1971

Determination of the Effectiveness of Selected Organizational Communication Techniques.

Ridley Joseph Gros
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DETERMINATION OF THE EFFECTIVENESS OF
SELECTED ORGANIZATIONAL COMMUNICATION TECHNIQUES

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Management

by

Ridley Joseph Gros
B.A., Louisiana State University, 1963
M.B.A., Louisiana State University, 1966
August, 1971
PLEASE NOTE:

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ABSTRACT

This study consisted of an experiment to determine the comparative effectiveness of the written and graphic communications technique with the (1) written and (2) graphic techniques. The after-only experimental design included a total of 448 college students. The subjects were divided into three groups. Group A received the written and graphic message. The same message was presented to Group B, except that in their case the communicated message was strictly graphic. Group C received only the written version.

The message was a comparison of television and selected magazine advertising revenues and costs for 1969. Following a six minute exposure, a multiple choice examination was distributed to all three groups. After a ten-minute testing period, these examinations were picked up. The examinations were graded based upon the number of correct answers. Recall, thus, was the variable used to measure effectiveness.

After it was established that there were three homogeneous groups, the F-Distribution was used to determine if there were any significantly statistical differences in the examination results. The experimental findings indicated that written and graphic communications is a more effective communications technique than either written or graphic communications (+1% level of significance). There was no significant statistical difference between strictly written and strictly graphic
presentations. There is evidence, however, that this effectiveness should also take into account the type of information that is being conveyed.

The examinational questions were divided into two groups, informational and analytical. Those questions in which the respondents needed only to recall a bare recitation of facts were classified as informational. The analytical questions were those in which the respondents had to draw conclusions from the factual data. Given this framework, the results were different.

The graphic group produced the highest mean scores in those questions characterized as being informational. There were significant statistical differences between all three groups (±1% level of significance) indicating that there was a significant difference among these selected communication techniques.

The situation, however, was quite different in the test results of the analytical questions. In this particular case, the strictly graphic technique was the poorest of those surveyed in conveying analytical information (±1% level of significance). The written and graphic, as well as the written communication techniques conveyed this type of information better.

What is the significance of these findings? In the first place, an exhaustive search of the literature indicates very little primary research concerning the effectiveness of selected organizational communication techniques. Yet, these techniques are essential to successful communications.

Secondly, authorities in the area of business communications
have emphasized written and graphic communications as the most effective communications technique in business report writing. Furthermore, these authors emphasize the viewpoint that the graphic technique should not take the place of the written means of communicating. Rather, it should be ancillary to the written word.

The overall results of this experiment give strong support to this contention. Written and graphic communications is a more effective technique than either written or graphic communications. It would also seem, however, that if the sender of the message wanted to convey factual information, the graphic technique would be the one to use. Finally, analytical information would be effectively communicated by both the written and graphic or strictly written technique.
DETERMINATION OF THE EFFECTIVENESS OF
SELECTED ORGANIZATIONAL COMMUNICATION TECHNIQUES

I. AN EXAMINATION OF THE FIELD OF INVESTIGATION

A. The Authorization Facts

This research effort into the effectiveness of selected organizational communication techniques is submitted to a committee of members representing the Department of Management, Louisiana State University, Baton Rouge, Louisiana. This work has been undertaken to satisfy part of the requirements leading to the Doctor of Philosophy degree.

B. Importance Of Communications

The survival of most living creatures depends upon cooperation within the species. Such cooperation is, furthermore, achieved through the process of communications. Thus, it has become generally acknowledged that communications is essential to all organized activity.

Furthermore, communications is much more vital to the survival of human beings than it is to the survival of lower order species. The reason is that man is the only animal capable of pooling knowledge. As one writer has pointed out, "Dogs and cats and chimpanzees do not, so far as we can tell, increase their wisdom, their information, or their control over their environment from one generation to the next.
But human beings do not. This important pooling of knowledge, also referred to as time binding, is expressed usually in terms of some language. The language of business reports is but one example of how man pools his knowledge from one generation to the next.

C. Statement of the Problem

Dr. Leland Brown refers to a report as simply an account—that is, a collection of information designed for use. Dr. Michael Adelstein defines the term in terms of its uniqueness by stating that it differs from other types of informative writing because of captions, traditional organizational patterns and usage of certain conventional sections. Concerning this uniqueness, another author, Dr. Norman Sigband, states that how a business report is classified is really of little significance. He states that what is important is that a report contains statistical and/or narrative information. Dr. Raymond V. Lesikar summarizes these various perspectives by defining a business report as

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report as "an orderly and objective communication of factual information which serves some business purposes".

Within the framework of these definitions is the importance of communications; the latter includes, among other things, the transmission of meaning. There are many ways to emit meaning. In a normal day, such efforts as speaking, writing, gesturing, drawing, etc. are attempts of expression.

Although there are a myriad of ways to communicate, Drs. Aurner and Wolf view a report as, "an oral or written message that conveys information for decision and use". Dr. Lesikar coincides with this viewpoint by stating that most business reports, practically speaking, are either written or oral.

Furthermore, the approach taken by many authors and teachers in the business report field is to train the students in the art and science of written reports. Consequently, the development of good writing habits is considered important.

The writer of the business report, however, has techniques available to him besides the written word. As Professors Boyd and Lesikar point out, "There are numerous occasions when words alone are not enough. Frequently some form of graphic aid (pictures, charts, maps)
will help when words alone would fail. Professors Aurner and Wolf state that such pictorial devices allow simplification. These illustrative devices, therefore, do perform a valuable function.

A survey of the literature indicates, however, that such graphic techniques perform a supportive function—that is, they are ancillary to the written word. For example, Dr. William Damerst points out, "However obvious the point may be, an illustration should never be used to take the place of words." Professor Adelstein concurs with this viewpoint by stating, "However, all these devices serve only as an aid to the written word; they do not replace it." This supportive function is as Professor Sigband states "... used only when they help clarify the data presented." In summary, "the primary function of graphic aids in the report is that of assisting the words to communicate the report contents."

Another position concerning this supportive function of visual aids was expressed by Professors Berenson and Colton in their recent edition, Research And Report Writing For Business And Economics. In

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12Adelstein, Michael E., op. cit., p. 243.

13Sigband, Norman E., op. cit., p. 182.

14Lesikar, Raymond V., op. cit., p. 297.
it they state, "At one time the prevalent view was that such visual aids were to supplement the written text, but now they often form an important part of the manuscript in their own right; more and more they are supplanting written material." This minority viewpoint does present a differing attitude concerning the function of graphics within the long formal report.

A survey of the literature indicated no empirical research to support either position, although there is some empirical support verifying the significance of other techniques used in communicating (See Chapter II). The problem, thus, becomes one of determining whether or not written and graphic communications is the most effective communicating technique.

The overall objective of this research study was to attempt to determine, given the same period, whether written and graphic communications is a more effective communication technique than either written or graphic communications. Specifically, the following aspects of the problem were investigated:

1. Which communication technique is most effective--written, graphic, or graphic and written?

2. Which one of these three techniques communicates factual information best? Analytical information best?

Thus, an experiment was conducted to prove or disprove the following hypotheses:

Hypothesis I: The written message with graphics is a more effective communicating technique than strictly graphic presentation.

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Hypothesis II: The written message with graphics is a more effective communicating technique than strictly written presentation.

Hypothesis III: Informational data is communicated best by the graphic technique.

Hypothesis IV: Analytical information is best communicated by the written and graphic communications technique.

The words that needed defining included "informational" and "analytical". The criteria used was as follows: that data that required a bare recitation of facts is referred to as informational. The information that required the students to draw conclusions from the data is identified as being analytical.

Since the term communications is rather broad in scope, the special conditions under which it will be studied should be enumerated before proceeding any further.

D. Defining The Topic Area

In the following discussion attention is focused, first of all, on the difficulty of determining what is meant by the term communications. After viewing communications as a process, some of the variables involved in determining successful communications are brought out. The emphasis in this section is the subject matter of the dissertation, that is, the techniques involved in communicating. This examination concludes with a possible classification scheme for communications within the organization.

1. Difficulty of Defining Communications

Of the eight definitions given for communications within Webster's Unabridged Dictionary, two explanations include "(l) an act of
impacting or transmitting;"\(^\text{16}\) and "(2) the facts or information communicated."\(^\text{17}\) Other authors have added and deleted from these definitive phrases. For example, one writer has viewed communications as being "social interaction through symbols and message systems."\(^\text{18}\) The difference in this latter case seems to be the inclusion now of the participants involved with communicating.

Someone else has made the distinction based upon whether or not the communication is intentional or unintentional.\(^\text{19}\) The reason for such a distinction according to the author, is to avoid defining communication in its broadest sense—that is, as envisioning any situation involving a response to a stimulus. Now the importance in defining the terms relies on the intentions of the participants; that is, what is the communicator trying to do?

In all of these definitions there is one common denominator: the importance of meaning. As David Berlo points out, "In teaching others about communication, in communicating ourselves, in criticizing the communication of other people, meaning is and should be our


\(^{17}\)Ibid.


chief concern. The reason for stressing meaning is that this term depicts a primary purpose of communicating in the first place—that is, to emit meaning.

Which one of these definitions is correct? Should the emphasis, in other words, be on the act of imparting, the facts communicated, or in the final result, meaning itself? The answer to the question is that all of these definitions are relevant. It is for this reason that if communication is to be defined, it will best be understood if viewed as a process.

2. Communication Viewed as a Process

Definitions are statements about language. They are merely explanations of the ways in which the meanings of words have developed according to historical usage and customs. As such, they enumerate the meanings that a word or series of words may have. However, such definitions tell us nothing about things.

Thus, in order to understand such processes as communications, it is necessary to show how they work. Such operational definitions provide more perspective by bringing these things within the range of one's experience.

The bulk of the presentation that follows is from Communications Theory and Application by Dr. Raymond V. Lesikar. The model in


Figure 1 depicts what takes place in the communications process.

Stage 1 of the model depicts the real world; the latter consists of all that exists as opposed to that which exists only in the minds of men. The signs within this world are all that is capable of creating a stimulus within the individual. Such a world of things is infinite in nature—that is, incapable of being described in total by the individual, whose sensory receptors pick up but a few of these signs (Stage 2).

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23 Ibid., p. 23.
These limited signs go through the nervous system and are given meaning (Steps 3 and 4). Such meaning may trigger communication responses (shown in Stage 5).

How does this meaning take place? Ogden and Richards developed the triangle of meaning\textsuperscript{25} which illustrates how this phenomenon occurs. The three component parts in making sense out of our experiences (perception)\textsuperscript{26} include thoughts, words, and things (see Figure 2).

The peak of the triangle consists of the human being who uses symbols to depict or represent objects (things). Note that there is no base to the triangle indicating no direct relation between words and things. In other words, these symbols only represent the objects.\textsuperscript{27}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{triangle_of_meaning.png}
\caption{The Triangle of Meaning}
\end{figure}

\textbf{Figure 2: The Triangle of Meaning}

\textbf{Source:} Ogden and Richards


\textsuperscript{27}Hayakawa, op. cit., pp. 28-29.
Furthermore, these words can never describe a thing in its totality, because a definite number of words must represent an infinity of things.

This "triangle" of meaning is restricted to the language of fact because in the model the symbols (e.g. words) refer to things or objects—that is, extensional or denotative meaning as opposed to intensional or connotative meaning. In summary, then symbols are signs because they act as a substitute for something. There is, however, another type of sign.

For example, assume the individual shown in Figure 2 became dejected when viewing the referent (chair) because his brother was sentenced to death for a crime. Then another response is also produced. In other words, the responses elicited in an individual are influenced by his emotions and viewpoints (Stage 6). How behavior is colored by the filter of the mind is shown by the signals triggered within the individual. Signals are signs, just as symbols; however, they are a substitute stimulus.

Most of the time, signs are expressed and there are various

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29 Lee, Irving, loc. cit.


techniques in presenting them (reading, writing, gesturing) (Stage 7). These man-made signs are then picked up by the sensory receptors of others (Stage 8) and another cycle begins.

