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READING THE MANUAL ALPHABET--A RESEARCH PROGRAM FOR DEVELOPING A FILMED PROGRAM FOR TEACHING THE MANUAL ALPHABET.

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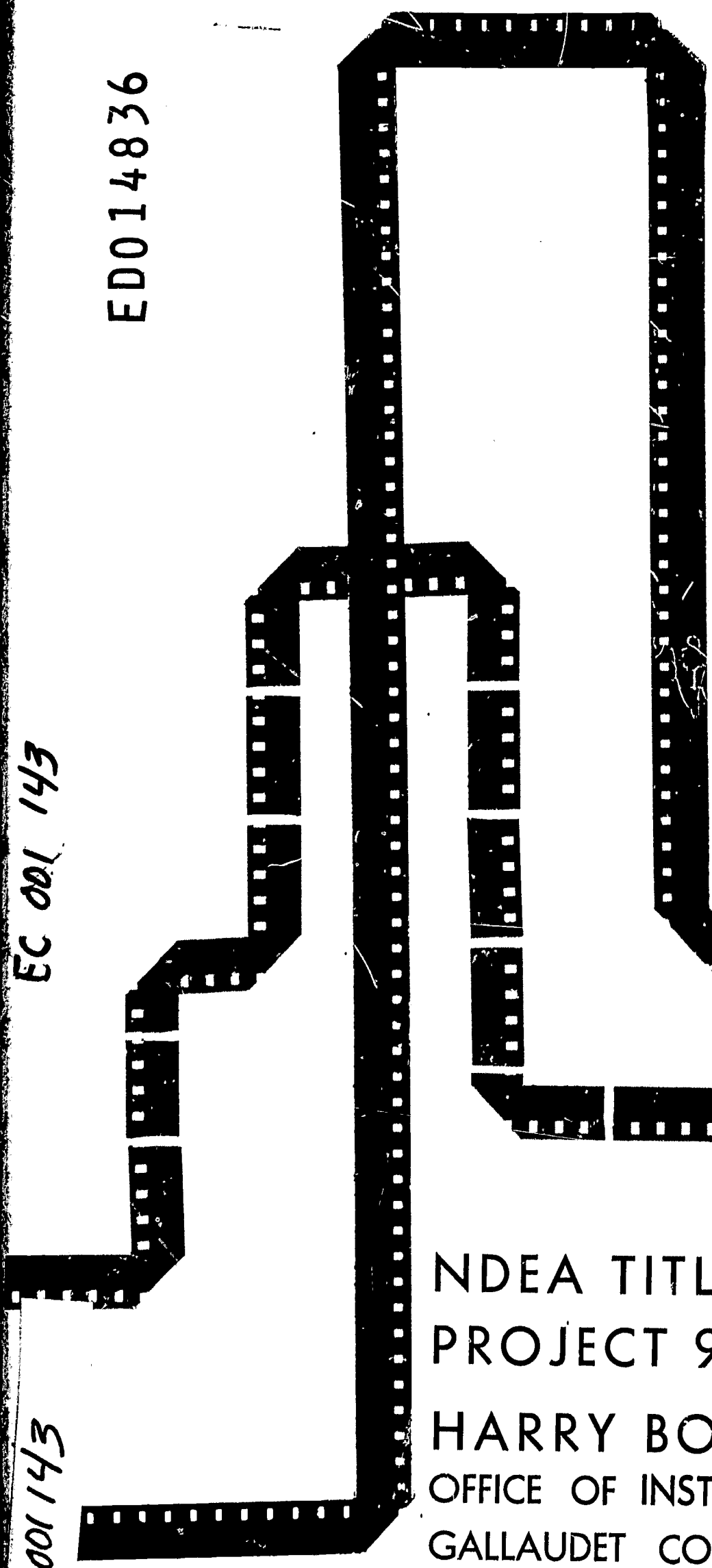
A PROGRAMED FILM COURSE WAS DEVELOPED TO TEACH PERSONS HOW TO READ THE MANUAL ALPHABET. THE EFFECTS OF THE FOLLOWING PROGRAMING CONDITIONS WERE STUDIED--MANNER OF STIMULUS REPETITION, RATE OF STIMULUS PRESENTATION, AND MODE OF RESPONSE. THE PROJECT WAS DONE IN TWO PHASES. IN THE FIRST PHASE, SUBJECTS WERE 42 DEAF GALLAUDET COLLEGE PREPARATORY STUDENTS, 26 HEARING FACULTY AND STAFF MEMBERS OF THE NEW MEXICO SCHOOL FOR THE DEAF, AND 14 HEARING GRADUATE STUDENTS AT GALLAUDET. THEIR PROGRAMS CONSISTED OF 17 LESSONS AND 8 FILMED TESTS. A RELATIONSHIP OF .90 OR ABOVE (WITH ONE EXCEPTION) WAS OBTAINED BETWEEN PRE- AND POST-TEST SCORES. ANALYSIS OF VARIANCE ON SCORES FROM VARIATIONS IN RATE OF PRESENTATION AND AMOUNT OF REPETITION OF THE STIMULUS MATERIAL FOR THE PREPARATORY STUDENTS SHOWED NONE OF THE EXPERIMENTAL TREATMENTS WERE SIGNIFICANTLY EFFECTIVE, BUT THERE WAS AN OVERALL MEAN GAIN (STATISTICALLY SIGNIFICANT, P IS LESS THAN .01) FOR READING WORDS AND FOR READING SENTENCES. FOR THE HEARING FACULTY GROUP AND THE GRADUATE STUDENT GROUP, DIFFERENCES IN RESPONSE METHOD (ORAL, WRITTEN, OR MANUAL) FAILED TO ACHIEVE STATISTICAL SIGNIFICANCE. IMPROVEMENT IN READING WORDS ACHIEVED STATISTICAL SIGNIFICANCE (P IS LESS THAN .01) FOR BOTH GROUPS, BUT MEAN GAIN FOR READING SENTENCES WAS NOT STATISTICALLY SIGNIFICANT FOR EITHER GROUP. THE FILM COURSE WAS JUDGED AN INEFFECTIVE INSTRUCTIONAL TOOL. THE SECOND PHASE UTILIZED A CHANGE IN PRESENTATION AND A REVISED, EXPANDED FILM PROGRAM (24 LESSONS) AND TWO FILM TESTS. FORTY-EIGHT HEARING COLLEGE STUDENTS SERVED AS SUBJECTS. ANALYSIS OF VARIANCE SHOWED REPETITION WAS THE ONLY EXPERIMENTAL TREATMENT SIGNIFICANTLY AFFECTING SCORES FOR WORDS AND FOR SENTENCES (P IS GREATER THAN .01 AND LESS THAN .05). DATA FOR BOTH PHASES IS PRESENTED TABULARLY. APPENDIXES INCLUDE (1) CAPTIONED INSTRUCTIONS AND SCRIPTS FOR READING THE FILM COURSE AND THE TWO REVISED TESTS AND (2) COPIES OF FORMS USED FOR WRITTEN RESPONSES. REFERENCE LIST CITES 12 ITEMS. (MK)



READING THE MANUAL ALPHABET

NDEA TITLE VII
PROJECT 985

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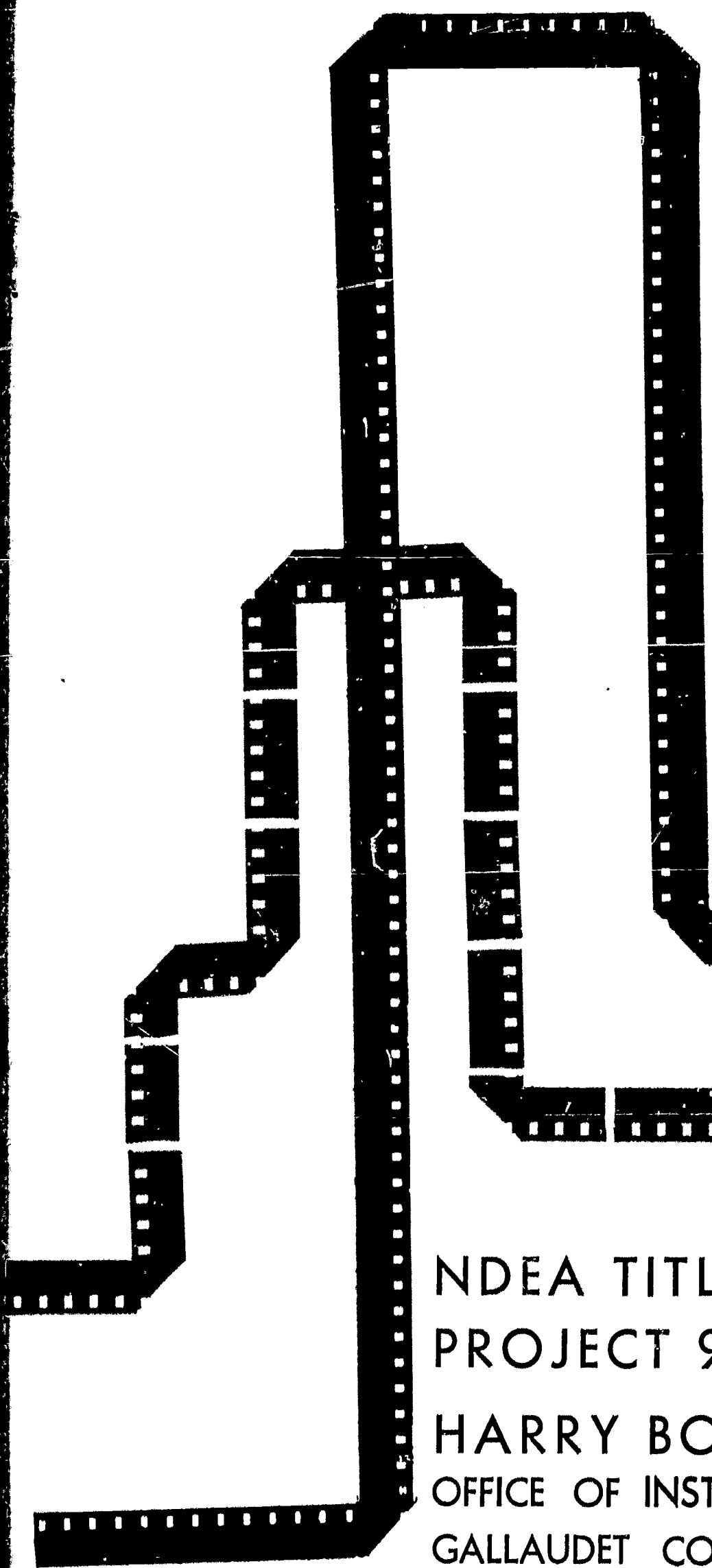

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ABSTRACT

READING THE MANUAL ALPHABET: A RESEARCH PROGRAM FOR DEVELOPING A FILMED PROGRAM FOR TEACHING THE MANUAL ALPHABET

Purposes

It was believed that a rigorously constructed motion picture film program designed to teach persons how to read the manual alphabet might serve two purposes. The first was to teach individuals how to acquire a reasonable facility in reading the manual alphabet in a greatly shortened period of time. The second was to determine experimentally the effect of several conditions of programming on the course of learning of this visual code. The specific conditions were:

(1) repetition of stimulus: free or a single presentation.

