The Effects on Comprehension of Selected Variations in Organization and Physical Presentation of Administrative Communications.

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THE EFFECTS ON COMPREHENSION OF SELECTED VARIATIONS IN ORGANIZATION AND PHYSICAL PRESENTATION OF ADMINISTRATIVE COMMUNICATIONS.

Louisiana State University and Agricultural and Mechanical College, Ph.D., 1967
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THE EFFECTS ON COMPREHENSION OF SELECTED VARIATIONS
IN ORGANIZATION AND PHYSICAL PRESENTATION
OF ADMINISTRATIVE COMMUNICATIONS

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
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in

The Department of Management and Marketing

by

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B. A., Southeastern Louisiana College, 1957
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ABSTRACT

The purpose of this study is to determine, if possible, whether or not organization, format, size of type, and spacing between lines have any appreciable effect on comprehension in typewritten administrative communications. Background investigation into theories of organization and physical presentation reveals that the practices advocated in texts on business communication appear to be predicated primarily on custom and personal preference rather than on empirical evidence.

The experiment design, which utilizes a "to-from-subject" form of memorandum report, divides the variations to be tested into two factors: factor R, organization and format; and factor A, size of type and line spacing. "Organization" distinguishes between logical and psychological approaches to the presentation of the body of the communication; "format" differentiates between use and non-use of captions. Size of type variations are two: standard Elite and standard Pica. Line space variations are limited to single spacing and one and one-half line spacing.

The memorandum report used in the experiment was prepared in twelve variations. Four were variations of factor R: (1) logical order without captions, (2) logical order with captions, (3) psychological order with captions, and (4) logical order in outline form. Each variation of factor R was prepared in three variations of factor A: (1) Elite type, single spacing; (2) Elite type, one and one-half line spacing.
spacing; and (3) Pica type, single spacing. All variations used six-
inch lines and were identical as to heading, inside address, and
subject line.

The reading material, test questions, and procedures were devel-
oped in a pilot study. The major study, conducted at Louisiana State
University, used as subjects junior and senior students enrolled and
present in business communication classes on December 6 and 8, 1966.
The subjects were allowed five minutes to read the memorandum and then
were tested immediately thereafter by use of a fifteen-question
multiple-choice examination. Two hundred forty usable observations
were made, twenty observations for each variation of the memorandum
report. The results were processed by computer, using an analysis-of-
variance program.

The overall mean score is 9.8 out of a possible 15. The highest
mean of 10.7 was achieved on the memorandum report presented in psycho-
logical order with captions, using Elite type and one and one-half line
spacing; the lowest mean of 9.0 was achieved on the report prepared in
logical order with captions, using Pica type and single spacing. The
reports in outline form placed second, third, and fourth (tied) with
means of 10.4, 10.1, and 10.0. The results, while interesting, are not
statistically significant at the five per cent level.

Statistical analysis shows that none of the variations in organi-
ization and format (factor R) and in size of type and line spacing
(factor A) have any statistically significant influence on the test
results. Nor is the interaction of factors RA statistically signifi-
cant. Two definite conclusions are drawn from this limited experiment:
(1) No single combination of organization, format, size of type, and line spacing incorporated in the memorandum reports used in this experiment is superior to the others insofar as ease of comprehension is concerned; and (2) the variations in scores in the various memorandum reports are due to chance rather than to any particular advantage that one form of memorandum report has over the others.

These results, while conclusive for the current experiment, raise additional questions. For example, would the results be the same if longer communications were used? May well-organized writing dispense with captions and sub-captions insofar as ease of comprehension is concerned? These and similar questions indicate a need for further experimentation.
CHAPTER I

INTRODUCTION

A. Statement of the Problem and Importance of the Study

Widespread concern in society about miscommunication and lack of ability to communicate has produced an abundance of books and articles about communications and the necessity for improvement in communicative skills. One of the major themes in this unending discussion of communications and communications improvement is the need for "logical arrangement." Logical sequence of thought, orderly arrangement of content, and (in business writing) well-organized format are offered as keys to successful written communications. These techniques are not new: the importance of arrangement and the relation of organization to patterns of thought have been the subject of comment for centuries. The ancient Greeks considered "contiguity" to be one of the three laws of association, and Aristotle's formula for the effective organization of rhetoric is still popular today. The seventeenth-century French philosopher Descartes expressed the opinion that method "consists entirely" in properly ordering and arranging the "objects toward which our mental vision must be directed if we would find any truth."¹

This widespread concern with communication pervades all major elements of society, particularly government agencies and business institutions. Officials of government agencies have long been concerned with the jargon and "officialese" that have come to be accepted as the trademark of government communications. Government attempts to correct this situation and at the same time reduce the costs associated with poor communications are reflected in on-the-job training programs and publications with such titles as *Plain Letters* and *Guide Letters*. Business establishments, dependent on profits for survival, are, of course, vitally concerned with eliminating waste, whatever the source.

In commenting on the importance of communications, Leon C. Megginson, professor of management, says that "improvements in this process could vastly increase efficiency and productivity" and that "one of the greatest sources of net profits for American business lies in eliminating the waste in management communications, because a considerable amount of time and money is spent ineffectively on the communicative process."\(^2\) Noting that the typical executive spends the majority of his time in the communicative process and that American management spends hundreds of millions of dollars each year to improve communications, Professor Megginson says that the results are not satisfactory: "Effective communications is still an unattained goal in many companies. Apparently, everyone is communicating more, but the level of understanding is about as low as it has ever been."\(^3\)

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\(^3\) Ibid., p. 516.
One of the problems facing the writer of administrative communications is the organization of data into a meaningful, comprehensible whole. Moreover, since visual presentation complements content, the writer would like to use the physical format most conducive to quick comprehension. A survey of literature on the subject of internal organization reveals a variety of opinions and techniques based principally on custom and personal preference rather than on empirical evidence. For the writer whose choice of physical formats is limited to those feasible for the typewriter, the problem is narrowed but not solved. Little or no evidence is available to substantiate the many subjective opinions available concerning organization and format; therefore, the writer of administrative communications is left to his own devices to select what seems appropriate for the occasion.

In view of the widespread concern with communications improvement, the high cost incident to poor communications, and the lack of empirical evidence to support current practices, it is obvious that any analysis and experimentation which results in a better understanding of the relationship, if any, that exists between organization and format of the communication and comprehension by the recipient will be a valuable contribution to the field of written communications.

B. Purpose and Limitations of the Study

The purpose of this study is to determine, if possible, whether or not organization, format, size of type, and spacing between lines have any appreciable effect on comprehension in typewritten administrative communications. The study of organization techniques will be
concerned with the structure of communications; for example, it proposes to study the use of logical (inductive) order as opposed to psychological (deductive) order, the use and non-use of captions, and the use of a report incorporating only an outline of main points as opposed to a full report in conventional prose. The study of the effect of variations in physical formats will be limited to those which may be accomplished by use of the typewriter, the instrument generally used in preparing administrative communications. The variations contemplated here are size of type (Elite and Pica) and spacing between lines (single-spacing versus one and one-half line spacing).

The study will first incorporate a survey of theories about organization as an aid to comprehension in written communications and a search to discover what testing and measuring has been done in areas related to the effect of such organization on comprehension. Limitations of the study require that "communications" be narrowed to typewritten administrative communications. The study will be limited to these matters: (1) a survey of literature pertaining to composition to discover the heritage of administrative communications; (2) discussion of prevalent theories and practices concerning organization of content and format as aids to comprehension; (3) the status of scientific investigations in fields related to organization of content and format as aids to comprehension; and (4) the design and execution of an experiment to test the effect on comprehension of variations in organization and format and size of type and spacing between lines.

Any terms which may possibly confuse the reader will be defined where introduced.
C. Preview of the Presentation

A survey of literature about organization and of experimentation connected with comprehension is incorporated in Chapter II. This survey first traces the historical development of administrative communication and then discusses theories concerning organization and format, with emphasis on organization as an aid to comprehension. The discussions analyze what early texts say about organization and format in report writing as well as analyzing theories about organization and format that are advanced by current business texts. The final part of Chapter II surveys available literature concerning scientific experimentation related to organization and comprehension.

Chapter III is concerned with testing the effect on comprehension of variations in organization and format and size of type and line spacing. The first part of the chapter presents the experiment design and discusses the preparation of the memorandum report to be used in the experiment. The second section of Chapter III explains the selection of subjects for the experiment and the methodology used in conducting both the pilot study and the major study. The final part of the chapter presents an analysis of the results of the experiment; supporting tables are provided.

The final section of the research report, Chapter IV, presents the conclusions and recommendations based on the results of the experiment.
CHAPTER II

SURVEY OF LITERATURE ON ORGANIZATION AND EXPERIMENTATION

A. Historical Development of Administrative Communication

Administrative communication has evolved from the completely functional reporting of ancient days. The history of oral reports is conjectural, of course. As for written reports, even primitive picture writing may be considered a form of reporting: records of hunts, reports of natural phenomena, schematic directions, and so on. Moses recorded the Ten Commandments as a report to his people. Ships' logs were reports, very complete reports, made by the administrator of the ship to his superior. The history of civilization is, in a broad sense, the history of reports, for whenever men cooperate for the fulfillment of common goals, reports are a necessity.

No evidence is available to indicate that early administrators were concerned with the style of communication. Even at the height of Greek civilization, rhetoric was the province of orators, not of business communicators. In the sixteenth century Francis Bacon sought to develop and to promote a simple, concise style suitable for scientific reporting, but with little success. Lack of appropriate style for such reports is evident in Jonathan Swift's eighteenth-century satire of communication in Gulliver's voyage to Laputa. It was not until business itself came of age as a social science that any attempt was made to formulate theories specifically for business communication.
When in the late nineteenth century Frederick W. Taylor drew attention to management as a specialized field, he opened the doors to the development of management as a profession. A profession requires that the practitioner be taught certain skills and be provided with certain tools. Consequently, the tremendous expansion of business and industry in the early twentieth century gave rise to the establishment of many business schools and the publication of many texts about business writing. Most of these had to do with such mechanical skills as typewriting and shorthand. Many were concerned with the style, content, and format of business correspondence.

When the acceptance of business as a social science drew attention to business communication as a special form of composition, traditional principles of grammar and composition were transferred practically unchanged to business communication. Theorists from Aristotle to Whatley to Wendell Johnson and practitioners from Alta Gwinn Saunders and A. Charles Babenroth of the 1920's to those of the 1960's agree that clarity, validity, and logical sequence of thought are requisites of effective communication. The basic principles of classic rhetoric remain the basic principles of administrative communication.

Modern books on writing echo Aristotle's recommendations concerning the correct use of connectives to indicate relationships, the use of specific rather than general words, and the avoidance of ambiguity.\footnote{Lane Cooper, The Rhetoric of Aristotle, an Expanded Translation, Appleton-Century-Crofts, Inc., New York, 1932, p. 194.} He offered as a "general rule" the theory that "a composition should
be easy to read";\(^2\) and much of Book III of his *Rhetoric* is devoted to appropriateness of style. In discussing organization, Aristotle offers the simplest order as this: you state your case and then you prove it.\(^3\) At most, he says, organization may consist of four parts: Proem (introduction), Statement (statement of the problem or thesis), Argument (development of the thesis or of the case presented), and Epilogue (conclusion).\(^4\) Rhys Roberts sums up the gist of the three books of Aristotle's *Rhetoric* as follows:

Book 1 seems to say: 'Be logical. Think clearly. Reason cogently.'... Book 2: 'Study human nature. Observe... the characters and emotions of your audience, as well as your own emotions.' Book 3: 'Attend to delivery. Use language rightly. Arrange your material well. End crisply.' And the whole treatise presupposes good wits and a fine general education.\(^5\)

Aristotle's theories and Roberts' comment apply with peculiar aptness to what is known as administrative communication. The professional manager is presupposed to have good wits and a fine general education. Otherwise, he cannot expect to fulfill the criteria of professional management.\(^6\) Moreover, administrative communication—whether vertical or horizontal—must reflect logical process of thought, clearly stated and cogently reasoned. In addition, the

\(^2\)Ibid., p. 195. \(^3\)Ibid., p. 220.  
\(^4\)Ibid. \(^5\)Ibid., p. xlviii. 

\(^6\)Lawrence A. Appley in a television series entitled "Managers in Action." Appley lists the following as requisites for a profession: (1) It must have a body of knowledge that is transferable; (2) it must be subject to scientific approach; (3) it must have skills and tools that are peculiar to it; (4) it must have a code of ethics; and (5) it must have a discipline.
manager must study human nature and take into consideration in his communications the character and emotions of his reader as well as his own character and feelings. Finally, he must give careful attention to the language he uses, to the arrangement of the content, and to the impact of the ending he chooses.

In short, administrative communication has inherited from the Golden Age of Greece a well-ordered philosophy of composition which modern theorists have accepted and use as being sound logically and psychologically.

B. Theories Concerning Organization and Format

Accepted principles and practices of modern writers about written communication obviously depend heavily upon heritage. Few, if any, revolutionary ideas or techniques have been offered. On the whole, the principles of Aristotle provide the foundation for the principles advocated by modern business communicators. Herbert Spencer's 1864 essay, "The Philosophy of Style," reprinted in a 1932 anthology of modern business literature, applies the Aristotelian theories to the structure of language. A civil engineer, Spencer points out that language, an apparatus of symbols for the conveyance of thought, is like any mechanical apparatus: "the more simple and the better arranged its parts, the greater will be the effect produced." Just as a decrease in friction increases the efficiency of machinery, the

less time and effort expended by the reader in recognizing and re-arranging the symbols, the more time and effort he can devote to the meaning being conveyed. In illustrating his idea by examples of primitive and sophisticated syntax, Spencer notes that the direct (psychological) organization is more effective than indirect (logical) only if the reader is already oriented to the situation; that is, he is already aware of the controlling idea or purpose of the communication.

Spencer is not, of course, discussing organization of business communications; he is, nonetheless, commenting on orderly arrangement of language symbols in much the same way that twentieth century semanticists and structural linguists do so. Moreover, twentieth century writers will concur that the order of presentation of material in a business communication must be determined by the controlling idea. Spencer was aware of this need for flexibility: "There are many cases, however, in which neither the direct nor the indirect structure is the best; but where an intermediate structure is preferable to both.

Theories Advocated by Early Texts on Report Writing

Early in the twentieth century, System, The Magazine of Business, published a series of "how-books" concerned with efficiency of operation. In How To Be Personally Efficient in Business, published in 1915, Part IV is devoted entirely to business writing. Knowing and presenting the facts; analyzing the reader; using the "you" attitude;

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8 Ibid., p. 334.  
9 Ibid., pp. 333-347.  
10 Ibid., p. 345.
organization, clarity, and conciseness—all part of the Aristotelian prescription—are points of emphasis. 11

In 1923 Ray Palmer Baker, in The Preparation of Reports, offers a brief comment on the importance of rhetorical structure in report writing: "Clearness ... depends upon the manner in which the materials are arranged." 12 Other than pointing out that "the scheme may be chronological, spatial, or 'logical,'" however, Baker confines himself to discussion of the cardinal virtues of composition in general: clearness, completeness, and conciseness. Moreover, half of the one paragraph devoted to organization is concerned with format: use of headings and typographical devices to indicate arrangement of material. 13 This early text obviously assumes, as Aristotle did, good wits and a fine general education. Both title and preface of the Baker text indicate that the central emphasis is on the construction of reports: "how the material of a report affects its form." 14 Nevertheless, only one chapter of twenty pages is concerned with principles of composition, that is, completeness, clearness, conciseness, style, and what he calls "personality." 15 Most of the book is concerned with form and content of specific types of reports, not with how one achieves orderly arrangement of thought and data.