3. **Summary of Definitions**

Viewing communications as a process points out in the first place the relevance of all the definitions given in the earlier section. Secondly, from the model and its interpretation it becomes apparent that communications is not a precise activity; that is, at each stage in the process, miscommunications is likely to occur because (1) all knowledge gained from experience is limited, (2) the human being colors or passes judgment on these events around him, and (3) the symbols used in communicating are static representations of something very dynamic.

A fourth and final point that may be made as a result of this discussion is that the subject involved in communicating is very complex. In fact, a psychological postulate made about the human being is "the viewpoint that the human organism can be regarded as a complex information--processing system\textsuperscript{32}". The human mind is so complex that another writer has used the phrase "exceedingly complex probabilistic system\textsuperscript{33}" to describe it.

In effect, what the author meant by such a classification is that human beings do not have uniformly determined outcomes and are


Furthermore, capable of such a wide variety of behavior that probability analysis is of little value for forecasting. Such a classification extends to the discussion of human communications.

If human communications is so complex, how can it be studied? Studying communications would be no different than studying, e.g., education. Both are broad concepts; however, in order to study education—that is, making learning more rapid and profitable—certain conditions of learning are set up and in general the term is limited to an application under certain conditions. 34 In order to see what is termed communications attempts must be made to put it, also, in relationship to the vast number of other experiences of which it is a part. Thus, it should be applied under certain conditions; e.g., communications within an organization. Before considering communications within an organization, however, it is important to determine what is involved in communicating successfully.

4. Determining Effective Communications

One writer has stated the proposition "that 'successful' (e.g., effective) communications depends first upon one's conceptual abilities, then upon one's attitudes and orientations and only then upon the kinds of techniques one actually employs . . . " 35

It is a foregone conclusion then that all aspects presented


earlier in the communications model are important in determining whether or not communications have been successful. The bulwark of this dissertation, however, will address itself to the kinds of techniques employed in communication; in particular, consideration will be given to techniques and their effectiveness within organizations.

5. Techniques Used in Communicating

In Stage 7 of the communication model presented in an earlier section, mention was made of the fact that there are many symbolic ways of expressing oneself. These symbolic methods may be viewed as codes, and in communicating a choice as to which code or codes used must be made.

These codes or techniques employed in communicating refer to the categories of media which can be employed for purposes of communication. A division of these techniques may be generally summarized as follows:

a) Verbal - consisting of telephone conversations, public address conferences, interviews.

b) Pictorial - charts, displays, posters, movies.

c) Exemplary - appearance, actions.

d) Written - advertisements, bulletins, signs, forms, pay inserts, letters, handbooks, house organs, union contracts, etc. 37

36 Berlo, David K., op. cit., p. 169.

Codes or techniques have been viewed by another writer as part of what he refers to as the technology of communication which includes "all of the tools of communication which have been created (or have evolved)--and which therefore have served both to enhance and to limit man's communication abilities." The problem becomes one of how much have these tools enhanced and/or limited man's attempts at successful communications? Before this problem can be considered, however, mention should be made of the special condition under which communications will be studied—that is, communications within an organization.

6. Importance of Communications to an Organization

Any time people are in contact with one another, there exists the need to communicate effectively. Successful communications is especially important in an organization. Such an observation becomes more apparent when considering (1) what the communication function is within an organization and (2) how its comprehension can provide a better understanding of organizations.

The function of communications within the organization may be viewed as the network that pulls all of the members of an organization together. It thus becomes a linking element between individuals within the organization. This cohesiveness is especially important in the achievement of objectives and does provide some understanding of organizational behavior.

One author has stated that a clear understanding of the organization itself would be possible if one could (1) identify all the

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channels conveying information and (2) establish the means by which information influences the behavior of the organization. From this observation, then, communications becomes an important attribute in studying organizations because it provides clues as to what makes an organization work as it does. The problem in the above assessment is trying to solve the two criteria in order to understand the organization. Growth of the organization compounds this difficulty even more. Communications become more difficult to understand as organizations grow. For example, the growing trend in business corporations lately has been largeness. Such bigness has made corporations more complex and consequently, today's organization requires performance at an unprecedented level of excellence. Thus, effective communications become even more of an important topic as organizations increase in size.

In summary, the importance of effective communications within an organization cannot be underestimated because it is very difficult to envision the very existence of organized activity without successful communications.

7. Classifying Communications Within an Organization

There are many ways of classifying communications within an

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41 Ibid., p. 3.
organization. In the ensuing discussion attention is focused on three particular categories: (1) forms of organizational communications, (2) communications viewed as a network, and (3) communication flows within formal organizations.

In the case of the forms of organizational communications, three broad categories could be classified as internal-operational, external-operational and personal.\(^42\)

By operational communications is meant those communications that are concerned with the purpose of the organization. Those communications unrelated to the function of the organization may be referred to as personal.

External-operational communications are the information flows which the organization conducts with individuals outside the organization. Internal-operational communications are those flows dealing with the organization's plan of operation deliberately designed to achieve the organization's objectives.

Besides the forms of communication present within an organization, a second classification scheme could include the types of communication networks. "The communication used by organizations basically travels through two types of networks--a formal organization relationship, and an informal network determined by the undefined relationship that develops among individuals making up the organization."\(^43\)

\(^42\)Lesikar, Raymond, op. cit., pp. 8-12.

In a formal sense, then, the organizational chart provides the defined relationships for communicating within the organization. These relationships, such as authority and responsibility, directly involve communications; and this organizational structure has an influence on establishing boundaries in this formal communications network. The organizational chart is important, also, because it provides a set structure so that operational communications may be filtered throughout the organization.

Of equal importance is the communications network which arises from the informal group. Informal groups have their beginning from the social interactions occurring among people. Invariably people are pulled together by common interests, shared attitudes, or the need to be accepted by the group with which they work. Such an informal group performs desired functions for its members. One of these functions is communications. This type of communications network is sometimes known as the "grapevine".

A third distinction may be made relative to the direction communication flows within the formal organization. Differentiation in this case is between downward, upward, and horizontal communications. Downward communications is generally the mass message from one or a

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few managers to many employees below. In upward communications, information is transmitted from subordinates to supervisors. Two-way communication would entail both types of flows.

Much of the actual and necessary communication is horizontal. Such cross-communication was introduced by Henri Fayol who devised a bridge for this type of communications and referred to as a "gang plank."47

Thus, these flow patterns coupled with the network that takes place as well as the various forms of communications provide more special conditions in which communications can be studied.

8. A Summary Of The Topic Area

As a result of the preceding discussion, it becomes apparent that communications is a very difficult and complex subject. In the first place, it may be viewed as a process consisting of several stages, each of which is important if an individual is to be successful in the transmission of meaning.

Secondly, each stage in this process includes many variables. For example, the techniques used in communicating (Stage 7) are important determinants in successful communications. Yet, there are many such techniques available to the communicator. A broad scheme was presented as a representation of these possibilities (written, verbal, pictorial, and exemplary). Either one or combination of

these may produce successful communications.

A third and final assessment as a result of this discussion is that if this broad concept, communications, is to be studied, it should be applied under certain conditions; for example, communications within an organization. Given the importance of communications to the organization, it may be classified according to form, network, and flow. For the purposes of this dissertation effort, the emphasis, given this overall framework, was on the internal-operational, formal communications within the organization.

E. Scope Of The Study

This research effort was an attempt to evaluate the effectiveness of selected techniques used in communicating. These methods of transmitting information included written, graphic, and written and graphic. The recall of pertinent information via a multiple choice exam was the measurement used to decide effectiveness.

F. Limitations Of The Project

Communications viewed as a process illustrates the fact that lines of demarcation are not always clearly drawn between the various stages in communicating. For example, communication techniques cannot be divorced from who is sending the message, who is receiving it, as well as the contents of the message and the medium used to carry it. Nevertheless, the emphasis in this effort will be on the codes used in communicating.

A second limitation is the fact that the problem area has been
narrowly defined by relying, first, on only one stage of the communications process and, secondly, classifying selected techniques within a highly structural environment (i.e., the formal internal operational communications within an organization). By using such a classification scheme, however, the topic is hopefully narrowed enough so that an exhaustive search of the literature may be made.

A third limitation is that the experiment considers but three of many possible communication techniques. Yet, these chosen codes are often used in the formal communications network. Given these communication techniques (written, graphic, and written and graphic), a fourth shortcoming is the fact that there are many different ways of presenting them; for example, there are different types of graphic aids available to convey the same message.

A final limitation is that college students would be used for the experiment. Therefore, the situation applies more to the use of these techniques to a select group. The reason for choosing such subjects is that of the objectiveness possible in creating the experimental design.

G. Methodology Used In Conducting Experiment

In the ensuing discussion attention is focused on who would take part in the experiment, what type of material would be used for testing, exclusion of certain subjects, how the testing time was determined, what kinds of instructions would be given to the subjects and the statistical tools that were to be used in verifying the results.
1. Subjects for the Experiment

The subjects for the experiment were the students enrolled in the Principles of Management Course at Louisiana State University in Baton Rouge. This group was chosen because it represented a large sample size. (At the time of registration, there was an approximate total of 750 students enrolled in this particular course.) These students were divided into three groups:

1. Group A: were exposed to written and graphic communications.
2. Group B: were exposed to graphic communications.
3. Group C: were exposed to written communications.

2. Nature of Presented Material

All of these groups were exposed to the same communicated message; however, the techniques used in presenting the information were different for each group. The material was essentially informative rather than persuasive, realistic and relatively non-controversial. The chosen topic was magazine and television revenues and costs for 1969.

3. Exclusion of Certain Subjects

Students who did not attend class that day were to be automatically excluded. Of the number that did take the test it was decided to exclude the following: (1) foreign students, (2) transfer students, and (3) beginning freshmen.

The foreign students were excluded because it was felt that they had more of a language barrier to overcome. How were they excluded? These students do not take the Admissions College Tests usually required of freshmen entering Louisiana State University in Baton Rouge.
Thus, by checking through the transcripts of all the subjects who took the exam, the international students included in the sample were discovered.

Besides the international students, transfer students and beginning freshmen were also excluded. The reason is that grade point averages were to be used as a test of homogeneity among Groups A, B, and C. These two groups would not be reliable groups statistically if included in the testing sample.

When students transfer to Louisiana State University, their past grades are averaged in as a 2.00 (C average) until their final semester in residence. For example, a student with a 3.50 (B+ average) transferring to this institution would only show a 2.00 on his transcript until his final semester in residence. It was decided to exclude this group, and this rejection was accomplished by examining the transcripts of all the experimental subjects. The final group eliminated were the beginning freshmen because they have not accumulated any grade point average.

The remaining subjects used in the analysis were as follows:

(1) 152 subjects in Group A
(2) 149 subjects in Group B
(3) 147 subjects in Group C

448 total subjects used in the statistical computations

4. Determination of Testing Period

It was decided to allocate a time period of six minutes to the reading of the communicated message and ten minutes to the exam completion. This decision was made as a result of a pilot study conducted at Nicholls State University involving twenty-seven junior level students enrolled in a Human Relations Course. These students
were divided into three groups, and it was found that six minutes was enough time for all of them to complete the reading. Shown in Table I is the result of the time needed for the completion of the exam portion of the test.

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Number of Students</th>
</tr>
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<tbody>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
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<tr>
<td>8</td>
<td>6</td>
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<tr>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Primary

5. Instructions To The Assistants

Principles of Management is taught at Louisiana State University in Baton Rouge via television. There would be, therefore, only one person transmitting the information. This person gave general standardized testing information to all three groups. The following information were conveyed simultaneously to all groups.

"Good morning. Today our program varies from our normal class meeting. We have been asked to participate in a research project being conducted by Mr. Ridley Gros, Head of the Department of Management and Marketing at Nicholls State University. Your cooperation in this study is appreciated. At this time, the class will be turned over to your section instructor who will give you additional information about this project."

He would then turn the meeting over to the section instructor.