(2) rate of stimulus presentation: fixed or varied.

(3) mode of response: oral, written, or fingerspelled.

The research had two distinct phases. In the first phase a preliminary programmed film course and two film tests were constructed and experimentally tested in a variety of settings. The information gained from the analyses of these testings became the basis for revising both the film and the tests. In phase two, the films were revised and further subjected to experimental analysis.

Phase I: The Preliminary Film Course

Procedure

Three different samples of students studied the preliminary film course: 42 Gallaudet College preparatory students,

26 hearing faculty and staff members of the New Mexico School for the Deaf, and 14 hearing graduate students in education at Gallaudet College.

The film course consisted of 17 lessons, the first two of which presented the alphabet and ran for about 25 minutes each. The remaining 15 lessons were about 12 minutes long and consisted of 15 discrete words followed by 15 different sentences. The word or sentence was first fingerspelled, followed by a blank screen, which in turn was followed by an English caption. The spelling in the films was presented initially at a rate of 152 letters per minute and slowly increased to 200 letters per minute. Each student used a self-threading, variable speed projector which enabled him to speed up, slow down, reverse, or stop the film. Two film tests each of 35 discrete words and 21 sentences were constructed to measure achievement or skill.

All subjects had had some previous exposure to the manual alphabet and continued to study manual communication from other sources during the experiment. The basic design employed was a factorial analysis of gain scores or the difference between pre- and post-test scores. Assignment into experimental treatments was based upon pre-test scores.

Results and Conclusions

For all three groups, modest mean gains were achieved in the ability to read words. No practical increase in the ability

to read sentences occurred (in spite of the one small gain that was statistically significant). High relationships of .90 or above (with only one exception) obtained between pre- and post-test scores.

The different methods of responding to the film program seemed to have no effect on learning in the two situations where compared. Rate of stimulus presentation had a small effect on ability to read words. The relationship between the amount of time spent with the course and increase in ability was statistically significant in only one setting and only with the ability to read words.

Phase II: The Revised Film Course

Procedure

A single group of 48 Catholic University undergraduate, paid volunteers studied the revised film course over a one month period of time. The students had no previous exposure to the manual alphabet.

The film course was completely redone and expanded to 24 lessons. Pauses were systematically introduced into and faded from the junctures between words in the sentence presentation. The two tests were revised to parallel the new course. A multifactor analysis of variance design with raw achievement scores was used with this group.

Results and Conclusions

The only significant experimental treatment was the amount of repetition of stimulus material. The ability to vary the

rate of presentation and to respond in different ways to the film seemed to have no significant effect on learning.

The group studied the course on the average about 15 hours. As a consequence of this effort, they acquired a modest ability to read discrete words. On the average, they acquired only a minimal skill in reading sentences. Since repetition of stimulus presentation did affect learning, it is possible that repeating the course might bring a further achievement.

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PROBLEM

Aside from using the written word, a deaf person can communicate with others by using any combination of the language of signs, the manual alphabet (fingerspelling), reading lips, and, of course, speaking. Although users of manual communication commonly employ a mix of the sign language and fingerspelling, this research is concerned only with the manual alphabet. More specifically, this is a report of the construction and evaluation of a programmed motion picture film course designed to teach persons how to read the manual alphabet.

The American manual alphabet is a system whereby an individual can represent manually each of the 26 letters in the English alphabet on a single hand. It is a manual representation of the graphemes or writing system of the English language. A description of the historical development of the manual alphabet is given by Moser, et al (7). This description, however, sheds little light on the best way to teach a person how to read the manual alphabet. Nor does there appear to be any existing experimental evidence of the effectiveness of alternate methods of teaching people how to read the manual alphabet.

Experienced teachers of the skill state that the usual course of learning for an adult is as follows: An adult can

be expected to learn to transmit all 26 letters of the manual alphabet, however haltingly, in a brief one to two hours. With continued daily practice (for perhaps an hour or two) a person can reach a transmission rate of about 20 to 30 words a minute after several weeks of practice. At some unknown point in the course of the learning the learner ceases to attend to the finger configuration he forms for the separate letters. It is at this point that his speed increases markedly. The phenomenon is akin to the motor learning that occurs when a person learns to touch type. The typist ceases to attend to a given finger touching a specific key. One additional point about transmission should be noted. It is possible to transmit at a rate which exceeds the capacity of even the most expert reader's ability to read.

Reading the manual alphabet, on the other hand, seems to be a much more difficult learning task. Typically, most adults need to spend many weeks or months in the presence of deaf persons before acquiring the necessary skill to read even a very slow and deliberate rate of transmission - about 10 to 15 words per minute. It is not uncommon to encounter individuals who have not advanced beyond this state of skill even after several years of attempting to learn to read the manual alphabet. Indeed, some unknown proportion of individuals seemingly never acquire any facility in reading the manual alphabet. Motivation, amount and frequency of practice, inability to see words as "wholes", and the age of the learner

are all offered as possible explanations of learning difficulty.

Other possible reasons for the difficulty may be inherent in the way in which the learning task is usually structured for the learner. The student needs an instructor who is available and willing to transmit to him. Initially, the rate of transmission must be very, very slow. The instructor must fingerspell a great many words to provide the necessary practice. Not only is this a tedious activity but many students report it is embarrassing to be a slow learner in this kind of face-to-face situation. In short, the student requires an instructor who will present exercise drills in a visual code under conditions suitable for his needs. Why must this instructor be a living person? Could a motion picture film teach this skill? Moreover, could a motion picture film be programmed for more effective individual instruction? The potential advantages of a motion picture film and of the programmed format will be discussed in turn.

A motion picture film would allow a constant, precise control of the stimulus presentation, i.e., number of letters spelled per minute. A film could be used at the convenience of the learner. It could be shown as often as desired. The film could depict many spellers, thus minimizing dependence on a single spelling style. Lastly, it is doubtful that a film would embarrass the student.

A programmed instruction format could easily be built into a film by first showing a fingerspelled word or sentence,

next, leaving a blank screen for a student's response, and finally, showing an English caption of the original word.

The student could control the film presentation by using a variable speed film projector. The student could increase or decrease the rate at which words or sentences were spelled to him; he could repeat all or part of the spelling presentation; and he could spend as much or as little time with the stimulus as he desired.

On the response side, the learner could vary the character of his participation in the learning process. More specifically, he could orally describe the words he had seen presented on the screen, write them out on paper, or even spell the words manually.

It seemed, therefore, that a rigorously constructed film program designed to teach persons how to read the manual alphabet might serve two purposes. The first was to teach individuals how to acquire a reasonable facility in reading the manual alphabet in a greatly shortened period of time. The second was to determine experimentally the effect of various conditions of programming on the course of learning a visual code.

RELATED RESEARCH

A. Manual Alphabet

Over the last several years there has been a marked increase in published interest in the formal and/or incidental use of the manual alphabet for the education of deaf

children. Morkovin (6) and Hester (5) describe actual class usage of the manual alphabet. Quigley and Frisina (10) and Birch and Stuckless (2) have experimentally described the relationships between some aspects of manual communication and other cognitive and non-cognitive skills, e.g., English language ability. These efforts, however, have been directed at the utility of the manual alphabet rather than the acquisition of the skill.

The only experimental work with the manual alphabet as direct object of research uncovered by the writer is that of Moser, et al (8). They experimentally determined the distance at which the different letters used in fingerspelling could be recognized at given accuracy levels. These authors claim that no previous experimental work has been done with fingerspelling.

An examination of the index to approximately 100 years of the Annals of the Deaf uncovered only one intuitive description by Porter (9) on how the manual alphabet should be taught. Yet in the last three years at least two new films have been made to teach the manual alphabet. Roy and Fant (11) have produced an ambitious 46 lesson film course on the sign language which includes the manual alphabet as an integral part of the course. It will be recalled that a mix of the two communication systems is commonly used by deaf persons. The course is partially programmed. At the present time much of the course is designed to be an adjunct to an instructor taught course in sign language. The film is considered by Roy to be a preliminary effort. No research data have been

collected for this course as of this writing.

A series of instructional films in fingerspelling by Belknap, Griffing, and Jones (1) has recently been produced. It consists of nine cartridged lessons on fingerspelling. The course is on 8 mm film and is used with a convenient cartridge projector. Cartridges hold a maximum of 60 feet of film and run for five minutes. The course is not in a programmed format. Although the course is described as having ". . . its effectiveness . . .borne out by extensive testing . . .", no data are available nor is there any evidence that research methods have been employed in the construction of the film course.

B. Programmed Instruction

Aside from its applied value the manual alphabet may be an unusually promising medium by which a few of the more vexing problems of programmed instruction can be explored. As Silberman (12) has pointed out the research on the efficacy of virtually every aspect of programmed instruction offers conflicting evidence, e.g., overt versus covert response, size of step, reinforcement, the relationship of rate to effectiveness of learning, etc. He reasoned that among other difficulties, the complex and varied content of the instructional materials simply did not permit useful measurement and hence did not allow for well-controlled experimentation.

The manual alphabet, on the other hand, is based upon only 26 different units, the letters of the alphabet. The

English letters are so overlearned to the native English speaker that these units can be assumed to be roughly equal in "close range" recognizability for readers with normal vision. The learning task, therefore, is primarily the learning of a visual code with speed and accuracy of recognition as the goal of the learning. The criterion performance should be amenable to precise measurement and the effects of any learning condition readily ascertained. To the best of the writer's knowledge no research has been conducted on the effects of programmed instruction on the learning of such a visual code.

OBJECTIVES

This research had two principal objectives:

A. The development of a programmed motion picture film course to teach persons how to read the manual alphabet.

B. The experimental evaluation of the effect of several programming principles or characteristics on learning the above skill. These are:

1. Repetition of stimulus material: Free repetition was compared with a single presentation of stimulus material.
2. Rate of stimulus presentation: A standard rate of stimulus presentation was compared with a varying rate chosen by the learner.
3. Mode of response or participation: A comparison was made between these ways of responding to the stimulus: (a) orally, (b) in writing, and (c) by spelling manually.