In 1929, in Business Reports, Investigation and Presentation, Alta Gwinn Saunders and Chester Reed Anderson devote three pages to

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13 Ibid.
14 Ibid., p. vi.
15 Ibid., pp. 43-63.
discussion of logical, psychological, and chronological methods of organization. Logical arrangement, according to the authors, is a step-by-step structure presenting all data "in ascending order of importance to the definite conclusions and possible recommendations." Yet immediately after instructing the reader to present data in "ascending order of importance," the text comments, "This style is used particularly in submitting reports in which the reader is interested in every step in the development of the investigation so that he may either draw his own conclusions or at least know the complete steps taken in arriving at the conclusions presented by the writer." Step-by-step development is chronological—a logical arrangement, to be sure, but not "logical" in the meaning of the terminology used to classify the general types of arrangement. Nor is "order of importance" necessarily a step-by-step development. This brief discussion of "logical arrangement," as defined by the authors, would probably prove confusing to the would-be writer seeking guidance.

The Saunders and Anderson text then describes psychological arrangement as "quicker" than logical arrangement and consequently favored by "executives who demand results quickly," and by "investigators . . . who must present their material in such a favorable light that they will induce a certain desired action." This type of arrangement assigns to "the most strategic place," the beginning of


17 Ibid.
the report, the material likely to be of most interest. Once again, however, a reader may be confused by a subsequent remark that "psychological arrangement follows no order of time, nor sequence in which the data were collected." The example given points out that two or three "outstanding events" may be selected for emphasis, "while the minor facts are more or less buried where they will be available but not deadly monotonous."\(^{18}\) The authors are referring to an annual report written for the general reader; yet such an example could be misleading for the beginning report writer—he may conclude that objectivity is of secondary importance. The problem really lies in the fact that so little space is devoted to the discussion of arrangement of material that the reader without good wits and a fine general education is left without effectual guidance. Even the addition of a few words to the effect that chronology is not a guiding principle in psychological arrangement would clarify the meaning.

The 1940 revised edition of the Saunders and Anderson text does not enlarge the discussion of arrangement. The only revision of this section of the book is an occasional rephrasing of words. Whatever the shortcomings of the presentation may be, the important fact is that both the 1929 and the 1940 Saunders and Anderson texts include three pages of discussion of the organization of content. Such is not the case with the 1949 edition of the Babenroth text, Modern Business

\(^{18}\)Ibid., p. 175.
This text does not contain any discussion of organization of content; nor is organization of content as a whole discussed in the Marcoux text of 1939. Marcoux's orientation seems to be a literary one, for he discusses—although quite briefly—the use of the four forms of discourse and the development of the paragraph. His contribution is his comment on "structural paragraphs": introductory, transitional, and concluding paragraphs. Structure is an approach to organization; unfortunately, Marcoux neither classifies nor discusses approaches to organization.

In the 1955 anthology *Writing for Business*, compiled by Wilkinson, Kenning, and Anderson, an undated Air Force informational bulletin by Hilary H. Milton includes discussion of "Time Sequence," "Logical Method," and "Psychological Method" under the general heading of "Selecting a Method of Approach." For Milton, however, the "logical method" is that of enumeration: "The logical method is similar to the time-sequence method in that it moves from one point to another in a first-second-third-fourth order." The 1956 Tuttle and Brown text, *Writing Useful Reports*, also includes only scant mention of "sensible" order. Under the heading "Some Useful Orders," chronological, spatial, functional, order of importance, and "other orders" receive brief

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comment. Included in the "other order" classification are general-to-particular, also identified as "deductive" and "the reverse of inductive."  

**Theories about Organization Advanced by Current Business Texts**

The year 1957 offers a demarcation between "early" and "current" texts concerned with business report writing. *Business Report Writing*, by Robert D. Hay and Raymond V. Lesikar, includes a complete chapter on "organizing information."  

An important point is that the approaches to organization are discussed in connection with outlining. Although the use of outlining as a tool of organization is a matter of complete agreement in the business writing texts surveyed, the Hay-Lesikar text is the only one of the pre-1960 books examined in which the beginner's attention is called to the necessity for deciding on the pattern of organization before outlining can begin. Also, the text points out that one not only can but usually does combine two or more of these patterns in individual sections even though the overall pattern will be determined by one of the general types. A second contribution of the Hay-Lesikar text is the discussion of the analytical nature of the outline. Instead of merely insisting that the headings and subheadings be "logical," this text offers a general and systematic procedure for outlining. This "how-to" approach makes available

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to the writer a valuable guideline for organizing and writing reports.

Neither Robert Aurner nor Norman Sigband follow the Hay-Lesikar lead, however, in developing organization as an aid to comprehension. As the title indicates, Aurner's *Effective Communication in Business—With Management Emphasis* (1958) emphasizes communication by and for management. In his preface to the fourth edition, Aurner comments on this dominant theme, pointing out that "within just a few years" management had discovered communication to be "one of its most powerful resources for operating success." Nevertheless, other than a brief discussion of the outline, the text offers the reader little assistance in achieving "logical arrangement." Sigband's comments on organization of content in *Effective Report Writing* (1960) are so scanty as to be of little help to the beginning writer. Sigband uses substantially the same divisions as the 1956 Tuttle and Brown text: temporal or chronological, geographical or spatial, simple-to-complex, general-to-specific, specific-to-general, and functional.

In *Report Writing for Business* (1965), Raymond V. Lesikar adds structure and function of the paragraph to the concept of logical arrangement of content in report writing. In addition to discussing (in connection with outlining) patterns such as logical, psychological,

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chronological, and combination of these, he points out that "logical arrangement of facts alone is not enough. . . . the writer needs to make special effort to structure the report so that the relationships are clear. 27 The diagram of this "structural coherence plan" reduces to the simplest possible terms a method for increasing comprehension by means of organization. 28 Of course, Marcoux had discussed in his 1939 text the use of "well-made paragraphs" to assist the reader to "follow with little effort the thought of the report." 29 In fact, the importance of the paragraph as a building unit is stressed in the average course in English composition. The Lesikar contribution is a substantial one, nevertheless. For one thing, the impact of diagrammatic presentation adds another dimension of comprehension. For another, talking about is a far different matter than showing how.

Another contribution of the Lesikar text—carried over from the 1961 edition but expanded in 1965—is the explanation of the process of communication and the discussion of fallacies which affect communication. 30

Theories Concerning Format of Administrative Reports

As far as the overall format of written administrative communication is concerned, there seems to be general agreement about the major divisions and the units which make up the major divisions. The use of


Ibid., p. 199

Marcoux, op. cit., p. 371

Lesikar, loc. cit.
captions is usually discussed in detail, some authors giving very
definite instructions as to style and placement. The length of para-
graphs is of interest as "space-breaking." Spacing between lines is
commented on by some, ignored by others. The general emphasis is that
the report must be displayed. "To secure maximum effectiveness for
the content of your report, you must give the greatest thought and
care to every detail of its presentation . . . . The principle of
display governs throughout." 31

Theories Advanced by Early Business Writers. Of the books sur-
veyed, only the 1928 Saunders and Creek text makes reference to place-
ment of headings in the margin. The section pertaining to the physical
presentation of the business report is written as if it were a report.
The captions appear in the left margin, each numbered or lettered to
correspond with the designations of the divisions of the outline-table
of contents. "Putting titles and subtitles in the margin expedites
reference for the busy reader. For that reason, as well as the fact
that the resulting balance is bettered, the titles should stand out
from the body." 32 The author of this section is evidently an adver-
tising man, for he spaces his "copy" as if he were making a layout.
In fact, he advocates that the report writer study the advertisers'
use of white space, for "it is a thing to conjure with." 33 Neverthe-
less, single-spacing the report is emphatically declared to be

31 Alta Gwinn Saunders and Herbert L. Creek, The Literature of

32 Ibid., p. 612

33 Ibid., p. 611.
superior to double-spacing. The former can be arranged more effectively; the latter is "cumbersome." Just as emphatic is insistence that paragraphs be broken up into short units. "It is more important that the eye be rested, that the report read comfortably, than that a relatively unimportant grammatical rule be overobserved."\textsuperscript{34}

Marcoux's approach to paragraphing is quite different. "Since a good paragraph generally runs from seventy-five to three hundred words in length, the best way to divide material is to outline it first and then to base paragraphs on the order which will give units of the proper length."\textsuperscript{35} He too is concerned with space, but his concern is with the proportion of space occupied.

As for spacing between lines, it is interesting to note that the 1940 edition of the Saunders and Anderson text disagrees with the 1928 publication edited by Saunders and Creek. Whereas the latter insists on single spacing, the former supports double spacing. "The spacing may be either single or double, depending upon the use or purpose of the paper. Routine intracompany reports are usually single-spaced. Double spacing is easier to read, especially for older eyes."\textsuperscript{36} No choice is permitted as to placement of captions, however. Explicit directions are given for position, designation, and style.

Theories Advanced by Current Business Texts. Current authors of textbooks on business communications are not so dogmatic as their

\textsuperscript{34}\textit{Ibid.}, p. 614. \hspace{1cm} \textsuperscript{35}\textit{Marcoux, loc. cit.}

\textsuperscript{36}\textit{Saunders and Anderson, op. cit.}, p. 379.
earlier colleagues were. Aurner is quite casual in regard to captions: "Display your materials, with headings and subheadings, to help your reader find the information he wants." Sigband, too, considers captions as aids to fast and easy reading. Diagrammatic sketches illustrating the use of headings indicate that he considers them to be space-breakers. He too attaches importance to "white space." Both the Hay-Lesikar and the Lesikar texts--particularly the latter--discuss paragraph size at length. Their concern, however, is readability. Formulas for readability are supplied, and their use and abuse are discussed. The basic concern of these writers is reader comprehension, not speed or esthetics. With captions too the concern is for comprehension: "... any combination of type and position which shows the relative importance of the captions at a glance is acceptable." In both texts the reader is offered a choice of several acceptable schemes. Their discussion of the physical presentation of a report also includes discussion of various styles of type, but no comment is offered as to which might be preferable for administrative communication. The authors present also both sides of the single-versus double-space controversy, but again no recommendation is made.

C. Scientific Testing of Theories Related to Comprehension and Organization

Social scientists are far more limited in their research possibilities than are the physical scientists. Human behavior is affected

\[37\text{Aurner, op. cit., p. 511}\]
\[38\text{Sigband, op. cit., p. 198}\]
\[39\text{Hay and Lesikar, op. cit., p. 190}\]
by so many uncontrollable factors that the social scientist can merely take these into account in designing his experiments and in interpreting and evaluating the results. Least understood of the aspects of human behavior is language. Perhaps it is because the limitations to scientific investigation in this area are almost overwhelming that comparatively little research has been conducted in connection with human communication through the medium of language. Even less has been done in the specific area of comprehension. When the area of comprehension is narrowed to written administrative communication, there is no record of research.

Research in the relation of organization and format to comprehension has been conducted in the fields of psychology, speech, and reading. Since these fields are closely related to one another and with written communication, much of the work done would seem to be logically applicable to written composition. The applicability has not been tested; nevertheless, a survey of the research in these related areas may not only be quite interesting but also serve as a guide for research in the particular area of the relationship of organization and format to comprehension in administrative communication.

Investigation of Teaching Methods and Objectives

In 1928 Leon R. Meadows surveyed teacher-training colleges and teachers of English composition to try to determine their objectives and the difficulties encountered in their efforts to attain those objectives in the teaching of composition. Of the sixty-eight respondent colleges, fifty-one stated that the major objective of the English
composition courses was to teach "fundamentals"—that is, form, sentence structure, paragraphing, spelling, mechanical accuracy, and neatness. Only eight stated the major concern to be "organization." Of these, six expanded "organization" to mean "ability to organize thought and to follow a carefully prepared outline." Since seventy-five per cent of those respondent colleges emphasized "fundamentals," it may be assumed the teachers so trained would emphasize the grammarian approach to composition. At any rate, Meadows reports that of the sixty-five respondent teachers, only six per cent stated their chief difficulty in teaching composition to be "inability of students to think clearly," and five per cent "inability of students to organize their thoughts." One may safely infer that the other respondents were not concerned primarily with clarity and organization of thought.

In a review of selected literature and research on the teaching of English composition, Patrick T. Hayden reported in April, 1965, that "we still need sound research"—not to find a "best" method, but to "save us trial and error in our search for more effective methods."

Investigations Closely Related to Comprehension and Organization

Although educationists have not been active in testing methods for achieving effective communication, they and the psychologists have

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41 Ibid., pp. 21-25.
been active in studying and testing "readability." In his study of the measurement of readability, George C. Klare lists 482 works in his bibliography. These references cover a wide range of interest, from typography to work length to level of abstraction to the language of science. 43

One of the studies of some interest is "The Relation of Format Organization to Learning," in which Klare was one of a team of three. The study was an attempt to relate three levels of format organization to efficiency of reading, acceptability, and comprehension. The investigators report that although a "higher level" of format organization did not affect reading speed, the readers found such organization more acceptable. The higher level of format organization also aided the "more able" readers in achieving higher immediate retention, but not the less able. 44 Material used in testing, however, was not comparable to business communication.

In testing the relationship between interest and reading comprehension, M. R. Bernstein found that "interest has a real relationship to comprehension in reading." According to Bernstein, interest increases reading efficiency. 45

The Flesch studies relating comprehension and word length are included in Klare's bibliography, of course, as are the Dale-Chall and the Gunning studies. In fact, much of the bibliography concerns readability studies of one kind or another. Most are investigations into

44 Ibid., p. 216
45 Ibid., p. 193
elementary-school-level material. Some are practical applications of the readability formulas, especially of the Flesch formula.

A study by Klare and others attempted to determine the relation of "patterning" (underlining) to retention and acceptability of technical material. They found that patterning gave somewhat greater immediate retention among more able students but not among the less able. However, the patterning seemed to have little effect on either speed of reading or acceptability. Materials used in testing were instruction bulletins for Air Force mechanics.

A similar study attempted to relate typographic arrangements to reading speed, immediate retention, and acceptability. Again the results showed that the arrangement helped the more able students but not the less able; and again only in retention, not in speed or acceptability.

A study designed by F. P. Robinson in 1947 to show how reading comprehension may be affected by the complexity of language structure failed to reveal any significant effects. The results suggested, however, that vocabulary is not the only determinant of comprehension, that "language structure, intelligence, and training" are all factors which must be considered.

A test in 1940 by H. Goldstein comparing reading and listening comprehension at various rates of presentation was concerned only with relationship between speed and comprehension. The findings indicated

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46 Ibid., p. 215.  
47 Ibid.  
48 Ibid., p. 218.
that at slow speeds listening comprehension is greater than reading comprehension for easy materials. Increased speed reduced comprehension in both modes of presentation. A similar test in 1951 by K. A. Harwood revealed no really significant difference, in the study as a whole, in the effect on comprehension of the two types of presentation: oral and visual. The segment concerned with the more difficult samples, however, revealed a significant difference in comprehension in material presented for reading.