The instructors were briefed four days prior to the testing
period. The agenda covered with them included: (1) verification of
class size of each group, (2) reiterating the importance of the time
factor; (3) reminding students that they may mark or make notations
on the communicated message, (4) stressing of the facts that all sub-
jects were to keep their exams face down until told to begin, and (5)
importance of reminding the students that before they were to take
the test that they were to print their complete name at the top of
the exam.

6. Statistical Verification Of Results

The first effort would be to determine if the three sample groups
were homogeneous. This measurement would be done by using the subjects' 
grade point averages as a standard of comparison; that is, the test
would be designed to determine if the variances among the grade point
averages of the three groups were homogeneous.

If homogeneity was established, the next step would be to use a
statistical testing technique which would determine if the differences,
if there were any, in test results, were due to chance or to the
testing method. The "one-way" test of variance using the F-Distribu-
tion would produce such a result.

7. Summary Of Experimental Procedure

As pointed out in an earlier section, Technique A was a written
and graphic message comparing television and selected magazine revenues
and costs for 1969. The same message was presented to Group B, except
that in their case the communicated message was strictly graphic. In
the case of the third group, Group C, the students were exposed only
to the written message.
Following this exposure of six minutes a multiple choice exam was distributed to all the subjects. Given a ten-minute testing period, these exams were then picked up. The exams of these subjects (excluding absences, foreign and transfer students as well as beginning freshmen) were graded and recall was the variable used to measure effectiveness. This recall was based upon the number of correct answers out of a possible 20 in testing the first two hypotheses; that is, determining whether written and graphic communication was superior to (1) graphic, and (2) written communications. The number of correct answers out of a possible score of ten was used to test the other hypotheses; that is, comparing analytical and informational data given these techniques at communicating.

H. Preview To The Presentation

The second chapter of this effort is a survey of the literature as to the effectiveness of selected communication techniques within business organizations. The information will include formal communications, whether it be upward, downward or horizontal. Furthermore, the subject matter will be an analysis of the formal internal-operational communications within the organization.

The third chapter will consist of an experiment to determine the effectiveness of written, graphic, or written and graphic communications. This after-only experimental design includes downward communications within a formal organization. From such experimentation, hopefully pertinent knowledge may be added to the problem of which written technique communicates best in organizational communications.
The fourth and final chapter is a review of the findings of the previous chapters. The summary and conclusions are presented in this particular section. Before reaching any conclusions, however, a survey of the existing literature will be made as to the effectiveness of selected techniques used in organizational communications.
II. A SURVEY OF THE EFFECTIVENESS OF WRITTEN, ORAL AND PICTORIAL CODES

In defining the topic area of communications in Chapter I, mention was made of the techniques used in communicating. The categories presented at that time were verbal, pictorial, written, and exemplary. In researching each of these techniques, exemplary communications proved to be the most difficult one to isolate. As defined in Chapter I, this technique includes the appearance or actions of others. Such acts, visually seen, do communicate meaning. These exemplary communications, however, are usually included within the pictorial medium. Thus, these communication techniques, with the exception of exemplary, provide the basis for the ensuing discussion.

These techniques may be combined in the communications' process; however, they are also singularly used in transferring ideas. The following discussion will be an informational review of these techniques or codes. This examination will include the following four areas: first, the oral medium as the most used code; secondly, the pictorial presentation as a single means of communicating; thirdly, readable writing as the most sophisticated code; and finally, the possibility of combining these techniques for communication effectiveness.

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A. Oral Medium As Most Used Code

Oral communications involve the creation of symbolic sounds. Such individual spoken expressions are physiologically produced in four phases: inhalation, phonation, resonation, and modification. Examples of the oral medium would include formal speeches, interviews, conferences, interpersonal conversations, et cetera. Such person to person communicating may be done on a face-to-face basis, or the individual may rely on mechanical means such as the telephone. Although the transcribing of one's voice mechanically is a more recent phenomenon, the oral medium has been around for a long period of time. Thus, while not considered the only mode of communicating, it is considered to be the first technique that was developed.

Another writer concurs with this viewpoint by stating that human speech predates all forms of writing by many centuries. This same author points out that even in individual development one learns to talk long before learning how to write.

There are definite advantages in using speech to communicate. In the first place it can transmit more meaning than the printed page. Secondly, it has the advantage of being rapid. Finally, it can be

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quickly changed to meet the listener's mood and temperament.\textsuperscript{51}

There are, also, certain disadvantages to this technique. It is costly and prone to error in transmitting information.\textsuperscript{52} Furthermore, most of the time it does not have the advantage of being re-checked because such communications are not always recorded.

In any event, oral communications represents an often used medium. For example, one writer has stated that the typical manager spends seventy-five per cent of his time communicating and about seventy-five per cent of this time in individual, face-to-face situations.\textsuperscript{53} A study by J. D. Croston and H. B. Goulding indicated that two-thirds of all the communication activities in one company was spent in oral communications.\textsuperscript{54}

Further research in this area indicates that in business organizations the oral medium is preferred by employees. In one book, \textit{Business and Industrial Communication}, the authors cite two studies that uphold this position. In the first study the employees of eight stores of a major retail chain were asked to rank the communication techniques which they preferred. In every instance, oral was preferred over written. In a second study, a survey of 22


\textsuperscript{53}Haney, William H., \textit{op. cit.}

companies was made and the results clearly indicated an employee preference for the oral medium. 55

B. Consideration Of Strictly Pictorial Presentations

The pictorial technique consists of, "an image or likeness of an object, person, or scene produced on a flat surface, especially by paintings, drawings, or photography 56". Such communications are usually viewed as being non-personal 57—that is, the absence of a person to person contact. Included within this classification are such codes as television screens, bulletin boards, visual handouts, graphs, 58 et cetera. Such visual, or pictorial presentations, thus, may be viewed as a language in themselves; that is, like words every picture has a content of meaning partly intensional, partly extensional. 59


58 There is some disagreement among the authorities in the business communications area concerning the correct classification of graphics. For the purpose of the discussion in this study they will be classified as pictorial in order to distinguish them from strictly written presentations.

This visual medium has been part of civilization for a long period of time. The early scripts of the Mediterranean civilization were in the forms of pictographs and ideographs.  

Another writer has made the observation that the pictorial means of communicating has been in usage longer than words. This theory has historical support. For example, archeological findings include caveman drawings depicting the extensional world about them. Such an observation is not refutable; yet, it is not easily proven either. There may, for example, have been some communications that were not transcribed or interpreted. In any event, the pictorial form of communicating has a long history.

Historically, there has been a sophisticated evolution of this medium. With the development of photography, for example, pictures may be used as a single means of factually communicating. There is even the suggestion in this study that graphical presentations alone may be able to depict enough meaning to accomplish effective communications. Thus, in this latter case, the graphic presentation may take the place of written language in some instances.

This visual technique as a communications medium is not usually considered alone. Most of the time it is combined with other codes. One author specified, in fact, that the visual method of communication should be used in cases where instructions are given to a group.

60 Ibid.
61 Cherry, Colin, op. cit., p. 33.
For example, a sales manager presenting new techniques to his salesmen might use charts or slides as part of the group training program. Another writer, Joseph Cooper, states that visual presentations are merely a means of communicating ideas when the written word alone is insufficient.

A picture, however, does have meaning of, and by, itself. There is not, admittedly, a one-to-one correspondence between the elements of the visual presentation and the elements of the event. This correlation problem is not to say that a visual presentation does not have structure. Although this configuration of symbols makes it possible for individuals to interpret the picture, one must have enough experience with the symbols in order to read the picture. In support of this position, the results of one experiment conducted several years ago indicated that written arguments are easier to understand than those presented graphically, except in certain circumstances. The special conditions include, in this case, sufficient intelligence and general education on the part of the reader to handle graphical material intelligently.

Apparently the problem of meaning being derived from visual

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Chase, Andrew, loc. cit.


Presentations is the fact that pictures are multiordinal. In other words, visual presentations may be interpreted on different levels of abstraction. For example, a picture of a close relative has concrete meaning to those related; it is just another person to people not related. Thus, the picture, or visual presentation, is interpreted on different levels and forms the basis for different interpretations of the same phenomenon. In summary, while it is true that a picture may be worth a thousand words, the question then becomes which thousand words in the eyes of the receiver.

The results of one experiment suggest that the more realistic a visual representation is the better are its chances of effectively communicating. In this particular experiment the subject matter consisted of symbolic representations of a situation (navigation instruments) and pictorial representations (radar screen) of a similar situation. Pilots were asked to indicate what action should be taken under each situation. More correct answers were recorded under the radar screen medium. The radar screen, it was felt, gave a more realistic presentation of the situation. Thus, it was more effective because if was more realistic.

Another experiment suggests that color coding enhances the

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65 Wendt, Paul R., op. cit., p. 254.

communication effectiveness of the visual media. The study consisted of projecting displays of twenty, sixty, or one hundred symbols of bright colored figures on a dark background. The subjects were asked to count the number of target items designated by color or shape. Counting time and errors were used to determine effectiveness. These results showed that the average counting time and number of errors were significantly lower when color was used to designate a target class.67

In summary, the pictorial means of presenting data may be effective when singularly considered. The picture does have structure. A problem develops, however, in the various interpretations that may be given to it. Thus, the picture may be worth a thousand words, but will it be the same thousand words in the receiver of the message as it was in the sender of that message?

This mutiordinal problem may be reduced by making, for example, the picture more realistic in detail. This realism is possible in such areas as graphics where quantitative information, presented visually, communicates at a lower abstraction level. Another problem develops, however, in this situation—that is, is the receiver well-versed in the technique? Nevertheless, such sophistication in this technique does make it possible to narrow the interpretive scope of the receiver.

C. Readable Writing As Most Sophisticated Code

The greatest advancement in communication techniques was the invention of phonetic writing with which sounds were given symbols. At this time speech and writing were linked. Those civilizations which did not adopt such symbolism have been handicapped throughout history. With the passage of time, phonetic writing became simplified into a set of two or three dozen alphabetic letters. 68

Written communications has evolved into one of the most advanced communication techniques. Professor Colin Cherry has stated that without the written word, civilization in the form we know it today could not be sustained. This same writer states that present civilization has become the Age of Paper. 69 Writing has become such an important means of communicating because this medium, more than any other, has made it possible for man to have a record of those events that preceded him.

How is written communication classified? It is, practically speaking, concerned with handwritten or printed information. Letters, memorandums, reports, manuals, et cetera, are examples of the written medium. 70 In this situation, as in the visual medium, there is an

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68 Cherry, Colin, op. cit., p. 33.
69 Ibid., p. 79.
absence of person-to-person contact. There is, furthermore, vigorous training involved in mastering writing techniques.

Compared to the oral medium, writing is clumsy, lengthy, and slow. Another one of its shortcomings is that it requires more thought. Furthermore, in the written form the message does not have the great expression and flexibility that is possible with oral communication. For example, it may take a page of prose to express what one scream would convey.

Even with these limitations, writing is often a preferred medium in communicating. For example, in a study conducted by the California Institute of Technology, it was found that the most important source of employee information is planned written communications (company magazines, letters to employees, et cetera). Secondly, the results of a study previously cited by Charles Redding and George Sanborn indicated a heavy company preference for the written medium although the employees' preference was for the oral medium.

Its acceptance as a communications technique is due basically to the preciseness of detail possible with the sender of the message.

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71 Cherry, Colin, op. cit., p. 79.


Consequently, the receiver who is not present can conceivably understand more fully the message than the other non-personal medium, pictorial presentations. Its effectiveness, however, depends upon many variables in the communications process.

There have been some studies done concerning the effectiveness of the written medium. One of the most important products of this research has been the importance of readability. Administrators, scholars and employees have all expressed the belief that complicated styles of messages frequently reduce communication effectiveness. For example, one study indicated that the reason written communications fail within a business organization is that many interoffice memorandums are poorly written and consequently ignored.\(^4\) In another study it was found that procedure manuals are too wordy, they contain too many references to other procedures, and they are hard to understand.\(^5\)

What should the business organization try to do in attempting to make the written message more effective? The employee, who is the receiver of the message, will not be able to immediately change his reading level. The burden, thus, is upon the employer to write at a


reading level which the employee is qualified to understand. Writing to the reader's level is sometimes referred to as the principle of adaptation.

