AN INVESTIGATION OF THE ABILITY OF UNSKILLED LIPREADERS TO DETERMINE THE ACCENTED SYLLABLE OF POLYSYLLABIC WORDS

Thesis for the Degree of M. A.

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ABSTRACT

AN INVESTIGATION OF THE ABILITY OF UNSKILLED LIPREADERS TO DETERMINE THE ACCENTED SYLLABLE OF POLYSYLLABIC WORDS

by Janet D. Greene

The purpose of this study was to determine whether or not syllable accent of polysyllabic words could be lipread. Thirty unskilled lipreaders and two talkers were used in the study. Eighteen of the lipreaders were females and twelve were males, all of whom were students enrolled in speech courses at Michigan State University. The two talkers were both graduate students in the Department of Speech and Hearing Science.

One talker was filmed while enunciating the sixty-three syllable nonsense words, which were especially designed for this study. These sixty, three-syllable, nonsense words comprise the Test of Visual Accent Placement. The other talker repeated aloud the number of each word before it appeared on the screen. The lipreaders viewed the silent, color film and responded by checking the syllable position of the syllable which they thought was accented. This was done individually for each of the sixty test words. The score received on the test was determined by counting the number of words in which the accented syllable had been correctly identified.

The data were statistically analyzed by *t* tests and by analysis of variance. The raw scores of Test I (the first half of the words as they appear on the film) and Test II (the second half of the words as they appear on the film) of the TVAP were individually subjected to *t* test. The results of the analysis showed that lipreaders did equally as well when accents were placed on a particular syllable in accordance with the number of times that syllable position is accented in three syllable words in the language as when accents were assigned to a syllable arbitrarily.

On the basis of the findings obtained from the statistical analysis the following conclusion was made:

It is possible for unskilled lipreaders to lipread accent placement in polysyllabic words and to obtain a score greater than would be expected by chance.

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By

Janet D. Greene

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

A need which remains paramount throughout life is that of communicating with others. Many factors are involved and contribute to the success or failure of this complex act. One of the most disabling handicaps to communication is a severe aural impairment. An individual with an aural impairment must compensate for this disability by demanding that his other sensory channels not only perform well the intricate and highly specialized tasks for which they were intended, but must also take on the added responsibility of "hearing." For this individual, the eyes become one of the tremendously important receptors by which the visible component of oral language are received and transmitted for decoding. Consequently, proficiency in lipreading ability is an indispensable requisite as well as a valuable asset.

Lipreading involves an insurmountable number of factors, one of which is determining which syllable of a polysyllable word is accented. Our voices like everything on earth, have to do with motion.[1] We learn to speak with

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[1]M. Faircloth, Lip Reading Study and Practice (Toronto: The Ryerson Press, 1946), p. 56.

rhythmic motion and stress our words and syllables according to the rules of inflection.[1] The accenting of syllables within a word is one of the determining factors of the rhythm of the English Language. Moreover, the accenting of the correct syllable is not a matter which can be arbitrarily decided by each individual speaker because the rhythm of the language demands that certain syllables of certain words be accented. Therefore, it can be logically assumed that in order for a lipreader to reproduce words with the customary rhythm, especially words with which he is unfamiliar, he must be able, through the use of lipreading, to determine which syllable of a word is being accented by the speaker.

Statement of Problem

The purpose of this study is to determine whether or not individuals with no previous lipreading training can, by lipreading alone, determine which syllable of a trisyllabic word is accented; and if this is possible, to what degree or extent are they proficient. In order to investigate this problem a special test was devised. The Test of Visual Accent Placement (TVAP) which was constructed by the investigator especially for this study, consisted of sixty nonsense words, each of which contained three syllables. These words were filmed while being enunciated by one of the talkers and this film was used as visual stimulus material.

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[1] Ibid.

Nonsense rather than actual words were used so that the subjects would not gain cues because of their familiarity with the word. If the subjects had viewed and recognized a word with which they were familiar, their answer probably would have been biased. In this case, they would have given the correct response because they were familiar with the word and knew which syllable should have been accented rather than having determined the accented syllable by lipreading.