More pertinent to the question of relationship between organization and comprehension is a study by S. L. Payne, also in 1951. The purpose of the study was to determine why there were no significant differences in the answers to alternate wordings of some groups of questions ("tight questions") and yet significant differences in the answers to alternate wordings of others ("loose questions"). Sixteen interchangeable pairs of questions were used in the study, which concluded that "in a verbal statement of two ideas, the last one stated tends to have greater drawing power, and that brevity and simplicity in wording are important elements in tight questions." The Payne experiment would seem to refute the "Law of Primacy," a conclusion also reached by Harvey Cromwell in his 1950 study of the effect of order of presentation. On the other hand, the studies by Carl Hovland and his

49 Ibid., p. 270.  50 Ibid., p. 271  51 Ibid.


associates revealed no definite advantage for either primacy or recency: "When two sides of an issue are presented successively by different communicators, the side presented first does not necessarily have the advantage."\(^54\)

Several primacy-recency studies are surveyed by Ralph L. Rosnow in his March, 1966, article, "Whatever Happened to the 'Law of Primacy'?" All are concerned with presentation of opposing sides of an issue. In addition, Rosnow discusses his own experimentation in this area. His conclusion is that studies already made should be replicated and that additional research should be designed to determine "the effects of interactions of primacy-bound, recency-bound, and free variables." In other words, there are too many variables involved in the studies to afford a reliable conclusion as to the actual effect of primacy or recency.\(^55\)

Even more closely concerned with the question of the relationship of organization and comprehension is the study of Arnold G. Abrams testing possible correlation between structural skill and comprehension. He concludes that "the ability to recognize the structure of a written message is positively correlated with both listening comprehension and reading comprehension." He suggests that "research is now needed . . . to determine how much of what we call 'comprehension' is incorporated in the ability to structure messages at a relatively gross


level, and how skill in structuralization relates to other skills of reading and listening comprehension.\textsuperscript{56}

Another closely related study is K. C. Beighley's investigation in 1952 and again in 1954 of the effect of certain variables on listener comprehension. Organization of content was only one of the variables. Beighley's 1952 hypothesis had been that "a certain lack of organization might stimulate an audience to make some active effort towards understanding the material presented, and thus result in more comprehension than would very careful organization."\textsuperscript{57} The findings of the 1952 study were not in accord with previous studies in that organization showed no statistically dependable superiority for comprehension over the kind of disorganization which was used. The same conclusion was reached at the end of the second study. As Beighley puts it, "the conclusions of these two experiments . . . make it obvious that there is much unknown about the functioning of organization in both comprehension and persuasion."\textsuperscript{58}

Experimentation in Aspects of Physical Presentation

In the area of format, experimentation has largely been concerned with legibility of various faces and arrangements of type. The "laws


of perception" are cited by Arthur Eckstein in his discussion of visual appearance as an integral part of printed matter, but he does not cite the experiments by which these "laws" were established.⁵⁹

In *Legibility of Print*, Miles Tinker surveys numerous tests related to speed-of-reading, fatigue-in-reading, and legibility. Of these, it is pointed out, few except the Tinker-Paterson studies have checked comprehension. However, as Tinker also points out, "reading" without comprehension is not reading.⁶⁰ These studies, however, are concerned with print. The only similar investigation made with typewritten copy is the 1933 test made by Edward B. Greene. The test material was typed and then lithoprinted on white bond paper. A speed-of-reading technique was employed to determine legibility, but only three factors were studied: size of type, leading, and line width. The results of the study were not statistically significant.⁶¹ Even if they had been, they would have had limited applicability to typewritten administrative communication of today for these reasons: two of the type sizes are not now commonly used in offices; the line lengths tested are longer than lengths normally used with typewritten material; and spacing (leading) was not tested with all type sizes. Greene's study was a beginning. Much testing will be necessary to determine the


effect, if any, of type face and size, of spacing, of organization, and of design.

In discussion of graphic design of printed material, Eckstein declares that "all the rules and laws of design that have been discovered or formulated and proven valid" are readily transferable to the design of visual communication. He cites the "Law of Proximity," which states that elements placed close together tend to form groups, and the "Law of Good Contour," which states that parts of a figure which seem to belong together tend to form units.\(^{62}\) It may be that these theories are transferable to design of formats for typewritten administrative communication. The point is that no testing has either validated or invalidated Eckstein's theory.

\(^{62}\)Eckstein, loc. cit.
CHAPTER III

TESTING THE EFFECT OF ORGANIZATION AND FORMAT
AND SIZE OF TYPE AND LINE SPACING ON COMPREHENSION

Investigation into the backgrounds of theories about organization and format as aids to comprehension has revealed that the principles upon which modern theories and practices are based may readily be traced to Aristotle, philosopher and teacher of the fourth century B.C. A survey of available literature has also revealed the lack of scientific evidence to support the various theories of organization and their relationship to ease of comprehension. An experiment was designed, therefore, to determine, within specified limits, whether or not comprehension of typewritten administrative communication can be increased by using mechanical means such as organization techniques and physical formats. The experiment was designed to test specifically the effects on comprehension of two major factors: (1) organization and format and (2) size of type and line spacing.

"Organization" is used here to distinguish between logical and psychological approaches to the presentation of the body of the communication, while "format" is used to differentiate between the use and non-use of captions. Size of type variations were two: standard Elite and standard Pica. Line spacing was limited to single line spacing and one and one-half line spacing.
TABLE 1

EXPERIMENT DESIGN FOR STUDYING THE EFFECTS ON COMPREHENSION OF A MEMORANDUM REPORT, USING FOUR VARIATIONS IN ORGANIZATION AND FORMAT AND THREE VARIATIONS IN SIZE OF TYPE AND LINE SPACING

<table>
<thead>
<tr>
<th>R: Variations in Organization and Format</th>
<th>A: Variations in Size of Type and Line Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Logical Order Without Captions</td>
<td>1. Elite Type Single Line Spacing</td>
</tr>
<tr>
<td></td>
<td>2. Elite Type, 1-1/2 Line Spacing</td>
</tr>
<tr>
<td></td>
<td>3. Pica Type, Single Line Spacing</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
</tr>
<tr>
<td>1. Logical Order Without Captions</td>
<td>R1A1</td>
</tr>
<tr>
<td></td>
<td>R1A2</td>
</tr>
<tr>
<td></td>
<td>R1A3</td>
</tr>
<tr>
<td></td>
<td>R1</td>
</tr>
<tr>
<td>2. Logical Order With Captions</td>
<td>R2A1</td>
</tr>
<tr>
<td></td>
<td>R2A2</td>
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<tr>
<td></td>
<td>R2A3</td>
</tr>
<tr>
<td></td>
<td>R2</td>
</tr>
<tr>
<td>3. Psychological Order With Captions</td>
<td>R3A1</td>
</tr>
<tr>
<td></td>
<td>R3A2</td>
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<tr>
<td></td>
<td>R3A3</td>
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<td></td>
<td>R3</td>
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<tr>
<td>4. Logical Order in Outline Form</td>
<td>R4A1</td>
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<td></td>
<td>R4A2</td>
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<td></td>
<td>R4A3</td>
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<td>R4</td>
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<tr>
<td>Sum</td>
<td>A1</td>
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<td>A2</td>
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<td></td>
<td>A3</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
</tr>
</tbody>
</table>
A. The Experiment Design

The experiment, the design of which is summarized in Table 1, utilized a memorandum report of approximately 1,350 words. This memorandum report was prepared in twelve forms, each form varying from the others in some respect as indicated in the twelve cells in Table 1. These memorandum report forms, copies of which are included in the appendix, had identical headings and other prefatory material. A six-inch line was used throughout. The report forms differed in the body as indicated below:

<table>
<thead>
<tr>
<th>Appendix Number</th>
<th>Cell Designation</th>
<th>Description of Variations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R1A1</td>
<td>Logical order without captions, using Elite type and single line spacing.</td>
</tr>
<tr>
<td>2</td>
<td>R1A2</td>
<td>Logical order without captions, using Elite type and one and one-half line spacing.</td>
</tr>
<tr>
<td>3</td>
<td>R1A3</td>
<td>Logical order without captions, using Pica type and single line spacing.</td>
</tr>
<tr>
<td>4</td>
<td>R2A1</td>
<td>Logical order with captions, using Elite type and single line spacing.</td>
</tr>
<tr>
<td>5</td>
<td>R2A2</td>
<td>Logical order with captions, using Elite type and one and one-half line spacing.</td>
</tr>
<tr>
<td>6</td>
<td>R2A3</td>
<td>Logical order with captions, using Pica type and single line spacing.</td>
</tr>
<tr>
<td>7</td>
<td>R3A1</td>
<td>Psychological order with captions, using Elite type and single line spacing.</td>
</tr>
<tr>
<td>8</td>
<td>R3A2</td>
<td>Psychological order with captions, using Elite type and one and one-half line spacing.</td>
</tr>
</tbody>
</table>

Since the copies of the memorandum report to be used in the experiment were to be mimeographed and each subject (student) was to have a previously unused form to read, it was desirable that uniformity be achieved in typing and reproduction. To achieve this uniformity, the following precautions were taken: (1) all stencils were prepared by the same typist using manually-operated typewriters, an Olympia typewriter with standard Elite type and a Royal typewriter with standard Pica type; (2) all stencils were processed on the same mimeograph machine by the same operator; and (3) all copies were mimeographed on the same quality of white mimeograph paper.

The pages of each memorandum report plus a cover sheet (Appendix 13) were stapled together at the upper left corner. This cover sheet, each of which was coded with the examination number and the examination symbol, gave the student instructions concerning procedures for taking the examination and for recording information on the answer sheet (Appendix 14). A test composed of fifteen multiple-choice questions (Appendix 15) was taken by the students immediately after they had read the memorandum reports.
B. Selection of the Subjects for the Experiment

Students, principally juniors and seniors, enrolled in various classes in business administration at Southeastern Louisiana College, Hammond, Louisiana, were used for the pilot study. The major study conducted at Louisiana State University, Baton Rouge, Louisiana, used all the students enrolled and present in laboratory sessions of Management 71 (Business Communication) on December 6 and 8, 1966, the days the tests were administered. The students in the major study were all of junior or senior standing. Since these students had approximately the same academic preparations or at least were of approximately equal class standing, this selection tended to reduce somewhat the uncontrollable variables that might have influenced the test results.

C. Methodology

The material for this experiment was completely new and had not been previously used for testing purposes. Consequently, a pilot study was conducted to perfect the material and the procedures for conducting the experiment. The pilot study did reveal that several changes were desirable.

Conduct of the Pilot Study

Prior to administering the tests in the pilot study, the memorandum reports and cover sheets were, first, coded with the examination symbols and arranged in sequential order (R1A1, R1A2, R1A3, R2A1, R2A2, R2A3, R3A1, R3A2, R3A3, R4A1, R4A2, R4A3, R1A1, and so on), and then numbered consecutively beginning with number one. The
answer sheets were attached to the memorandum reports and cover sheets with paper clips and marked with the same examination numbers and symbols as the items to which they were attached. The reading and testing materials (memorandum reports with cover sheets and answer sheets) were handed out to the students in consecutive order beginning with number one.

In the pilot study, 156 observations were made (13 observations each of the 12 different memorandum reports). In the first class tested (28 students), the students were given eight minutes to read only the memorandum report. In subsequent testing, the time for reading the memorandum report was reduced to seven, then to six, and finally to five minutes. Only a few very slow readers failed to finish reading the material in five minutes; therefore, five minutes was set as the reading time to be used in the major study.

In the pilot study, all subjects were given approximately the same verbal instructions. They were told to read the cover sheet and to write in the upper left portion of the answer sheet the information requested. When they had all finished reading the instructions on the cover sheet and writing the requested information on the answer sheet, they were given the signal to start reading the memorandum report itself. On the "stop" signal, they stopped reading and returned the memorandum reports (with cover sheets) to the examiner, retaining the answer sheets. The students were then given copies of the test questions, their answers to which they marked on the answer sheets which they had kept. No time limit was given for answering the
questions, but students were asked to work as rapidly as possible to avoid taking up too much class time. The average time taken for administering the examinations during the pilot study was about twenty-five minutes.

The answer sheets for the pilot study tests were graded and the scores marked. The results were then put on IBM cards for processing through the IBM 1620 computer at Southeastern Louisiana College, using an analysis of variance program by Lew D. Harkins (Appendix 16). The analysis indicated that the comprehension scores did not differ significantly for the various memorandum reports. A question-by-question analysis of the answers given indicated that some changes were desirable in the multiple choice selections. For example, on several questions few, if any, students selected choices which were too obviously wrong. The indicated changes were made. New examination sheets and answer sheets were then made for the major study to be conducted at Louisiana State University.

Conduct of the Major Study

Since the examinations for the major study were to be administered by four different teachers at Louisiana State University, a uniform set of written instructions for administering the tests was prepared for use by these teachers. Also, enough copies of the memorandum reports with attached cover sheets, the answer sheets, and the multiple-choice test questions were prepared to provide each student taking the test with previously unused forms. This latter precaution eliminated the possibility of any student's being influenced by
another's markings, although students had been cautioned to make marks on the answer sheets only. Again the memorandum reports were put in sequential order, as in the pilot study, and coded and numbered consecutively beginning with number one.

The teachers administered the tests beginning with test number one and continuing until all laboratory sections of Management 71 had been tested. Slightly over 240 individual tests were administered; but since an equal number of each test was desirable for the statistical analysis planned, those last few tests which did not represent a complete set were eliminated. Each student taking the test had as equal an opportunity or chance of getting one test as another; therefore, the choice can be considered random or non-discriminatory.

After the examinations for the major study had been completed, the answer sheets were graded and the scores marked on each. Again, the results were put on IBM cards and processed through the IBM 1620 computer at Southeastern Louisiana College, using the same analysis of variance program that had been used with the pilot study.