There were two studies of employee handbooks that indicate this principle is not followed in industry. In the first effort, the Flesch readability scores of twenty-nine employee handbooks were compared with the scores of comparable handbooks in the same organization fifteen years earlier. During this period of time it was found that the change was in the predicted direction of more readability. The average improvement, however, of the whole sample was small. Applying the Flesch concept of preferred reading grade, the conclusion of this study was that employee handbooks are not yet adequately readable for the audience for which they are intended.

In the second study, an analysis was made of the eleven major "Billion Dollar" Corporations. The authors used the Flesch Reading Ease Scores as a measuring device. The comparison, using this test, was in terms of the educational level required for these eleven

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76 The Flesch Formula is the product of exhaustive research. Flesch readability scores are derived first by computing the average sentence length in a written passage. This average is then multiplied by an index number (1.015). The second step consists of computing the number of syllables of 100 consecutive words within the same passage. This number is also multiplied by a base number (.846). Both products are added and subtracted from an index total (206.835). This score is then interpreted by a reading ease scale to determine the difficult level of readership.

employee handbooks and the median educational level of unskilled employees. The results indicate that seven of the eleven handbooks were written over the heads of their intended readers.78

Simplifying information is one of the ways that this adaptation may take place. One study verifies this position that by shortening sentences, the comprehensibility of the printed material could be improved. In this study, students read three different passages with sentences of varying lengths. The experiment was carefully controlled so that only sentence length varied significantly. Students were tested immediately after reading each passage by a cloz test. This test is a rewriting of the original message with every fifth word omitted. The results indicated that shortened sentences were easier to read and comprehend than those with lengthened sentences.79

There is not exact unanimity on this position, however. In another study conducted in a large state hospital, messages in which the content was held constant were prepared in two contrasting styles and distributed to employees. One style used conformed to the traditional formal messages of the organization. The other style was simplified in that sentences were shorter, there were fewer syllables per word, and layout was used to improve readability. In comparing


79Ibid.
the two styles for effectiveness it was found that although the comprehension of shorter sentences was better than that of longer sentences, the magnitude of the difference was small. In this particular case, it appeared doubtful that reading ease was improved by shortening the sentences still further. 80

Nevertheless, the predominance of the literature indicates that shortened sentences improved the written medium. For example, in 1948, the Air Material Command of the United States Air Force conducted a program aimed at improving communications. Part of the program consisted of the distribution of a manual entitled Gobble-de-Gook Or Plain Talk. The book was written at a sixth grade level and the objective was to encourage the use of plain talk in communications. Before this change, a survey of most of the manuals that were used indicated that they were written in a very difficult reading style and aimed at the college level. After only two years under the plan, noticeable improvements in communications occurred within the Air Material Command. 81

As businesses increase in size, however, it becomes necessary to increase the amount of written communications that is done. This


increased volume may produce more complexity. One insurance and financial firm, the Celina Group redesigned its written policy forms. Although it normally took one day to complete 80 policies, it now takes but 44 minutes to do the same number. Again the solution was simplification.

Readability does not, however, include only simplification and adaptation. Another study pointed out that physical characteristics such as size, appearance, organization and spelling could make one not want to read a letter or manual. 83

D. Combining These Techniques For Successful Communications

The previous discussions have considered selected communication techniques singularly and apart from one another. Many times, however, the best alternative is a combination of these media. Which combination provides the best alternative depends upon the given situation.

One author states that "although our ability to communicate is enhanced by many visual status symbols, cues and instructions, the


83 Voyles, Jean, An Evaluation Of Written Communication In Two Atlanta Companies, Bureau of Business and Economic Research, Georgia State College, Atlanta, Georgia, 1964, p. 11.
primary media of communications are written and oral. Another writer indicates that a combination of oral and written media conveys information with maximum effectiveness.

Another study indicated that the combination of the oral and visual media is more effective than the written or oral media alone. In this particular experiment, a written speech was given to some subjects. A speech was presented without visual aids to a second group. A third group was given a speech with visual aids. All of the subjects were given a test immediately after completing the required reading or listening. Recall via an exam of ten multiple choice questions was used to measure effectiveness. The results showed that the subjects remembered much more material from the visual aid speech than from either of the other forms of presentations. What was also significant in this case was that the test was given after a lapse of six weeks.

The most meaningful research in this area was a study done by Thomas Dahle. This effort was an attempt to determine the

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effectiveness of five methods used in transmitting information from management to employees in business and industrial situations. These methods included (1) oral and written, (2) oral, (3) written, (4) visual, and (5) the grapevine. 88

One phase involved industrial employees. In this experiment only the (1) oral, (2) written, (3) oral and written, and (4) grapevine were compared. The bulletin board (visual) was not tested because of administrative limitations. The communication material came from the employees handbook where the subjects were employed. Appropriate instructions were prepared and distributed to the foremen involved in transmitting information. The test consisted of ten multiple choice questions stated in the same words as that of the handbook. Testing was administered forty-eight hours after the original presentation.

The final phase of this study involved employees of a mail order concern. All five methods (oral, written, oral and written, bulletin board, and grapevine) were tested. The same procedures used within the industrial employees were used in this experiment; that is, the same type of information and test procedures were used on these subjects. The one exception was that personnel supervisors were used instead of foremen. The results of both

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88The grapevine refers to the informal communication network that exists within an organization. Unlike Thomas Dahle's study, the present analysis examines the techniques rather than the informational networks within the organization.
experiments conducted by Dahle indicated that written and oral was statistically significantly superior to the other forms of communicating.

E. **Summary Of Secondary Research**

That there has been very little research done on the effectiveness of the various techniques used in communicating is the conclusion of this research effort. Those techniques selected in this analysis included oral, pictorial, and written.

Oral communications involve the physiological creation of symbolic sounds. Considered by some authors to be the oldest technique, it is certainly one of the most prolific means of communicating. Although preferred by employees as a mode of communicating, it is costly and prone to error.

The pictorial medium, unlike the oral means of communicating is classified as being non-personal. It is further defined as an image of a scene or object produced on a flat surface. It is not only considered alone, however, as a communications technique. Many times it is combined with the oral and/or written codes. Its potential, however, as a single means of communicating has increased with technological improvements in presenting it as a medium. Such advancements make for more realistic presentations and, thus, make possible closer correlations between the picture and event.

Writing has evolved into a sophisticated attempt in communicating reality. Such handwritten or printed information is non-personal. Although it is clumsy, lengthy and slow, it does
represent a very important means of communicating. Precision may be one of the reasons why management prefers the written medium. A second reason may be due to the fact that it also gives them the advantage of being able to trace accountability within the formal organization. In any event, studies regarding this medium have been concerned primarily with readability. In most of the information that was uncovered, adaptation on the part of the writer seemed to produce the best results.

The best alternative in achieving successful results, however, has been to combine these techniques. The results of those studies referred to within the chapter indicate a preference in each case for such combinations rather than a singular means of presentations. Which combination produced the best results seemed to depend upon the situation.

Business organizations need to consider such findings because of the fact that most organized activity depends upon communications if it is to succeed. Its frequency of occurrence within the organization makes it too costly not to be successful in communicating through the various channels. Thus, more work needs to be done in this vital area. Experimental research is a valid measuring tool that may be used in determining the effectiveness of selected techniques used in organizational communications.
III. AN EXPERIMENT TO DETERMINE THE EFFECTIVENESS OF WRITTEN AND/OR GRAPHIC COMMUNICATIONS

A. Orientation to the Project

Extensive research of the literature indicates that very little has been done in assessing the effectiveness of selected techniques used in organizational communications (see Chapter II). These codes are, however, very important to the communications process (as shown in Chapter I).

The written medium may be classified as one of these codes. Because it requires deliberate thought and planning, it has evolved into a rather sophisticated technique. Although there are several disadvantages in using this medium, many organizations depend upon it for survival.

Consequently, the curriculums in many institutions of higher learning include written business communications as a required course(s) of instruction. Report writing is an example of the subject matter that may be covered in these courses.

Report writing may be defined as an orderly and factual communication that serves some purpose. In preparing these written reports, students usually become well-versed in the written and graphic communication technique. A survey of several leading authors in the
field, however, indicates that pictorial means such as graphic aids are an adjunct to the written word (Chapter I). These visual presentations, thus, add to the written presentation but do not take the place of it.

Secondary research indicates no empirical support for this position. The following experiment, therefore, is an attempt to determine whether or not the written and graphic communications technique is the most effective code. Specifically, the following hypotheses are tested:

Hypothesis I: The written message with graphics is a more effective communicating technique than strictly graphic presentations.

Hypothesis II: The written message with graphics is a more effective communicating technique than strictly written presentations.

The analysis will also attempt to determine whether the type of information is a determinant of which technique communicates best. In particular, the following hypotheses will be tested:

Hypothesis III: Informational data is communicated best by the graphic technique.

Hypothesis IV: Analytical information is best communicated by the written and graphic communications technique.

A complete methodology is presented in Chapter I. Briefly stated, however, the experiment consisted of three groups (A, B, and C) of college students. Each group received the same communicated message. Only the technique used in presenting the message was different. Following an equal time period, all three groups were given the same exam to test comprehension.
B. Material Presented to Subjects

The subject matter used for the testing was a comparison of television and selected magazine advertising revenues and costs for 1969. It was felt that this material would be informative rather than persuasive, non-controversial and realistic. Group A (See Appendix A) was given the written and graphic message. Its composition conformed to good report writing principles. Graphics were placed where it enhanced or added to the written material. Group B (See Appendix B) received only the graphics portion of the written message. Although conclusions were not drawn in this presentation, they could be inferred from the material that was given. The final message, strictly written, was given to Group C (See Appendix C). Conclusions were given in this particular case as in Group A. The difference between this group and Group A, however, was the fact that there were no graphics used in Group C's presentation.

Each group was given six minutes to study the contents of the message (see how time was derived in Chapter I). Following this time period, a multiple choice exam of twenty questions (Appendix D) was given to all three groups. After a ten minute testing period these exams were then picked up.

The exams were graded based upon the number of correct answers. The results from the tests would either prove or disprove the first two hypotheses—that is, whether written and graphic communications are superior to strictly graphic or strictly written presentations. An important question that needed to be answered, however, was whether or not the three groups who took the exam were homogeneous.
Such homogeneity would assure that it was the message and not the groups that made for any difference in the test scores, if there were any.

C. Homogeneity Of Test Groups

The first effort was an attempt to determine if the three sample groups were homogeneous. By homogeneity is meant that the groups "are sufficiently alike to be comparable for the purpose of this study."

The F-Distribution would be used to determine if the differences in performance, if there were any, among the three groups were due to chance or to the communication techniques. Why the tests for homogeneity? It would determine if the three testing groups had identical standard deviations. This test for homogeneity is important because an assumption made in the F-Distribution is that the populations from which the three groups were obtained could be closely approximated by normal curves having the same variance. Furthermore, some standard had to be developed to test whether or not these three groups were in fact homogeneous.

It was decided to use the grade point average of the subjects in this determination. A person's grade point average is indicative of his academic performance while in college. Furthermore, these grades are quantifiable—that is, a student acquires a numerical grade point average for all academic work undertaken. Finally, there

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is an ordering system in this distribution.

There were 152 students in the written and graphic group (Group A), 149 students in the graphic group (Group B) and 147 students in the written group (Group C). Out of a possible 4.00 academic average the mean score of Group A was 2.27, group B, 2.32, and group C, 2.32. These mean scores were fairly close; in fact, two of them were identical. A good test of homogenity, in order to satisfy one of the assumptions of the F-Distribution, would be to see if the variances among these grade point averages of the three groups were homogenous. It is possible with the F-Distribution to arrive at such a result.

As mentioned in an earlier section, transfer students, as well as freshmen, were automatically excluded from the samples because their academic performance had not been measured. Foreign students were also excluded because of the language barrier.

In order to test for the homogenity of the variances, the following hypotheses were set up.

First: The standard deviation of the grades in the written and graphic group is identical to the graphic group.