PHASE I: THE PRELIMINARY FILM COURSE

PROCEDURE

This research had two distinct phases. In the first phase a preliminary programmed film course was constructed and experimentally tested in a variety of learning settings. The information gained from the analyses of these testings became the basis for revising the film. In phase two, the film was revised and further subjected to experimental analysis. This report is, therefore, divided into two parts, each of which describes a phase of the research.

A. Samples

Three different samples of students studied the preliminary version of the programmed film course. Each sample was involved in an independent experiment and, hence, will be described separately. The first sample consisted of 42 Gallaudet College preparatory students. These students were "graduates" of public high schools or schools for the deaf who did not score high enough on standard achievement tests to be admitted into the freshman class at Gallaudet College. All of the students were deaf, averaged about 19-1/2 years of age, and had little or no previous exposure to manual communication. These students stated that they wanted more training in the use of manual communication. When tested with a film pre-test of ability to read the manual alphabet, they showed relatively low ability thus substantiating their need for training. The students took the preliminary film course in conjunction with other intensive training in the sign

language during the three week orientation period which preceeds the preparatory year of instruction.

The second sample consisted of 50 adult hearing members of the New Mexico School for the Deaf. This school had recently adopted the manual alphabet as an integral method of communication in its academic and extra-curricular program. The school administration was especially desirous to have all faculty and staff members learn how to use the manual alphabet as well as possible. The learners consisted of both teachers and staff members. In spite of this administrative concern, only 26 of those who began finished the course and these only after considerable "prodding". The majority of those who completed the series scored best in achievement on the pre-test, that is, were the more able readers of fingerspelling before beginning the course.

The third and last sample was made up of hearing graduate students in Education at Gallaudet College, all of whom were studying for a master's degree. All of them were taking a non-credit course in manual communication. Seventeen voluntarily began but only 14 persisted enough to take both the pre- and post-tests. The group was made of of eight men and six women. The mean age of the "finishing" group was 34.4 with a standard deviation of 8.9 years.

A measurement of the ability of the three "finishing" samples was made prior to their taking the film course with a motion picture film test of the ability to read the manual alphabet. This test is described in detail below. Suffice

it to say here, that the test is made up of two parts: (a) discrete words and (b) sentences. A perfect score for words would be 35 and for sentences 21.

Tables 1 through 4 show rather clearly that the three samples are significantly different in their ability to read both discrete words and sentences. The New Mexico sample is the most skilled with the deaf Gallaudet preparatory students having the least skill in reading the alphabet.

B. Experimental preparation

The experimental preparation consisted of two basic activities; the construction of the film course and the development of film tests of ability to read the manual alphabet. Each of these activities will be discussed in turn.

1. The Film Course

It seemed obvious that it would be necessary to create a sizable amount of practice material before students could be expected to achieve even a modest degree of skill. Moreover, to sustain student interest and motivation it was thought that the film course should have face validity. It should look as if it were designed to have the student reach a practical level of skill. The practical consequence of this decision was that only one or two large, well-organized learning tasks could be developed rather than many small learning tasks or fragments. The latter approach would have permitted greater freedom in trying out different programming techniques.

TABLE 1

WORDS READ CORRECTLY BEFORE TAKING THE FILM COURSE BY NEW MEXICO STAFF, PREPARATORY, AND GRADUATE STUDENTS

	New Mexico Staff	Preparatory Students	Graduate Students	Total
N	26	42	14	82
$\bar{X}$	27.5	16.3	19.0	20.3
S.D.	6.1	10.5	8.9	10.4

TABLE 2

ANALYSIS OF VARIANCE OF NEW MEXICO STAFF, PREPARATORY AND GRADUATE STUDENTS WORD SCORES

Source of Variation	SS	df	MS	F
Treatment	2041.97	2	1020.99	11.83*
Error	6816.58	79	86.29	
Total	8858.55	81		

* $P < .01$

TABLE 3

SENTENCES READ CORRECTLY BEFORE TAKING THE FILM COURSE BY NEW MEXICO STAFF, PREPARATORY, AND GRADUATE STUDENTS

	New Mexico Staff	Preparatory Students	Graduate Students	Total
N	26	42	14	82
$\overline{X}$	10.7	3.8	5.6	6.3
S.D.	5.1	4.8	6.2	6.0

TABLE 4

ANALYSIS OF VARIANCE ON NEW MEXICO STAFF, PREPARATORY AND GRADUATE STUDENTS SENTENCE SCORES

Source of Variation	SS	df	MS	F
Treatment	765.72	2	382.86	13.56*
Error	2230.38	79	28.23	
Total	2996.10	81		

* $P < .01$

a. Course Content

The preliminary film course consists of 17 lessons, the first two of which each take about 25 minutes running time. The last 15 lessons run for about 12 minutes each. After the student learns how to operate a self-threading, variable speed projector, the film program is essentially self-contained.

The first lesson is designed to present the manual alphabet to a person who has never seen the alphabet. Hence, each letter is slowly and carefully "swept" over a 90° arc on the screen so that the student can clearly see the proper hand position and finger configuration. After the entire alphabet has been shown, similarities and differences between various letters are highlighted for the student. Additionally, some of the rather limited punctuation used in fingerspelling is demonstrated.

The second, and all succeeding lessons, are cast in a common form of programmed instruction. A stimulus is presented to the student. He is required to make a judgment about that stimulus. Immediately thereafter, the film presents information which permits the student to assess the accuracy of his judgment. In the second lesson this program pattern is employed with five consecutive presentations of the randomly ordered manual alphabet. Each presentation consists of a random sequence of the 26 discrete, static letters. A different speller is used for each of the five presentations.

Each of the remaining 15 lessons concentrates on a single

consonant (with the exception of the end of the alphabet when the number of common words becomes too small for the pattern described below). The first half of the lesson consists of 15 words presented separately or in isolation. Words were selected to fit into the following pattern:

ab____	__ab__	____ab
eb____	__eb__	____eb
ib____	__ib__	____ib
ob____	__ob__	____ob
ub____	__ub__	____ub

The student thus sees the single consonant in combination with each of the five vowels in the beginning, in the middle, and at the end of a different word. The lesson on p. 51 illustrates the words selected for the consonant b.

The second half of each lesson is made up of 15 different sentences. The initial 15 words are included in these sentences. As a matter of fact, each word is exposed to the student at least three times. Initially, he sees it as an isolated word. Next, he sees the word as a part of a sentence in the second half of that same lesson and again in the lesson which immediately follows. Hopefully, this affords a reasonable amount of repetition. As with the second lesson, these 15 programmed lessons all follow the programmed format of presentation of stimulus, student response, and confirmation of accurary of student response.

b. Presentation Characteristics

A number of different characteristics are inherent in the very presentation of the manual alphabet to the

viewer. These seem most important: (1) the context in which the spelling takes place, (2) the speed of spelling, (3) the angle from which the speller's hand is viewed, and (4) the style and skill of the person who is spelling

(1) the context in which the spelling takes place

The manual alphabet is most often used in conjunction with the sign language and/or speech reading. It is seldom used exclusively. Nevertheless, it is used exclusively in this film course because it was not desired to complicate the experimental variables under consideration. Similarly, the viewer usually knows the general topic under discussion when attempting to read the manual alphabet. It was decided that no general topic would be pursued in the stimulus material so that the student would have to depend more on "reading" than "guessing" from a knowledge of content. In short, the context in which these films are presented is "artificial" in that variables extraneous to the manual alphabet have been excluded from the film program.

(2) speed of spelling

Perhaps the most easily controlled stimulus variable is the rate of speed at which words are spelled. A simple, empirical procedure was developed to determine an estimate of "normal" speed. First a passage of prose material was selected from a popular periodical. The passage was given to a dozen deaf persons each of whom had used the manual alphabet for considerably longer than a decade. Each was in-

structed to fingerspell the passage at a "comfortable" rate. They were further instructed to assume a competent person was reading the spelling. It was found that the mean rate of spelling was approximately 300 letters per minute (lpm) with a S.D. of about 20 lpm. Because this average seemed somewhat high to some of the spellers themselves, the experiment was replicated with different prose passages. Almost identical results were obtained. Hence, 300 lpm was accepted as a working estimate of the comfortable rate of speed for an experienced transmitter of the manual alphabet.

Estimates vary on the amount of time it takes adults to become "proficient" in reading the manual alphabet. The units of time in these estimates are typically stated as months or years. It was simply not judged feasible to attempt to carry the student to 300 lpm in the first set of films in this series. Consequently, all rates specified below are arbitrary and frequently based primarily upon convenience in the film making.

It was decided that the first lessons should be presented at a speed of about one-half of normal, or 152 lpm. The variable speed projector permits the students to slow this further to about 120 or 125 lpm.[1]

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[1]The projectors were selected mostly for cost and durability reasons. With these machines, projector speed could not be varied over a precise, calibrated range. Indeed, considerable variation exists both between projectors as well as for any given projector over a period of use. Variations in temperature seem to produce fairly sizable variations in projector speed. Hence, the rate of 152 lpm for the 10 projectors employed in the research could be slowed down to a range from 120 lpm to 135 lpm depending on which projector was being used. The same lesson could be speeded up to about 180 lpm with the "fastest" machine.

The terminal speed for this first series was set at 200 lpm. When the projector speed is raised to the maximum, this can be viewed at about 250 lpm. Two lessons were filmed at the slowest speed (152 lpm). Thereafter, each succeeding pair of lessons was filmed with an increment of 8 lpm until the final speed of 200 lpm was reached. The 8 lpm increment is the same measurement which exists on a visual metronome which was used to pace the spellers during the filming of the lessons.

(3) angle from which the spelling is viewed

It was decided that five different angles along the horizontal would be used as the point of view from which the student sees the speller's hand. These five positions included the direct perpendicular view or "head-on" view which is most commonly found in person-to-person conversation. Alternate views 22.5° and 45° both to the right and left of center were used. The camera photographed the speller's hands from a few degrees above the "horizon". No attempt was made to represent this dimension more systematically.

(4) the person who is spelling

Eight different deaf spellers posed for the film. These were equally divided between the sexes and included two children. The spellers' hands had a wide variety of shapes - from those having long, slender fingers to short, stubby fingers. All spellers were very experienced in manual communication and were judged competent by a consultant on the manual alphabet. It was felt that this variety of spellers would

maximize transfer to a real situation although it is conceivable that a greater transfer could be achieved by using only a very few superb spellers.