D. Analysis of Results of Experiment

An analysis of Table 2 shows that the individual scores range from a low of three to a high of fifteen. These extremes of low and high are in the same cell, R1A1, which represents the memorandum report prepared in logical order without captions and using Elite type with single line spacing. The highest mean for any cell is 10.7 recorded in R3A2, psychological order with captions using Elite type and one and one-half line spacing; the lowest mean is 9.0 recorded in cell R2A3, logical order with captions using Pica type and single line spacing. The sum of all scores is 2,350, and the overall mean is 9.8. Six of the
TABLE 2
INDIVIDUAL AND CELL SCORES MADE ON TESTS BASED ON MEMORANDUM REPORT,
USING FOUR VARIATIONS IN ORGANIZATION AND FORMAT AND THREE
VARIATIONS IN SIZE OF TYPE AND LINE SPACING

<table>
<thead>
<tr>
<th>Cell Designation and Scores</th>
<th>R1A1</th>
<th>R1A2</th>
<th>R1A3</th>
<th>R2A1</th>
<th>R2A2</th>
<th>R2A3</th>
<th>R3A1</th>
<th>R3A2</th>
<th>R3A3</th>
<th>R4A1</th>
<th>R4A2</th>
<th>R4A3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>8</td>
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<td>8</td>
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<td>11</td>
<td>10</td>
<td>8</td>
<td>6</td>
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<td></td>
</tr>
</tbody>
</table>

**Sum** 200 188 190 194 190 180 198 213 187 202 208 200 2,350
**Mean** 10.0 9.4 9.5 9.7 9.5 9.0 9.9 10.7 9.4 10.1 10.4 10.0 9.8

Note: 20 individual scores (observations) for each cell; 240 observations overall.
TABLE 3

RANKING OF CELLS IN ORDER OF SCORES AND MEANS
SHOWING PERCENT VARIATIONS (PLUS AND MINUS)
FROM OVERALL MEAN OF 9.8

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cell</th>
<th>Sum of Scores</th>
<th>Mean</th>
<th>Percent Variation From 9.8</th>
<th>Cell Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R3A2</td>
<td>213</td>
<td>10.7</td>
<td>+ 9.18</td>
<td>Psychological order with captions, Elite type, 1 1/2 line spacing</td>
</tr>
<tr>
<td>2</td>
<td>R4A2</td>
<td>208</td>
<td>10.4</td>
<td>+ 6.12</td>
<td>Logical order in outline form, Elite type, 1 1/2 line spacing</td>
</tr>
<tr>
<td>3</td>
<td>R4A1</td>
<td>202</td>
<td>10.1</td>
<td>+ 3.06</td>
<td>Logical order in outline form, Elite type, single line spacing</td>
</tr>
<tr>
<td>*4</td>
<td>R4A3</td>
<td>200</td>
<td>10.0</td>
<td>+ 2.04</td>
<td>Logical order in outline form, Pica type, single line spacing</td>
</tr>
<tr>
<td>*4</td>
<td>R1A1</td>
<td>200</td>
<td>10.0</td>
<td>+ 2.04</td>
<td>Logical order without captions, Elite type, single line spacing</td>
</tr>
<tr>
<td>6</td>
<td>R3A1</td>
<td>198</td>
<td>9.9</td>
<td>+ 1.02</td>
<td>Psychological order with captions, Elite type, single line spacing</td>
</tr>
<tr>
<td>7</td>
<td>R2A1</td>
<td>194</td>
<td>9.7</td>
<td>- 1.02</td>
<td>Logical order with captions, Elite type, single line spacing</td>
</tr>
<tr>
<td>**8</td>
<td>R1A3</td>
<td>190</td>
<td>9.5</td>
<td>- 3.06</td>
<td>Logical order without captions, Pica type, single line spacing</td>
</tr>
<tr>
<td>**8</td>
<td>R2A2</td>
<td>190</td>
<td>9.5</td>
<td>- 3.06</td>
<td>Logical order with captions, Elite type, 1 1/2 line spacing</td>
</tr>
<tr>
<td>10</td>
<td>R1A2</td>
<td>188</td>
<td>9.4</td>
<td>- 4.08</td>
<td>Logical order without captions, Elite type, 1 1/2 line spacing</td>
</tr>
<tr>
<td>11</td>
<td>R3A3</td>
<td>187</td>
<td>9.4</td>
<td>- 4.08</td>
<td>Psychological order with captions, Pica type, single line spacing</td>
</tr>
<tr>
<td>12</td>
<td>R2A3</td>
<td>180</td>
<td>9.0</td>
<td>- 8.16</td>
<td>Logical order with captions, Pica type, single line spacing</td>
</tr>
</tbody>
</table>

* Identical scores and tied for fourth ranking.
** Identical scores and tied for eighth ranking.
cells have means higher than the overall mean, leaving six cells with means lower than the overall mean. The ranking of the individual cells according to scores and means is shown in Table 3. This table also shows the percentum variation (plus and minus) of the individual cell means from the overall mean of 9.8.

The cell-by-cell analysis in Table 4 shows that of the four variations in organization and format (factor R), the highest mean of 10.2 is in R4, logical order in outline form; of the three variations in size of type and line spacing (factor A), the highest mean of 10.0 is in A2, Elite type with one and one-half line spacing. Logically, the interaction of factors RA, therefore, should result in the highest individual mean being in cell R4A2, which combines logical order in outline form with Elite type and one and one-half line spacing. This is not the case, however, for the highest individual mean is in cell R3A2, which combines psychological order with captions and Elite type with one and one-half line spacing.

Another inconsistency shows up if one assumes that "psychological order with captions" is the best of the four variations of factor R, since the highest individual mean is in cell R3A2, which uses that variation of factor R. This assumption is not substantiated, however, for the cell mean of 9.9 in cell R3A1 is exceeded by the means of cells R1A1 and R4A1, both prepared with other variations of factor R but with the same variation of factor A as cell R3A1. Also, the mean of 9.4 in cell R3A3 is exceeded by the means of cells R1A3 and R4A3. These latter two cells represent other variations of factor R, but they are prepared with the same variation of factor A as cell R3A3.
<table>
<thead>
<tr>
<th>R: Variations in Organization and Format</th>
<th>1. Elite Type, Single Line Spacing</th>
<th>2. Elite Type, 1 1/2 Line Spacing</th>
<th>3. Pica Type, Single Line Spacing</th>
<th>Summary of Data for R</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Logical Order Without Captions</td>
<td>R1A1</td>
<td>R1A2</td>
<td>R1A3</td>
<td>R1 60</td>
</tr>
<tr>
<td>Number of scores</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sum of Scores</td>
<td>200</td>
<td>188</td>
<td>190</td>
<td>578</td>
</tr>
<tr>
<td>Mean</td>
<td>10.0</td>
<td>9.4</td>
<td>9.5</td>
<td>9.6</td>
</tr>
<tr>
<td>2. Logical Order With Captions</td>
<td>R2A1</td>
<td>R2A2</td>
<td>R2A3</td>
<td>R2 60</td>
</tr>
<tr>
<td>Number of scores</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sum of scores</td>
<td>194</td>
<td>190</td>
<td>180</td>
<td>564</td>
</tr>
<tr>
<td>Mean</td>
<td>9.7</td>
<td>9.5</td>
<td>9.0</td>
<td>9.4</td>
</tr>
<tr>
<td>3. Psychological Order With Captions</td>
<td>R3A1</td>
<td>R3A2</td>
<td>R3A3</td>
<td>R3 60</td>
</tr>
<tr>
<td>Number of scores</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sum of scores</td>
<td>198</td>
<td>213</td>
<td>187</td>
<td>598</td>
</tr>
<tr>
<td>Mean</td>
<td>9.9</td>
<td>10.7</td>
<td>9.4</td>
<td>10.0</td>
</tr>
<tr>
<td>4. Logical Order in Outline Form</td>
<td>R4A1</td>
<td>R4A2</td>
<td>R4A3</td>
<td>R4 60</td>
</tr>
<tr>
<td>Number of scores</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sum of scores</td>
<td>202</td>
<td>208</td>
<td>200</td>
<td>610</td>
</tr>
<tr>
<td>Mean</td>
<td>10.1</td>
<td>10.4</td>
<td>10.0</td>
<td>10.2</td>
</tr>
<tr>
<td>Summary of Data for A</td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>Number of scores</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>240</td>
</tr>
<tr>
<td>Sum of scores</td>
<td>794</td>
<td>799</td>
<td>757</td>
<td>2,350</td>
</tr>
<tr>
<td>Mean</td>
<td>9.9</td>
<td>10.0</td>
<td>9.5</td>
<td>9.8</td>
</tr>
</tbody>
</table>
Still another inconsistency shows up if one assumes that "Elite type with one and one-half line spacing" is superior to the other two variations in size of type and line spacing under factor A. This assumption appears logical, since the highest individual cell mean of 10.7 is in cell R3A2 under factor A2; and the mean of 10.0 in A2 is greater than the means of 9.9 in A1 and 9.5 in A3. The assumption that Elite type with one and one-half line spacing is superior holds true in most cases. There are three exceptions, however: The mean of 9.4 in cell R1A2 is exceeded by the means of 10.0 and 9.5 recorded in cells R1A1 and R1A3, respectively; and the mean of 9.5 recorded in cell R2A2 is exceeded by the mean of 9.7 in cell R2A1.

All of these inconsistencies are brought out graphically in Figure 1 and Figure 2. Figure 1 shows the patterns formed by plotting factor R, variations in organization and format, above the variations in factor A; and Figure 2 shows the patterns formed by plotting factor A, variations in size of type and line spacing, above the variations in factor R. Each line crossing reflects an inconsistency; for example, in Figure 2 the line marked A1 shows a lower mean than line A2; but the lines cross, and in two instances line A1 is plotted higher than line A2, above R1 and R2. If there were significant differences among the variations in factors R and A, the plotted lines would not cross but would remain fairly equidistant.

The inconsistencies reflected by analysis of the material in Table 4 indicates a need for a more sophisticated analysis to determine whether the differences that exist are significant. This sophisticated
Figure 1. Graphic Illustration of Experiment Results Showing Patterns Formed by Factor R, Variations in Organization and Format

Figure 2. Graphic Illustration of Experiment Results Showing Patterns Formed by Factor A, Variations in Size of Type and Line Spacing
analysis is provided by the material in Table 5, which analyzes the differences that exist among the cells.

The analysis of variance in Table 5 shows that none of the variations in organization and format (factor R) and in size of type and line spacing (factor A) had any statistically significant influence on the test results. Also, the interaction of factors RA was not statistically significant. Since all of the F-ratios in the experiment are below that which would be necessary to indicate differences of statistical significance, it is concluded that the variations in scores in the various cells are due to chance rather than to any particular advantage of one form of memorandum report over the others.

The findings in Table 5 confirm the results obtained in the pilot study, where the differences in cells were even less pronounced than in the major study. It appears, therefore, that there are no statistically significant differences among the memorandum report forms used for this experiment. It must be concluded that none of the variations tested is superior insofar as ease of comprehension is concerned. The decision as to which combination of organization, format, type size, and line spacing to be used will have to be based on some factor other than aid to comprehension.
TABLE 5
ANALYSIS OF VARIANCE OF SCORES MADE ON TEST BASED ON MEMORANDUM REPORT,
USING FOUR VARIATIONS IN ORGANIZATION AND FORMAT AND THREE
VARIATIONS IN SIZE OF TYPE AND LINE SPACING

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>*F-Ratio</th>
<th>**F-Ratio for Significance at 5% Level</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>R: Variations in Organization and Format</td>
<td>20</td>
<td>3</td>
<td>6.67</td>
<td>1.69</td>
<td>2.65</td>
<td>Not significant</td>
</tr>
<tr>
<td>A: Variations in Size of Type and Line Spacing</td>
<td>13</td>
<td>2</td>
<td>6.50</td>
<td>1.63</td>
<td>3.04</td>
<td>Not significant</td>
</tr>
<tr>
<td>RA: Interaction</td>
<td>14</td>
<td>6</td>
<td>2.33</td>
<td>.59</td>
<td>2.14</td>
<td>Not significant</td>
</tr>
<tr>
<td>Total between groups</td>
<td>47</td>
<td>11</td>
<td>4.27</td>
<td>1.08</td>
<td>1.83</td>
<td>Not significant</td>
</tr>
<tr>
<td>Within groups (Residual)</td>
<td>905</td>
<td>228</td>
<td>3.97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>952</td>
<td>239</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* F-Ratio determined by dividing individual Mean Squares by 3.97, the Mean Square Within Groups.


Degrees of Freedom:
1. R: Variations in Organization and Format = R - 1 = 4 - 1 = 3
2. A: Variations in Size of Type and Line Spacing = A - 1 = 3 - 1 = 2
3. RA: Interaction = (R - 1) (A - 1) = 3 x 2 = 6
4. Total between groups = Number of cells - 1 = 12 - 1 = 11
5. Within groups = Number of cells (number of scores in each cell - 1) = 12 (20 - 1) = 228
6. Total = Number of scores - 1 = 240 - 1 = 239
TABLE 6
MATHEMATICAL COMPUTATIONS USED TO DERIVE
SUM OF SQUARES (SS) USED IN ANALYSIS
OF VARIANCE IN TABLE 5

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>Computation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of Squares</td>
<td>Sum of squared scores - ( \frac{(\text{Sum of Scores})^2}{\text{Number of Scores}} )</td>
<td>952</td>
</tr>
<tr>
<td>( (10)^2 + (11)^2 + (9)^2 + \ldots (6)^2 - \frac{(2,350)^2}{240} )</td>
<td>= 23,962 - 23,010</td>
<td>952</td>
</tr>
<tr>
<td>SS Between Groups</td>
<td>( \frac{(200)^2}{20} + \frac{(194)^2}{20} + \frac{(198)^2}{20} + \frac{(202)^2}{20} + \frac{(188)^2}{20} + \frac{(190)^2}{20} + \frac{(213)^2}{20} + \frac{(208)^2}{20} + \frac{(190)^2}{20} + \frac{(180)^2}{20} + \frac{(187)^2}{20} + \frac{(200)^2}{20} - \frac{(2,350)^2}{240} )</td>
<td>= 23,057 - 23,010</td>
</tr>
<tr>
<td>SS for R Factor</td>
<td>( \frac{(578)^2}{60} + \frac{(564)^2}{60} + \frac{(598)^2}{60} + \frac{(610)^2}{60} - \frac{(2,350)^2}{240} )</td>
<td>= 23,030 - 23,010</td>
</tr>
<tr>
<td>SS for A Factor</td>
<td>( \frac{(794)^2}{80} + \frac{(799)^2}{80} + \frac{(757)^2}{80} - \frac{(2,350)^2}{240} )</td>
<td>= 23,023 - 23,010</td>
</tr>
<tr>
<td>SS for RA</td>
<td>SS between groups - (SS for R + SS for A)</td>
<td>= 47 - (20 + 13)</td>
</tr>
<tr>
<td>SS Within Groups</td>
<td>Sum of Squares - SS between groups</td>
<td>= 952 - 47</td>
</tr>
</tbody>
</table>
CHAPTER IV
CONCLUSIONS AND RECOMMENDATIONS

The experiment described in the previous chapter is admittedly a limited one, and the results may not have wide application. For example, since a rather short memorandum report was used in the experiment, the results may not be applicable to administrative communications requiring ten, fifteen, or thirty minutes to read. Two definite conclusions, however, can be drawn from the experiment described herein:

1. No single combination of organization, format, size of type, and line spacing incorporated in the memorandum reports used in this experiment is superior to the others insofar as ease of comprehension is concerned; and
2. The variations in scores in the various cells (memorandum reports) are due to chance rather than to any particular advantage that one form of memorandum report has over the others.

These results indicate that perhaps some of the recommendations in business communication textbooks are based more on authors' preferences than on scientific experimentation. For example, as previously cited in Chapter II, both Aurner and Sigband advocate use of headings and sub-headings as aids for "fast and easy reading." This suggestion is logical and, apparently, widely accepted; however, the experiment raises the question of whether or not such headings actually do facilitate comprehension. The material presented in both Aurner's and Sigband's books reads "fast and easy," but this ease and speed may be due more to the lucidity of their prose than to their use of headings...
and sub-headings. Also, Saunders and Creek, in their 1928 text, say that "putting titles and subtitles in the margin expedites reference for the busy reader." This opinion too is logical, since captions would appear to be helpful for index and reference purposes, especially in long, involved papers. Nevertheless, the results of this experiment indicate that captions do not have any significant influence on comprehension in a three-page report.

