THE TALKER AND THE LIPREADER AS VARIABLES IN FACE-TO-FACE TESTING OF LIPREADING ABILITY

Thesis for the Degree of M. A.

MICHIGAN STATE UNIVERSITY

Donald L. Aylesworth

1964

ABSTRACT

THE TALKER AND THE LIPREADER AS VARIABLES IN FACE-TO-FACE TESTING OF LIPREADING ABILITY

by Donald L. Aylesworth

The purpose of this study was to investigate the sources variance in lipreading test scores obtained in a face-to-face test situation as a result of different talkers, as a result of presentations by the same talker, and as a result of the sex of the lipreader and talker.

Forty-eight lipreaders and four talkers were used in the study. The lipreaders consisted of twenty-four male and twenty-four female subjects randomly selected from students enrolled in undergraduate speech courses. The talkers consisted of two male and two female subjects randomly selected from graduate students in the area of speech and hearing science, Department of Speech, Michigan State University.

Each talker presented the lipreading test to three different groups of lipreaders. Two male and two female lipreaders observed each presentation. Two adjoining rooms with an observation window between them were employed to allow the talker to use voice in presenting the test without being heard.

Thirty-two unrelated sentences were spoken by the talker. After each sentence was presented, the lipreaders wrote down what

they thought the speaker had said. The score received on the test was determined by the mean percentage of correct identifications within each sentence.

The data were analyzed statistically by a two-way analysis of variance. Two separate analyses were made; the first contained lipreader sex and talker sex as main effects. The second used different talkers and presentations as main effects.

The results of the analyses show no significant differences between scores as a result of different talkers, talker sex, or presentations by the same talker. In addition, no significant interaction between lipreader and talker sexes was noted. A significant difference was found between male and female lipreaders as groups. As a group, female lipreaders received significantly higher test scores.

On the basis of the analysis of the data, the following conclusion was made: Lipreading performance, as measured by a face-to-face test, varies in part as a result of lipreader sex.

Implications for future research were suggested and discussed.

THE TALKER AND THE LIPREADER AS VARIABLES IN FACE-TO-FACE TESTING OF LIPREADING ABILITY

By

Donald L. Aylesworth

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Speech

1964

ACKNOWLEDGEMENTS

I would like to express my appreciation to the Chairman of my Committee, Dr. James W. Hillis, Assistant Professor of Speech, for his helpful guidance; and to Dr. Herbert J. Oyer, Chairman, Department of Speech, and Dr. Charles Pedrey, Associate Professor of Speech, for serving as members of my Committee.

A special note of thanks is extended to Dr. Max Nelson, Associate Professor of Speech, for making materials available to me from his personal library.

TABLE OF CONTENTS

		Page
LIST OF TABLES		iv
LIST OF APPENDICES		v
Chapter		
I.	STATEMENT OF THE PROBLEM	1
	Introduction Statement of Purpose of Study Hypotheses Importance of the Study Limitations Definition of Terms Organization of Thesis	
II.	SURVEY OF THE LITERATURE	9
	Introduction The Talker The Sex of the Lipreader Discussion of the Literature	
III.	SUBJECTS, EQUIPMENT, AND PROCEDURES	17
	Subjects Test Environment Equipment Materials Procedure	
IV.	ANALYSIS AND DISCUSSION.	22
	Analysis Discussion	
V.	SUMMARY AND CONCLUSIONS	27
	Summary Conclusions Implications for Future Research	
BIBLIOGRAPHY		30
APPENDICES		33

LIST OF TABLES

Table		Page
1.	Summary Table for Two-way Analysis of Variance Lipreader and Talker Sex. . .	23
2.	Summary Table for Two-way Analysis of Variance with Pooled Interaction and Error Term Lipreader and Talker Sex . .	24
3.	Summary Table for Two-way Analysis of Variance Talkers and Presentations . .	25

LIST OF APPENDICES

Appendix		Page
A.	LIPREADING TEST SENTENCES	34
B.	ANSWER SHEET	35
C.	RAW SCORE	37
D.	FLOOR PLAN AND SEATING ARRANGEMENT	39

CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

According to Reid,[1] one of the first attempts to measure lipreading ability objectively was made by Day and Fusfeld[2] in the year 1928. Four sets of sentences were developed and read to deaf students in a face-to-face situation. The students were asked to write down exactly what they could lipread. One set of questions was presented by the teacher and another by the field agent making the survey. The mean scores for the tests given by the teacher were higher than those tests presented by the field agent. It was suggested that the variability of speaking situations and among talkers contributed to a low reliability.

Many of those active in the development of lipreading tests have pointed out possible weaknesses of the face-to-face type of test situation with particular reference to the talker or talkers. Mason states:

> A possible reasonable explanation for the lack of objective measurement may be found in the

---

[1]Gladys A. Reid, "A Preliminary Investigation in the Testing of Lipreading Achievement," Journal of Speech Disorders, 12 (1947), pp. 77-82.

[2]H. E. Day, I. S. Fusfeld, and R. Pintner, A Survey of American Schools for the Deaf: 1924-25 (Washington, D. C.: National Research Council, 1928).