Second: The standard deviation of the grades in the written and graphic group is identical to the strictly written presentations.

Third: The standard deviation of the grades in the graphic group is identical to the strictly written presentation.

Given these hypotheses, the test is to determine whether the variances of these three sample groups can be considered homogeneous on the basis of the +1% level of significance. The formula used in the calculations was based upon Henry L. Alder and Edward B.
Roessler, *Introduction To Probability And Statistics.*

The formula is as follows:

\[ F = \frac{S_x^2}{S_y^2} \]

Where \( S_x^2 = \frac{\sum (X - \bar{X})^2}{n_1 - 1} \)
and \( S_y^2 = \frac{\sum (Y - \bar{Y})^2}{n_2 - 1} \).

The computer center at Nicholls State University computed the variances for Group A (0.28844791), Group B (0.2554811), and Group C (0.25123879). From information given within the text, the procedure followed was to divide the larger variances by the smaller. The reason for following this procedure is that when \( F \) results are larger than 1, the values can then be compared with the critical \( F \) values given in the tables.

To determine the outcome of Hypothesis I \((\sigma_A = \sigma_B)\), the following computations were obtained:

\[ F (151, 148) = \frac{S_A^2}{S_B^2} = 1.1287 \]

In the case of Hypothesis II \((\sigma_A = \sigma_C)\)

\[ F (151, 146) = \frac{S_A^2}{S_C^2} = 1.1481 \]

and finally, in the case of Hypothesis III \((\sigma_B = \sigma_C)\)

\[ F (148, 146) = \frac{S_B^2}{S_C^2} = 1.0171 \]

---

Since the calculated F-value does not exceed $F_{.95} (200,150) = 1.43$ or $F_{.99} (200,150) = 1.29$, the conclusion reached is that these variances can be assumed to be homogeneous, that is, these three sample groups can be considered as coming from three populations with identical standard deviations, and therefore the three hypotheses are accepted. Given three homogeneous groups, the next step was to determine what significance, if any, did the techniques used in communicating have on the outcomes.

D. Analyzation Of Selected Communication Techniques

The ensuing discussion will examine the results of the tests. A further analysis will attempt to determine whether there is a statistical significance between the three groups. Finally, summary and conclusions will be drawn from these results.


In Table II is shown the results of the tests given to Groups

<table>
<thead>
<tr>
<th>Type of Measurement</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means Scores</td>
<td>13.164</td>
<td>11.872</td>
<td>12.115</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.207</td>
<td>0.236</td>
<td>0.209</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.016</td>
<td>0.019</td>
<td>0.017</td>
</tr>
<tr>
<td>Variance</td>
<td>0.043</td>
<td>0.055</td>
<td>0.043</td>
</tr>
</tbody>
</table>

Source: Primary
A, B, and C. From these figures Group A (written and graphic) has a higher average mean than either B (graphic) or C (written). The values obtained for the three different communication techniques are, thus, not alike. This fact is important in statistics; however, it only tells part of the story.

In order to determine the extent to which the statistical data are dispersed the other information gives some idea of these measures of variation. The standard deviation of the three methods is quite small, indicating that the numbers for each of the three groups are bunched closely about their mean. Furthermore, there is very little difference shown in the variance between the three groups; in fact, A and C have the same variance (.043). Finally, the standard error of the mean of the three groups is quite small, indicating again not much deviation among the mean scores.

In summary, there is a difference in performance on the three tests and fairly close relationships are shown among the variances between them. There still remains a primary issue that must be solved; i.e., is the difference in performance due to chance or to the different testing methods?

2. Statistical Significance of Results.

In the preceding discussion, differences were found between the mean scores of Groups A, B, and C. The objective now is to see whether the differences among the three means can be attributed to chance. In order to determine whether this difference is statistically significant, a one-way analysis of variance was used. This statistical measurement is described by John E. Freund and Frank J. Williams in
The problem, thus, became one of deciding whether there was a significant difference between the three communication techniques. In other words, can the differences among the three means be attributed to chance or to the testing methods? Letting the population means be $u_A$ (average score made by the written and graphic groups), $u_B$ (average score made by strictly graphic group) and $u_C$ (average score made by strictly written group), the null hypotheses to be tested state:

First: $u_A = u_B$
Second: $u_A = u_C$
Third: $u_B = u_C$

The alternative hypothesis states that at least two of the hypotheses are not equal.

In order to accept the hypothesis or alternative hypothesis, a precise measure of the size of the discrepancies among the $\bar{x}$'s must be made; such a measurement among the sample means would be their variance.

An assumption which is critical to the method of analysis is that the populations from which Group A (written and graphic), Group B (graphic) and Group C (written) were obtained could be closely approximated by normal curves having the same variance $\sigma^2$. This means that it is assumed that if many students were tested by each

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of the three techniques, the distribution of the respective test scores would follow the over-all pattern of normal distributions having the same variance \( \sigma^2 \). Strong support for this assumption was found in the previous section when the three groups were found to be homogeneous based upon the identical spread or variance among the grade point averages within each group. Given the assumptions that the null hypothesis is true and that the samples came from normal populations with equal variances, the theoretical sampling distribution of the statistic used was the so called F-Distribution.

The raw data was given to the Department of Computer Science at Nicholls State University in Thibodaux, Louisiana. The summary table illustrated in Table III depicts the results in comparing the estimates of two of these variances (Groups A & B). The results

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Means Squared</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>125.597</td>
<td>125.597</td>
<td>17.02</td>
</tr>
<tr>
<td>Within Tests</td>
<td>299</td>
<td>2205.465</td>
<td>7.376</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>2331.063</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary

\(^{92}\text{Ibid.}\)
indicate an F value of 17.02, which is much greater than the Table value of 6.72 at +.01 level of significance. Thus, the hypothesis that the mean score of Group A is equal to the mean score of Group B is rejected at .01 level. Since the null hypothesis is disproven, the difference is not only due to an estimate of chance variation but also to whatever variation may exist among the population means. From the experimental procedure discussed in Part B of this Chapter, that variable has been the type of communication technique used among the two groups. In conclusion, the written and graphic communications technique (A) is shown to be more effective than the strictly graphic presentation (B) because it produced the highest mean scores on the examination and was proven highly significant at the +1% level of significance.

In Table IV is shown the summary table comparing techniques A and C. In this case, also, the hypothesis, $u_A = u_C$, is rejected.

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum Squares</th>
<th>Means Squared</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>82.204</td>
<td>82.204</td>
<td>12.71</td>
</tr>
<tr>
<td>Within Tests</td>
<td>297</td>
<td>1919.922</td>
<td>6.464</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>298</td>
<td>2002.127</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary
because at the +.01 level of significance the F value of 12.71 is much greater than the Table value of 6.72. In conclusion, the written and graphic communications technique (A) is shown to be more effective than the strictly written presentation (C) because it produced the highest mean scores on the examination and was proven highly significant at the +1% level of significance.

A final hypothesis to be tested included Groups B and C. The test was to determine if \( u_B = u_C \). Depicted in Table V are the F-Distribution results in comparing them.

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum Squares</th>
<th>Means Squared</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>4.375</td>
<td>4.375</td>
<td>0.59</td>
</tr>
<tr>
<td>Within Tests</td>
<td>294</td>
<td>2155.611</td>
<td>7.332</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>295</td>
<td>2159.986</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary

In this particular case the F value was less than 1. The reciprocal of the F ratio was used and the degrees of freedom were reversed. Dividing 7.332 by 4.375, the resulting value is 1.60. This computed value is less than the Table value of 6.356 at the +.01 levels of significance. Therefore, the hypothesis \( u_B = u_C \) is accepted. Thus,
there is no statistical difference shown in either graphic or written communications.

In summary, written and graphic communications is a more effective communicating technique than either written or graphic communications. There was, furthermore, no statistical difference shown between the written versus the graphic means of communicating. Thus, the position taken by many report writers that written and graphic communications is the better technique seems justified based upon this experiment. At this juncture, it was decided to test, given these communication techniques, whether there was any difference, among the groups, in the type of information that was recalled.

E. Evaluation Of Informational Data

The ensuing discussion is divided into the following three areas: (1) determination of informational questions; (2) results of test scores; and (3) statistical significance of factual recall.

1. Determination Of Informational Questions.

In Appendix D is depicted the exam that was given to the three groups. Certain information required only that the subject remembers, either graphically and/or in a written form, the matter as it was depicted. Given this criteria, as defined in the introductory section, Appendix E is an enumeration of those questions that were considered informational.

For example, the second question in the exam asked the respondent which magazine had the largest circulation in 1969. In all three testing groups this information was given. Group A received this information in written and graphic form. Group B, on the other hand, received in graphic form a bar chart depicting Reader's Digest as
having the largest circulation. In the case of Group C this information was given only in the written form. The answer sought in this instance was which technique communicated such factual information the best?

2. Results of Test Scores.

Table VI reflects the scores made by the three groups regarding these informational questions. Group B (graphic communications) had the highest mean score (6.577) of the three groups, followed by the written and graphic group (5.644) and the written group (4.938). As noted also in Table VI, there is very little variance between the three test groups which indicates that there is very little dispersion in test results of the three groups. Finally, the standard error of the means of the three groups is quite small, indicating again not much deviation among the mean scores.

Nevertheless, in order to determine whether the differences in the test scores were due to chance or to the different techniques, the one-way test of variance was used.
3. **Statistical Significance of Factual Recall.**

Assuming that the population means be $u_{A1}$, $u_{B1}$, and $u_{C1}$ for Groups A, B, and C respectively, the null hypotheses to be tested included:

First: $u_{A1} = u_{B1}$

Second: $u_{A1} = u_{C1}$

Third: $u_{B1} = u_{C1}$

The alternative hypothesis states that at least two of the hypotheses are not equal.

Table VII depicts the results of the F-Distribution for the informational data relating to Groups A and B. In this particular situation, the computed F value of 21.53 is much greater than the

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum Squares</th>
<th>Means Squared</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>62.679</td>
<td>62.679</td>
<td>21.53</td>
</tr>
<tr>
<td>Within Tests</td>
<td>299</td>
<td>870.250</td>
<td>2.910</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>932.930</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table value at $+.01$ level of significance (6.72). Thus, the hypothesis that $u_{A1} = u_{B1}$ is rejected. The differences in the mean scores are not due to chance, but rather, to the type of communications
technique. In conclusion, in this experiment graphic communications is shown to be a more effective communicating technique of informational data than the written and graphic communication form because it produced the highest mean score that was proven highly significant at the \( \pm 1\% \) level of significance.

Two more hypotheses were tested. They included: \( u_{A1} = u_{C1} \) and \( u_{B1} = u_{C1} \). Shown in Tables VIII and IX are the F values for the written communications compared to (1) the written and graphic communications and (2) the graphic presentation.

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum Squares</th>
<th>Means Squared</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>39.355</td>
<td>39.355</td>
<td>15.45</td>
</tr>
<tr>
<td>Within Tests</td>
<td>297</td>
<td>756.337</td>
<td>2.546</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>298</td>
<td>795.692</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary

In both cases the derived F value of 15.45 and 73.47 is highly significant at the \( \pm 0.01 \) level; thus, techniques A1, and C1, as well as B1 and C1, are not mutually effective. In conclusion, there is a difference in the techniques used to convey informational data. In this particular case, however, the graphic means of communications were superior. The written communications was inferior to both of


| TABLE IX |
|------------------|-----------------|-----------------|-----------------|-----------------|
| **F-Distribution Results In Comparing Informational Data For Strictly Graphic (B₁) and Strictly Written (C₁) Presentations** | | | | |
| Source | Degrees of Freedom | Sum Squares | Means Squared | F |
| Between Tests | 1 | 198.634 | 198.634 | 73.47 |
| Within Tests | 294 | 794.811 | 2.703 | |
| Total | 295 | 993.445 | |

Source: Primary

the other techniques.

F. Determination of Best Analytical Code

In this final test, the objective was to find out which of the three techniques communicated analytical information best. The following examination will be (1) a discussion of the test questions, (2) an evaluation of the statistical information, and then, (3) an examination of whether or not there is a statistical difference in the different techniques given these results from the analytical questions.