The findings of the experiment do not offer support either for the assertions made by some writers concerning spacing and type. The experiment indicated that no particular combination of spacing and size of type used was significantly more conducive to ease of comprehension than any of the other combinations. This lack of significant difference—although the experiment is admittedly limited—does not support the statement in the 1928 Saunders and Creek text that single spacing is superior to double spacing; the latter, they say, is "cumbersome." A 1940 text written jointly by Creek and Anderson supports double spacing: "Double-spacing is easier to read, especially for older eyes." Again, no scientific evidence is offered to substantiate either the 1928 opinion or that of 1940. The extensive Tinker experimentation with line spacing revealed an optimum leading of two to four points between lines of type approximating standard Elite and standard Pica.\(^1\) Since the line-and-a-half spacing is close to Tinker's optimum, it was used in this experiment instead of double spacing. However, no variation in spacing showed any significant superiority over any other; moreover, Elite and Pica type were equally effective.

Recommendations by authors of business communication texts usually advocate use of a specific type of organization to achieve a specific goal: logical order when the writer wishes to build his case before presenting a conclusion, and psychological order when the writer wishes to prepare the reader's receptivity of the supporting material offered in the body of the report. Both logical and psychological orders are used in the memorandum report variations in this experiment, but neither showed any significant superiority over the other insofar as comprehension is concerned. It would seem, therefore, that the writer of administrative communications should be guided by the needs of the situation in making a decision as to which organization to use. There is as yet no scientific formula for effective communication.

Instead of providing the would-be writer with answers, this limited experiment seems to open a Pandora's box of questions. For example, would the same results be attained with a longer administrative communication, one requiring ten, fifteen, or thirty minutes to read? Does well-organized writing not need captions and sub-captions? Have captions come to be used as a crutch for otherwise poorly-organized writing? Are short paragraphs really more comprehensible than long paragraphs? Is there an optimum for spacing between lines in typewritten material? Which type faces and styles enhance comprehension and which are barriers to fast reading? These and many more questions need to be answered and therefore warrant further research.

The possible variations in organization and format of typewritten administrative communications are almost unlimited, so a search for "the best method of presentation" is doomed to failure at the start. Nevertheless, even though a "best" method may be impossible to find, better
methods of presentation are a realistic possibility. There is also need for experimentation with unorthodox as well as with conventional forms; for instance, more research should be conducted with the outline form of report, such as that used in this experiment. Experimentation may reveal that the unorthodox outline form of report, or some form approximating the military staff study, is more effective than the conventional prose form now used in administrative communications. Moreover, experiments should be conducted with administrative communications to test the effect on comprehension of both organization and disorganization, especially since some form of disorganization seems to be the norm in many communications. In the Beighley experiments previously cited, Beighley found that listener comprehension of organized material was not statistically superior or inferior to comprehension of disorganized material. His conclusion that "there is much unknown about the functioning of organization . . . in comprehension" is borne out by the results of this current experiment.

The search for "the best method of presentation" is such a long-range goal as to be seemingly out of reach; but a continuing search for better, more effective methods of presenting typewritten administrative communications should be carried on and should prove rewarding.
SELECTED BIBLIOGRAPHY

Books


**Periodicals**


Miscellaneous

Appley, Lawrence A., President, American Management Association, in a television series entitled "Managers in Action" over Station WVUE-TV, Channel 12, New Orleans, Louisiana, April 29 - July 22, 1966.
APPENDIX NUMBER 1

MEMORANDUM REPORT IN LOGICAL ORDER WITHOUT CAPTIONS,
USING ELITE TYPE AND SINGLE LINE SPACING
MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

The problem facing the company is to improve the fitting of children's shoes in the juvenile shoe departments. Improvements in fittings will reduce the high rate of returns due to improper fittings. The loss due to the returns of poorly-fitted shoes averaged $725.00 per juvenile department last year. In addition to this measurable loss, there is surely a loss due to dissatisfied customers' not returning for additional purchases. A survey of 100 customers returning children's shoes shows that all the shoes were returned for the same reason: the shoes did not fit.

The buyers for the Juvenile Shoe Division, Mr. John Beech, has proposed as a solution of our problem that the company purchase a number of Shoemaster x-ray machines to improve the fitting of shoes in our stores, particularly in the juvenile shoe departments. The Shoemaster machines assist in fitting shoes by measuring the foot and then taking a picture of (fluoroscoping) the foot inside the shoe. The Shoemaster machines cost $325 each, have an estimated ten-year life, and carry five-year parts and service warranties. Installation is simple; they can be plugged into ordinary electric outlets. Only one machine is needed in each store.

Users who favor the Shoemaster say that the machine is a valuable aid in fitting shoes because it permits the salesman and the customer to see exactly how the foot fits inside the shoe. Fifty stores in the Shoe Hill chain are using the Shoemaster, and they report that returns due to poor fittings have decreased 75 per cent. A similar experience in our juvenile shoe departments would cut our losses due to poor fittings to such an extent that the machines would pay for themselves in less than one year.

Current annual losses per department due to poor fittings $ 725.00
Gross savings with Shoemaster (75% of $725.00) $ 543.75
Cost of Shoemaster machine (1 per store) 325.00
Net savings in first year in each store $ 218.75

The Three-Coin chain stores use the Shoemaster in each of their 600 shoe departments, and their salesmen are highly pleased with the machine. The salesmen report that the Shoemaster permits quicker and better fittings, which results in their selling more shoes and thereby
earning higher commissions. The ten stores in the New Haven chain say the Shoemaster is the "greatest thing since the invention of soles for shoes"; and they feature the use of the Shoemaster in their newspaper, radio, and television advertising. The consensus seems to be that as far as being a valuable aid to good shoe-fitting is concerned, the Shoemaster and similar fluoroscope machines are fulfilling their purpose.

Numerous objections to the use of the Shoemaster have been voiced, however. The foremost objection is the fact that the Shoemaster is an x-ray machine. Known as a fluoroscope, it works by radiation. It is generally believed that too much radiation is harmful to one's health. The long-run effect of excessive radiation on future generations is not known but is feared. On inspection, a number of fluoroscopes in use (not necessarily the Shoemaster) have been found to be defective and to give off several times more radiation than is necessary. Also, one national magazine (People's Digest) reports that more than 10,000 shoe-fitting fluoroscopes are being used by 40,000 shoe salesmen who have not received any professional training in the administration of radiation. The Michigan Department of Health reports that over 85 per cent of the 500 machines checked are defective and give too large a dose of radiation in the fitting of shoes. The Michigan report also states that professionally trained radiologists should be on hand to operate the fluoroscopes, provided, of course, that the machines were made safe for use.

Shoe-fitting experts have testified that fluoroscopes are not needed to fit shoes properly. The American Medical Association and the American Roentgen Ray Society are campaigning to have shoe-fitting fluoroscopes outlawed. And the American College of Radiology has prepared a detailed manual on the Harmful effects of too much exposure to radiation. The manual displays this warning very prominently on the back cover: "NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!" The manual warns that exposure to too much radiation could be harmful to future generations.

In summary, improper fitting of children's shoes in our juvenile shoe departments is now costing the company about $725 per store per year. Better fitting of children's shoes could reduce this loss considerably. The Shoemaster has proved to be a valuable aid in fitting shoes properly in other stores. The Shoemaster and similar fluoroscopes operate by radiation, however, and are considered unsafe by medical and health authorities. The use of these machines for fitting shoes probably will be stopped or greatly reduced by legislation in the near future. Many people have a deep fear of radiation and may not shop in stores using fluoroscopes.

I recommend that the Foot-Ease Shoe Company not purchase the Shoemaster or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments.
Carrying out the second part will permit the company to realize increased sales by advertising our use of medically-approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

1. That the company start a training program to teach our salesmen how to fit shoes properly. Proper fitting of children's shoes, according to medical experts, involves the following points:
   a. Size—fit the shoe to the larger foot.
   b. Length—fit the shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap—select shoe styles that are roomy in height and width.
   d. Widest part of shoe—fit to the ball of the foot.
   e. Heel—fit heels snug but not tight.
   f. Shoe top—select for close fitting but not too high for ankle bones.
   g. Standing comfort—fit snug but not cramped over instep; no bumps or ridges.
   h. Walking comfort—fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 2

MEMORANDUM REPORT IN LOGICAL ORDER WITHOUT CAPTIONS,
USING ELITE TYPE AND ONE AND ONE-HALF LINE SPACING
FOOT-EASE SHOE COMPANY
Baton Rouge, Louisiana
July 28, 1966

MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

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I recommend that the Foot Ease Shoe Company not purchase the Shoemaster or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments. Carrying out the second part will permit the company to realize increased sales by advertising our use of medically-approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

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   e. Heel -- fit heels snug but not tight.
f. Shoe top--select for close fitting but not too high for ankle bones.

g. Standing comfort--fit snug but not cramped over instep; no bumps or ridges.

h. Walking comfort--fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 3

MEMORANDUM REPORT IN LOGICAL ORDER WITHOUT CAPTIONS,
USING PICA TYPE AND SINGLE LINE SPACING
FOOT-EASE SHOE COMPANY
Baton Rouge, Louisiana
July 28, 1966

MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

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Current annual losses per department due to poor fittings

<table>
<thead>
<tr>
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<tbody>
<tr>
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</tr>
<tr>
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I recommend that the Foot-Ease Shoe Company not purchase the Shoemaster or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments. Carrying out the second part will permit the company to realize increased sales by advertising our use of medically-approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

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   g. Standing comfort—fit snug but not cramped over instep; no bumps or ridges.
   h. Walking comfort—fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 4

MEMORANDUM REPORT IN LOGICAL ORDER WITH CAPTIONS,

USING ELITE TYPE AND SINGLE LINE SPACING
MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Statement of the problem

The problem facing the company is to improve the fitting of children's shoes in the juvenile shoe departments. Improvements in fittings will reduce the high rate of returns due to improper fittings. The loss due to the returns of poorly-fitted shoes averaged $725.00 per juvenile department last year. In addition to this measurable loss, there is surely a loss due to dissatisfied customers' not returning for additional purchases. A survey of 100 customers returning children's shoes shows that all the shoes were returned for the same reason: the shoes did not fit.

Proposed solution of the problem

The buyer for the Juvenile Shoe Division, Mr. John Beech, has proposed as a solution of our problem that the company purchase a number of Shoemaster x-ray machines to improve the fitting of shoes in our stores, particularly in the juvenile shoe departments. The Shoemaster machines assist in fitting shoes by measuring the foot and then taking a picture of (fluoroscoping) the foot inside the shoe. The Shoemaster machines cost $325 each, have an estimated ten-year life, and carry five-year parts and service warranties. Installation is simple; they can be plugged into ordinary electric outlets. Only one machine is needed in each store.

Discussion of the proposed solution

Points in favor of the Shoemaster. Users who favor the Shoemaster say that the machine is a valuable aid in fitting shoes because it permits the salesman and the customer to see exactly how the foot fits inside the shoe. Fifty stores in the Shoe Hill chain are using the Shoemaster, and they report that returns due to poor fittings have decreased 75 per cent. A similar experience in our juvenile shoe departments would cut our losses due to poor fittings to such an extent that the machines would pay for themselves in less than one year.

- Current annual losses per department due to poor fittings $725.00
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Factors unfavorable to use of the Shoemaster. Numerous objections to the use of the Shoemaster have been voiced, however. The foremost objection is the fact that the Shoemaster is an x-ray machine. Known as a fluoroscope, it works by radiation. It is generally believed that too much radiation is harmful to one's health. The long-run effect of excessive radiation on future generations is not known but is feared. On inspection, a number of fluoroscopes in use (not necessarily the Shoemaster) have been found to be defective and to give off several times more radiation than is necessary. Also, one national magazine (People's Digest) reports that more than 10,000 shoe-fitting fluoroscopes are being used by 40,000 shoe salesmen who have not received any professional training in the administration of radiation. The Michigan Department of Health reports that over 85 per cent of the 500 machines checked are defective and give too large a dose of radiation in the fitting of shoes. The Michigan report also states that professionally trained radiologists should be on hand to operate the fluoroscopes, provided, of course, that the machines were made safe for use.

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Summary

In summary, improper fitting of children's shoes in our juvenile shoe departments is now costing the company about $725 per store per year. Better fitting of children's shoes could reduce this loss considerably. The Shoemaster has proved to be a valuable aid in fitting shoes properly in other stores. The Shoemaster and similar fluoroscopes operate by radiation, however, and are considered unsafe by medical and health authorities. The use of these machines for fitting shoes probably will be stopped or greatly reduced by legislation in the near future. Many people have a deep fear of radiation and may not shop in stores using fluoroscopes.
Recommendations

I recommend that the Foot-Ease Shoe Company not purchase the Shoe-master or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments. Carrying out the second part will permit the company to realize increased sales by advertising our use of medically-approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

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2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 5

MEMORANDUM REPORT IN LOGICAL ORDER WITH CAPTIONS,
USING ELITE TYPE AND ONE AND ONE-HALF LINE SPACING
FOOT-EASE SHOE COMPANY  
Baton Rouge, Louisiana  
July 28, 1966

MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

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   a. Size--fit the shoe to the larger foot.
   b. Length--fit the shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap--select shoe styles that are roomy in height and width.
   d. Widest part of shoe--fit to the ball of the foot.
   e. Heel--fit heels snug but not tight.
   f. Shoe top--select for close fitting but not too high for ankle bones.
   g. Standing comfort--fit snug but not cramped over instep; no bumps or ridges.
   h. Walking comfort--fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 6

MEMORANDUM REPORT IN LOGICAL ORDER WITH CAPTIONS,

USING PICA TYPE AND SINGLE LINE SPACING
MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President

FROM: Harry Rollins, Sales Manager

SUBJECT: Report on the desirability of purchasing Shoe­master x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Statement of the problem

The problem facing the company is to improve the fitting of children's shoes in the juvenile shoe departments. Improvements in fittings will reduce the high rate of returns due to improper fittings. The loss due to the returns of poorly-fitted shoes averaged $725.00 per juvenile department last year. In addition to this measurable loss, there is surely a loss due to dissatisfied customers' not returning for additional purchases. A survey of 100 customers returning children's shoes shows that all the shoes were returned for the same reason: the shoes did not fit.

Proposed solution of the problem

The buyer for the Juvenile Shoe Division, Mr. John Beech, has proposed as a solution to our problem that the company purchase a number of Shoemaster x-ray machines to improve the fitting of shoes in our stores, particularly in the juvenile shoe departments. The Shoemaster machines assist in fitting shoes by measuring the foot and then taking a picture of (fluoroscoping) the foot inside the shoe. The Shoemaster machines cost $325 each, have an estimated ten-year life, and carry five-year parts and service warranties. Installation is simple; they can be plugged into ordinary electric outlets. Only one machine is needed in each store.