Three-syllable words were used in order to minimize the probable number of correct answers occuring by chance. The nonsense words used were constructed by randomly combining syllables which actually appear in authentic three syllable words of the English Language.

The first half (1-30) of the nonsense words, as they appear on the film, comprise Test I of the TVAP. The second half (31-60) of the nonsense words, as they appear on the film, comprise Test II of the TVAP (see Appendix A). In Test I, the number of words having a particular syllable position (first, second or third) accented is proportional to the number of three syllable words which occur in the English language that have that same syllable position accented. These proportions were obtained by taking a sample of five hundred, three-syllable words from the works of five contemporary authors and computing the percentage of accents received by each of the three syllable positions.

It was found that the first syllable is the syllable most often accented, with the second syllable being the next in prominence, and the third syllable receiving the accent least often. In Test II all syllable positions were accented an equal number of times. In all other respects, for both tests, the position of accent was randomly determined.[1]

Hypotheses

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

1. Do lipreaders score higher than would be expected by chance on Test I of the TVAP?

Null Hypothesis: The mean score on Test I of the TVAP is less than or equal to the chance score of 33.3 per cent.

2. Do lipreaders score higher than would be expected by chance on Test II of the TVAP?

Null Hypothesis: The mean score on Test II of the TVAP is less than or equal to the chance score of 33.3 per cent.

3. Do lipreaders obtain different mean scores between Test I and Test II of the TVAP?

Null Hypothesis: The mean score for TVAP, Test I is equal to the mean score for TVAP, Test II.

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[1]This refers to the test used which was especially designed for this study by the author--Test of Visual Accent Placement.

4. Are scores of lipreaders on the TVAP distributed with the same variance in Test I as in Test II?

Null Hypothesis: The variance of the scores on TVAP, Test I is equal to the variance of the scores on TVAP, Test II.

Importance of the Study

Rhythm is an important aspect of any language; the English Language being no exception. The speech reader must observe the rhythm, stress, and accent of speech.[1] Close observation of these elements of the language increases the aurally handicapped individual's proficiency in speech reading. The purpose of speech reading training is to restore the ability of an aurally handicapped person to understand speech.[2] Since syllable accent is a determiner of the rhythm of language, it is hoped that the results and conclusions brought out by this study will aid speech therapists and teachers of the deaf and hard of hearing in assisting the aurally handicapped individual to incorporate the customary rhythm of the language into his speech. It is also hoped that this information can be

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[1]M. Bethel Clifford and Robert G. Chaplin, Seeing and Hearing, The Art of Lipreading (Published by the Michigan Association for Better Hearing, Inc., Lansing, Michigan, n.d.).

[2]Boris V. Morkovin, "Rehabilitation of the Aurally Handicapped Through the Study of Speech Reading in Life Situations," Journal of Speech and Hearing Disorders, V. 12 (1947), p. 363-368.

be used to aid the aurally handicapped individual in understanding the speech of others.

Definition of Terms

For the purpose of this study, the terms used are defined in the following manner:

Accent or Stress.--The means by which a syllable or syllables are given their promenence over the unaccented syllables in a word by a relative increase in the muscular effort exerted during their production.[1]

Lip Reading or Speech Reading.--The process which enables an individual to determine what is being said and which syllable of a polysyllabic word is accented by utilizing only visual cues.

Talker.--The person who is seen saying the words on the filmed test.

Subjects.--Those persons to whom the filmed test is administered.

Syllable.[2]--A motor unit; each syllable is basically a movement complex in which the larger, underlying movement is the breath pulse, or thrust of the chest musculature, which creates a compression of air in the lungs.

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[1]L. F. Brosnahan, The Sounds of Language (Cambridge, England: W. Heffer & Sons LTD., 1961), p. 175.

[2]R. H. Stetson quoted by R.M. S. Heffner, General Phonetics (Madison, Wisconsin: The University of Wisconsin Press, 1949).