> existence of individual differences in speech manifestations exhibited by various speakers. . . Indeed, comparable results may likewise be difficult to obtain from subsequent tests made by the same speaker.[1]

In addition, Reid comments; that: "we may also note that an individual does not speak precisely the same way all the time so that using the same speaker is no guarantee of uniformity in presenting lipreading tests."[2]

Seemingly, the advent of motion pictures provided the ultimate answer to the problem of consistency in administering lipreading tests. The advantages of filmed tests have been enumerated by various authors. Mason's[3] listing is representative; she cites the ability to control the constancy of speech movements, rate of speech, visibility of speech presentation, distance from the speech source, and the use of the same talker as primary advantages.

The validity of filmed tests is claimed by their authors. Utley feels her test is valid because of its "logical derivation as a representative work-sample from everyday life."[4]

Reid claims validity for her test by stating:

> Except for slight differences that might result from the use of colored motion pictures in place of the

---

[1]Marie K. Mason, "A Cinematographic Technique for Testing Visual Speech Comprehension," Journal of Speech Disorders 8 (1943), p. 272.

[2]Reid, op. cit., p. 77.

[3]Mason, loc. cit.

[4]Jean Utley, "Factors Involved in the Teaching of Lipreading Ability Through Motion Pictures," Volta Review, 48 (1946), p. 659.

> living speaker the test is considered valid in that any lipreading situation is a valid one for testing.[1]

In discussing the Utley filmed test, but obviously referring to all filmed tests, Heider does not feel that the test results are a measure of how much an individual can get from lipreading in a life situation because, "it is recognized that it is harder to read the lips of a person seen on a screen than one who is present."[2]

Taafee,[3] in discussing the filmed test developed at the John Tracy Clinic in Los Angeles, cited favorable and unfavorable aspects of it; some of which seem to apply to most filmed tests. The favorable aspects he cites have been previously listed. The unfavorable aspects which differ from the face-to-face situation include a two dimensional representation of three dimension, enlargement of the talker's features, and additional minor changes in appearance common to photographic reproduction.

In addition, Taafee found that test scores from face-to-face and filmed presentations indicate that live presentations are more difficult to lipread. This is directly opposed to Heider's statement concerning the two types of presentations.

---

[1]Gladys A. Reid, "A Preliminary Investigation in the Testing of Lip-Reading Achievement," American Annals of the Deaf, 91 (1946), p. 409.

[2]Grace M. Heider, "The Utley Lip Reading Test," Volta Review, 49 (1947), p. 458.

[3]Gordon Taafee, "A Film Test of Lip Reading: Studies in Visual Communication," John Tracy Clinic Research Papers, II (November, 1957).

Postove[1] does not feet that any available filmed test meets all required criteria. She lists presentation of the material by at least one male and one female speaker, use of colored photography, two equivalent forms, wide range of difficulty, and ease of discrimination and scoring as necessary criteria to be met.

In the opinion of this writer, a statement by Simmons succinctly summarizes the problem:

> There appears to be no doubt that a filmed test of lipreading can test reliably some aspect of lipreading, but many therapists seem to feel that the ability tested by films is not the same as the one that they would like to test - the ability to read lips in the everyday face-to-face situation.[2]

Statement of Purpose of Study

The purpose of the study is to investigate the assumptions underlying statements, such as those of Mason[3] and Reid,[4] concerning variance of the same talker in the administration of lipreading tests over several presentations in a face-to-face situation; and the variance among different talkers. It is an attempt to determine whether lipreading test scores obtained in a face-to-face presentation of the test are affected more by the talkers or the lipreaders.

---

[1]Mary Jane Postove, "Selection of Items for a Speechreading Test by Means of Scalogram Analysis," Journal of Speech and Hearing Disorders, 27 (1962), pp. 71-75.

[2]Audrey A. Simmons, "Factors Related to Lipreading," Journal of Speech and Hearing Research, 2 (1959), p. 340.

[3]Supra, p. 1.

[4]Supra, p. 2.

Hypotheses

The questions to be investigated and the corresponding null hypotheses are as follows:

1. Does sex difference among lipreaders affect lipreading scores?

Null Hypothesis: There is no difference between lipreading test scores as a result of lipreader sex.

2. Does the sex of the talker affect lipreading scores?

Null Hypothesis: There is no difference between lipreading test scores as a result of talker sex.

3. Do lipreading test scores vary because certain lipreaders make higher scores with some talkers while other lipreaders make higher scores with still other talkers? If so, is it because one lipreader sex obtains higher scores with one talker sex and vice versa?

Null Hypothesis: There is no interaction of talker sex by lipreader sex.

4. Does the difference from one presentation to another by the same talker affect lipreading scores?

Null Hypothesis: There is no difference in lipreading test scores as a result of different presentations by the same talker.

5. Does the difference from one talker to another affect lipreading scores?

Null Hypothesis: There is no difference in lipreading test scores as a result of different talkers.

Importance of the Study

O'Neill and Oyer[1] list various uses for lipreading tests. These include measuring basic lipreading ability, measuring the effects of lipreading training, as an aid to proper placement within a training program, as an aid in deciding upon teaching methods, and use in research.

It is important to note that of the various applications listed, the majority are applications that a speech and hearing therapist, or a teacher of the deaf and hard-of-hearing are likely to utilize. However, it has been made rather obvious to this investigator, through contacts with teachers and therapists, that filmed tests of lipreading have not found widespread use in rehabilitation or educational settings.

The need for testing lipreading ability in rehabilitation and educational settings appears to be great. The latest survey shows that 465 schools and classes in the United States served 30,799 deaf individuals. This does not include service provided the hard-of-hearing. In addition, there were several hundred speech and hearing clinics serving an untabulated number of individuals with hearing impairment.[2]

Because many speech and hearing therapists and teachers of the deaf and hard-of-hearing work in situations where filmed tests

---

[1]John J. O'Neill and Herbert J. Oyer, Visual Communication for the Hard of Hearing (New Jersey: Prentice Hall, 1961).