Discussion of the proposed solution

Points in favor of the Shoemaster. Users who favor the Shoemaster say that the machine is a valuable aid in fitting shoes because it permits the salesman and the customer to see exactly how the foot fits inside the shoe. Fifty stores in the Shoe Hill chain are using the Shoemaster, and they report that returns due to poor fittings have decreased 75 per cent. A similar experience in our
juvenile shoe departments would cut our losses due to poor fittings to such an extent that the machines would pay for themselves in less than one year.

Current annual losses per department due to poor fittings $725.00

Gross savings with Shoemaster (75% of $725.00) $543.75
Cost of Shoemaster machine (1 per store) 325.00
Net savings in first year in each store $218.75

The Three-Coin chain stores use the Shoemaster in each of their 600 shoe departments, and their salesmen are highly pleased with the machine. The salesmen report that the Shoemaster permits quicker and better fittings, which results in their selling more shoes and thereby earning higher commissions. The ten stores in the New Haven chain say the Shoemaster is the "greatest thing since the invention of soles for shoes"; and they feature the use of the Shoemaster in their newspaper, radio, and television advertising. The consensus seems to be that as far as being a valuable aid to good shoe-fitting is concerned, the Shoemaster and similar fluoroscope machines are fulfilling their purpose.

Factors unfavorable to use of the Shoemaster. Numerous objections to the use of the Shoemaster have been voiced, however. The foremost objection is the fact that the Shoemaster is an x-ray machine. Known as a fluoroscope, it works by radiation. It is generally believed that too much radiation is harmful to one's health. The long-run effect of excessive radiation on future generations is not known but is feared. On inspection, a number of fluoroscopes in use (not necessarily the Shoemaster) have been found to be defective and to give off several times more radiation than is necessary. Also, one national magazine (People's Digest) reports that more than 10,000 shoe-fitting fluoroscopes are being used by 40,000 shoe salesmen who have not received any professional training in the administration of radiation. The Michigan Department of Health reports that over 85 per cent of the 500 machines checked are defective and give too large a dose of radiation in the fitting of shoes. The Michigan report also states that professionally trained radiologists should be on hand to operate the fluoroscopes, provided, of course, that the machines were made safe for use.

Shoe-fitting experts have testified that fluoroscopes are not needed to fit shoes properly. The American Medical Association and the American Roentgen Ray Society are campaigning to have shoe-fitting fluoroscopes outlawed.
And the American College of Radiology has prepared a detailed manual on the harmful effects of too much exposure to radiation. The manual displays this warning very prominently on the back cover: "NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!" The manual warns that exposure to too much radiation could be harmful to future generations.

Summary

In summary, improper fitting of children's shoes in our juvenile shoe departments is now costing the company about $725 per store per year. Better fitting of children's shoes could reduce this loss considerably. The Shoemaster has proved to be a valuable aid in fitting shoes properly in other stores. The Shoemaster and similar fluoroscopes operate by radiation, however, and are considered unsafe by medical and health authorities. The use of these machines for fitting shoes probably will be stopped or greatly reduced by legislation in the near future. Many people have a deep fear of radiation and may not shop in stores using fluoroscopes.

Recommendations

I recommend that the Foot-Ease Shoe Company not purchase the Shoemaster or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments. Carrying out the second part will permit the company to realize increased sales by advertising our use of medically-approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

1. That the company start a training program to teach our salesmen how to fit shoes properly. Proper fitting of children's shoes, according to medical experts, involves the following points:

   a. Size—fit the shoe to the larger foot.
   b. Length—fit the shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap—select shoe styles that are roomy in height and width.
   d. Widest part of shoe—fit to the ball of the foot.
   e. Heel—fit heels snug but not tight.
f. Shoe top--select for close fitting but not too high for ankle bones.
g. Standing comfort--fit snug but not cramped over instep; no bumps or ridges.
h. Walking comfort--fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 7

MEMORANDUM REPORT IN PSYCHOLOGICAL ORDER WITH CAPTIONS,

USING ELITE TYPE AND SINGLE LINE SPACING
FOOT-EASE SHOE COMPANY
Baton Rouge, Louisiana
July 28, 1966

MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Recommendations

I recommend that the Foot-Ease Shoe Company not purchase the Shoemaster or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments. Carrying out the second part will permit the company to realize increased sales by advertising our use of medically-approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

1. That the company start a training program to teach our salesmen how to fit shoes properly. Proper fitting of children's shoes, according to medical experts, involves the following points:
   a. Size--fit the shoe to the larger foot.
   b. Length--fit the shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap--select shoe styles that are roomy in height and width.
   d. Widest part of shoe--fit to the ball of the foot.
   e. Heel--fit heels snug but not tight.
   f. Shoe top--select for close fitting but not too high for ankle bones.
   g. Standing comfort--fit snug but not cramped over instep; no bumps or ridges.
   h. Walking comfort--fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.

Statement of the problem

The problem facing the company is to improve the fitting of children's shoes in the juvenile shoe departments. Improvements in fittings will reduce the high rate of returns due to improper fittings. The loss due to the returns of poorly-fitted shoes averaged $725.00
per juvenile department last year. In addition to this measurable loss, there is surely a loss due to dissatisfied customers not returning for additional purchases. A survey of 100 customers returning children's shoes shows that all the shoes were returned for the same reason: the shoes did not fit.

Proposed solution of the problem

The buyer for the Juvenile Shoe Division, Mr. John Beech, has proposed as a solution of our problem that the company purchase a number of Shoemaster x-ray machines to improve the fitting of shoes in our stores, particularly in the juvenile shoe departments. The Shoemaster machines assist in fitting shoes by measuring the foot and then taking a picture of (fluoroscopy) the foot inside the shoe. The Shoemaster machines cost $325 each, have an estimated ten-year life, and carry five-year parts and service warranties. Installation is simple; they can be plugged into ordinary electric outlets. Only one machine is needed in each store.

Discussion of the proposed solution

Points in favor of the Shoemaster. Users who favor the Shoemaster say that the machine is a valuable aid in fitting shoes because it permits the salesman and the customer to see exactly how the foot fits inside the shoe. Fifty stores in the Shoe Hill chain are using the Shoemaster, and they report that returns due to poor fittings have decreased 75 per cent. A similar experience in our juvenile shoe departments would cut our losses due to poor fittings to such an extent that the machines would pay for themselves in less than one year.

Current annual losses per department due to poor fittings 725.00
Gross savings with Shoemaster (75% of $725.00) 543.75
Cost of Shoemaster machine (1 per store) 325.00
Net savings in first year in each store 218.75

The Three-Coin chain stores use the Shoemaster in each of their 600 shoe departments, and their salesmen are highly pleased with the machine. The salesmen report that the Shoemaster permits quicker and better fittings, which results in their selling more shoes and thereby earning higher commissions. The ten stores in the New Haven chain say the Shoemaster is the "greatest thing since the invention of soles for shoes"; and they feature the use of the Shoemaster in their newspaper, radio, and television advertising. The consensus seems to be that as far as being a valuable aid to good shoe-fitting is concerned, the Shoemaster and similar fluoroscope machines are fulfilling their purpose.

Factors unfavorable to use of the Shoemaster. Numerous objections to the use of the Shoemaster have been voiced, however. The foremost objection is the fact that the Shoemaster is an x-ray machine. Known as a fluoroscope, it works by radiation. It is generally believed that too much radiation is harmful to one's health. The long-run effect of excessive radiation on future generations is not known but
is feared. On inspection, a number of fluoroscopes in use (not necessarily the Shoemaster) have been found to be defective and to give off several times more radiation than is necessary. Also, one national magazine (People's Digest) reports that more than 10,000 shoe-fitting fluoroscopes are being used by 40,000 shoe salesmen who have not received any professional training in the administration of radiation. The Michigan Department of Health reports that over 85 per cent of the 500 machines checked are defective and give too large a dose of radiation in the fitting of shoes. The Michigan report also states that professionally trained radiologists should be on hand to operate the fluoroscopes, provided, of course, that the machines were made safe for use.

Shoe-fitting experts have testified that fluoroscopes are not needed to fit shoes properly. The American Medical Association and the American Roentgen Ray Society are campaigning to have shoe-fitting fluoroscopes outlawed. And the American College of Radiology has prepared a detailed manual on the harmful effects of too much exposure to radiation. The manual displays this warning very prominently on the back cover: "NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!" The manual warns that exposure to too much radiation could be harmful to future generations.

Summary

In summary, improper fitting of children's shoes in our juvenile shoe departments is now costing the company about $725 per store per year. Better fitting of children's shoes could reduce this loss considerably. The Shoemaster has proved to be a valuable aid in fitting shoes properly in other stores. The Shoemaster and similar fluoroscopes operate by radiation, however, and are considered unsafe by medical and health authorities. The use of these machines for fitting shoes probably will be stopped or greatly reduced by legislation in the near future. Many people have a deep fear of radiation and may not shop in stores using fluoroscopes.
APPENDIX NUMBER 8

MEMORANDUM REPORT IN PSYCHOLOGICAL ORDER WITH CAPTIONS,

USING ELITE TYPE AND ONE AND ONE-HALF LINE SPACING
FOOT-EASE SHOE COMPANY  
Baton Rouge, Louisiana  
July 28, 1966

MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Recommendations

I recommend that the Foot-Ease Shoe Company not purchase the Shoemaster or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments. Carrying out the second part will permit the company to realize increased sales by advertising our use of medically approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

1. That the company start a training program to teach our salesmen how to fit shoes properly. Proper fitting of children's shoes, according to medical experts, involves the following points:
   a. Size—fit the shoe to the larger foot.
   b. Length—fit the shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap—select shoe styles that are roomy in height and width.
   d. Widest part of shoe—fit to the ball of the foot.
   e. Heel—fit heels snug but not tight.
   f. Shoe top—select for close fitting but not too high for ankle bones.
   g. Standing comfort—fit snug but not cramped over instep; no bumps or ridges.
   h. Walking comfort—fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company...
stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.

Statement of the problem

The problem facing the company is to improve the fitting of children's shoes in the juvenile shoe departments. Improvements in fittings will reduce the high rate of returns due to improper fittings. The loss due to the returns of poorly-fitted shoes averaged $725.00 per juvenile department last year. In addition to this measurable loss, there is surely a loss due to dissatisfied customers' not returning for additional purchases. A survey of 100 customers returning children's shoes shows that all the shoes were returned for the same reason: the shoes did not fit.

Proposed solution of the problem

The buyer for the Juvenile Shoe Division, Mr. John Beech, has proposed as a solution of our problem that the company purchase a number of Shoemaster x-ray machines to improve the fitting of shoes in our stores, particularly in the juvenile shoe departments. The Shoemaster machines assist in fitting shoes by measuring the foot and then taking a picture of (fluoroscopying) the foot inside the shoe. The Shoemaster machines cost $325 each, have an estimated ten-year life, and carry five-year parts and service warranties. Installation is simple; they can be plugged into ordinary electric outlets. Only one machine is needed in each store.

Discussion of the proposed solution

Points in favor of the Shoemaster. Users who favor the Shoemaster say that the machine is a valuable aid in fitting shoes because it permits the salesman and the customer to see exactly how the foot fits inside the shoe. Fifty stores in the Shoe Hill chain are using the Shoemaster, and they report that returns due to poor fittings have decreased 75 per cent. A similar experience in our juvenile shoe departments would cut our losses due to poor fittings to such an extent that the machines would pay for themselves in less than one year.
Current annual losses per department due to poor fittings $ 725.00
Gross savings with Shoemaster (75% of $725.00) $ 543.75
Cost of Shoemaster machine (1 per store) 325.00
Net savings in first year in each store $ 218.75

The Three-Coin chain stores use the Shoemaster in each of their 600 shoe departments, and their salesmen are highly pleased with the machine. The salesmen report that the Shoemaster permits quicker and better fittings, which results in their selling more shoes and thereby earning higher commissions. The ten stores in the New Haven chain say the Shoemaster is the "greatest thing since the invention of soles for shoes"; and they feature the use of the Shoemaster in their newspaper, radio, and television advertising. The consensus seems to be that as far as being a valuable aid to good shoe-fitting is concerned, the Shoemaster and similar fluoroscope machines are fulfilling their purpose.

Factors unfavorable to use of the Shoemaster. Numerous objections to the use of the Shoemaster have been voiced, however. The foremost objection is the fact that the Shoemaster is an x-ray machine. Known as a fluoroscope, it works by radiation. It is generally believed that too much radiation is harmful to one's health. The long-run effect of excessive radiation on future generations is not known but is feared. On inspection, a number of fluoroscopes in use (not necessarily the Shoemaster) have been found to be defective and to give off several times more radiation than is necessary. Also, one national magazine (People's Digest) reports that more than 10,000 shoe-fitting fluoroscopes are being used by 40,000 shoe salesmen who have not received any professional training in the administration of radiation. The Michigan Department of Health reports that over 85 per cent of the 500 machines checked are defective and give too large a dose of radiation in the fitting of shoes. The Michigan report also states that professionally trained radiologists should be on hand to operate the fluoroscopes, provided, of course, that the machines were made safe for use.

Shoe-fitting experts have testified that fluoroscopes are not needed to fit shoes properly. The American Medical Association and
the American Roentgen Ray Society are campaigning to have shoe-fitting fluoroscopes outlawed. And the American College of Radiology has prepared a detailed manual on the harmful effects of too much exposure to radiation. The manual displays this warning very prominently on the back cover: "NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!" The manual warns that exposure to too much radiation could be harmful to future generations.

Summary

In summary, improper fitting of children's shoes in our juvenile shoe departments is now costing the company about $725 per store per year. Better fitting of children's shoes could reduce this loss considerably. The Shoemaster has proved to be a valuable aid in fitting shoes properly in other stores. The Shoemaster and similar fluoroscopes operate by radiation, however, and are considered unsafe by medical and health authorities. The use of these machines for fitting shoes probably will be stopped or greatly reduced by legislation in the near future. Many people have a deep fear of radiation and may not shop in stores using fluoroscopes.
APPENDIX NUMBER 9

MEMORANDUM REPORT IN PSYCHOLOGICAL ORDER WITH CAPTIONS,

USING PICA TYPE AND SINGLE LINE SPACING
MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President

FROM: Harry Rollins, Sales Manager

SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Recommendations

I recommend that the Foot-Ease Shoe Company not purchase the Shoemaster or similar fluoroscope machines for use in our stores. An alternate two-part recommendation is detailed below. Carrying out the first part of the recommendation should solve our problem, improving the fitting of children's shoes in the juvenile shoe departments. Carrying out the second part will permit the company to realize increased sales by advertising our use of medically-approved techniques in fitting shoes. The alternate two-part recommendation is as follows:

1. That the company start a training program to teach our salesmen how to fit shoes properly. Proper fitting of children's shoes, according to medical experts, involves the following points:

   a. Size—fit the shoe to the larger foot.
   b. Length—fit the shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap—select shoe styles that are roomy in height and width.
   d. Widest part of shoe—fit to the ball of the foot.
   e. Heel—fit heels snug but not tight.
   f. Shoe top—select for close fitting but not too high for ankle bones.
   g. Standing comfort—fit snug but not cramped over instep; no bumps or ridges.
   h. Walking comfort—fit for flexibility over ball of foot to allow for some spreading when foot bends.

