Out of one pound of this mixture, 80-90 baits weighing about one-fifth of an ounce can be made. Since this poison is toxic to human beings and animals, it should be ensured that it is not eaten by them mistakenly, and children who usually are less careful in such matters are not around when making baits. After making baits, hands and utensils should be thoroughly washed with soap or washing soda. In case someone eats a bait by mistake administer copper-sulphate and lots of water, but not fats, oils or milk. The former neutralizes
the effect of poison and induces vomiting, but the latter increases the
effect of the poison. Therefore no milk, oils or fats are to be adminis-
tered.

How and where the poison baits should be placed for maximum
effectiveness? One day before the baits are planned to be placed near
the burrows, all the burrows should be closed well with earth, and baits
should be placed near those burrows the next day which are found to be
opened afresh by the rats. To increase bait acceptability by the rats,
they should be wrapped in 4" x 4" paper and placed near the burrows on
a clear evening, and also make sure that the baits are fresh, since
only 40 milligrams of poison is sufficient to kill a rat in less than
one hour, but smaller amounts usually take 2-3 days. Zinc phosphide
eats through the intestines of rats and thus kills them. Uneaten baits
should be collected from the fields next day, so animals wouldn't eat
them.

Please listen carefully, I am going to repeat the main points
which have been talked about above. Grey rats, which are found in fields
can best be poisoned in winter by using zinc-phosphide. Fresh baits
which are placed in 4" x 4" paper near the live burrows of rats, are made
with one part of zinc phosphide, 10 parts of molasses and 24 parts of
wheat flour, and 80-90 baits should be made from one pound of this mix-
ture. Zinc phosphide is toxic to animals and human beings, and the anti-
dote for the poison is the administration of copper-sulphate and not milk
or fats. Each pair of rats produces about 1500 rats in one year and
the best time to poison them is winter. Each rat is estimate to cause a
loss of 165 rupees to the farmer. Controlling rats effectively is in
your own interest and the local village level worker can supply you the
poison and help make the baits. Contact him as early as possible and make plans to poison the rats which have been causing you great loss.

Thank you for listening to this message.
Treatment 3: Low Encoding Complexity and Implicit Encoding Organization

A farmer has many enemies. Field rats are one of them. Their control is a long-standing problem. They also have a social order. They live in colonies. In case of danger, they leave en masse. There are eight rats per human being in the rural areas of our country. One pair of rats can reproduce 1500 rats in one year. They breed all the year around. They generally have six litters in a year. Each litter has eight offspring. A baby reaches maturity in 100 days.

You can kill field rats by poisoning. There are many poisons for this purpose. Greyish-black poison is mostly used by farmers. It is cheap. It is available from your grass sevak (VLW). You may also get it from your pansari (shopkeeper). Rats carry diseases such as plague, typhus fever and rat-bite fever. One rat consumes your food grains worth 15 rupees. They destroy ten times that much. They are most active in breeding in spring and fall. You should poison them in winter. They breed lowest in winter. Population of rats killed in winter does not replace itself in 12 months. If you poison them in summer, they regain original size of population in six months.

You make baits with greyish-black poison. From half seer (one pound) of mixture, you can make 7-8 dozen baits. To make baits, take one part poison, 10 parts of molasses and 24 parts of wheat flour. Mix them well. Make baits by adding water. Rats eat fresh baits better. You should wrap baits in chappa wide and chappa long (about 4" x 4") paper. Place them near live burrows of rats in the evening.
Rats are of three types. They are brown, black, and grey rats. You find grey rats in your fields. They dig deep burrows. In one year rats consume and destroy seven arab (billion) rupees worth of your crops. They roam about 20-30 kams (100-150 feet) from their burrows. If you see one rat in a day, there may be 15-20 more in the same area. Live burrows have freshly dug out earth near them. They may also have fresh droppings. Dead burrows have cobwebs over them. You may see dry earth around them.

You should close all burrows before you put baits. Next day put baits near the newly opened burrows. Greyish black poison harms animals and people. You should be careful when you make baits. Do not let children come near. Wash your hands and utensils with soda. This poison eats away the intestines of rats. About one ratti of poison can kill a rat in less than an hour. Small amount of poison may take 2-3 days.

If someone eats a rat bait by mistake, do not give him ghee (fats) or milk. You should make a light solution of neela-Thotha (copper-sulphate) and make him drink that. Also give lots of water to drink.

You can control rats by using traps also. This method is not very efficient. Rats do not eat anything which has strong flavor. They also avoid eating bitter things. Greyish black poison is odorless. It also does not have a very bitter taste. This poison kills rats more effectively than other poisons. It is cheap and easily available. You can increase your profits by killing rats. The crops they consume and destroy can be saved. Your local gram sevak can give you more information about this. He will also help you in making baits.

Thank you for listening.
Treatment 4: Low Encoding Complexity and Explicit Encoding Organization

How many enemies do you have? Many, right. I am sure you know that rats are one of them. In this talk I shall talk about getting rid of this enemy. I shall tell you how much damage rats do; what are their living habits; how soon they multiply; and how best to kill them. I am sure you will enjoy this talk.