Organization of the Thesis

Chapter One includes the statement of the problem, the hypotheses and the corresponding null hypotheses to be tested, the importance of the study, and definitions of terms which will be used. Chapter Two contains a review of the literature which pertains to this topic. In Chapter Three a discussion of the subjects, equipment, materials and testing procedures employed in conducting this study is presented. The analysis of the data and a discussion of the results of the study are brought forth in Chapter Four. Chapter Five consists of the summary and conclusions of the study with recommendations for future research.

CHAPTER II

REVIEW OF THE LITERATURE

Non-Visual Cues

D. B. Fry[1] investigated the effects of duration and intensity of vowels as they relate to linguistic stress. Using six pairs of words in which a change of meaning, from noun to verb, is accompanied by a change of strong stress from the first to the second syllable, and using twelve American speakers, spectrograms were made of the words as they were uttered. Some of the test words were: contract, subject, and digest. The measurements showed that when the stress was shifted from the first to the second syllable the most marked variation took place in the relative duration and intensity of the "vowel" portions of the speech wave, while other parts of the wave remained remarkably constant in these respects.[2] The test words were recorded having the intensity and duration of the two vowels vary over a set range. A test was made from this material and a group of listeners was asked to judge, for

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[1]D. B. Fry, "Duration and Intensity as Physical Correlates of Linguistic Stress," Journal of the Acoustical Society of America, V. 26, no. 1 (1954), p. 138.

[2]Ibid.

each test item, whether the noun or the verb had been uttered. The results revealed that there is a good correlation between the perception of stress and the vowel duration and vowel intensity ratios.[1]

Phillip Lieberman[2] conducted a study which was very much like the study done by Fry. Lieberman used sixteen speakers and twenty-five pairs of words which could either be nouns or verbs, depending on syllable stress. He found that fundamental frequency seemed to be one of the most relevant unidimensional accoustic correlates of syllable stress.

Gleason speaks of suprasegmental phonemes which are stressed and intonations of pitch. One of the useful aspects of suprasegmentals is that they can be used as syntactic devices. The use of suprasegmentals as syntactic devices is of primary importance to the linguist when he is endeavoring to decide if two, or more, grammatical constructions are comparable. If two grammatical constructions have similar patterns of stress and intonation, they may be compared.[3]

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[1] Ibid.

[2] Phillip Lieberman, "Some Acoustic Correlates of Word Stress in American English," Journal of the Acoustical Society of America, V. 32, no. 4 (1960), p. 451.

[3] H. A. Gleason, Jr., An Introduction to Descriptive Linguistics (New York: Holt, Rinehart and Winston, 1955), p. 135.

Both phrase and syllable stress require careful listening to be identified. Both have an extensive effect on pronunciation and also play a very important part in determining the over-all rhythm of American speech.[1] Suprasegmental phonemes also aid an individual who is engaging in conversation by denoting the emotional tone of the conversation. An individual with a severe hearing impairment cannot, by acoustical means, determine the rhythm of the language, nor can he determine the emotional tone of the conversation. Therefore, in order to gain this information he must rely heavily on visual cues.

Visual Cues

The aurally handicapped individual readily learns to make use of visual cues in understanding speech. O'Neill and Oyer state that in this situation the eye is the primary receptor, with the ear affording some slight assistance. For the individual with a moderate to severe hearing loss, the visual shape and movement of a speaker's articulators become the important communicative elements.[2]

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[1]James Carrell and William Tiffany, Phonetics: Theory and Application to Speech Improvement (New York: McGraw-Hill Book Co., Inc., 1960), p. 254.

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

Stone[1] investigated the effect of facial cues in lipreading. The three variables which he took into consideration were: lip mobility, facial expression, and facial exposure. The results of his study revealed that lip mobility had the most pronounced and consistent effect. It was concluded that mobile lips were easier to lipread than tight ones. The next variable, in order of importance, was facial expression. Here, it was concluded that a grim facial expression is easier to lipread than is a smiling one. Facial exposure was the least important of the three variables. However, it is thought that the greater the area of face exposed, the more successful lipreading is likely to be.