1. Enumeration of The Analytical Questions.

   The analytical questions were defined as those in which the students had to draw conclusions from facts that were given in the graphics. Although more detail was presented in the written and graphic, the purpose of the test was to see if more subject matter actually impedes recall. What
became important was that these inferences could be drawn from the graphic presentations. In the case of the latter, it was assumed it would take more reasoning time; however, it would not take as long to digest the facts as would the written and graphic communication message.

In this instance, as in the preceding ones, the variable allowed to change was the techniques used in communicating the message.

For example, the first question in the examination (See Appendix F) asked the respondent how much more in advertising dollars was spent on television as opposed to magazines in 1969. In order to answer this question all three groups had to take the data that was given and draw conclusions. None of the three groups were told that television advertising is over twice as much, in terms of revenues, as magazine advertising.

Most of the analytical questions, however, were not of this nature. As another example, question number 5 referred to the advertising costs per thousand households. In both the written and graphic as well as written presentations, the analysis of these costs concluded with the statement that television is a far cheaper buy per thousand than most magazines. In the graphic form, however, it is not possible to write these conclusions although they can be inferred by looking at the bar chart depicting the television and selected magazine advertisement costs.

The fact that the writer is able to draw conclusions from the written and graphic forms, is an advantage. It does point out, however, an added bias. The reason is because the writer is able
to lead the reader to the conclusions of the former. While such cause and effect relationships may be valid, perhaps the reader may make inferences that are not in the same direction, given the same facts.

Thus, it is true that in the written and graphic and written form the receiver does get more stimuli. Given the same time period, however, this measurement is to determine if it really makes for a statistical difference in recalling pertinent information.

2. Exam Results of Such Information.

Group A had the highest mean score on the analytical questions (see Table X). Again there was very little variance between the three test groups. As in the other cases, the standard error was also quite small, indicating again not much deviation among the mean scores. The important point, of course, is whether or not these results are statistically significant.

<table>
<thead>
<tr>
<th>TABLE X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Results Of Analytical Test Questions Given To Groups A, B, and C</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Type of Measurement</td>
</tr>
<tr>
<td>Mean Score</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
<tr>
<td>Variance</td>
</tr>
<tr>
<td>Source: Primary</td>
</tr>
</tbody>
</table>
3. **Statistical Significance of This Data.**

The hypotheses to be tested included:

First: \( u_{A2} = u_{B2} \)

Second: \( u_{A2} = u_{C2} \)

Third: \( u_{B2} = u_{C2} \)

Where \( u_{A2} \) are the mean scores for the analytical questions for the written and graphic group and \( u_{B2} \) and \( u_{C2} \) are the mean scores for written and graphic groups, respectively. In Tables XI, XII, and XIII are shown the F-Distribution Tables in comparing the statistical significance of these mean scores.

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum Squares</th>
<th>Means Squared</th>
<th>( F )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>352.751</td>
<td>352.751</td>
<td>111.87</td>
</tr>
<tr>
<td>Within Tests</td>
<td>299</td>
<td>942.769</td>
<td>3.153</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>1295.521</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary

At the \( +.05 \) and \( +.01 \) level of significance the null hypothesis \( u_{A2} = u_{C2} \) is proven but the hypotheses \( u_{A2} \neq u_{B2} \) and \( u_{B2} \neq u_{C2} \) is disproven. In summary, there is no statistical difference between techniques \( A_2 \) and \( C_2 \). No inference can be drawn as to whether written and graphic communications are more effective than written communications.
### TABLE XII

**F-Distribution Results In Comparing Analytical Information For Written and Graphic ($A_2$) and Strictly Written ($C_2$) Information**

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum Squares</th>
<th>Means Squared</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>6.012</td>
<td>6.012</td>
<td>2.44</td>
</tr>
<tr>
<td>Within Tests</td>
<td>297</td>
<td>731.164</td>
<td>2.461</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>298</td>
<td>737.177</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary

### TABLE XIII

**F-Distribution Results In Comparing Analytical Information For Strictly Graphic ($B_2$) and Strictly Written Information ($C_2$)**

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum Squares</th>
<th>Means Squared</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Tests</td>
<td>1</td>
<td>261.970</td>
<td>261.970</td>
<td>85.34</td>
</tr>
<tr>
<td>Within Tests</td>
<td>294</td>
<td>902.408</td>
<td>3.069</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>295</td>
<td>1164.378</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary
Both of these techniques, however, are highly significant when compared with the graphic communications. Thus, the graphic communications technique (C2) is the poorest of the three techniques in communicating that information classified as analytical.

G. Summary And Conclusions Of Experimental Findings

Authorities in the area of business communications have stressed written and graphic communications as the most effective communicating technique in business report writing. Furthermore, these authors emphasize the viewpoint that the graphic technique should not take the place of the written means of communicating. Rather, it should be an adjunct to the written word.

The results of this experiment give strong support to this contention. Statistical proof from the experiment indicate that written and graphic communications is a more effective communications technique than either written or graphic communications. Furthermore, there was no significant statistical difference between strictly written and strictly graphic communications. There is strong evidence, however, that this effectiveness should also take into account the type of information that is being communicated.

Given the overall effectiveness of written and graphic communications, an attempt was made to subdivide the exam questions into the two groups, informational and analytical. Those questions in which the subject needed only to recall a bare recitation of facts was classified as informational. The analytical questions were those in which the respondents had to draw conclusions from the factual data.
Given this framework, the results of the tests were different.

Graphic communications produced the highest mean scores in those questions characterized as being informational. There were significant statistical differences between all three groups indicating that there was a significant difference among these selected communication techniques.

The situation, however, was quite different in the test results of the analytical questions. In this particular situation, the graphic communications produced the lowest test scores. Furthermore, no significant statistical difference was shown between the written and graphic and strictly written communication techniques. Thus, analytical information is best communicated in written or written and graphic form.

In conclusion, the position that the written and graphic communication technique is the most effective technique has been upheld when considering both informational and analytical communications. If the purpose of the writer, however, is to obtain a bare recitation of facts, the graphic technique produces the best results. Yet, if conclusions are to be drawn from the data, the graphic communications gives the poorest recall. In the latter case, written and graphic, as well as strictly written, seem to be better alternatives.

From these conclusions, further research should be conducted to see if information in business report writing can be classified in this way. If this breakdown is logical then perhaps more reports could be justified as being strictly graphic or strictly written.
IV. SUMMARY AND CONCLUSIONS OF STUDY

This study attempted to determine the effectiveness of selected organizational communication techniques. The ensuing summary and conclusion will include: first, an informational review of the topic area covered within the study; secondly, the findings after an exhaustive search of the literature pertaining to the effectiveness of selected communication techniques; thirdly, the methodology and results of an experiment undertaken to determine the effectiveness of written and graphic communications as opposed to (1) written and (2) graphic presentations; fourthly, the implications of these experimental findings; and, finally, the future research possibilities involving selected communication techniques.

A. Introduction To The Topic Area

Communications represents one of the most prolific human activities. Furthermore, the survival, as well as the continuance, of all organized activities depend upon how well human beings perform this activity. It is very difficult, however, to determine the essential criteria that make for successful communications.

This difficulty arises because of the complex nature of the subject matter. This complexity becomes evident when examining (1) the definitional aspects of communications and (2) the broadness
in scope of this field.

1. **Definitional Aspects of Communications**

   In trying to uncover what is meant by communications, several explanations were found. They included the act of imparting, the facts communicated, the participants involved, their intentions in communicating, and meaning itself. All of these definitions are relevant if successful communications are to take place. For the purposes of this study, communications is best understood if operationally defined.

   An operational definition shows how things work. Communications, operationally defined, may be viewed as a process consisting of various stages. The first stage is the world of reality. Such a world is infinite in nature since it is incapable of being described in total by the individual. In the second stage, the individual's sensory receptors pick up but a few of these signs. These signs go through the nervous system in the third stage and, in the fourth stage, are given meaning by the individual. In the fifth stage, this meaning sometimes triggers a communication response in the individual. Such a response is, in the sixth stage, filtered by the individual. It is in this stage that a person's emotions and viewpoints influence his behavior. The seventh stage of the communications process consists of the expressions given to these signs. Such expressions may be writing, speaking, gesturing, et cetera. In the final stage, these expressions are then picked up by the sensory receptors of others, and another cycle begins.

   Successful communications is, therefore, dependent upon the
effectiveness of each stage in the communications process. This re-
search effort examined one of these stages—the expressions, or
techniques, employed in presenting the message (stage 7). Such
techniques make up the communication language. This language is
essential to human survival because it becomes the tool with which
men bridge the knowledge of past generations.

Communication techniques may include the oral, pictorial, examen-
plary, and written means of expression. Oral or verbal communica-
tions involve the physiological creation of symbolic sounds. The
pictorial medium may be defined as a non-personal means of producing
an image of a scene, event, or object on a flat surface. Written
communications, which also may be defined as a non-personal means of
expression, includes handwritten or printed information. A final
classification, exemplary, includes the appearances, position, or
actions of others. These techniques may be used singularly or com-
bined to produce successful communications.

2. Broad Scope of Field

A second characteristic that reflects the complexity of communi-
cations is the fact that it is such a broad concept. In order to
study this area, thus, attempts must be made to limit its applica-
tion under certain conditions. Such an example of the narrowing of
scope would be the examination and evaluation of selected techniques
used in internal-operational, formal, organizational communications.
In other words, a study could be limited to that information dealing
with the organization's plan of operation deliberately designed to
achieve the organization's objectives. In a formal sense the organi-
zational chart provides the defined relationships for communicating within an organization.

B. Survey Of The Literature

The first phase of this study (Chapter II) included an exhaustive search of the literature to determine the effectiveness of oral, pictorial, and written techniques in organizational communications. Since the fourth technique, exemplary, is usually combined with the other techniques, it was not considered singularly.

There are several advantages in the oral technique, the most used medium in communicating. First, it is a very rapid means of presenting information. Secondly, it can be quickly changed. Thirdly, it can transmit more meaning than the printed page. Finally, it is considered to be a more personal technique than the written or pictorial forms.

The disadvantages of this technique include first, the fact that it may be costly to the organization. Secondly, it is prone to error in transmitting information. Thirdly, it does not have the advantage of being rechecked because such communications are not always recorded. Nevertheless, research in this area indicates that in business organizations, the oral medium is preferred by employees.

The second technique, or code, surveyed was the pictorial means of presenting information. Although usually combined with other techniques in organizational communications, it may communicate by itself. The biggest advantage is that one picture may convey a tremendous amount of meaning. The major disadvantage is that
pictures are multiordinal—that is, they may be interpreted on different levels of abstraction. A study by A. C. William and S. N. Roscoe indicated the multiordinal problem may be reduced by making the picture more realistic in detail. Another study by Sidney L. Smith and Donald W. Thomas suggests that color coding enhances the communication effectiveness of the pictorial technique.

The most recently developed technique has been the final medium considered in this analysis, the handwritten or printed message. There are several disadvantages in using this technique. In the first place, writing is clumsy. Secondly, it is lengthy. Thirdly, it represents a slow means of communication.

The written technique, however, represents a very important means of communicating. Precision, for example, may be one reason why management prefers this technique. A second reason may be that it gives management the advantage of being able to trace accountability within the formal organization.

Most of the research concerning the effectiveness of this technique involved the readability of writing. The results indicate that complicated styles of messages frequently reduce communication effectiveness. The probability of being successful is increased if the writer of the message communicates at the reading level of the receiver of that message. Thus, one of the first principles of business writing, adaptation, seems to be upheld with these findings.

Written, pictorial, and oral techniques may be combined to produce successful communications. Which combination produces the best results seems to depend upon the situation. For example, William
Himstreet and Wayne Muslin Baty found that the best media of communications are written and oral. A study by David C. Phillips indicated that the combination of the oral and visual media is more effective than the written or oral medium alone. Thomas L. Dahle found the written and oral to be superior to the (1) written, (2) oral, and (3) visual means of presenting information.