2. The Film Tests

Two alternate forms of a film test to measure ability to read the manual alphabet were made. The tests were for pre- and post-test measurement purposes. These tests were designed to parallel the rate of spelling and the five visual angles used in the film course. Each test contained 35 items presenting only discrete words and 21 items dealing with complete sentences. Thus five words and three sentences were presented at each of the seven speeds used in the film course. In a further dovetailing of test to course, seven of the words were spelled from each of the five angles originally used. The sentences also were presented from the five angles but on a sampling basis.

An effort was made to determine experimentally if the two tests were parallel forms. More specifically, it was desired to secure an estimate of the alternate form reliability and to determine if the test difficulties were equal. The 1964-65 Gallaudet preparatory class of 240 deaf students tried both Test 1 and Test 2 in the fall of 1964. To offset practice effects the tests were administered in balanced order. One-half of the group received Test 1 before Test 2 while the other half took the tests in the reverse order, i.e., Test 2 initially and then Test 1.

The product-moment correlation between the number of

words correct on Test 1 and Test 2 was .92. The correlation between the number of sentences correct on Tests 1 and 2 was .96. Not only are these very satisfactory reliability figures for measurement purposes, but they indicate a very stable skill at least over a few hours' time.

The means and S.D.'s of both the words and the sentences on Tests 1 and 2 are given in Table 5. No significant difference was found between the means and S.D.'s of the words on Tests 1 and 2. With a mean of approximately 28 correct words out of a possible 35 correct, it can be seen that the preparatory students found the test rather easy. However, the S.D.'s which are close to 10 and almost identical indicate a reasonably good degree of discrimination among the readers.

TABLE 5

MEANS AND S.D.'s OF NUMBER OF CORRECT WORDS AND SENTENCES FOR FILM TESTS ONE AND TWO

Test		Words		Sentences	
	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.
No. 1	240	27.7	9.5	12.2	7.1
No. 2	238	28.3	9.7	10.7	6.1

A comparison of the means of the number of sentences correct however, reveals that Test 2 with a mean of 10.7 is slightly more difficult than Test 1 with a mean of 12.2. This mean difference of 1.5 though small is statistically signifi-

cant. The very large N and the very high relationship between the two tests (r = .96) make the statistical test very powerful indeed. In any event, the mean difference of 1.5 will complicate somewhat the gain analyses to be described below.

C. Basic Design

The basic design employed in the three experimental administrations of the preliminary film course is a factorial analysis of gain scores or the difference between pre- and post-test scores. Since all subjects had at least a minimal exposure to the manual alphabet, each subject was administered a pre-test before taking the film course. Assignment into experimental treatments was based upon these pre-test scores. Each group was rendered as nearly comparable in mean and S.D. of reading ability as possible.

The multifactor study with Gallaudet preparatory students compared the effect on learning of two stimulus variables. The two other single factor studies compared the effect of three different response modes. All experimental treatments were considered fixed effects models. In addition to the primary information obtainable from the above design, tests of significance of the grand mean gains were made. Additionally, some correlational information was obtained.

All of the students in this series of experiments studied the film course while in environments where manual communication is used as a matter of course. As a matter of fact, almost all had additional formal instruction from other students. All students expected to use this skill in some part

of their future daily activities. The Gallaudet students learned under "massed" conditions, i.e., over a three week time span. The two adult groups studied on a "free-time" basis over a period of several months which may be one explanation of the sizable attrition that took place.

D. Variables

1. Stimulus

a. Rate of presentation

As described above a systematic increase in the number of letters presented per minute (from 152 to 200 lpm) was built into the film when it was run at 18 frames per second. The learner could vary this standard however. He could speed it up or slow it down. The first stimulus variable comparison, therefore, consisted of the standard rate built into the film versus the variable rate chosen by the learner.

b. Repetition

If permitted, a learner could study a lesson or a portion of a lesson many times. A comparison was made of the effect of seeing the film a single time (no repetition) against a free amount of repetition. Since lessons are relatively brief, it should be noted the student could readily and unconsciously memorize some of the presentation after only a few trials. Hence, the practical range of repetition varies from one to perhaps three to five presentations.

2. Mode of Response

On the response side, there are three possible

means of responding to the film presentation: (a) orally, (b) in writing, and (c) spelling manually. Theoretically, of course, the more actively the student responded the more he could be expected to learn.

RESULTS

A. Stimulus Variables

Analysis of the effect of variation in the rate of presentation and the amount of repetition of the stimulus material for Gallaudet preparatory students.

Table 6 shows that the mean differences or gains in the number of words read correctly by the Gallaudet preparatory students were about the same for the different rates of presentation and amounts of repetition. The summary of the analysis of variance (Table 7) further indicates that these effects were not statistically significant. Although no experimental treatment appeared to affect learning, there was a relatively modest overall mean gain for the total group of 6.0 words which is statistically significant ($P < .01$). In addition, the correlation between initial and final ability (between pre- and post-test scores) was very high, .91, indicating that those who were able initially continued most able at the end of the course.

Moving now to the analysis of the improvement gained in reading sentences (Table 8), it can be seen that the mean gain for the total group is quite small, only 1.1. Nevertheless, because the correlation between the pre-test and post-test sentence scores is extremely high, .95, this very small gain

TABLE 6

WORDS READ CORRECTLY BY GALLAUDET PREPARATORY STUDENTS BEFORE AND AFTER FILM COURSE

Treatment		Pre-Test		Post-Test		Difference	
	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Variable rate Free repeat	8	13.1	8.1	19.3	8.7	6.2	3.2
Standard rate Free repeat	9	14.8	11.7	19.9	11.4	6.6	2.6
Variable rate No repeat	11	13.9	9.3	21.5	8.3	7.6	3.4
Standard rate No repeat	14	19.1	10.2	25.3	7.8	6.1	4.7
Total	42	16.3	10.5	22.3	9.1	6.0	4.4

TABLE 7

ANALYSIS OF VARIANCE OF GALLAUDET PREPARATORY STUDENT WORD DIFFERENCE SCORES

Source of Variation	SS	df	MS	F
Rate (V-S)	3.0	1	3.0	.15
Repetition (F-N)	2.0	1	3.0	.10
(V-S) (F-N)	9.1	1	9.1	.45
Within Cell	766.67	38	20.18	
Total	780.77	41		

TABLE 8

SENTENCES READ CORRECTLY BY GALLAUDET PREPARATORY STUDENTS BEFORE AND AFTER FILM COURSE

Treatment		Pre-test		Post-Test		Difference	
	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Variable rate Free repeat	8	2.5	4.8	3.1	5.8	.6	1.0
Standard rate Free repeat	9	3.4	5.6	5.7	7.4	2.2	2.5
Variable rate No repeat	11	3.1	3.8	3.0	3.8	-.1	1.4
Standard rate No repeat	14	4.3	3.6	5.8	4.9	1.7	2.0
Total	42	3.8	4.8	4.9	5.9	1.1	2.0

TABLE 9

ANALYSIS OF VARIANCE OF PREPARATORY STUDENTS SENTENCE DIFFERENCE SCORES

Source of Variation	SS	df	MS	F
Rate (V-S)	28.73	1	28.73	8.19*
Repetition (F-N)	3.78	1	3.78	1.08
(V-S) (F-N)	0.12	1	0.12	0.03
Within Cell	133.20	38	3.51	
Total	165.83	41		

* $P < .01$

is still statistically significant ($P < .01$). Also somewhat surprisingly, one experimental treatment, the rate of stimulus presentation, proved to have a statistically significant effect on learning with the standard rate being better than the variable rate of stimulus presentation (Table 9). This is a reversal of theoretical expectations. A possible explanation might be that beginning readers most frequently slow down the stimulus presentation. They, thus, may practice reading at a rate of presentation which is slower than that used on the post-test.

B. Response Variables

1. Analysis of the effect of oral, written and manually spelled responses for the New Mexico Staff.

Table 10 shows that the 26 staff members of the New Mexico School manifested a mean difference or gain of only 2.4 words after taking the film course. It should be remembered, however, that this was a relatively skilled group. The mean post-test score which is about 30 is close to the test ceiling, which is 35. Nevertheless, because the correlation of initial and final ability (pre-test and post-test scores) is .89, this relatively small increase is still statistically significant ($P < .01$). The summary of the analysis of variance (Table 11) however, clearly shows that the different methods of responding had no significant effect on achievement.

Turning now to the parallel analysis for sentences (Table 12) the average gain for the group is tiny, .4. This increase is statistically insignificant in spite of pre- and

TABLE 10

WORDS READ CORRECTLY BY NEW MEXICO STAFF BEFORE AND AFTER FILM COURSE

Treatment		Pre-Test		Post-Test		Difference	
	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Fingerspelling	6	24.3	8.5	27.2	5.7	2.8	3.6
Oral	10	27.3	5.9	29.4	5.9	2.1	2.6
Writing	10	29.5	3.9	32.0	3.2	2.5	2.6
Total	26	27.5	6.3	29.9	5.3	2.4	2.9

TABLE 11

ANALYSIS OF VARIANCE OF NEW MEXICO STAFF WORD DIFFERENCE SCORES

Source of Variation	SS	df	MS	F
Treatment	2.12	2	1.06	.12
Error	208.23	23	9.05	
Total	210.35	25		

TABLE 12

SENTENCES READ CORRECTLY BY NEW MEXICO STAFF BEFORE AND AFTER FILM COURSE

Treatment		Pre-Test		Post-Test		Difference	
	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Fingerspelling	6	9.0	6.1	9.0	6.2	.3	2.0
Oral	10	10.8	5.7	10.1	6.2	-.7	2.5
Writing	10	11.5	3.6	13.0	4.3	1.5	2.7
Total	26	10.7	5.2	11.0	5.7	.4	2.6

TABLE 13

ANALYSIS OF VARIANCE OF NEW MEXICO STAFF SENTENCE DIFFERENCE SCORES

Source of Variation	SS	df	MS	F
Treatment	26.22	2	13.11	1.96
Error	153.93	23	6.69	
Total	180.15	25		

post-correlation of .89. Test ceiling is probably not a factor here since it was possible to get 21 sentences correct and the group averaged only 11. The different methods of responding to the film also failed to show any significant effect on the ability to read sentences (Table 13).

The mean amount of time the students spent with the films was five hours and ten minutes with a S.D. of one hour and 58 minutes. The correlation between the time spent studying and the number of words correctly read was computed. It proved to be .46 ($P < .01$). A similar statistic was computed between time spent with the program and number of sentences correctly read. This correlation was statistically insignificant (-.24). It would seem that the small increase in the ability to read words was related to the amount of time spent studying with the films. Since there was no increase in the ability to read sentences, no relationships of any significance were obtained.