[2]Powrie V. Doctor, et al., "Tabular Statements of American Schools for the Deaf, October 31, 1963," American Annals of the Deaf, 109 (1964), pp. 138-210.

are not available to them, any information concerning the testing of lipreading ability in a face-to-face situation would be valuable. It is hoped that this study may provide useful information concerning the reliability of testing in a face-to-face situation.

Limitations

Forty-eight subjects, randomly selected from students enrolled in undergraduate speech courses were used in this study. This imposed a limitation regarding projection of the results of this study to a population of young children and to the deaf and hard-of-hearing.

Four talkers, randomly selected from graduate students majoring in Speech and Hearing Science were used in this study. The limitation imposed concerns the projection of the results of this study to a population of talkers who do not have a knowledge of the lipreading process.

The test situation used in this study utilized two rooms with an observation window between them. The talkers spoke with voice, but were not heard by the subjects . This imposes a limitation on the projection of the results of this study to face-to-face situations using only one room and where the talker does not use voice.

Definition of Terms

Talker.--The person administering the lipreading test will be referred to as the talker.

Lipreading.--For the purposes of this study the term "lipreading" will be used to refer to the process employed by an

individual to tell what another is saying by utilizing visual cues.

Lipreader.--The term lipreader will be used to refer to the individual employing the process of lipreading.

Presentation.--The term presentation, as used in this study, refers to one complete administration of the test material by a talker.

Organization of Thesis

Chapter One has included the statement of the problem, the importance of the study and the null hypotheses to be tested.

Chapter Two contains a review and discussion of the literature pertinent to the present study.

Chapter Three contains a description of the subjects, equipment, materials, and procedures employed in conducting the study.

Chapter Four contains the analysis of the data and a discussion of the results of the study.

Chapter Five contains the summary and conclusions of the study with recommendations for future research.

CHAPTER II

SURVEY OF THE LITERATURE

Introduction

The efficiency of lipreading as an information transmitting system has been studied over several decades. Researchers have explored the lipreading of vowels and consonants, aspects of visual acuity, memory, perception, and rate of speech. The factors of intelligence, cognitive processes, educational achievement, and other variables such as personality, audition, rhythm perception, and the psycholinguistic characteristics of lipreading have also received attention.[1]

The Talker

Most of the literature is concentrated on the lipreader and primarily represents attempts to define the factors which correlate with lipreading success. By comparison, the literature pertinent to the talker as a variable in the communicative act of lipreading is sparse. However, some aspects of the talker have received attention and may be regarded as possible influences on lipreading performance.

---

[1]John J. O'Neill and Herbert J. Oyer, Visual Communication for the Hard of Hearing (New Jersey: Prentice Hall, 1961).

Familiarity.--In discussing results of an earlier study by Day and Fusfeld,[1] Pintner[2] indicated that familiarity with the talker would yield higher scores on lipreading tests. He felt that familiarity with the teacher was reflected in higher mean scores on the tests she gave as compared with those of the field agent. He reasoned that the students were better able to interpret the teachers' lips.

The Heiders, in discussing the fact that the talker used in their test film was more familiar to older students than to the younger ones involved in their study, offer a somewhat contradictory statement regarding the importance of familiarity as a variable:

> Familiarity with the speaker is certainly important for good lipreading performance, especially when the speaker has peculiarities of speech. In our case, however, the speaker had very "normal" speech free from peculiarities, and we think that the factor of familiarity had rather little influence.[3]

Eisman and Levy[4] investigated a group of subjects who were known to each other. Each member of the group was lipread by the

---

[1]H. E. Day, I. S. Fusfeld, and R. Pintner, A Survey of American Schools for the Deaf: 1924-25 (Washington, D. C.: National Research Council, 1928).

[2]R. Pintner, "Speech and Speech-Reading Tests for the Deaf," Journal of Applied Psychology, 13 (1929), pp. 220-225.

[3]F. Heider and G. Heider, "An Experimental Investigation of Lip Reading," Psychological Monographs, 52 (1940), p. 128.

[4]Bernice Eisman and Joel Levy, "Interpersonal Factors Related to Lip Reading Performance: Performance as a Function of Characteristics of Known Communicators," John Tracy Clinic Research Papers, VIII (February 1958), 1-11.

other members of the group, and then they rated one another as passive, aggressive, or likeable. They found that lipreading efficiency was not influenced by a subject's perception of a communicator as passive, aggressive, or likeable. However, when extremes were considered, the most preferred was significantly better lipread than the least preferred.

As a part of the same study, the influence of aggressive and moderate group leadership on lipreading success was investigated. Two subjects alternated playing the aggressive and moderate leader in different groups. The groups met as discussion groups for a period of one week. The leaders were then lipread one week later and the results showed that the role played was ineffective in influencing lipreading. However, each was significantly better lipread in the role which was most natural to her.

McEachern and Rushford investigated the influence of unknown talkers on lipreading performance by having the talkers judged on fifty adjectives before and after being lipread. They concluded:

> The lipreading test situation does not approximate the conditions which would prevail in a interaction situation in which interpersonal variables would have their greatest effect on lipreading.[1]

Rate of Speech.--The effect of the rate of speech on lipreading performance was studied by Byers and Lieberman.[2] They

---

[1]A. W. McEachern and Georgina Rushford, "Lipreading Performance as a Function of Characteristics of Unknown Communicators," John Tracy Clinic Research Papers, VIII, (February 1958), p. 17.