2. That, on the conclusion of the training program, the company stress in its advertising its use of medically-approved techniques to insure properly fitted shoes for all customers.
Statement of the problem

The problem facing the company is to improve the fitting of children's shoes in the juvenile shoe departments. Improvements in fittings will reduce the high rate of returns due to improper fittings. The loss due to the returns of poorly-fitted shoes averaged $725.00 per juvenile department last year. In addition to this measurable loss, there is surely a loss due to dissatisfied customers' not returning for additional purchases. A survey of 100 customers returning children's shoes shows that all the shoes were returned for the same reason: the shoes did not fit.

Proposed solution of the problem

The buyer for the Juvenile Shoe Division, Mr. John Beech, has proposed as a solution of our problem that the company purchase a number of Shoemaster x-ray machines to improve the fitting of shoes in our stores, particularly in the juvenile shoe departments. The Shoemaster machines assist in fitting shoes by measuring the foot and then taking a picture of (fluoroscoping) the foot inside the shoe. The Shoemaster machines cost $325 each, have an estimated ten-year life, and carry five-year parts and service warranties. Installation is simple; they can be plugged into ordinary electric outlets. Only one machine is needed in each store.

Discussion of the proposed solution

Points in favor of the Shoemaster. Users who favor the Shoemaster say that the machine is a valuable aid in fitting shoes because it permits the salesman and the customer to see exactly how the foot fits inside the shoe. Fifty stores in the Shoe Hill chain are using the Shoemaster, and they report that returns due to poor fittings have decreased 75 per cent. A similar experience in our juvenile shoe departments would cut our losses due to poor fittings to such an extent that the machines would pay for themselves in less than one year.

Current annual losses per department due to poor fittings $725.00
Gross savings with Shoemaster (75% of $725.00) $543.75
Cost of Shoemaster machine (1 per store) $325.00
Net savings in first year in each store $218.75

The Three-Coin chain stores use the Shoemaster in each of their 600 shoe departments, and their salesmen are highly pleased with the machine. The salesmen report that the
Shoemaster permits quicker and better fittings, which results in their selling more shoes and thereby earning higher commissions. The ten stores in the New Haven chain say the Shoemaster is the "greatest thing since the invention of soles for shoes"; and they feature the use of the Shoemaster in their newspaper, radio, and television advertising. The consensus seems to be that as far as being a valuable aid to good shoe-fitting is concerned, the Shoemaster and similar fluoroscope machines are fulfilling their purpose.

Factors unfavorable to use of the Shoemaster. Numerous objections to the use of the Shoemaster have been voiced, however. The foremost objection is the fact that the Shoemaster is an x-ray machine. Known as a fluoroscope, it works by radiation. It is generally believed that too much radiation is harmful to one's health. The long-run effect of excessive radiation on future generations is not known but is feared. On inspection, a number of fluoroscopes in use (not necessarily the Shoemaster) have been found to be defective and to give off several times more radiation than is necessary. Also, one national magazine (People's Digest) reports that more than 10,000 shoe-fitting fluoroscopes are being used by 40,000 shoe salesmen who have not received any professional training in the administration of radiation. The Michigan Department of Health reports that over 85 per cent of the 500 machines checked are defective and give too large a dose of radiation in the fitting of shoes. The Michigan report also states that professionally trained radiologists should be on hand to operate the fluoroscopes, provided, of course, that the machines were made safe for use.

Shoe-fitting experts have testified that fluoroscopes are not needed to fit shoes properly. The American Medical Association and the American Roentgen Ray Society are campaigning to have shoe-fitting fluoroscopes outlawed. And the American College of Radiology has prepared a detailed manual on the harmful effects of too much exposure to radiation. The manual displays this warning very prominently on the back cover: "NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!" The manual warns that exposure to too much radiation could be harmful to future generations.

Summary

In summary, improper fitting of children's shoes in our juvenile shoe departments is now costing the company about $725 per store per year. Better fitting of children's shoes could reduce this loss considerably. The Shoemaster
has proved to be a valuable aid in fitting shoes properly in other stores. The Shoemaster and similar fluoroscopes operate by radiation, however, and are considered unsafe by medical and health authorities. The use of these machines for fitting shoes probably will be stopped or greatly reduced by legislation in the near future. Many people have a deep fear of radiation and may not shop in stores using fluoroscopes.
APPENDIX NUMBER 10

MEMORANDUM REPORT IN LOGICAL ORDER IN OUTLINE FORM,

USING ELITE TYPE AND SINGLE LINE SPACING
MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Statement of the problem

To improve the fitting of children's shoes in the juvenile shoe departments of the company.

a. Average annual loss per juvenile department due to poorly-fitted shoes is $725.00.
b. Dissatisfied customers may mean additional losses in sales.
c. Survey of 100 customers reveals all returns are due to poor fittings.

Proposed solution of the problem

Buyer for Juvenile Shoe Division, Mr. John Beech, proposes purchase of Shoemaster x-ray machines to improve the fitting of shoes, especially children's shoes.

a. Shoemaster assists in fitting shoes.
   (1) It measures the foot.
   (2) It takes a picture of (fluoroscopes) the foot inside the shoe.
b. Shoemaster machines cost $325 each.
   (1) They have an estimated 10-year life.
   (2) They carry a 5-year parts and service warranty.
c. Installation is simple; machine just plugs into ordinary electric outlet.
d. Only one machine is needed in each store.

Discussion of the proposed solution

1. Points in favor of the Shoemaster.
   a. Users say it is a valuable aid in fitting shoes.
   b. Salesman and customers see how the foot fits inside the shoe.
   c. Fifty Shoe Hill chain stores report that use of Shoemaster reduced by 75 per cent returns due to poor fittings.
   d. A 75 per cent decrease in our returns due to poor fittings would result in machines paying for themselves in the first year;
Current annual loss per department due to poor fittings $725.00
Gross savings with Shoemaster (75% of $725.00) $543.75
Cost of Shoemaster machine (1 per store) 325.00
Net savings in first year in each store $218.75

e. The Three-Coin chain stores are using 600 Shoemaster machines.
   (1) Salesmen are all highly pleased with the Shoemaster.
   (2) Salesmen fit shoes quicker and better with Shoemaster.
      (a) They sell more shoes.
      (b) They earn higher commissions.

f. Ten stores in New Haven chain report in favor of Shoemaster.
   (1) They say it is the "greatest thing since the invention of soles for shoes."
   (2) They feature Shoemaster in newspaper, radio, and TV advertising.

g. Consensus of users favor Shoemaster as a valuable aid to good shoe-fitting.

2. Factors unfavorable to use of the Shoemaster.
   a. Shoemaster is an x-ray machine (called "fluoroscope") and works by radiation.
   b. People generally believe that too much radiation is harmful.
   c. Effect of excessive radiation on future generations is not known but feared.
   d. Many fluoroscopes in use are defective, giving off too much radiation.
   e. People's Digest magazine's survey condemns use of fluoroscopes.
      (1) It says that 10,000 fluoroscopes are in use by 40,000 shoe salesmen.
      (2) It states that shoe salesmen are not professionally trained in administration of radiation.

f. Michigan Department of Health report on fluoroscopes is unfavorable.
   (1) Survey shows that 85% of machines inspected are defective.
   (2) Inspection reveals that machines give too large a dose of radiation in fitting shoes.
   (3) Report says only professionally trained radiologists should use such machines.

h. Shoe experts say fluoroscopes are not needed to fit shoes properly.
   i. American Medical Association and American Roentgen Ray Society want shoe-fitting fluoroscopes outlawed.
      (1) It warns that excessive radiation is harmful to future generations.
      (2) It displays admonition on back cover: NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!
Summary

1. Improper fittings of children’s shoes cost $725 per store per year.
2. Better fittings could reduce or eliminate this cost.
3. Shoemaster (fluoroscope) machines have proved to be valuable in fitting shoes properly.
4. Fluoroscopes are considered unsafe by medical and health authorities.
5. Use of fluoroscopes probably will be outlawed in near future.
6. Fear of radiation may keep people from shopping in stores using fluoroscopes.

Recommendations

1. Do not purchase Shoemaster machines.
2. Start a training program to teach salesmen how to fit children’s shoes in manner approved by medical experts. Observe following points:
   a. Size—fit the shoe to the larger foot.
   b. Length—fit shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap—select shoe styles that are roomy in height and width.
   d. Width—fit widest part of shoe to the ball of the foot.
   e. Heel—fit heels snug but not tight.
   f. Shoe top—select for close fitting but not too high for ankle bones.
   g. Standing comfort—fit snug but not cramped over instep; no bumps or ridges.
   h. Walking comfort—fit for flexibility over ball of foot to allow for some spreading when foot bends.
3. Stress in our advertising our use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 11

MEMORANDUM REPORT IN LOGICAL ORDER IN OUTLINE FORM,
USING ELITE TYPE AND ONE AND ONE-HALF LINE SPACING
MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Statement of the problem
To improve the fitting of children's shoes in the juvenile shoe departments of the company.

a. Average annual loss per juvenile department due to poorly-fitted shoes is $725.00.

b. Dissatisfied customers may mean additional losses in sales.

c. Survey of 100 customers reveals all returns are due to poor fittings.

Proposed solution of the problem
Buyer for Juvenile Shoe Division, Mr. John Beech, proposes purchase of Shoemaster x-ray machines to improve the fitting of shoes, especially children's shoes.

a. Shoemaster assists in fitting shoes.
   (1) It measures the foot.
   (2) It takes a picture of (fluoroscopes) the foot inside the shoe.

b. Shoemaster machines cost $325 each.
   (1) They have an estimated 10-year life.
   (2) They carry a 5-year parts and service warranty.

c. Installation is simple; machine just plugs into ordinary electric outlet.

d. Only one machine is needed in each store.

Discussion of the proposed solution
1. Points in favor of the Shoemaster.
   a. Users say it is a valuable aid in fitting shoes.
   b. Salesman and customers see how the foot fits inside the shoe.
   c. Fifty Shoe Hill chain stores report that use of Shoemaster reduced by 75 per cent returns due to poor fittings.
d. A 75 per cent decrease in our returns due to poor fittings would result in machines' paying for themselves in the first year:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current annual loss per department due to poor fittings</td>
<td>$725.00</td>
</tr>
<tr>
<td>Gross savings with Shoemaster (75% of $725.00)</td>
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</tr>
<tr>
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<td>$325.00</td>
</tr>
<tr>
<td>Net savings in first year in each store</td>
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</tr>
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e. The Three-Coin chain stores are using 600 Shoemaster machines.

(1) Salesmen are all highly pleased with the Shoemaster.

(2) Salesmen fit shoes quicker and better with Shoemaster.

   (a) They sell more shoes.

   (b) They earn higher commissions.

f. Ten stores in New Haven chain report in favor of Shoemaster.

(1) They say it is the "greatest thing since the invention of soles for shoes."

(2) They feature Shoemaster in newspaper, radio, and TV advertising.

g. Consensus of users favor Shoemaster as a valuable aid to good shoe-fitting.

2. Factors unfavorable to use of the Shoemaster.

a. Shoemaster is an x-ray machine (called "fluoroscope") and works by radiation.

b. People generally believe that too much radiation is harmful.

c. Effect of excessive radiation on future generations is not known but feared.

d. Many fluoroscopes in use are defective, giving off too much radiation.

e. People's Digest magazine's survey condemns use of fluoroscopes.

   (1) It says that 10,000 fluoroscopes are in use by 40,000 shoe salesmen.

   (2) It states that shoe salesmen are not professionally trained in administration of radiation.

f. Michigan Department of Health report on fluoroscopes is unfavorable.

   (1) Survey shows that 85% of machines inspected are defective.
(2) Inspection reveals that machines give too large a dose of radiation in fitting shoes.

(3) Report says only professionally trained radiologists should use such machines.

g. Shoe experts say fluoroscopes are not needed to fit shoes properly.

h. American Medical Association and American Roentgen Ray Society want shoe-fitting fluoroscopes outlawed.


(1) It warns that excessive radiation is harmful to future generations.

(2) It displays admonition on back cover: NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!

Summary

1. Improper fittings of children's shoes cost $725 per store per year.

2. Better fittings could reduce or eliminate this cost.

3. Shoemaster (fluoroscope) machines have proved to be valuable in fitting shoes properly.

4. Fluoroscopes are considered unsafe by medical and health authorities.

5. Use of fluoroscopes probably will be outlawed in near future.

6. Fear of radiation may keep people from shopping in stores using fluoroscopes.

Recommendations

1. Do not purchase Shoemaster machines.

2. Start a training program to teach salesmen how to fit children's shoes in manner approved by medical experts. Observe following points:
   
   a. Size--fit the shoe to the larger foot.
   
   b. Length--fit shoes 1/2 to 3/4 inch longer than the longest toe.
   
   c. Toe cap--select shoe styles that are roomy in height and width.
   
   d. Width--fit widest part of shoe to the ball of the foot.
   
   e. Heel--fit heels snug but not tight.
   
   f. Shoe top--select for close fitting but not too high for ankle bones.
g. Standing comfort—fit snug but not cramped over instep; no bumps or ridges.

h. Walking comfort—fit for flexibility over ball of foot to allow for some spreading when foot bends.

3. Stress in our advertising our use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 12

MEMORANDUM REPORT IN LOGICAL ORDER IN OUTLINE FORM,
USING PICA TYPE AND SINGLE LINE SPACING
FOOT-EASE SHOE COMPANY
Baton Rouge, Louisiana
July 28, 1966

MEMORANDUM REPORT

TO: Mr. Jack C. Smith, President
FROM: Harry Rollins, Sales Manager
SUBJECT: Report on the desirability of purchasing Shoemaster x-ray machines for use in fitting shoes in the juvenile shoe departments of the company.

Statement of the problem

To improve the fitting of children's shoes in the juvenile shoe departments of the company.

a. Average annual loss per juvenile department due to poorly-fitted shoes is $725.00.
b. Dissatisfied customers may mean additional losses in sales.
c. Survey of 100 customers reveals all returns are due to poor fittings.

Proposed solution of the problem

Buyer for Juvenile Shoe Division, Mr. John Beech, proposes purchase of Shoemaster x-ray machines to improve the fitting of shoes, especially children's shoes.

a. Shoemaster assists in fitting shoes.
   (1) It measures the foot.
   (2) It takes a picture of (fluoroscopes) the foot inside the shoe.
b. Shoemaster machines cost $325 each.
   (1) They have an estimated 10-year life.
   (2) They carry a 5-year parts and service warranty.
c. Installation is simple; machine just plugs into ordinary electric outlet.
d. Only one machine is needed in each store.

Discussion of the proposed solution

1. Points in favor of the Shoemaster.

   a. Users say it is a valuable aid in fitting shoes.
   b. Salesman and customers see how the foot fits inside the shoe.
c. Fifty Shoe Hill chain stores report that use of Shoemaster reduced by 75 per cent returns due to poor fittings.

d. A 75 per cent decrease in our returns due to poor fittings would result in machines paying for themselves in the first year:

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e. The Three-Coin chain stores are using 600 Shoemaster machines.
   (1) Salesmen are all highly pleased with the Shoemaster.
   (2) Salesmen fit shoes quicker and better with Shoemaster.
      (a) They sell more shoes.
      (b) They earn higher commissions.

f. Ten stores in New Haven chain report in favor of Shoemaster.
   (1) They say it is the "greatest thing since the invention of soles for shoes."
   (2) They feature Shoemaster in newspaper, radio, and TV advertising.

g. Consensus of users favor Shoemaster as a valuable aid to good shoe-fitting.