2. Analysis of the effect of oral, written and manually spelled responses for Gallaudet graduate students.

It will be recalled that the hearing Gallaudet College graduate students in Education were slightly superior to the Gallaudet preparatory students in initial ability but considerably less "able" than the New Mexico staff. The mean difference or gain in number of words read correctly for this group was 8.7 and was statistically significant ($P < .01$). The correlation between pre-test and post-test scores in this case was only .76. Thus, the group improved its ability to

read discrete words. Moving to the comparison of the effects of the different methods of responding, the mean differences presented in Table 14 appear to be of similar magnitude. The summary of the methods of responding described in Table 15 again bears this out. All treatment effects are statistically insignificant.

Turning now to the analysis of sentences, the graduate students registered a tiny and statistically insignificant mean gain of .6. The pre- and post-test correlation was .90. As might be expected, here too, different methods of response failed to have any effect in a situation where apparently no real learning took place. (See Tables 16 and 17). The correlations between the amount of time spent with the films and gains in the ability to read words or sentences were statistically insignificant. The mean amount of time spent with the film was five hours and three minutes with a S. D. of four hours and seven minutes.

CONCLUSIONS

For all three groups, modest mean gains were achieved in the ability to read words. No practical increase in the ability to read sentences occurred (in spite of the one small gain that was statistically significant). The fact that the post-test was slightly more difficult than the pre-test could be used to build a case that there may well have been a small increase in skill which was masked by using imperfectly

TABLE 14

WORDS READ CORRECTLY BY GRADUATE STUDENTS BEFORE AND AFTER FILM COURSE

Treatment		Pre-Test		Post-Test		Difference	
	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Fingerspelling	5	18.6	7.8	26.6	6.9	8.0	2.8
Oral	5	19.2	9.4	27.6	5.4	8.4	7.4
Writing	4	19.3	9.5	29.3	6.4	10.0	6.1
Total	14	19.0	8.9	27.7	6.5	8.7	5.8

TABLE 15

ANALYSIS OF VARIANCE OF GRADUATE STUDENTS WORD DIFFERENCE SCORES

Source of Variation	SS	df	MS	F
Treatment	1.25	2	.63	.01
Error	1108.75	11	100.8	
Total	1110.00	13		

TABLE 16

SENTENCES READ CORRECTLY BY GRADUATE STUDENTS BEFORE AND AFTER FILM COURSE

Treatment		Pre-Test		Post-Test		Difference	
	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Fingerspelling	5	4.6	4.4	5.2	3.2	.6	2.6
Oral	5	6.4	7.5	6.8	5.1	.4	3.8
Writing	4	5.8	6.3	6.5	4.6	.7	3.0
Total	14	5.6	6.2	6.1	4.5	.6	3.2

TABLE 17

ANALYSIS OF VARIANCE OF GRADUATE STUDENTS SENTENCES DIFFERENCE SCORES

Source of Variation	SS	df	MS	F
Treatment	8.28	2	4.14	.08
Error	539.15	11	49.01	
Total	547.43	13		

parallel tests. Even if this flawless logic were accepted, it would be doubtful that the adjustment would have much practical effect. High relationships of .90 or above (with only one exception) obtained between pre- and post-test scores. This would indicate that those students with most ability before beginning the course retain that advantage.

The different methods of responding to the film program seemed to have no effect on learning in the two situations where compared. Rate of stimulus presentation had a small effect on ability to read words. However, the effect was unexpected because those students who were not permitted to vary the rate of stimulus presentation learned slightly more than those who could. The relationship between the amount of time spent with the course and increase in ability was statistically significant in only one setting and only with the ability to read words.

In short, the instructional course, especially the presentation of sentences, could not be regarded as an effective instructional tool. Learning was so limited that it is probable that an effective test of the effects of the several characteristics of programmed instruction could not be made. Moreover, the manual environment in which these experiments took place may have permitted other variables to contaminate or mask the effects of the several experimental treatments. It was decided, therefore, to make substantial revisions in the film course and to subject it to another experimental tryout. This work is described in the next section.

PHASE II: THE REVISED FILM COURSE

PROCEDURE

A. Sample

One group studied the revised film course. This group consisted of 52 Catholic University student volunteers, none of whom had had any prior exposure to the manual alphabet. The students were told before beginning the course that they would be paid $1.50 an hour if they completed the course and 75¢ an hour if they did not. Since the experimental design called for 48 subjects, a slightly larger group, 52, was permitted to begin the course. Fifty-one completed it. One student had to drop out because of illness. For ease of computation, three students were dropped at random from the sample from those cells that had an excess. Twenty-seven of the final 48 students were female and 21 were male. The mean age of the group was 19.9 with a S.D. of 1.8. The students came from all the undergraduate classes with the juniors and sophomores being the largest classes, 18 and 13, respectively.

B. Experimental preparation.

Two changes in course content and three changes in presentation characteristics were made for the revised film course. These changes were reflected in the two revised tests as well. A description of the changes follows:

1. The Film Course

a. Course Content

(1) The course was enlarged from 17 to 24 lessons. Two additional lessons were made at the slowest rate of presentation, 152 lpm. One additional lesson was written for each speed but the last, 200 lpm. The additional lessons were intended to provide the students with more reading practice, especially at the slower rates.

(2) Many of the original sentences were rewritten because learners had complained that they seemd "awkward" or unusual. A few sentences were dropped. Nevertheless, the same goal was sought: Prepare a text which would require the student to read not guess the next word(s) in the sentence sequence.

b. Presentation Characteristics

(1) Pauses were introduced between words during the presentation of sentences. The length of these pauses was progressively reduced or faded as the rate of presentation was increased. For example, the first three lessons at 152 lpm were presented with a two beat pause between words. The pause was created by the speller "holding" the finger configuration for the last letter of a word for two beats (at 152 beats per minute) before beginning the next word. The pauses in the fourth lesson at that same speed were reduced to a single beat between words. This general logic was fol-

lowed throughout the course according to the pattern outlined below.[1] It is a frequent complaint that a major, if not the major, difficulty in reading fingerspelling is "seeing the word". The pause pattern was devised to help the student acquire this facility.

(2) The preliminary version presented the spelling to the viewer from five different angles along the horizontal plane. The extreme angles were 45° to the right and to the left of center. Only three angles were retained: "head-on" and 22.5° right and left of center. The two extreme views were dropped.

(3) Only those who were judged to be very fine spellers performed as models in the revision. On the preliminary version some objections had been raised about the "quality" of the spelling of some of the original spellers.

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[1] Pause and speed patterns for the revised film program

1pm	Number of Beats Per Pause	Number of Lessons
152	2	3
152	1	1
160	2	2
160	1	1
168	1	2
168	0	1
176	1	2
176	0	1
184	1	1-1/2
184	0	1-1/2
192	1	1-1/2
192	0	1-1/2
200	1	1
200	0	2

2. The Film Tests

It will be recalled that the alternate form reliability estimates for both the word and sentence test scores were in the .90's. Hence, the earlier test format seemed an appropriate guide for the construction of two new alternate forms. This time 28 words, four at each of the seven rates, was thought a sufficient number for good reliability. It was desired, however, to construct a more sensitive measure of the ability to read sentences. Hence, a larger number of sentences, 32, was made for each of the two tests. Most of the English material in the preliminary tests was included in the new tests. Several sentences, however, were revised or discarded.

As of this report, reliability estimates were not obtained for these revised tests. Because of the nature of the test development, it seems a reasonable assumption that the reliability should be quite comparable to those obtained earlier. Although equal test difficulty is still a requisite attribute of alternate forms, the basic design described below employs only a single measuring event, thus by-passing the need for this test attribute.

C. Basic Design

Several changes in the experimental procedure were deemed imperative. A detailed explanation as well as a description of the changes is given below.

In the first series of experiments, all of the students lived and/or worked in an environment where they formally and

informally learned manual communication from other means. This could have easily contaminated or masked the effects of any of the treatment differences tested. Additional problems existed because the learners had different levels of skill when they began the course and, consequently, may have had different needs and expectations for a course of instruction. There was also substantial variation in the ages of the students in two of the samples. It is very possible that this, too, may have masked treatment effects. For all of these reasons it seemed appropriate to carry out an experiment with subjects (a) who had had no previous exposure to the manual alphabet, (b) who could reasonably be instructed <u>not</u> to practice outside the experimental learning sessions, (c) who were young and capable learners, and (d) who had the same instructional needs, i.e., who had no skill.

Another major advantage in using an unskilled sample was that only a single film test need be used to measure ability. Thus, difference scores were not required and raw scores could be used directly with a resultant increase in reliability. Moreover, the vexing scaling problem involved when dealing with learners who begin at different points of skill was also bypassed. Finally, the question of equivalent test difficulties ceased to be of moment.

In two of the earlier three samples many of those who began the course did not finish. There is little question that learning to read the manual alphabet is a difficult and

a tedious task. The device of securing and differentially paying volunteers seemed to be very influential in getting them to complete the course. Above and beyond monetary considerations, however, almost all of the students manifested a considerable interest in the research project, in manual communication, and in problems of educating the deaf. All students were made aware of the basic experimental design because some were not allowed to utilize all of the capabilities of the projector. This caused many to express feelings of frustration. All of the above seemed to attest to a reasonable amount of motivation on the part of the subjects.

The multifactor design used with the revised film permitted an assessment of all three experimental treatments and interactions. The overall design was thus more efficient than those designs used earlier.

With one exception it can be seen that the experimental setting and design for the revised film are superior to any of the previous ones. The exception is an important one. Learning how to read the manual alphabet is not a normal activity for this group of subjects.

D. Variables

The stimulus variables tested were again (1) rate of presentation and (2) amount of repetition.

As before, the response variables were different modes of responding: orally, in writing, and spelling manually.

RESULTS

A description of the number of words read correctly by the Catholic University students for all experimental conditions is given in Tables 18 and 19. The summary of the analysis of variance (Table 20) shows that the only experimental treatment that had any significant effect on their learning was a main effect: repetition. The mean number of words read correctly for the entire group was 7.9 with a S.D. of 4.0. This seems to be a modest but reasonable achievement.

Tables 21 and 22 present similar statistics for the number of sentences read correctly. As with words, only repetition affected the learning (Table 23). The mean achievement for the group was 1.3 sentences read correctly with a S.D. of 1.8. This is a very small achievement, indeed.

The mean amount of time spent working with the film course was 13 hours and 40 minutes with a S.D. of 4.0 hours. This was considerably longer than any of the previous groups had spent with the films. Two other groups had averaged about five hours with the somewhat smaller preliminary course. The correlation between both the number of words and sentences read correctly and the amount of time spent with the course was .27 and .14 respectively. Both relationships fall short of statistical significance.