[2]Vincent W. Byers and Lewis Lieberman, "Lipreading Performance and the Rate of the Speaker," Journal of Speech and Hearing Research, 2 (1959), pp. 271-276.

made a film of a talker using a modification of the Utley test material. The projection speed was set at four different rates for subjects to lipread. The results showed no significant differences between the four rates of projection as reflected in test scores, and no significant differences as to the effect on good or poor lipreaders. Black, et.al.[1] also found that results of a self-administered lipreading training program were not significantly different for groups viewing films at normal or reduced projection rates.

Visual Cues of Talker's Face.--The effect of facial cues in lipreading was investigated by Stone.[2] The influence of smiling and grim facial expression, mobile and stiff lips, and the amount of facial exposure, were studied. One significant relationship was found between lip mobility and lipreadability, a normal speaking mouth being easier to lipread than a tight one. A grim facial expression tended to be easier to lipread than a smiling one; however, the difference was not significant. The least important of the variables was facial exposure.

Hartman[3] also studied the role of facial expression in lipreading. Blocking out the mouths of two talkers, he had one

---

[1]John W. Black, Patricia P. O'Reilly, and Linda Peck, "Self-Administered Training in Lipreading," Journal of Speech and Hearing Disorders, 28 (1963), pp. 183-186.

[2]Lewis Stone, "Facial Cues of Context in Lipreading," John Tracy Clinic Research Papers, V (December, 1957).

[3]N. Hartman, Quoted by W. J. Bechinger, "Convention to Further Informing and Educating Teachers of Schools for the Deaf, the Hard of Hearing, and Speech Defectives in Baden-Wurttenberg, Heidelberg, January 9 and 10, 1961, "Neue Blatter fur Taubstummenbildung, 15 (1961), 168-184. Cited in dsh Abstracts 2, No. 3, (1962), pp. 209-210.

exaggerate his facial expression, and the other restrict facial expression to the area of the mouth. Students were able to lipread 66 percent of the sentences spoken by the talker with exaggerated facial expression, while only 44 percent of those spoken by the talker using restricted facial expression were lip-read correctly. In addition, Gilliat[1] indicates on the basis of his experience that an expressionless face, immobile lips, and facial grimaces tend to inhibit lip-readability of the talker.

The vertical mouth opening as an influence on the visual intelligibility of test words was found not to be significant by Brannon and Kodman. They state that: "the visibility of the total-movement form of a word is the best cue the lipreader has in identifying it."[2] In a recent study, Fulton[3] investigated visible differences between voiced and unvoiced production of four words. He found that physical measurements showed differences involved included size of lip openings, mouth widths, amount of jaw movement, amount of mouth and teeth area exposed, and the percentage of time that the tongue and teeth are visible. The unvoiced productions

---

[1]M. E. Gilliat, "If I Were Teaching Children Again," Teacher of Deaf, 59 (1961), pp. 55-59.

[2]John B. Brannon, Jr., and Frank Kodman, Jr., "The Perceptual Process in Speech Reading," AMA Archives of Otolaryngology, 70 (1959), pp. 114-119.

[3]Richard Fulton, "Comparative Assessment of Visible Differences Between Voiced and Unvoiced Words " (unpublished Masters Thesis, Michigan State University Department of Speech, 1964).

showed the greatest fluctuations and a definite tendency toward exaggeration by the talkers. Sex differences were indicated between talkers; with females having a more prominent lip opening, mouth width, and teeth area when talking.

The Sex of the Lipreader

The extent to which the lipreader has been studied was previously indicated. It was stated that much of the literature reflects the attempts to define factors which correlate with lipreading ability. These works have been summarized in other sources--O'Neill and Oyer[1], and Simmons.[2] It is the purpose of this section to review that part of the literature which is pertinent to the concerns of this study as regards the lipreader. Specifically, the sex of the lipreader as a possible influence on lipreading performance was considered.

Taafee[3]--in a study analyzing the filmed test of lipreading developed at the John Tracy Clinic in Los Angeles, California--investigated the scores within and between sexes of lipreaders. The scores of male subjects from different institutions did not differ significantly, and the same was true for female subjects. A significant difference was found between scores of the male and female groups

---

[1]O'Neill and Oyer, loc. cit.

[2]Audrey A. Simmons, "Factors Related to Lipreading," Journal of Speech and Hearing Research, 2 (1959), pp. 340-352.

[3]Gordon Taafee, "A Film Test of Lip Reading: Studies in Visual Communication," John Tracy Clinic Research Papers, II (November, 1957).

with the females on the average the better lipreaders. Another study by the same author[1] indicated that female subjects tended to identify correctly more words in each sentence than male subjects.

McEachern and Rushford[2] in their study relating to unknown communicators found no significant differences between mean scores for male and female lipreaders. Brannon[3] also found no significant differences between male and female lipreaders' scores in his study of the relative difficulty of various speech materials used in lipreading training.

Discussion of the Literature

There are several aspects of the literature concerning the talker which are of interest to the present study. First, there seems to be some evidence that a tendency to distort exists when words are spoken without voice.[4] Therefore, it may be unwise in the developing of a filmed test of lipreading to select material by first presenting it in a face-to-face situation without voicing, and then film the talker presenting the material with voice. It would seem that such a practice warrants study.