Thus, the best alternative in achieving successful results seems to be in combining these techniques. The results of those studies referred to in the literature indicate a preference in each case for such combinations rather than singular means of presentations.

In conclusion, a search of the literature for oral, pictorial and written techniques used in organizational communications indicates very little primary research done as to their effectiveness within the business organization. Hopefully, however, the introductory work that has been undertaken will provide a basis for more exploratory work.

C. Determination Of Technique Effectiveness

The second phase of this study (Chapter III) was an attempt to make an original contribution to this virtually unexplored area. An experiment was conducted to scientifically assess the effectiveness of selected techniques used in communicating. The following discussion will examine: (1) techniques selected for the experiment; (2) experimental methodology in conducting research; and (3) research findings of the experiment.
1. **Techniques For The Experiment**

Determination of which techniques to measure was reached after surveying the area of business report writing. The approach taken by many authors in the field of business report writing is to train the students in the art and science of written reports. The writer of the business report, however, has techniques available to him besides the written word. For example, the use of visual aids, such as charts and graphs may be quite successful in transmitting information. According to those authorities surveyed, graphics are ancillary to the written word. Thus, the graphic technique enhances but does not take the place of the written word.

The overall objective of this research effort was to determine whether written and graphic communications is a more effective communications technique than either written or graphic communications alone. A second phase of the experiment was to determine if the effectiveness of selected techniques were dependent on the type of information being conveyed.

2. **Experimental Methodology in Conducting Research**

The subjects for this experiment included students enrolled in a Principles of Management course, at Louisiana State University in Baton Rouge, Louisiana. These individuals were divided into three groups (A, B, and C). Group A received a written and graphic message. The same message was presented to Group B, except that in their case the communicated message was strictly graphic. Group C received only the written message. Following a six-minute exposure, a multiple choice exam was distributed to all three groups. After
a ten minute testing period, the exams were picked up. The exams were graded and recall was the variable used to measure effectiveness. The degree of recall was based upon the number of correct answers.

3. Research Findings of the Experiment

After it was established that there were three homogeneous groups, the F-Distribution was used to determine if there were any statistically significant differences between written and graphic means of communicating and strictly graphic as well as strictly written presentations. An F value of 17.02 was obtained in comparing the estimates of the variances between written and graphic, and strictly graphic presentations. Furthermore, an F value of 12.71 was derived in comparing written and graphic with strictly written presentations. Both values are highly significant (+1% level of significance).

Finally, there was no statistical difference between the written versus the graphic means of communicating. In the latter case an F value of 1.60 was obtained and is not significant at the +5% level.

In conclusion, these results give very strong support to the position that the written and graphic communications technique is a more effective communications technique than either written or graphic communications. The authoritative position, also, that the graphic communications technique is strictly supportive to the written word was given emphasis as it produced the lowest recall in the examination. Further analysis suggests, however, that the type of information conveyed could have an effect on which technique to use.

The examination given to the students consisted of twenty multiple-choice questions. These questions were then classified as
being either informational (10 questions) or analytical (10 questions). The questions in which the subjects needed to recall only a bare recitation of facts were classified as informational. The analytical questions were those in which the respondents had to draw conclusions from the data. For example, if the question asked which magazine had the largest circulation in 1969, all three techniques directly depicted this information. On the other hand, if the respondents were asked what could be inferred about the television advertising revenues as opposed to the magazine advertising revenues, not all of the techniques could have presented such conclusions. Such statements may be presented in written form, but must be inferred from the graphic technique.

Given this framework, the test results were quite different. The highest mean score on the informational questions was made by the graphic group. The F-Distribution was used to see if there was a statistically significant difference. In comparing the results of the scores made on the informational questions by the written and graphic communications group as opposed to the strictly graphic communications group the computed F value of 21.53 was highly significant (+1% level). When comparing the graphic to the written communications form the computed F value of 73.47 was highly significant at the +1% level. Finally, the computed F value of 15.45, obtained when comparing the written and graphic with the graphic, was also significant at the +1% level. In conclusion, graphic communications was the best technique in conveying informational data. In this particular situation, the written communications
was inferior to both of the other techniques.

The test results were also different when considering the analytical questions. The highest mean scores earned on the analytical questions were with the written and graphic as well as strictly written presentations. In comparing the written and graphic and strictly written presentations there was no significant difference at the +5% level of significance (F value was 2.44). The situation was quite different, however, in comparing the graphic (a computed F value of 111.87) and the strictly written (a computed F value of 85.34). In conclusion, the strictly graphic technique is the poorest of those surveyed in conveying analytical information. The written and graphic, as well as the written communications techniques conveyed this type of information better.

The results of this experiment, thus, give strong support to the viewpoint that written and graphic communications is the most effective general communication technique in business report writing. It would also seem, however, that if the sender of the message wanted to convey strictly factual information, the graphic technique would be the proper one to use. Finally, analytical information would be most effectively communicated by both the written and graphic or strictly written techniques.

D. Implications Of Experimental Findings

A search of the literature indicated that the best alternative in achieving successful results in communicating is to combine communication techniques. The results of those studies referred to in
Chapter II indicated a preference in each case for such combinations rather than the singular means of presentation. This position was generally upheld in these experimental findings. There is also the suggestion in this study, however, that under certain conditions, combining techniques may not be the most effective means of communicating. Determining the technique or the combination of techniques to use seems to depend upon the objective of the communicator.

For example, business reports have traditionally been classified as being informational, examinational, and/or analytical depending on the type of information that is conveyed. Yet, most authors proceed to view report writing primarily as a written and graphic medium. Perhaps, as these findings indicate, attention should be focused on the graphic report as a possibility when the objective of the sender of the message is to convey factual information.

The experimental findings indicate that graphics are ineffective in conveying analytical information. A possible explanation is that analytical information is best conveyed in the written form. In the case of graphics, the receiver must be able to make the same inferences as the sender intended the receiver to make. Such conclusions are, thus, more easily expressed by the writer of the message than by someone trying to pictorially depict the events.

Should analytical information be distinguished from factual data? For example, there were presentations in this experiment made to three different groups. In those cases where inferences were made, they could only be directly stated, as a matter of fact, through the written medium. Is the writer in these instances
leading the reader to the writer's way of thinking? Therefore, are most of the business reports nothing more than persuasive writing? In other words, the writer may point out good cause and effect relationships in an analytical inquiry; however, could there not prove to be other cause-effect relationships that could be more pertinent?

Therefore, what about the possibility of using the written medium to express analytical information and letting the graphics express the factual data? The approach in report writing is to describe, using the written medium, the pertinent information within the graphics before proceeding to state what this data means. This other approach could streamline the writing of reports.

E. Future Research In Technique Effectiveness

An exhaustive search of the literature indicates that very little work has been done in determining the effectiveness of selected techniques used in organizational communications. These oral, pictorial, exemplary and written techniques are, however, very important for successful communications. Which one, or combination, of these techniques to use depends upon the situation. Further research in this area could assess, given certain situations, which technique would be preferable.

Primary research, thus, such as experimentation, may be beneficial because it: (1) identifies a small narrow situation, (2) presents a hypothesis, and (3) finds a solution, given this artificial, but well-simulated condition. More experiments along the lines of this research effort should, therefore, provide the businessman with needed information in determining which technique communicates best
in which situation.

What are some of the areas where future research may prove valuable? In the first place, these experimental findings were restricted to college students. More work could be done to see if these same results would be obtained in business and industrial situations. Secondly, this experiment was concerned with only one stage in the communications process. Communication effectiveness also depends upon one's conceptual abilities, attitudes, and orientations. Future research into these areas could also prove very helpful. Thirdly, more experimentation could be conducted to determine the effectiveness of other communication techniques; for example, the effectiveness of graphic compared to oral presentations. Given the same techniques, (written, graphic, and written and graphic), a fourth possibility would be to see if the same results were obtained if other ways were used in presenting them; for example, the effectiveness of pie charts, pictograms, et cetera, as a graphic technique. In this experiment only bar charts were used.

A fifth possibility would be to assess the effectiveness of the technological advances used in depicting these techniques. What are meant by technological advancements? The camera, for example, represented an advancement in the pictorial technique. The oral and pictorial medium certainly improved with the invention of television. The radio and phonograph have both been a more sophisticated means of presenting the verbal technique. These inventions are only illustrative of the many technological advancements that have evolved.

Progress has made possible an increased sophistication in the techniques used in communicating. Further research should be
undertaken in order to assess if man has been willing to adapt with the changing technology in attempting to communicate successfully. This time lag in technology and proper usage could conceivably impede effectiveness. Such research may also uncover certain guidelines regarding the responsibilities of those who use these media in communicating.

As a final point, the techniques used in communicating are very dynamic. There are constant improvements made in conveying these basic communication techniques. The possibility of oral reports, for example, done via cassettes could conceivably become a standard business practice. Nevertheless, primary research is continually needed to assure maximum utilization of these technological advancements.
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Appendix A

INFORMATION PROVIDED TO THE WRITTEN AND GRAPHIC COMMUNICATIONS GROUP

A COMPARISON OF TELEVISION AND SELECTED MAGAZINE ADVERTISING REVENUES AND COSTS IN 1969

Television advertising revenues have increased from almost zero in 1950 to $3.4 billion in 1969, while magazine advertising has grown from $428 million to only $1.2 billion (see Chart 1). It seems from these figures that magazines are fighting a losing battle with television for the advertising dollar.

One of the reasons why advertisers are switching media is shown in Chart 2. An advertiser can buy a minute on NBC's Laugh-In, reach 17 million households, and spend only $3.82 per thousand households. By comparison, he will spend $3.33 per thousand in Reader's Digest, $7.16 in Look, $7.55 in Life, $7.95 in Sunset, $10.45 in Sports Illustrated, and $16.33 in New Yorker. Television, thus, is a far cheaper buy per thousand than most magazines.

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Footnote: Magazine advertisement costs are based on a four color page layout. TV advertisement costs are based on a one-minute ad on NBC's Laugh-In.


Furthermore, the mass audience magazines such as Reader's Digest, Life and Look are generally a cheaper buy than the smaller special-audience magazines such as the New Yorker and Sunset (note the circulation figures in Chart 3 on following page).

Nevertheless, the special-audience magazines are in relatively better financial shape than Life, Look and Reader's Digest. Consider for example, the gains made by Sports Illustrated, Playboy, and Esquire.

Although the advertising revenues of Sports Illustrated ($35.2 million), Playboy ($32.2 million), and Esquire ($15.4 million) are
far less than Life ($153.2 million), Look ($77.3 million) and Reader's Digest ($57.2 million) (see Chart 4 on following page), they have shown increases from the previous year (see Chart 5). By comparison, the mass magazines have not fared as well showing no percentage increase or decrease in advertising revenues from the previous year (Chart 5).

Another revealing statistic is the loss of total advertising pages that Life (-13%), Look (-2%) and Reader's Digest (-4%) experienced from 1968 to 1969 (see Chart 6). Contrariwise, advertising space is on the increase for the special-audience magazines such as Sports Illustrated (+4%), Playboy (+14%) and Esquire (+14%) during the same period (see Chart 6).

What do all these statistics indicate? Television revenues are increasing faster than that of the mass magazines; however, those advertisers who want a far more "rifle-shot" audience (prospects of known background, interests and income) are increasing in numbers. In fact, the advertising space is noticeably up in special-audience magazines. In the case of the latter, business is getting better all the time.


Appendix B

MESSAGE CONVEYED TO THE STRICTLY GRAPHIC GROUP

A COMPARISON OF TELEVISION AND SELECTED MAGAZINE ADVERTISING REVENUES AND COSTS IN 1969


Footnote: Magazine advertisement costs are based on a four color page layout. TV advertisement costs are based on a one-minute ad on NBC's Laugh-In.


Appendix C

DATA GIVEN TO THE
STRICLY WRITTEN GROUP

A COMPARISON OF TELEVISION AND SELECTED
MAGAZINE ADVERTISING REVENUES AND COSTS IN 1969

Television advertising revenues have increased from almost zero in 1950 to $3.4 billion in 1969, while magazine advertising has grown from $428 million to only $1.2 billion. It seems from these figures that the day of the mass magazine has passed because these large audiences are now turning to television. In any event, the leading magazines have been affected by this switch.