CONCLUSIONS

A programmed course of film instruction consisting of 24 lessons and two film tests was developed as a vehicle for

TABLE 18

WORDS READ CORRECTLY BY CATHOLIC UNIVERSITY STUDENTS AFTER THE FILM COURSE ADMINISTERED UNDER VARIABLE SPEED CONDITIONS

	Writing		Oral		Fingerspelling		Total	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
No repeat	6.5	2.1	9.0	3.5	7.5	3.4	7.7	3.1
Free repeat	11.0	2.3	11.3	3.3	8.3	2.8	10.2	3.2
Total	8.8	3.0	10.1	3.8	7.9	3.1		

TABLE 19

WORDS READ CORRECTLY BY CATHOLIC UNIVERSITY STUDENTS AFTER THE FILM COURSE ADMINISTERED UNDER STANDARD SPEED CONDITIONS

	Writing		Oral		Fingerspelling		Total	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
No repeat	9.8	.7	4.3	1.9	3.0	1.2	5.7	3.2
Free repeat	8.0	4.4	8.5	5.0	8.0	4.8	8.2	4.7
Total	8.9	3.2	6.4	4.3	5.5	4.3		

TABLE 20

ANALYSIS OF VARIANCE OF CATHOLIC UNIVERSITY STUDENTS WORD SCORES

Source of Variation	SS	df	MS.	F
Repetition (F-N)	75.00	1	75.0	5.2*
Response Mode (W-O-F)	38.80	2	19.4	1.4
Rate (V-S)	48.00	1	48.0	3.4
(F-N)(W-O-F)	7.87	2	3.9	.3
(F-N) (V-S)	0.00	1	0.0	0.0
(W-O-F) (V-S)	30.87	2	15.4	1.1
(F-N) (W-O-F) (V-S)	61.13	2	30.8	2.2
Within Cell	516.00	36	14.3	
Total	777.67	47		

* $.01 < P < .05$

TABLE 21

SENTENCES READ CORRECTLY BY CATHOLIC UNIVERSITY STUDENTS AFTER THE FILM COURSE ADMINISTERED UNDER VARIABLE SPEED CONDITIONS

	Writing		Oral		Fingerspelling		Total	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
No repeat	1.0	2.6	.8	.8	.8	.2	.8	.8
Free repeat	3.5	1.7	1.8	1.9	1.8	2.5	2.3	2.2
Total	2.3	1.8	1.3	1.5	1.3	2.0		

TABLE 22

SENTENCES READ CORRECTLY BY CATHOLIC UNIVERSITY STUDENTS AFTER THE FILM COURSE ADMINISTERED UNDER STANDARD SPEED CONDITIONS

	Writing		Oral		Fingerspelling		Total	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
No repeat	1.0	2.6	1.0	1.2	0	0	.7	1.0
Free repeat	.8	.8	1.5	2.6	2.3	2.4	1.5	2.2
Total	.9	.9	1.3	2.0	1.1	2.1		

TABLE 23

ANALYSIS OF VARIANCE OF CATHOLIC UNIVERSITY STUDENTS SENTENCE SCORES

Source of Variation	SS	df	MS	F
Repetition (F-N)	17.38	1	17.38	5.11*
Response Mode (W-O-F)	2.34	2	1.17	.34
Rate (V-S)	4.04	1	4.04	1.19
(F-N) (W-O-F)	.49	2	.25	.07
(F-N) (V-S)	.29	1	.29	.09
(W-O-F) (V-S)	3.58	2	1.79	.53
(F-N (W-O-F) (V-S)	9.09	2	4.55	1.34
Within Cell	122.50	36	3.40	
Total	159.71	47		

* $.01 < P < .05$

testing certain programming considerations. Those characteristics of programmed instruction which could be experimentally varied and compared seemed to affect learning very little. Thus, the ability to vary the rate of stimulus presentation, the ability to repeat or not repeat the lessons, and the ability to respond orally, in writing, or manually, all seemed to have little practical effect on the course of learning. With well-motivated, capable learners, such as the Catholic University students, some small and statistically significant effect could be found in the ability to repeat all or a part of a lesson.

Although these conclusions have been drawn for bright, hearing college students, no evidence has been gathered over the course of previous research which would lead the writer to suspect that the results would differ for other learners.

An evaluation of the practical significance or value of the film program for teaching people how to read the manual alphabet necessarily is a subjective matter and very dependent upon local circumstances. The film course (including the two tests) costs about $625.00. The projector costs an additional $80.00. In a setting where there are no or very few people who are competent to teach the manual alphabet, such a film course may be of considerable value. A modest skill in reading discrete words, after all, was achieved in only 13 hours by the hearing college students. Unfortunately, the

skill reached in reading sentences was very limited. It is possible, however, that students might achieve more if they repeated the entire course a second time. An experimental test of the practical advantages of repeating the course would be a good check on this possibility.

Ironically, the failure of individual control over the learning situation to affect achievement has some favorable practical consequences. The film course can be used to teach a group of students simultaneously with probably as much effect as with a single student. For the same reason, there may be no need for a variable speed projector. The film could probably be mounted in a cartridge with little or no loss of effectiveness.

In a situation where many competent individuals are readily available, the value of these films might have to be judged against the skill which individuals might reach after studying with these teachers. No test of this kind was made in this study. For those who might be interested in using the film course for practical teaching purposes, it would seem desirable to set up an experiment comparing the amount of learning acquired from equivalent amounts of practice with the film and with a sample of competent instructors of the manual alphabet. It would be of interest to learn if "live teachers" secure better average results, especially in the reading of sentences.

It must be noted that the very limited skill in reading sentences reached by the students had pervasive effects on both the character of the research and on the theoretical implications of these results for programming methodology. It was not possible, for example,to investigate the interaction of different levels of skill or knowledge on rate of stimulus presentation because there simply was not enough of a range of skill to "manipulate" experimentally. In the same vein, the experimental variations in programming methodology may not have affected achievement because the students were measured at too early a point in their "potential learning curves".

Although the revised course represents a very substantial change from the preliminary version, other and more expensive methods of changing the stimulus do exist. For example, animation techniques could be used to add English text before or during the actual manual spelling. Indeed, another sense modality, sound, might also be used to supplement the stimulus presentation. Unfortunately, the resources committed to this research simply did not permit the utilization of such expensive filming procedures.

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APPENDIX

This appendix contains two types of materials:

1. The captioned instructions and scripts for the film course, Reading the Manual Alphabet, and the revised Tests 1 and 2.

2. A copy of each form used by those students who wrote their responses to the motion picture film course.

A few copies of a special overview film have been pieced together from parts of the film course and the film tests. It is designed to give the viewer a quick overview (25 minutes) of the entire film series. It can be borrowed for a limited time period from the Office of Institutional Research, Gallaudet College, Washington, D. C. 20002

Lesson 1

Captions

This is the first of a series of 24 programmed film lessons designed to teach you how to read the manual alphabet. Two film tests are also part of the series.

To use these films properly, you much first learn how to use a variable speed 8 mm projector.

You can then control the film presentation by stopping, reversing, slowing down or speeding up the projector.

This enables you to see words and sentences spelled as often as you like and at a rate of speed which you feel helps you learn best.

You can respond to the film presentation orally, in writing, or by spelling manually.

By stopping the projector in the interval between the manual and printed version of a word or sentence, you will have as much time as you need to respond.

Here are the letters of the manual alphabet.

The speller will sweep his hand before you so that you can clearly see how he forms each letter. Normally, he would hold his hand steady and direct it toward the reader.

[Model presents letters of the manual alphabet]

Here are some clues that may help you remember some of the letters in the manual alphabet.

Note how similar the G and Q are.

[Model]

H, U, and N have a common finger configuration.

[Model]

K and P also look alike.

[Model]

I and J are the only letters which involve the small finger

[Model]

If the thumb is not in the correct position the letter I will look like the letter Y.

[Model]

Two letters are traced: J and Z.

[Model]

Punctuation is also traced. For example, note the question mark.

[Model]

Here is the apostrophe or the comma.

[Model]

A few letters will be formed differently by different spellers. For example, this is the preferred way to make a G.

[Model]

But you will see spellers form a G anywhere along this axis.

[Model]

Sometimes you will even see this badly formed G.

[Model]

The letter H will most often be pointed at the reader. However, some spellers will "point" or direct the H to the side.

[Model]

To repeat a letter, a speller will move his hand slightly to his right.

[Model]

However, many spellers will simply form the letter twice.

[Model]

This completes your introduction to the manual alphabet.

Although you will only see very fine spellers in this film series, keep in mind that manual spelling may vary as much in quality as handwriting.

THE END

Lesson 2

Captions:

Now you can have some practice in reading the Manual Alphabet.

The 26 letters will be presented one at a time in random order. After each manual letter, there will be a two second interval. You will then see the printed letter.

Here is our first speller.

[Model]

A woman will now show you the alphabet in a different order.

[Model]

Here is another man.

[Model]

Now watch a second woman.

[Model]

Here is our final speller.

If you have not been able to recognize every letter on the last three presentations of the manual alphabet, continue practicing with this lesson until you reach that level of skill.

At that point you can begin working with lesson three.

The End

Captioned Instructions for Lessons 3-24

Instructions for Lessons 3 and 4

You will now see a series of 15 different words. Each word will be

1. spelled manually
2. followed by a pause
3. printed in English

Now, a series of 15 sentences will follow. Each sentence will be

1. spelled manually
2. followed by a pause
3. printed in English

Abbreviated Instructions for Lessons 5 through 24

Fifteen words follow

Fifteen sentences follow

READING THE MANUAL ALPHABET

Lesson 3

152*/2**

	Words		Sentences
1.	absent	1.	Ebony is black.
2.	ebony	2.	We object to that.
3.	Ibsen	3.	Do not fib.
4.	object	4.	The spider weaves a web.
5.	bubble	5.	He wants a job.
6.	label	6.	Take a bubble bath.
7.	debt	7.	Grab that thief.
8.	bribe	8.	Join the public club.
9.	globe	9.	Ibsen wrote fine plays.
10.	public	10.	Bribery is a crime.
11.	grab	11.	He is in debt.
12.	web	12.	They are absent today.
13.	fib	13.	Label that box.
14.	job	14.	See the Globe Theater.
15.	club	15.	Money is no object.

* letters per minute

** pauses between words

READING THE MANUAL ALPHABET

Lesson 4

152*/2**

	Words		Sentences
1.	baby	1.	She is a fine baby
2.	rebel	2.	Rebel against them.
3.	glib	3.	That is a glib person.
4.	bone	4.	Is the bone broken?
5.	rubble	5.	It shattered into rubble.
6.	crab	6.	Do you like crab meat?
7.	bear	7.	He is a hungry bear.
8.	tribe	8.	This is a fierce tribe.
9.	snob	9.	The club has snob appeal.
10.	bush	10.	Go hide in the bush.
11.	cabin	11.	Will you build a cabin?
12.	ebb	12.	Waves ebb and flow.
13.	bill	13.	Bill me tomorrow.
14.	noble	14.	Horses are noble animals.
15.	snub	15.	Ignore that snub.