Secondly, the rate of speech as investigated through altering projection rates may be quite different from the effect of a talker

---

[1]G. Taafee, and W. Wong, "Studies of Variables in Lipreading Stimulus Material," John Tracy Clinic Research Papers, III (Dec. 1957).

[2]McEachern and Rushford, loc. cit.

[3]J. B. Brannon, Jr., "Speechreading of Various Speech Materials," Journal of Speech and Hearing Disorders, 26 (1961), pp. 348-354.

[4]Fulton, loc. cit.

altering his rate of speech in a face-to-face situation. On film, all physical relationships of the talker remain the same regardless of the projection speed used. It seems quite possible that this might not be true in the face-to-face situation.

Thirdly, on the basis of the information at hand concerning known and unknown talkers, the talkers utilized in this study should not influence lipreading performance unequally due to familiarity with any of the subjects or by interpersonal variables with subjects unfamiliar to them.

The literature containing a comparison of male and female lipreading performance is very meager. In many instances no efforts have been made to compare. The results have been pooled, thus making it impossible for anyone to use the published data in making a comparative study. Those who have made some comparative analysis of their data show conflicting results. In some instances only one talker or talkers of the same sex have been used; in others there is unequal representation of the lipreader sexes.

CHAPTER III

SUBJECTS, EQUIPMENT, AND PROCEDURES

Subjects

Lipreaders.--The subjects used as lipreaders in this study were randomly selected from students enrolled in undergraduate speech courses at Michigan State University. Forty-eight, twenty-four male and twenty-four female, were used. For purposes of this study they were divided into twelve groups of four. Each group consisted of two male and two female lipreaders. A schedule was circulated of different times the experiment was to be conducted, and the subjects selected the times they wished to participate. All subjects reported normal hearing, normal or corrected 20/20 vision, and none had previous lipreading training. The ages of the lipreaders ranged from sixteen to thirty-four, with a mean age of 20.4 years.

Talkers.--Four talkers, two male and two female, were randomly selected from among graduate students in Speech and Hearing Science at Michigan State University. Four different geographic backgrounds were represented; Georgia, Texas, New York, and Minnesota. Both male talkers and one female talker were Caucasian, the second female talker was a Negro. Each talker had knowledge concerning lipreading gained from courses in audiology. They are considered

to be trained talkers with regard to lipreading instruction. The age range of the talkers was twenty-two to thirty-two years with a mean age of 26.2 years.

Test Environment

Two adjoining rooms were used in conducting the experiment, thus providing a control room and a test room. Both rooms were sound treated with acoustical tile, and a two-way observation window was located on the common wall. The aperature of the observation window in the control room was 22 x 11½ inches, and 32 x 11½ inches in the test room. The attenuation factor for the wall between the control room and the testing room was 50 dB for the frequency range 250 cps to 1500 cps. For frequencies above 1500 cps the attenuation was in excess of 50 dB. Accurate measurement at these frequencies was not possible due to ambient noise in the control room (see Appendix D).

The subjects were seated in the test room and observed the talker in the control room through the observation window. The view of the talker was limited to the upper shoulder, neck, and head area.

Four chairs were arranged in two rows in the test room. The midpoint of the back of the two front-row chairs was forty-eight inches from a point five and one-quarter inches on either side of the observation window. The midpoint of the back of the second-row chairs were on line with the inside edge of the front-row chairs at a distance of eighty-four inches from the observation window (see Appendix D).

The chair for the talker in the control room was arranged on line with the midpoint of the observation window. The distance between the observation window and the front edge of the chair was thirty-six and one-quarter inches (see Appendix D).

Two common goose-neck, clamp-on desk lamps, each with a one-hundred watt bulb, were used to eliminate a shadow line on the observation window created by the overhead lights in the control room. The lamps were mounted on either side of the observation window at its upper border and the light diffused over the area in front of it in the control room.

Equipment

Audiometer.--An Allison Clinical Audiometer (Model 20) was used to generate an auditory signal which terminated each response period and indicated a new sentence was forthcoming. The signal was a 1000 cps pure tone, presented into the sound field of the test room at thirty-five decibels (re. USPH Survey Norms).

Interval Timer.--A manually operated stop watch (type 204 BD, manufactured by A. R. and J. E. Meylan Co.) was used to measure fifteen-second response intervals.

Materials

Sentence Identification Cards.--A series of four-by-five-inch cards with the sentence numbers printed on them were constructed to aid the subjects in keeping proper sequence in their responses.

Answer Sheets.--Answer sheets were constructed with written directions, sentence numbers, and response lines (see Appendix B).

Visual Stimulus Material.--A lipreading test developed for another graduate thesis in Speech and Hearing Science at Michigan State University was employed in this study.[1] The test consists of two forms with a Pearson Product Moment correlation coefficient of .86 between forms. Each form is made up of thirty-two unrelated sentences. For purposes of the present study the two forms were combined (see Appendix A). The estimate of reliability for the combined forms, using the Spearman-Brown formula, is .92.

Procedure

The talkers were given the list of test sentences before the test to familiarize themselves with the materials. They were instructed to use voice during the test. No other instructions were given as to how they should administer the test.