Rats have been a problem for us for ages. We sort of accept them as a necessary evil. But why should we endure what we can cure. Did you know that each rat consumes food grains worth 15 rupees? It destroys crops ten times that much. Therefore each rat costs us 165 rupees to live. Rats cost seven arab rupees loss to our country. There are eight rats per human being in the rural areas. Don’t you think that’s a lot. Each costing 165 rupees to live and eight rats per human being.

That’s not all. Rats spread diseases also. They spread plague, typhus fever and rat-bite fever. They cause more human deaths through the spread of diseases than any other group of mammals. By controlling rats, we can save human beings and money. You get fruit as well as you eat it (a Punjabi proverb).

Let us talk about living habits of rats. To kill your enemy you should know his habits. Well, you know that, don’t you. Rats are sociable among themselves. They live in colonies. They are competitive and fight with members of other colonies. They leave enmasse if they sense danger. There are three types of rats: brown, black and grey. It is the grey rat we find in our fields. It digs deep burrows. It roams about 20-30 karns (100-150 feet) around its burrow. If you see one rat during the daytime you can guess there are 15-20 more in that
area. Not all the burrows in your fields are live burrows. Some are old and no longer used by rats. So how do you know which burrows are live and which are dead? Well, live burrows have no cobwebs. They generally have freshly dug out earth. They have fresh droppings. Also you may find gnawed plants near them. Dead burrows have cobwebs. They have dried earth and old droppings.

Let us now talk about how fast they multiply. They breed throughout the year. They breed maximum, however, in spring and fall. Each pair of rats produces six litters in a year. Each litter has about eight offspring. The babies reach maturity in 100 days. They also start breeding. By the end of the year one pair produces 1500 rats; yes, 1500 in one year from one pair. How about that, don't they grow like vines.

I know you are getting impatient to know how to kill them. Well let us talk about it. You control rats by traps or by poisons. But using traps is not very effective in fields. Poisons are very efficient for killing rats. There are several kinds of poisons: whitish powder, greyish-black powder and black powder. I recommend the use of greyish-black powder. Why? Because it is cheap. It is available from your gram sevak (VLH). It is also available from some paharins (shopkeepers). Important of all, it is more effective. It does not have any odor and taste. Rats avoid eating anything with strong odor and taste. It is not soluble in water. So, we should use greyish-black poison to kill rats.

Best time to poison rats is winter. Food is scarce in winter. So, rats will eat baits more readily. Also breeding is at its lowest in winter. Population of rats killed in winter replaces itself in 12 months. If you poison them in summer, they replace themselves in 6 months. Therefore best time to kill rats is in winter.
How to make poison baits? You take one part of poison, 10 parts of molasses and 24 parts of wheat flour. I shall repeat it once again, one part of poison, 10 parts of molasses and 24 parts of wheat flour. Mix them well. Make baits by adding a little water. From one half seer of mixture, you can make 7-8 dozen baits. Only one ratti of poison will kill a rat in less than one hour. Smaller quantities of poison may take 2-3 days to kill. The poison eats into the intestines of rats and kills them.

Now, I am going to tell you how, where and when to place poison baits. Rats like fresh baits. You should make them on the day you want to place them near the burrows. Baits should be wrapped in paper—chappa wide and chappa long (about 4" x 4"). This makes the rats curious. So chances of their eating baits are increased. We do not want to waste our bait. So, we put them near live burrows. We already talked about how to find a live burrow. To make sure, you may close all the burrows in the fields one day before poisoning. Next day place baits near the newly opened burrows. You should place baits on a clear evening. Rats more often come out of burrows in search of food at night. And you provide them with food near their burrows. How nice of you!

One word of caution. Greyish-black poison may also kill human beings and animals if eaten in quantity. So make sure there are no children around when you make baits. You should also keep the animals away from the baited area. After making baits wash your hands well with soap. Also, wash the utensils in which you make baits well. You should pick up all the uneaten baits from the fields next morning. You may ask "What if someone eats a bait by mistake?" You should give him some light
mixture of neela-thotha (copper-sulphate) to drink. Also make him drink lots of water. But do not give him ghee or milk. Take him to the doctor if he has taken in lot of poison. Well, best thing is to be careful, and let this not happen.

I will repeat the main points of the talk. Each rat consumes food grains worth 165 rupees and destroys crops ten times that much. They cause a loss of seven arab rupees to our country. One pair of rats produces about 1500 rats in one year. Greyish-black powder is used to kill rats. Baits are made by mixing one part of poison, 10 parts of molasses and 2½ parts of wheat flour. Best time to kill rats is in winter. The poison is available from your gram sevak and local pansari.

I believe you are already thinking of poisoning rats this season. This is the right time. I would strongly urge you to do so. You may see your gram sevak for further information. He will be very glad to help you. Why not see him today or tomorrow. The rats are hungry and waiting for your baits. Wouldn't you oblige them? You will also save your crops by getting rid of them. This way you will also be serving your country. We need to save all the food grains we can from rats to feed our brethren in the cities. So, please, make plans to poison the rats.

Thank you very much for listening.
BIBLIOGRAPHY

Books


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**Published Reports, Journal Articles and Bulletins**


-----, and McDonald, E. T. "Effect of Voice Quality on Communication," *Journal of Speech and Hearing Disorders*, XXI (June 1956), 236.


Smith, Raymond G. "An Experimental Study of the Effects of Speech Organization Upon Attitudes of College Students," Speech Monograph, XVIII, No. 4 (1951), 301.


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