* letters per minute

** pauses between words

READING THE MANUAL ALPHABET

Lesson 5

152*/2**

	Words		Sentences
1.	accuse	1.	Use this thick ebony rod.
2.	echo	2.	Label each section clearly.
3.	ice	3.	Oxygen bubbles in the ocean.
4.	ocean	4.	Grab that check.
5.	back	5.	Lock the club door.
6.	section	6.	Stop that public ice sale.
7.	thick	7.	Fibs bring bad luck.
8.	shock	8.	Push the web back.
9.	truck	9.	Did it occur to Ibsen?
10.	almanac	10.	Truck driving is a job.
11.	check	11.	He is accused of bribery.
12.	music	12.	You object to the echo.
13.	look	13.	His music paid his debt.
15.	luck	14.	The almanac pictures the globe.
15.	occur	15.	His absence shocks me.

* letters per minute

** pauses between words

READING THE MANUAL ALPHABET

Lesson 6

152/1

	Words		Sentences
1.	cadet	1.	Good cadets do not rebel.
2.	center	2.	We got that bill twice.
3.	chick	3.	Can you unlock the cabin?
4.	coffee	4.	It is a docile tribe.
5.	lucky	5.	That snub is not civil.
6.	rack	6.	He is a lucky snob.
7.	neck	7.	Rack up that rubble.
8.	twice	8.	Stiffen the neck bone.
9.	unlock	9.	Children like baby chicks.
10.	cure	10.	He was a noble actor.
11.	actor	11.	It ebbs from the center
12.	defect	12.	Defect into the bush.
13.	civil	13.	Feed him crabs and coffee.
14.	docile	14.	Cure this sick bear.
15.	stuck	15.	He stuck to his glib story.

READING THE MANUAL ALPHABET

Lesson 7

160/2

Words	Sentences
1. advice	1. The truck was beside the dock.
2. editor	2. Put the food on ice.
3. ideal	3. An echo is a glad sound.
4. odor	4. Change the section code.
5. duke	5. His back bled from a cut.
6. trade	6. Check this advice.
7. bedding	7. Who is music editor?
8. beside	8. This is a trade almanac.
9. code	9. He likes thick fudge.
10. fudge	10. Strong odors can shock people.
11. glad	11. Mud is on the ocean bottom.
12. bled	12. Lock the bedding in the closet.
13. valid	13. Valid theories occur rarely.
14. food	14. He has ideal luck.
15. mud	15. Accuse the duke again.

READING THE MANUAL ALPHABET

Lesson 8

160/2

	Words		Sentences
1.	daze	1.	The cadet was dazed.
2.	medium	2.	The actor adjusted his hat.
3.	hidden	3.	Put the sled in the rack.
4.	door	4.	My neck size is medium.
5.	dude	5.	Lead me to the center.
6.	lead	6.	The defect was well hidden.
7.	debt	7.	Reduce the civil budget.
8.	died	8.	He paid the debt twice.
9.	mood	9.	All the chicks died.
10.	judge	10.	Build a broad coffee table.
11.	adjust	11.	Kate was a docile bride.
12.	sled	12.	Please unlock the door.
13.	bride	13.	Cure him of his mood.
14.	broad	14.	What a lucky judge.
15.	budget	15.	The dude stuck it out.

READING THE MANUAL ALPHABET

Lesson 9

160/1

Words	Sentences
1. affair	1. This cafe serves good food.
2. effect	2. This was a glad affair.
3. if	3. Mud muffles footsteps.
4. offend	4. This chef works for the duke.
5. offer	5. Does the odor offend you?
6. cafe	6. Softball is an ideal game.
7. theft	7. Trade has a fine effect.
8. classify	8. We need valid proof.
9. softball	9. The editor met his staff.
10. muffle	10. Hanging is a stiff code.
11. staff	11. Stuff that bedding.
12. chef	12. He bled as if stabbed.
13. stiff	13. Theft is beside the point.
14. proof	14. Can you classify advice?
15. stuff	15. Offer him some fudge.

READING THE MANUAL ALPHABET

Lesson 10

168/1

Words	Sentences
1. farm	1. The folks were dazed.
2. refer	2. Adjust that nice muff.
3. sift	3. His craft is in the lead.
4. folk	4. They fear debt.
5. buffet	5. It is a medium size buffet.
6. craft	6. Did he refer to his sled?
7. fear	7. He died in a fire.
8. wife	8. Is she your future bride?
9. soft	9. He hid his wife.
10. future	10. Close the door softly.
11. safe	11. They like a broad sofa.
12. left	12. His mood left him.
13. fire	13. The judge can sift evidence.
14. sofa	14. Dudes should visit a farm.
15. muff	15. This is a safe budget.

READING THE MANUAL ALPHABET

Lesson 11

168/1

Words	Sentences
1. agency	1. Stuff that plug there.
2. eligible	2. He has a stiff leg.
3. ignore	3. He is the staff bugler.
4. ogle	4. Apply if you are eligible.
5. ugly	5. Theft is an evil design.
6. garage	6. This cafe is over a garage.
7. legal	7. Is this legal proof?
8. design	8. This is a stag affair.
9. foggy	9. Ignore that false offer.
10. bugle	10. Ogling often offends people.
11. stag	11. This has an ugly effect.
12. leg	12. This is the big softball game.
13. big	13. The dog made a muffled bark.
14. dog	14. Hire a chef from this agency.
15. plug	15. Classify today as foggy.

READING THE MANUAL ALPHABET

Lesson 12

168/0

Words	Sentences
1. gallon	1. This is a frog farm.
2. regal	2. Is golf a safe game?
3. bogus	3. Build a regal craft.
4. guilty	4. He fears the brig.
5. juggle	5. We refer to bogus checks.
6. drag	6. There is one gallon left.
7. gentle	7. We like a fire at night.
8. frog	8. He guards his wife.
9. brig	9. Sift the keg carefully.
10. guard	10. Hug the folks for me.
11. baggy	11. Drag the sofa over.
12. keg	12. She is soft and gentle.
13. golf	13. Make a future without guilt.
14. night	14. Do not juggle the buffet.
15. hug	15. The muff looks baggy.

READING THE MANUAL ALPHABET

Lesson 13

176/1

Words	Sentences
1. ahead	1. Brake quickly on foggy days.
2. ajar	2. Leave the garage door ajar.
3. eject	3. The Boxer is a sleek dog.
4. health	4. We need a big smock.
5. reject	5. Do not ignore your health.
6. brake	6. Make a block design.
7. sake	7. Some jokes are ugly.
8. steak	8. Do not ogle when you hike.
9. hike	9. Plug the gap for my sake.
10. strike	10. Stag steaks are rare.
11. sleek	11. Is this strike legal?
12. block	12. Will the agency reject us?
13. smock	13. Do not eject eligible people.
14. coke	14. The bugler drank a coke.
15. joke	15. There is a dog leg ahead.

READING THE MANUAL ALPHABET

Lesson 14

176/1

Words	Sentences
1. alumni	1. Make a bold strike.
2. illegal	2. Ice in coke will melt.
3. elect	3. Hike along the canal.
4. old	4. Alumni often reject change,
5. ultimate	5. He is old but healthy.
6. behalf	6. That fool needs a smock.
7. melt	7. The ultimate is still ahead.
8. kill	8. He tells jokes with skill.
9. bold	9. Eject him on my behalf.
10. result	10. The steak knife is dull.
11. canal	11. Elect a block leader.
12. bell	12. For my sake, do not kill.
13. skill	13. Worn brake linings are illegal.
15. fool	14. The bell tower door was ajar.
15. dull	15. The result was a sleek design.

READING THE MANUAL ALPHABET

Lesson 15

176/0

Words	Sentences
1. lady	1. We lost a gallon of gas.
2. help	2. The doll seemed baggy.
3. spill	3. Drag the lion away.
4. lost	4. She is a gentle lady.
5. bulk	5. Do not spill the keg.
6. tall	6. He is guilty also.
7. let	7. The night is cold.
8. silk	8. Let him leave the brig.
9. doll	9. The frog is full.
10. lunch	10. The bulk of it was bogus.
11. also	11. That guard is tall.
12. fell	12. Help him learn golf.
13. lion	13. She looks regal in silk.
14. cold	14. Stop juggling my lunch.
15. full	15. They fell into a hug.

READING THE MANUAL ALPHABET

Lesson 16

184/1

Words	Sentences
1. amount	1. Tom is a fool.
2. emblem	2. Kill the umpire!
3. impulse	3. Omit alumni from the list.
4. omit	4. Put your results in a memo.
5. umpire	5. That is a common skill.
6. campus	6. Design a bold emblem.
7. memo	7. Change the old amount.
8. simply	8. Elect my chum.
9. common	9. The canal runs by the campus.
10. bumpy	10. Candles melt into bumpy wax.
11. ham	11. They are simply dull.
12. hem	12. Hem your bell skirt.
13. slim	13. Love is the ultimate impulse.
14. Tom	14. Is it illegal to water ham?
15. chum	15. She is slim on my behalf.

READING THE MANUAL ALPHABET

Lesson 17

184/1 through sentence 6
184/0 beginning with sentence 7

	Words		Sentences
1.	mad	1.	The lady is mad.
2.	cement	2.	She has a cameo also.
3.	trim	3.	The tall boy swam well.
4.	moth	4.	Let the member in.
5.	jump	5.	Please help them.
6.	swam	6.	The mimosa tree fell.
7.	member	7.	The lion jumped out.
8.	shrimp	8.	This is a silk moth.
9.	room	9.	Do not spill the cement.
10.	mumble	10.	He lost his comic book.
11.	cameo	11.	The shrimp is cold.
12.	them	12.	The doll is in that room.
13.	mimosa	13.	Try a plum for lunch.
14.	comic	14.	Trim this bulk down.
15.	plum	15.	He mumbled he was full.

READING THE MANUAL ALPHABET

Lesson 18

184/0

Words	Sentences
1. analyze	1. Only one umpire is needed.
2. energy	2. This is of common concern.
3. include	3. Campus life is fun.
4. only	4. Analyze this in a memo.
5. uneasy	5. Simply rub his chin.
6. land	6. An electric impulse is energy.
7. bent	7. Hem the den curtains.
8. in	8. Draw the emblem upon the wall.
9. concern	9. Avoid bumpy land.
10. bun	10. Omit the bent pin.
11. bank	11. Tom went to the bank.
12. den	12. My chum is uneasy.
13. chin	13. Write the amount in the book.
14. upon	14. Ham was included on the menu.
15. fun	15. One bun makes a slim meal.