The subjects were given an answer sheet and asked to read the instructions along with the investigator. The instructions were as follows:

> You are being asked to participate in a lipreading task. A person will say thirty-two (32) sentences which you will not be able to hear. After each sentence a period of fifteen seconds will be allowed for writing down what you think the person said. At the end of the response period you will hear a signal tone to indicate a new sentence is forth coming.
>
> It is important that you respond to each sentence. Do not leave blank answer spaces; write down something for each sentence even if you have to make it up.

---

[1] Terry Lee Katt, Masters Thesis in Progress (Michigan State University, Department of Speech, 1964).

> To help you maintain the proper sequence of sentence order, the answer spaces are numbered and the number of the sentence to be given will also appear in the observation window before the sentence is given. Make certain that your response is made in the proper space by matching the number of each space with the number in the window.

Following the reading of the instructions, questions the subjects had concerning their responsibilities during the test were answered.

Four subjects, two male and two female, were seated in the test room for each presentation by the talkers. The lights in the test room were turned off. Illumination from lights in the control room was sufficient to allow the subjects to see the answer sheets.

The talker held the first sentence identification card in the observation window, then the sentence was given with voice. The investigator timed the response interval and presented the auditory signal into the test room to indicate the end of the response period and mobilize the attention of the subjects for the next sentence. The response interval was measured from the end of a sentence spoken by the talker to the auditory signal to terminate the response. This procedure was followed throughout.

Each talker made three presentations of the test sentences. A different group of lipreaders was employed for each presentation. The elapsed time between presentations by the same talker varied from ten minutes to two weeks.

CHAPTER IV

ANALYSIS AND DISCUSSION

Analysis

The data consisted of raw scores obtained on the lipreading test by each lipreader. Raw scores were derived by first computing the percent of correct word identification within each sentence and then computing the mean percent of correct identifications over all sentences (see Appendix C).

For the purposes of this study the data were submitted to a statistical analysis of variance. A two-way analysis of variance design, as described by Blalock,[1] was utilized. The design was employed in two different analyses of the data.

In review, the null hypotheses under test are:

1. There is no difference between lipreading test scores as a result of lipreader sex.

2. There is no difference between lipreading test scores as a result of talker sex.

3. There is no interaction of talker sex by lipreader sex.

4. There is no difference between lipreading test scores as a result of different presentations within the same talker.

---

[1] H. M. Blalock. Social Statistics (New York: McGraw-Hill Book Company, Inc., 1960).

5. There is no difference in lipreading test scores as a result of different talkers.

In order to test null hypotheses 1, 2, and 3, the data were analyzed using lipreader sex and talker sex as main effects. Data for lipreaders of the same sex were pooled and talker categories were treated in the same manner. The results of this analysis of variance is summarized in Table 1.

The critical region: F = 7.31 is required for significance at the .01 level of significance (df-40). The F-ratio of 7.74 (df-44) is significant at the .01 level of significance. Therefore, the following null hypothesis is rejected. There is no difference in lipreading test scores as a result of lipreader sex.

TABLE 1

SUMMARY TABLE FOR TWO-WAY ANALYSIS OF VARIANCE: LIPREADER AND TALKER SEX

Source	df	SS	Estimate of Variance	F-Ratio
Talker Sex	1	18.75	18.75	0.10
Lipreader Sex	1	1430.09	1430.09	7.74
T X L	1	146.99	146.99	0.80
Error	44	8127.84	184.72	
Total	47	9723.67		

The results of this analysis also indicate the following null hypotheses were not rejected: (2) There is no difference in lipreading test scores as a result of talker sex. (3) There is no interaction of talker sex by lipreader sex.

Since the variance due to interaction was not significant, it was pooled with the error term. This provides an additional degree of freedom with which to test the second null hypothesis. The summary of the results of this analysis is shown in Table 2.

TABLE 2

SUMMARY TABLE FOR TWO-WAY ANALYSIS OF VARIANCE WITH POOLED INTERACTION AND ERROR TERM LIPREADER AND TALKER SEX

Source	df	SS	Estimate of Variance	F-Ratio
Talker Sex	1	18.75	18.75	0.10
Lipreader Sex	1	1430.09	1430.09	7.78
Error	45	8274.83	183.88	
Total	47	9723.67		

The use of pooled interaction and error term did not yield significant results. Therefore, the second null hypothesis was again not rejected.

In order to test the fourth and fifth null hypotheses, the two-way analysis of variance design with talkers and presentations as main effects was employed. The sex of individual talkers was disregarded and presentations were considered with pooled data of lipreader sex. Table 3 summarizes the results of this analysis of variance. Since an interaction of talkers by presentations would have no meaning, it was pooled with the error term.

The results obtained in this analysis of variance did not yield significant results. Therefore, the results fail to reject

TABLE 3

SUMMARY TABLE FOR TWO-WAY ANALYSIS OF VARIANCE
TALKERS AND PRESENTATIONS

Source	df	SS	Estimate of Variance	F-Ratio
Talker	3	316.83	105.61	0.50
Presentation	2	461.29	230.64	1.08
Error	42	8945.55	212.99	
Total	47	9723.67		

two null hypotheses: (4) There is no difference in lipreading test scores as a result of different presentations within the same talker. (5) There is no difference in the lipreading test scores as a result of different talkers.

Discussion

The analysis of the data indicates that a significant difference existed between lipreader sexes as groups. As a group, female lipreaders obtained significantly higher test scores. This finding is in agreement with results reported by Taafee[1] and previously cited in Chapter II of this thesis.