Life magazine, far and away today's biggest revenue producer, generated $153.2 million in advertising revenues last year. Yet, because of the steep cost of its 8.5 million circulation, its advertising pages dropped 13% in 1969 and, like its major competitor, Look, generated only a small profit and no increase or decrease in ad revenues from the previous year.

Look grossed $77.3 million in ad revenues last year. In order to share publishing costs, however, it has decreased its circulation base from 7.7 million to 6.5 million in 1969. Although its ad rates have decreased for a four-color page from $55,500 to $48,500, the company's total advertising pages decreased 2% in 1969.

Even the country's largest magazine in circulation, Reader's Digest (17.5 million) lost 4% of its advertising pages in 1969. Digest is also in the same squeeze as Life and Look, because its $57.2 million in revenues also showed no percentage change in...
revenues during the last year.

Why are the advertisers switching to television? One explanation is the cost involved. For example, an advertiser can buy a minute on NBC's *Laugh-In*, reach 17 million households and only spend $3.82 per thousand households. By comparison it would cost this same company $7.16 to reach a thousand *Look* households with a four-color page layout and $7.55 for *Life*. The same buyers would fare better with *Reader's Digest* where the costs is $3.33. These cost figures are even greater with the special audience magazines. Consider, for example, the costs of the same four-color page layout in the *New Yorker* ($16.33), *Sports Illustrated* ($10.45) and *Sunset* ($7.95). Thus, television is a far cheaper buy per thousand than most magazines. Furthermore, the mass magazines are generally a cheaper buy than the smaller, special-audience magazines such as the *New Yorker* (470,000 circulation) and *Sunset* (932,000).

Nevertheless, the special-audience magazines are in relatively better financial shape than *Life*, *Look* and *Reader's Digest*. Consider, for example, the gains made by *Sports Illustrated*, *Playboy* and *Esquire*.

*Sports Illustrated* collected $35.2 million in advertising revenues in 1969 which was a 17% increase from the previous year. The magazine furthermore enjoyed a 4% increase in total advertising pages from the previous year.

*Playboy* over doubled the advertising revenues of *Esquire* (32.2 million to $15.1 million), yet both companies experienced the same percentage increase in total advertising pages from the previous year.
(14%). These increased ads accounted for a 27% increase in ad revenues from 1968 to 1969 for Playboy and a 22% increase for Esquire.

In summary indications are that television revenues are increasing faster than that of the mass magazines; however, those advertisers who want a far more "rifle shot" audience--prospects of known background, interests and income--are on the increase. Furthermore, they are turning more and more to these special-audience magazines. In the case of the latter, business is getting better all the time.
Appendix D

EXAMINATION GIVEN TO ALL
THREE GROUPS

QUESTIONS ON COMPARISONS BETWEEN
TELEVISION AND SELECTED MAGAZINE ADVERTISING

STUDENT NAME ______________________
GROUP _____________________________

Please mark the correct answer in the space provided before the number.

____ 1. In 1969, television advertising revenues:
   a) were less than magazine advertising
   b) were over twice as much as magazine advertising
   c) were equal to magazine advertising
   d) were over four times as much as magazine advertising

____ 2. The magazine with the largest circulation in 1969 was:
   a) Life
   b) Look
   c) New Yorker
   d) Reader's Digest

____ 3. Advertising pages in mass magazines:
   a) have declined within the last year
   b) are on the increase since 1968
   c) have remained about the same
   d) information not given

____ 4. The largest advertising revenue producer in the magazine field was:
   a) Look
   b) Life
   c) Reader's Digest
   d) New Yorker

____ 5. Television advertising costs per thousand households:
   a) is a more expensive buy per thousand than most magazines
   b) is a cheaper buy per thousand than most magazines
   c) is equal to most magazines
   d) is less than Reader's Digest
6. The special audience magazines such as Playboy and Esquire:
   a) are in relatively better financial shape than mass magazines such as Life, Look, and Reader's Digest
   b) are in the same financial shape as Life, Look and Reader's Digest
   c) are in poorer financial shape than Life, Look and Reader's Digest

7. The magazine with the highest advertising cost per thousand households was:
   a) Life
   b) Sports Illustrated
   c) Sunset
   d) New Yorker

8. Television advertising costs per thousand households were greater than:
   a) Look
   b) Life
   c) Reader's Digest
   d) None of the above

9. The magazine with the greatest positive percentage change in advertising revenues from 1968 to 1969 was:
   a) Esquire
   b) Sports Illustrated
   c) Playboy
   d) Life

10. Of the magazines shown in the article, the one with the least amount of advertising revenues was:
    a) Playboy
    b) Sports Illustrated
    c) Esquire
    d) Look

11. The magazines with the largest circulation figures in 1969:
    a) had the greatest percentage increase in total advertising pages from 1968
    b) had the smallest percentage increase in total advertising pages from 1968
    c) had the greatest percentage decrease in total advertising pages from 1968
    d) had the smallest percentage decrease in total advertising pages from 1968
12. Special audience magazines such as Playboy, Esquire, and Sports Illustrated (a) generate more advertising revenues than the mass magazines such as Life and Look; (b) generate far less revenues than Life and Look; (c) generate about the same amount of revenues; (d) information not given.

13. The magazine that had the most decrease in total advertising pages from 1968-1969 was (a) Reader's Digest; (b) Look; (c) Life; (d) Esquire.

14. Which of the following magazines showed no percentage change in advertising revenues from 1968-1969? (a) Life; (b) Look; (c) Reader's Digest; (d) All of the above.

15. The magazine with the smallest circulation figure was (a) Life; (b) Sunset; (c) Look; (d) New Yorker.

16. From the information given indications are that: (a) television advertising revenues are increasing while magazine advertising revenues are decreasing; (b) television advertising revenues are increasing as are the revenues of special audience magazines such as Playboy and Esquire; (c) the revenues of mass audience magazines such as Life and Look are increasing as are television; (d) television advertising revenues are decreasing while magazine advertising revenues are increasing.

17. Which of the following had the greatest percentage increase in total advertising pages from 1968-1969? (a) Sports Illustrated; (b) Playboy; (c) Esquire; (d) Both b and c are correct.
18. Mass magazines such as Life and Look:
   a) are generally a cheaper buy per thousand than smaller, special audience magazines
   b) are more expensive buys than the special audience magazines
   c) are equal in advertisement costs to the special audience magazines
   d) information not given

19. From the data that is given, indications are that in order to increase profits in the future the magazines should:
   a) concentrate on increasing circulation
   b) decrease emphasis on publication and choose alternative investments
   c) concentrate on special audience markets as opposed to mass markets
   d) increase the total advertising revenues

20. The increased television revenues in recent years has had the biggest impact:
   a) on the mass magazine market such as Life and Look
   b) on the selective magazine market such as Playboy and Esquire
   c) on both the mass market and selective audience market
   d) on neither the mass or selective magazine markets
Appendix E

THE INFORMATIONAL QUESTIONS ASKED
OF GROUPS A, B AND C

2. The magazine with the largest circulation in 1969 was:
   a) Life, b) Look, c) New Yorker, d) Reader's Digest

4. The largest advertising revenue producer in the magazine field was:
   a) Look, b) Life, c) Reader's Digest, d) New Yorker

7. The magazine with the highest advertising cost per thousand households was:
   a) Life, b) Sports Illustrated, c) Sunset, d) New Yorker

8. Television advertising costs per thousand households were greater than:
   a) Look, b) Life, c) Reader's Digest, d) None of the above

9. The magazine with the greatest positive percentage change in advertising revenues from 1968 to 1969 was:
   a) Esquire, b) Sports Illustrated, c) Playboy, d) Life

10. Of the magazines shown in the article, the one with the least amount of advertising revenues was:
    a) Playboy, b) Sports Illustrated, c) Esquire, d) Look

13. The magazine that had the most decrease in total advertising pages from 1968-1969 was:
    a) Reader's Digest, b) Look, c) Life, d) Esquire

14. Which of the following magazines showed no percentage change in advertising revenues from 1968-1969:
    a) Life, b) Look, c) Reader's Digest, d) All of the above

15. The magazine with the smallest circulation figure was:
    a) Life, b) Sunset, c) Look, d) New Yorker

17. Which of the following had the greatest percentage increase in total advertising pages from 1968-1969:
    a) Sports Illustrated, b) Playboy, c) Esquire, d) both b and c are correct
Appendix F

ANALYTICAL QUESTIONS ASKED OF
THE THREE TEST GROUPS

1. In 1969, television advertising revenues:
   a) were less than magazine advertising, b) were over twice as
      much as magazine advertising, c) were equal to magazine adver-
      tising, d) were over four times as much as magazine advertising

3. Advertising pages in mass magazines:
   a) have declined within the last year, b) are on the increase
      since 1968, c) have remained about the same, d) information not
      given

5. Television advertising costs per thousand households:
   a) is a more expensive buy per thousand than most magazines,
   b) is a cheaper buy per thousand than most magazines, c) is
      equal to most magazines, d) is less than Reader's Digest

6. The special audience magazines such as Playboy and Esquire:
   a) are in relatively better financial shape than mass magazines
      such as Life, Look, and Reader's Digest, b) are in the same
      financial shape as Life, Look, and Reader's Digest, c) are in
      poorer financial shape than Life, Look, and Reader's Digest

11. The magazines with the largest circulation figures in 1969:
    a) had the greatest percentage increase in total advertising
       pages from 1968, b) had the smallest percentage increase in
       total advertising pages from 1968, c) had the greatest percent-
       age decrease in total advertising pages from 1968, d) had the
       smallest percentage decrease in total advertising pages from 1968

12. Special audience magazines such as Playboy, Esquire, and Sports
    Illustrated
    a) generate more advertising revenues than the mass magazines
       such as Life and Look, b) generate far less revenues than Life
       and Look, c) generate about the same amount of revenues, d) inf-
       ormation not given

16. From the information given indications are that:
    a) television advertising revenues are increasing while magazine
       advertising revenues are decreasing, b) television advertising
       revenues are increasing as are the revenues of special audience
       magazines such as Playboy and Esquire, c) that the revenues of
       mass audience magazines such as Life and Look are increasing as
       are television, d) television advertising revenues are decreas­
       ing while magazine advertising revenues are increasing
18. Mass magazines such as Life and Look: 
a) are generally a cheaper buy per thousand than smaller, special 
audience magazines, 
b) are more expensive buys than the special 
audience magazines, 
c) are equal in advertisement costs to the 
special audience magazines, 
d) information not given

19. From the data that is given, indications are that in order to 
increase profits in the future the magazines should: 
a) concentrate on increasing circulation, 
b) decrease emphasis on publication and choose alternative investments, 
c) concentrate on special audience markets as opposed to mass markets, 
d) increase the total advertising revenues

20. The increased television revenues in recent years has had the 
biggest impact: 
a) on the mass magazine market such as Life and Look, 
b) on the selective magazine market such as Playboy and Esquire, 
c) on both the mass market and selective audience market, 
d) on neither the mass or selective magazine markets
VITA

Ridley Joseph Gros, son of Mrs. Ezal Daigle Gros and the late Mr. Ridley John Gros, was born on June 9, 1941, in Donaldsonville, Louisiana. A 1959 graduate of Ascension Catholic High School in Donaldsonville, he began his college career immediately afterward. He attended Louisiana State University in Baton Rouge from 1960-1968 during which time he earned a Bachelor of Arts degree in liberal arts, a Masters of Business Administration, and completed a major portion of his studies toward a Doctor of Philosophy degree. Since 1968 Mr. Gros has been an associate professor, and is presently serving as head of the Department of Management and Marketing at Nicholls State University in Thibodaux, Louisiana. Married to the former Kathleen Virginia Dolese, they have two daughters, Felicia Elise and Gabrielle Julie.
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Major Field: Management

Title of Thesis: Determination of the Effectiveness of Selected Organizational Communication Techniques

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Date of Examination: July 20, 1971