READING THE MANUAL ALPHABET

Lesson 19

192/1

Words	Sentences
1. apply	1. Only Ipswich clams are tasty.
2. epic	2. Place a bun beside the cup.
3. Ipswich	3. It was of epic concern.
4. operate	4. The zipper was bent.
5. upset	5. Reply in writing.
6. shape	6. The map is in the bank.
7. reply	7. Place the copy upon the table.
8. zipper	8. Prep students are full of energy.
9. copy	9. Keep your chin up.
10. up	10. Mop the den floor.
11. map	11. Change the shape of the land.
12. prep	12. Apply for the fun of it.
13. tip	13. Include a tip on the check.
14. mop	14. He is uneasy and upset.
15. cup	15. Analyze before you operate.

READING THE MANUAL ALPHABET

Lesson 20

192/1 through sentence 6
192/0 beginning with sentence 7

	Words		Sentences
1.	area	1.	Ipswich is a fine area.
2.	error	2.	The map is in error.
c.	iron	3.	It was urgent to operate.
4.	origin	4.	Murder is an epic crime.
5.	urgent	5.	Form your reply carefully.
6.	dare	6.	The fire upset our plans.
7.	perform	7.	Use one spoonful per cup.
8.	fire	8.	What is the origin of the zipper'
9.	form	9.	Dare you copy that paper?
10.	murder	10.	He applied from far away.
11.	far	11.	The fur coat had no shape.
12.	per	12.	The mop had an iron handle.
13.	fir	13.	A poor prep can work.
14.	poor	14.	Perform up to standard.
15.	fur	15.	Prune the tip of the fir tree.

READING THE MANUAL ALPHABET

Lesson 21

192/0

Words	Sentences
1. assure	1. He assured us it was urgent.
2. escort	2. The iron was rusty.
3. issue	3. Murder is a terrible risk.
4. ostrich	4. The paper had the usual errors.
5. usual	5. A gas fire is dangerous.
6. fasten	6. What is the origin of chess?
7. guest	7. The bus performs well.
8. risk	8. Escort him far away.
9. pose	9. He dared to force the issue.
10. rusty	10. My guest is poor.
11. gas	11. Our boss owns that fur coat.
12. chess	12. The ostrich stays in one area.
13. his	13. You order pictures per pose.
14. boss	14. Fasten the fir board here.
15. bus	15. His drawing had good form.

READING THE MANUAL ALPHABET

Lesson 22

200/1

Words	Sentences
1. attach	1. The clutch was gone on the bus.
2. etch	2. An ostrich will bite.
3. item	3. Etch that pose on the plate.
4. other	4. Find some other issue.
5. utensil	5. Light the gas with a match.
6. match	6. Fetch the guest.
7. fetch	7. We quit playing chess.
8. bite	8. Will you risk a jet flight?
9. Scotch	9. A good utensil will not rust.
10. clutch	10. Assure that brat again.
11. brat	11. The escort ship cut away.
12. jet	12. His boss drank Scotch.
13. quit	13. Fasten or attach it here.
14. plot	14. It is the usual item.
15. cut	15. Will he plot his own course?

READING THE MANUAL ALPHABET

Lesson 23

200/0

Words	Sentences
1. average	1. Attach it over here.
2. revolve	2. Etch it for a souvenir.
3. give	3. Every item is counted.
4. over	4. Where are the other new cars?
5. souvenir	5. The average utensil is strong.
6. every	6. Has he swum in a match?
7. ivy	7. Fetch the law book.
8. law	8. Does that ewe bite?
9. ewe	9. Give him some Scotch.
10. wind	10. Will the clutch revolve?
11. snow	11. He is an awful brat.
12. swum	12. The jet will arrive soon.
13. awful	13. The wind quit blowing.
14. will	14. Snow forced a change in plot.
15. new	15. Cut the ivy down.

READING THE MANUAL ALPHABET

Lesson 24

200/0

	Words		Sentences
1.	axe	1.	Give him the axe.
2.	Mexico	2.	They will visit Mexico.
3.	fix	3.	He can fix the average car.
4.	oxen	4.	Snow slows an oxen team.
5.	lux	5.	The Lux soap is over there.
6.	bay	6.	He has swum the bay.
7.	eye	7.	The eye revolves slowly.
8.	yield	8.	Did the study yield new data?
9.	enjoy	9.	They enjoy every play.
10.	buy	10.	This is an Aztec law.
11.	Aztec	11.	The wind made him sneeze.
12.	sneeze	12.	This is a prize souvenir
13.	prize	13.	Buy me the ivy.
14.	ozone	14.	How awful the ozone must be.
15.	fuzzy	15.	The little ewe was fuzzy.

Captioned Instructions for Tests 1 and 2

This is a test of your ability to read the manual alphabet

Here is how the test goes:

First, you will see a number.
Next, a word will be spelled manually.
Finally, you should write the word on your answer sheet.

Here is a practice item. After the number you will see a word spelled. WATCH FOR IT.

[Model]

Now write the word after the number 1 on your answer sheet.

You should have written dog after number 1

Here is another practice item.

[Model]

Write your answer.

Your answer should look like this: 2. cat.

There are 28 test words. The test will begin with number 3.

[Model]

Now you will see 32 short sentences. The test will continue with number 31.

[Model]

THE END

A FILM TEST FOR READING THE MANUAL ALPHABET

TEST NO. 1

Practice Words:

1. dog
2. cat

Test Words:

3. crown
4. hinge
5. razor
6. able
6. adore
8. bulk
9. upon
10. frog
11. violin
12. bestow
13. attain
14. donate
15. lounge
16. veal
17. trump
18. rare
19. relax
20. broil
21. drop
22. ablaze
23. grim
24. folder
25. number
26. year
27. stung
28. high
29. cream
30. break

Test Sentences:

31. The roof is red.
32. Where did he go?
33. The book is well written.
34. That dog is fierce.
35. He ran across the field.
36. John won the race.
37. Put it in the bag.
38. Is root beer good?
39. This ship is old.
40. Did you see him?
41. The meat is well done.
42. Tom lost his straw hat
43. This town is large.
44. This water is quite cool.
45. The view is good.
46. Tell me your name.
47. She visited Cape Cod many times.
48. They drove along the coast.
49. Please go see your advisor.
50. He chose English as his major.
51. His brand new car was wrecked.
52. The children enjoyed the train ride.
53. They bought the red brick house.
54. The woman missed the bus.
55. She loves swimming in the sea.
56. Here is the pen.
57. Pick this pencil up.
58. She needs some help in French.
59. John jumped over the fence.
60. We talked about going to Oregon.
61. She works in the front office.
62. Did you see your old bicycle?

A FILM TEST FOR READING THE MANUAL ALPHABET

TEST NO. 2

Practice Words:

1. dog
2. cat

Test Words:

3. chalk
4. daily
5. ghost
6. heat
7. later
8. mail
9. nest
10. siren
11. above
12. each
14. idle
14. coffee
15. wage
16. berate
17. nimble
18. panic
19. Japan
20. best
21. fatal
22. exit
23. throb
24. prowl
25. dream
26. troop
27. along
28. guitar
29. resort
30. acorn

Test Sentences:

31. He nodded to her.
32. This number is wrong.
33. Keep it in the file.
34. That girl is pretty.
35. The sick girl fainted twice.
36. Call me back later.
37. He did not help much.
38. Where is the school?
39. The test was very bad.
40. Thank you for coming again today.
41. He bought some stocks.
42. Where are you going?
43. He forgot my birthday.
44. He was very much surprised.
45. Her gain is our loss.
46. He takes his time.
47. Our guide showed us around.
48. He gets ahead of me.
49. This is an oak tree.
50. The boy cried for his mother.
51. The girl lost her rag doll.
52. My uncle went to the city.
53. He works like mad.
54. She is light on her feet.
55. Please drop me at the store.
56. Hear the noise of the rain.
57. Did you get my postcard?
58. The big project expired last month.
59. It tastes very good.
60. Her temper is quick.
61. He makes foolish remarks.
62. You may go now.

READING THE MANUAL ALPHABET*

LESSON 2: ALPHABET PRACTICE

NAME _____ DATE _____

Speller One	Speller Two	Speller Three	Speller Four	Speller Five
1. _____	1. _____	1. _____	1. _____	1. _____
2. _____	2. _____	2. _____	2. _____	2. _____
3. _____	3. _____	3. _____	3. _____	3. _____
4. _____	4. _____	4. _____	4. _____	4. _____
5. _____	5. _____	5. _____	5. _____	5. _____
6. _____	6. _____	6. _____	6. _____	6. _____
7. _____	7. _____	7. _____	7. _____	7. _____
8. _____	8. _____	8. _____	8. _____	8. _____
9. _____	9. _____	9. _____	9. _____	9. _____
10. _____	10. _____	10. _____	10. _____	10. _____
11. _____	11. _____	11. _____	11. _____	11. _____
12. _____	12. _____	12. _____	12. _____	12. _____
13. _____	13. _____	13. _____	13. _____	13. _____
14. _____	14. _____	14. _____	14. _____	14. _____
15. _____	15. _____	15. _____	15. _____	15. _____
16. _____	16. _____	16. _____	16. _____	16. _____
17. _____	17. _____	17. _____	17. _____	17. _____
18. _____	18. _____	18. _____	18. _____	18. _____
19. _____	19. _____	19. _____	19. _____	19. _____
20. _____	20. _____	20. _____	20. _____	20. _____
21. _____	21. _____	21. _____	21. _____	21. _____
22. _____	22. _____	22. _____	22. _____	22. _____
23. _____	23. _____	23. _____	23. _____	23. _____
24. _____	24. _____	24. _____	24. _____	24. _____
25. _____	25. _____	25. _____	25. _____	25. _____
26. _____	26. _____	26. _____	26. _____	26. _____

* This form has been single spaced for inclusion in this report.

READING THE MANUAL ALPHABET

Lesson _____

Words	Sentences
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____
7. _____	7. _____
8. _____	8. _____
9. _____	9. _____
10. _____	10. _____
11. _____	11. _____
12. _____	12. _____
13. _____	13. _____
14. _____	14. _____
15. _____	15. _____

A FILM TEST FOR READING THE MANUAL ALPHABET*

NAME _____ DATE _____

TEST NO. _____

Practice Words:

1. _____
2. _____

Test Words:

3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
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30. _____

Test Sentences:

31. _____
32. _____
33. _____
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36. _____
37. _____
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39. _____
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* This form has been single spaced for inclusion in this report.