The Taafee study used a filmed test of lipreading as opposed to the face-to-face situation employed in the present study. This would seem to indicate the lipreader-sex difference found in this study was

[1]Gordon Taafee, "A Film Test of Lip Reading: Studies in Visual Communication,' John Tracy Clinic Research Papers II (November, 1957).

not related to any artifact peculiar to it. It is the opinion of this investigator that the fact that the situations differed and still produced the same result tends to strengthen the finding more than if identical situations had been used.

However, the reader will recall that the literature pertaining to lipreader sex differences is both meager and conflicting. Two studies previously cited by McEachern and Rushford,[1] and Brannon,[2] did not find lipreader sex differences.

Analysis of the data did not reveal significant differences in test scores obtained with different talkers, or between presentations of the same talker. Therefore, the results cannot offer support of assumptions, as indicated by Mason,[3] and Reid,[4] that differences in speech manifestations between and within individuals significantly influence lipreading test scores. However, it is not feasible to suggest, on the basis of this study, that these factors do not have a significant influence. The limited number of talkers, lipreaders, and presentations used in this study prohibit such a generalization.

---

[1] McEachern and Rushford, loc. cit.

[2] Brannon, loc. cit.

[3] Supra, p. 1.

[4] Supra, p. 2.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

During the last several decades, the efficiency of the lipreading process as an information transmitting system has been investigated. Determining the lipreading ability of hearing-impaired individuals is particularly useful to those engaged in their education and rehabilitation.

Since the advent of motion pictures most test authors have utilized this mode of administrating their tests. For various reasons, widespread use of these tests in the field has not occured. The development of tests to be administered in a face-to-face situation has been thought to be impractical. This is due in part to assumptions that the individual differences between talkers and differences within the same individual talker from time to time would invalidate results.

The purpose of the present study was to investigate the variance in lipreading test scores obtained in a face-to-face presentation as a result of different talkers, as a result of the same talkers over several administrations, and as a result of sex of the lipreader and talker.

Forty-eight lipreaders and four talkers were used in the study. The lipreaders consisted of twenty-four male and twenty-four female

subjects randomly selected from students enrolled in undergraduate speech courses. The talkers consisted of two male and two female subjects randomly selected from graduate students in Speech and Hearing Science. All subjects attended Michigan State University.

Each talker presented the lipreading test to three different groups of lipreaders. Two male and two female lipreaders observed each presentation. Two adjoining rooms with an observation window between them were used in presenting the test to allow the talker to use voice without being heard.

Thirty-two unrelated sentences were spoken by the talker. After each sentence was presented, the lipreaders wrote down what they thought the speaker said from the information obtained through lipreading. The score received on the test was determined by the mean percent of correct identifications within each sentence.

The scores were analyzed using a two-way analysis of variance in two separate analyses. The results indicated that there was no significant difference in test scores obtained by different talkers, different talker sexes, or between presentations of the same talker. No significant interaction of talker sex and lipreader sex was indicated. The data showed that there was a significant difference between scores obtained by different lipreader sexes.

Conclusions

From the results obtained by statistical analysis of the data it was possible to reject the following null hypothesis: There is no difference between lipreading test scores as a result of lipreader sex.

Therefore, the following conclusion seems warranted: Lipreading performance, as measured by a face-to-face test, varies in part as a result of lipreader sex. Female lipreaders, as a group, receive significantly higher scores than males.

The difference obtained in this study was significant at the .01 level of significance.

Implications for Future Research

The significant difference in lipreading performance found between male and female lipreaders strongly suggests the need for additional research. Particularly since the literature is both meager and contradictory, and also because this variable may be operant in all lipreading tasks and not specifically related to a particular situation. The fact that a significant difference was found with a limited number of lipreaders would seem to justify additional research.

With specific reference to face-to-face type test administration, additional research increasing the number of talkers and extending the number of presentations seems worthwhile. Although no significant differences were found between talkers and among presentations in the present study, the limited number of talkers and presentations involved severely restrict the usefulness of the results.

The present study was conducted in a two-room test situation, with the lipreaders and talkers in separate rooms. Since this type of facility does not represent the typical classroom, investigation of test results obtained in a more typical environment may prove profitable.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Davis, Hallowell. Hearing and Deafness. New York: Holt Rinehart and Winston, Inc., 1963.

O'Neill, J. J. and Oyer, H. J. Visual Communication for the Hard of Hearing. New Jersey: Prentice Hall, 1961.

Periodicals

Black, J. W., O'Reilly, P. P., and Peck, L. "Self-Administered Training in Lipreading," Journal of Speech and Hearing Disorders, 28, 1963, 183-186.

Brannon, J. B. and Kodman, F. "The Perceptual Process in Speech Reading," AMA Archives of Otolaryngology, 70 (1959), 114-119.

Brannon, J. B. "Speechreading of Various Speech Materials," Journal of Speech and Hearing Disorders, 26 (1961), 348-354.

Byers, V. W. and Lieberman, L. "Lipreading Performance and the Rate of the Speaker," Journal of Speech and Hearing Research, 2 (1959), 271-276.

Gilliat, M. E. "If I Were Teaching Children Again," Teacher of the Deaf, 59 (1961), 55-59.

Hartman, N. cited by Bechinger, W. J. "Convention to Further Informing and Educating Teachers of Schools for the Deaf, the Hard of Hearing, and Speech Defectives," dsh Abstracts, 2 (1962), 209-210.

Heider, F. and Heider, G. M. "An Experimental Investigation of Lip Reading," Psychological Monographs, 52 (1940), 124-153.