2. Factors unfavorable to use of the Shoemaster.

a. Shoemaster is an x-ray machine (called "fluoroscope") and works by radiation.

b. People generally believe that too much radiation is harmful.

c. Effect of excessive radiation on future generations is not known but feared.

d. Many fluoroscopes in use are defective, giving off too much radiation.

e. People's Digest magazine's survey condemns use of fluoroscopes.
   (1) It says that 10,000 fluoroscopes are in use by 40,000 shoe salesmen.
   (2) It states that shoe salesmen are not professionally trained in administration of radiation.
f. Michigan Department of Health report on fluoroscopes is unfavorable.
   (1) Survey shows that 85% of machines inspected are defective.
   (2) Inspection reveals that machines give too large a dose of radiation in fitting shoes.
   (3) Report says only professionally trained radiologists should use such machines.

g. Shoe experts say fluoroscopes are not needed to fit shoes properly.

h. American Medical Association and American Roentgen Ray Society want shoe-fitting fluoroscopes outlawed.

   (1) It warns that excessive radiation is harmful to future generations.
   (2) It displays admonition on back cover: NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE!

Summary

1. Improper fittings of children's shoes cost $725 per store per year.
2. Better fittings could reduce or eliminate this cost.
3. Shoemaster (fluoroscope) machines have proved to be valuable in fitting shoes properly.
4. Fluoroscopes are considered unsafe by medical and health authorities.
5. Use of fluoroscopes probably will be outlawed in near future.
6. Fear of radiation may keep people from shopping in stores using fluoroscopes.

Recommendations

1. Do not purchase Shoemaster machines.
2. Start a training program to teach salesmen how to fit children's shoes in manner approved by medical experts. Observe following points:
   a. Size--fit the shoe to the larger foot.
   b. Length--fit shoes 1/2 to 3/4 inch longer than the longest toe.
   c. Toe cap--select shoe styles that are roomy in height and width.
   d. Width--fit widest part of shoe to the ball of the foot.
   e. Heel--fit heels snug but not tight.
f. Shoe top—select for close fitting but not too high for ankle bones.
g. Standing comfort—fit snug but not cramped over instep; no bumps or ridges.
h. Walking comfort—fit for flexibility over ball of foot to allow for some spreading when foot bends.

3. Stress in our advertising our use of medically-approved techniques to insure properly fitted shoes for all customers.
APPENDIX NUMBER 13

COVER SHEET AND INSTRUCTIONS

FOR THE READING AND COMPREHENSION EXAMINATION
COVER SHEET

Cover Sheet and Instructions for the Reading and Comprehension Examination

Examination Number ____________________________
Symbol ____________________________

Instructions

1. Do not start reading the material underneath this Cover Sheet until given the signal to do so.

2. Do the following now:
   a. Compare the Examination Number on this cover sheet with that on your answer sheet. The numbers should be the same; if they are not, change the examination number on your answer sheet to correspond with the number on this cover sheet.
   b. Fill in the information requested in the upper left section of your answer sheet.
   c. Read the material in the next paragraph.

3. This examination is intended to test your comprehension of the material presented. You will have a limited amount of time to read and study the material. Upon the given signal, turn to the material underneath this cover sheet and start reading it. Read and study the material until you are given the signal to stop. On the STOP signal, close the material and quit reading. On signal from the examiner, return the reading material to the examiner, keeping the answer sheet. After the examiner has picked up all the reading material, he will distribute a multiple-choice examination which is designed to test your comprehension of the material you have read.

4. Do not make any pencil marks on either the reading material or the examination sheets. Your answers are to be marked on the answer sheet.
APPENDIX NUMBER 14

ANSWER SHEET
ANSWER SHEET

Name_________________________________ Examination Number_______
Classification: Soph. ___; Jr. ___; Sr. ___
(Check one) Symbol ____________________
Sex: Male _______; Female _______
Major Field of Study ________________
Date _______________________________

Instructions

1. This answer sheet is given to you at the same time that you get the reading material. Read the instructions on the Cover Sheet and fill in the information requested at the top left of this Answer Sheet.

2. Each question on the examination has four choices labeled a, b, c, and d. Select that answer which you believe to be correct and circle the corresponding letter on this answer sheet. If you decide to change an answer, erase or scratch through your first answer and circle your new choice.

3. Do not make any marks on any material other than this Answer Sheet.

Multiple-choice answers: Example: 0. a (b) c d
1. a b c d
2. a b c d
3. a b c d
4. a b c d
5. a b c d
6. a b c d
7. a b c d
8. a b c d
9. a b c d
10. a b c d
11. a b c d
12. a b c d
13. a b c d
14. a b c d
15. a b c d
APPENDIX NUMBER 15

MULTIPLE-CHOICE EXAMINATION

FOR MEMORANDUM REPORT ON FOOT-EASE SHOE COMPANY
Multiple-choice examination for memorandum report on Foot-Ease Shoe Company.

Instructions: Do not make any marks on this examination. Select the answer which you consider best completes the statement presented and indicate your choice by circling the appropriate letter on the answer sheet. Select only one answer for each question.

1. The subject of the report concerns
   a. Training shoe salesmen in the juvenile shoe departments.
   b. The need for better fittings in the juvenile shoe departments.
   c. The desirability of purchasing Shoemaster machines for use in the stores of the company.
   d. The reduction of returns in the juvenile shoe departments.

2. The problem facing the Foot-Ease Shoe Company is
   a. To determine the economic feasibility of using Shoemaster x-ray machines in fitting shoes.
   b. To improve the fitting of children's shoes in the juvenile shoe departments.
   c. To reduce the high rate of return of children's shoes.
   d. To reduce the loss of revenue resulting from the high rate of returns.

3. The buyer for the Juvenile Shoe Division has proposed as a solution of the problem that the company
   a. Train salesmen to fit shoes better, especially children's shoes.
   b. Rent machines which fluoroscope the foot to determine the size needed.
   c. Use Shoemaster x-ray machines under the supervision of the American College of Radiology.
   d. Purchase a number of Shoemaster x-ray machines to improve the fitting of shoes.

4. The buyer apparently bases his proposal for a solution of the problem on the fact that
   a. The Shoemaster machines will soon pay for themselves.
   b. The American Medical Association approves this method of fitting shoes.
   c. Other companies have solved a similar problem with the use of Shoemaster machines.
   d. The company has been losing money due to returns of children's shoes.
5. The manual of the American College of Radiology says that
a. Excessive radiation may be harmful to future generations.
b. Only experts should use fluoroscopes in fitting shoes.
c. The Shoemaster x-rays the foot inside the shoe.
d. Radiation from fluoroscopes will harm untrained operators of
   the machines.

6. Proper shoe fitting, according to medical experts, involves the
   following point:
   a. Fitting the widest part of the shoe to the ball of the foot.
   b. Close fit over instep to control spread of foot.
   c. Fitting length of shoe 1/4 inch longer than the longest toe.
   d. Hiring trained radiologists to operate fluoroscopes.

7. The average loss per juvenile shoe department in the Foot-Ease
   Shoe Company last year because of returns of poorly-fitted shoes
   was
   a. $ 775  b. $ 525  c. $ 725  d. $ 543.75

8. By using the Shoemaster in their fifty stores, the Shoe Hill chain
   reduced returns due to poor fittings by
   a. 25 per cent  b. 85 per cent  c. 70 per cent  d. 75 per cent

9. The recommendation of the report is that
   a. The proposed solution be adopted.
   b. The proposed solution be adopted with certain revisions.
   c. The proposed solution not be adopted.
   d. The proposed solution not be adopted and that more advertis-
      ing be done.

10. Possible savings because of reduced returns due to better fittings
    with fluoroscopes will
    a. Pay the installation cost, which is expensive.
    b. Increase the advertising budget.
    c. Enable the machines to pay for themselves the first year.
    d. Permit installation of more than one machine in each store.
11. The statement "NEVER ALLOW YOUR CHILD TO STEP ON A SHOE-FITTING FLUOROSCOPE" appeared in a manual published by the
   b. American College of Radiology.
   d. American Roentgen Ray Society.

12. Users who favor using the Shoemaster and similar fluoroscopes say that
   a. The machines are a valuable aid in fitting shoes.
   b. Professionally trained radiologists are not needed to operate the machines.
   c. Savings generated by lowered returns will pay for the machines in less than one year.
   d. The fluoroscopes in use seldom, if ever, need adjustment.

13. The writer of the report expresses the opinion that
   a. Medical authorities are over-stating the case against using fluoroscopes in fitting shoes.
   b. The public is more concerned with well-fitted shoes than with the hazards of radiation.
   c. Technical training in radiology is too expensive for the company to undertake.
   d. Many people have a deep fear of radiation and may not shop in stores using fluoroscopes.

14. The sales manager recommends that the company
   a. Buy Shoemaster machines.
   b. Start a training program to teach its salesmen how to fit shoes properly.
   c. Revise its advertising budget to include public education in use of fluoroscopes.
   d. Train radiologists to sell shoes as well as to operate the fluoroscopes.

15. The writer of the report appears to be
   a. Primarily concerned with immediate profits.
   b. Concerned with the long-run public image of the Foot-Ease Shoe Company.
   c. Willing to use any expedient to eliminate the returns due to poorly-fitted shoes.
   d. Concerned with up-dating shoe-fitting practices.
APPENDIX NUMBER 16

ANALYSIS OF VARIANCE PROGRAM

FOR IBM 1620
SUPER ANALYSIS OF VARIANCE
for
IBM 1620
by
Lew D. Harkins

Purpose: Perform analysis of variance calculations on data without use of sorter to arrange factors in a certain order. Location of data on cards are selected through use of a parameter card, and sums of squares are corrected for influencing main effects and interactions. Means to be punched out are selected.

Limitations: Five (5) factors (R, A, B, C, D) in which R is used for replications, A is the main plot, B is the Split-plot, C is the Split-split-plot, and D is the Split-split-split-plot. Factors must be two (2) digits in size.

Observations must be from two (2) to eight (8) digits in size, (Fixed point). Sums are restricted to ten (10) digits in size, (Fixed point). Sums of Squares are restricted to twenty (20) digits in size, (fixed point). Number of observations must be 573 or less for 20 K machine; 1,684 or less for 40 K machine; 2,796 or less for 60 K machine. Unequal subcells are permissible; missing levels are not.

Input: By card; format specified for each problem by parameter card.

Output: By typewriter for Sums of Squares and degrees of freedom; by card punch for means.

Parameter Card

Col. 1 - 2 - Col. # of Low order position for factor R on Data Cards
" 3 - 4 - " " " " " " " " " " A " " " "
" 5 - 6 - " " " " " " " " " " B " " " "
" 7 - 8 - " " " " " " " " " " C " " " "
" 9 -10 - " " " " " " " " " " D " " " "
" 11-12 - " " High " " " " variable " "
" 13 -14 - " " Low " " " " " " " "
" 15 -18 - if multiple processing is to be done, this field contains n, the number of observations, for the data which follows. If only one problem is to be processed this field must contain zeros. (Also, the last problem in a file must be zeros in this field) This is due to last card indicator considerations.
The above fields on the parameter card must be flagged (X-punched) in the high order position. (Fields on the data cards need not be flagged in the high order position.)

The following columns on the parameter card are used for the selection of means to be punched out. If the column is blank or zero, means will not be punched for the main effect (or interaction) given for that column. If the column contains an X-punch (flag) then means for that main effect (interaction) will be punched. The mean for total must be selected if any means are to be punched.

Means:

| Col. 19 - Total | Col. 27 - C | Col. 35 - D | Col. 43 - RD |
| Col. 20 - R    | Col. 28 - AC | Col. 36 - AD | Col. 44 - RAD |
| Col. 21 - A    | Col. 29 - BC | Col. 37 - BD | Col. 45 - RBD |
| Col. 22 - RA   | Col. 30 - ABC | Col. 38 - ABD | Col. 46 - RABD |
| Col. 23 - B    | Col. 31 - RC | Col. 39 - CD | Col. 47 - RCD |
| Col. 24 - AB   | Col. 32 - RAC | Col. 40 - ACD | Col. 48 - RACD |
| Col. 25 - RB   | Col. 33 - RBC | Col. 41 - BCD | Col. 49 - RBCD |
| Col. 26 - RAB  | Col. 34 - RABC | Col. 42 - ABCD | Col. 50 - RABCD |

The following field is for problem identification and must be flagged in column 76. Col. 76 - 80 - identification no.

Console Switches

Check Switches: Set to Stop:

Program Switches: Only Switch one (1) is used. This switch should be turned on if means are selected and are desired in order. If means are not selected, this switch may be on or off. (Switch 1 setting determines if level identifications for each factor are to be put in order before totaling begins.) Operation is only slightly faster with switch off.

Typewriter: Clear all Tab stops on typewriter.

Operation Procedure

1. Zero core storage (Type 260000800009)
2. Load Program
3. Depress reset key on console
4. Depress start key on console
5. For each problem, follow parameter card with data cards.
6. After all cards for a problem are read in, means (if selected) are punched out and sums of squares are typed. The program is self-initializing and self-starting after each problem.
VITA

John Lincoln DeVillier, son of Elizabeth Wyble and Adam Cleveland DeVillier, was born January 20, 1916, near Leonville, Louisiana. His early education was in the parochial and public schools of Port Arthur, Texas, and Opelousas and Port Barre, Louisiana. He was a member of the Civilian Conservation Corps from July, 1934, to March, 1939, the last three years as the company clerk. He then worked as a stock record clerk for the Texas Nursery Company, Sherman, Texas, until June, 1941.

From June, 1941, to February, 1954, he served on active duty in the army in various assignments as an enlisted man, warrant officer, and commissioned officer. His military education includes resident courses at The Armored School, Fort Knox, Ky., and The Adjutant General's School, Fort Harrison, Indiana. He has also completed by correspondence a number of courses offered by The Adjutant General's School and the Industrial College of the Armed Forces. His military decorations include the Silver Star for gallantry in combat, the Purple Heart, and six campaign stars for service in World War II and the Korean War. He is now a member of the Retired Reserve with the rank of lieutenant colonel.

In June, 1954, he entered Southeastern Louisiana College, where he received a Bachelor of Arts degree in May, 1957. He entered Tulane University in July, 1957, and received a Master of Business Administration degree from that institution in June, 1958. Since September, 1958, he has been a member of the faculty of Southeastern Louisiana College. He entered the Graduate School, Louisiana State University, in June, 1960, and is now a candidate for the degree of Doctor of Philosophy in the Department of Management and Marketing.
Candidate: John Lincoln DeVillier

Major Field: Management

Title of Thesis: "The Effects on Comprehension of Selected Variations in Organization and Physical Presentation of Administrative Communications"

Approved:

[Signature]
Major Professor and Chairman

[Signature]
Dean of the Graduate School

EXAMINING COMMITTEE:

[Signature]
[Name]

[Signature]
[Name]

[Signature]
[Name]

Date of Examination: May 9, 1967