Heider, G. M. "The Utley Lip Reading Test," Volta Review, 49 (1947), 457-458, 488, 490.

Mason, M. K. "A Cinematographic Technique for Testing Visual Speech Comprehension," Journal of Speech Disorders, 8 (1943), 271-278.

Pintner, R. "Speech and Speech-Reading Tests for the Deaf," Journal of Applied Psychology, 13 (1929), 220-225.

Postove, M. J. "Selection of Items for a Speechreading Test by Means of Scalogram Analysis," Journal of Speech and Hearing Disorders, 27 (1962), 71-75.

Reid, G. A. "A Preliminary Investigation in the Testing of Lip-Reading Achievement," American Annals of the Deaf, 91 (1946). 403-413.

_____. "A Preliminary Investigation in the Testing of Lipreading Achievement," Journal of Speech Disorders, 12 (1947), 77-82.

Simmons, A. A. "Factors Related to Lipreading," Journal of Speech and Hearing Research, 2 (1959), 340-352.

Utley, J. "Factors Involved in the Teaching of Lip Reading Ability Through Motion Pictures," Volta Review, 48 (1946), 657-659.

Reports

Eisman, B. and Levy, J. "Interpersonal Factors Related to Lip Reading Performance: Performance as a Function of Characteristics of Known Communicators," John Tracy Clinic Research Papers, VIII (February 1958), 1-11.

McEachern, A. W. and Rushford, G. "Lipreading Performance as a Function of Characteristics of Unknown Communicators," John Tracy Clinic Research Papers, VIII (February 1958), 12-17.

Stone, L. "Facial Cues of Context in Lipreading," John Tracy Clinic Research Papers, V (December 1957).

Taafee, G. "A Film Test of Lip Reading: Studies in Visual Communication," John Tracy Clinic Research Papers, II November 1957).

Taafee, G. and Wong, W. "Studies of Variables in Lipreading Stimulus Materials," John Tracy Clinic Research Papers, III (December 1957).

Unpublished Materials

Fulton, Richard. "Comparative Assessment of Visible Differences Between Voiced and Unvoiced Words," Unpublished Masters Thesis, Michigan State University, Department of Speech, 1964.

Katt, T. L. Masters Thesis in progress, Michigan State University, Department of Speech, 1964.

APPENDICES

APPENDIX A

Lipreading Test Sentences

1. I cannot find him.
2. She looks lovely.
3. She wrote with pencil.
4. My salary is low.
5. She wears short skirts.
6. How fast will the car go?
7. Each of you was wrong.
8. Mary had a little lamb
9. The weather is bad.
10. The dogs barked.
11. The cat caught the mouse.
12. I shall tell.
13. The team played well.
14. Don't run away.
15. I like pumpkin pie.
16. Good Morning, how are you?
17. The child was crying.
18. I don't know!
19. My horse died.
20. Birds fly South for the winter.
21. I am boastful.
22. He swam a mile.
23. His answers were foolish.
24. This house is for sale.
25. Mop the floor.
26. The speaker was nervous.
27. Have I ever met you before?
28. What's your name.
29. Come with me.
30. Oh boy!
31. The boys were noisy.
32. What time is it?

APPENDIX B

SPEAKER:_____ PRESENTATION:_____

Answer Sheet

Name:_____ Sex:_____ Age:_____ Class:_____

You are being asked to participate in a lipreading task. A person will read thirty-two (32) sentences which you will be unable to hear. After each sentence a period of fifteen seconds will be allowed for writing down what you think the person said. At the end of the response period you will hear a signal tone to indicate a new sentence is forthcoming.

It is important that you respond to each sentence. Do not leave blank answer spaces; write down something for each sentence even if you have to make it up.

To help you maintain the proper sequence of sentence order, the answer spaces are numbered and the number of the sentence to be given will also appear in the observation window before the sentence is given. Make certain that your response is made in the proper space by matching the number of each space with the number in the window.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

APPENDIX C

RAW SCORES

Talker I: Female

Lipreaders:	Subject No.	Sex	Score
Presentation #1	1	M	23
	2	M	44
	3	F	48
	4	F	37
Presentation #2	5	M	27
	6	M	22
	7	F	50
	8	F	36
Presentation #3	9	M	42
	10	M	23
	11	F	65
	12	F	66

Talker II: Female

Lipreaders:	Subject No.	Sex	Score
Presentation #1	13	M	48
	14	M	30
	15	F	20
	16	F	34
Presentation #2	17	M	12
	18	M	10
	19	F	48
	20	F	51
Presentation #3	21	M	45
	22	M	32
	23	F	20
	24	F	56

Talker III: Male

Lipreaders:	Subject No.	Sex	Score
Presentation #1	25	M	56
	26	M	34
	27	F	56
	28	F	42
Presentation #2	29	M	38
	30	M	44
	31	F	29
	32	F	35
Presentation #3	33	M	29
	34	M	31
	35	F	65
	36	F	28

Talker IV: Male

Lipreaders:	Subject No.	Sex	Score
Presentation #1	37	M	40
	38	M	22
	39	F	22
	40	F	33
Presentation #2	41	M	38
	42	M	28
	43	F	43
	44	F	48
Presentation #3	45	M	48
	46	M	17
	47	F	32
	48	F	41

APPENDIX D

FLOOR PLAN AND SEATING ARRANGEMENT

Scale: 1" = 3'