Hartman[2] conducted a study of lipreading using eighty-seven deaf students. The students watched two speakers who were filmed. The mouths of the speakers were blocked out. One speaker used greatly exaggerated facial expression and the other speaker used only limited expressions around the mouth and lower jaw. The students were able to correctly identify 66 per cent of the sentences spoken by the speaker

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

[2]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.

with over-emphasized facial expression, while they were only able to correctly identify 44 per cent of the sentences spoken by the speaker who used limited expressions around the mouth and jaw.

Brannon and Kodman did a study in which they focused their attention on the visibility of vowel and consonants and vertical mouth opening as factors influencing word intelligibility. These factors were found not to be significant, although they do state that the visibility of the total-movement form of a word is the best cue that the lipreader has in identifying it, and that the visual identification of phoneme elements of words is directly related to the place of articulation of the element.[1]

Phoneme Pressure

Black[2] conducted a study which investigated the amount of air pressure in the mouth when producing certain consonants. Eight consonants and three vowels were chosen to be used. The vowels were combined with consonants to form syllables. Two instruments, a Killsman Altimeter and a Hill stall-proximity indicator were used for measuring the in-the-mouth air pressure. The results of this study

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

[2]John W. Black, "The Pressure Component In the Production of Consonants," Journal of Speech and Hearing Disorders, V., 15, (1950), pp. 207-210.

indicated that the four voiceless consonants that were studied had greater amounts of air pressure than did the four voiced consonants. The four voiceless consonants were identified more often by the subjects than were the voiced consonants.[1]

O'Neill also conducted a study of vowel and consonant pressure and found that the sound pressure level was not important in the visual recognition of vowels and consonants, but it did appear that vision had the greatest apparent effect on the identification of consonants, and lesser effect, in order on the recognition of vowels, words and phrases.[2]

Discussion of Literature

Although the literature was thoroughly searched, this investigator was unable to find studies dealing with the visual aspect of syllabic accent. The literature contains studies on numerous facets of lipreading, some of which are related to the present study. Visual and facial cues are always important factors of lipreading. The lipreader can discern many things from these cues, such as what word is being spoken, the rate at which the word is being spoken and even what syllable is being accented. The

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[1] Ibid.

[2] John J. O'Neill, "The Contribution of the Visual Components of Oral Symbols to the Speech Comprehension of Listerner," Journal of Speech and Hearing Disorders, V., 19 (1954), pp. 429-439.

hearing participant in conversation determines syllable stress by listening closely to the duration and intensity of the vowels. Since this is the method used for detecting syllable accent, the hearing impaired individual is at a disadvantage, and must find some way to cope with this problem.

Although great advancement has been made through the years, more research is needed in order to determine what factors or what cues gained from the speaker's face make it possible for the lipreader to determine which syllable of a polysyllabic word is being accented. This information would be extremely useful to those who are concerned with the education and rehabilitation of hard of hearing and deaf individuals.

CHAPTER III

SUBJECTS, EQUIPMENT, MATERIALS, AND PROCEDURE

Viewer Subjects

The experimental test population was composed of thirty students enrolled in undergraduate speech courses at Michigan State University. This group consisted of twelve males and eighteen females. The ages of the subjects ranged from eighteen to thirty-seven, with a mean age of 21.5 years. None of the subjects had had previous lip-reading training; moreover, all subjects reported normal or corrected 20/20 vision, normal hearing.

Talkers

Two adult females were used as talkers. One female adult was filmed while enunciating the sixty nonsense words which composed the test. The other adult female said aloud the number of each word before it appeared on the screen.

Equipment

Projector.--A Bell and Howell portable projector (model 265A) with autoload was used to project the film onto the screen. This projector was also equipped with a zoom

lense which could be used to vary the size of the picture on the screen.

Camera.--The filming of the speaker enunciating the sixty monsense words was accomplished by using a Nikkorex 8, portable, home movie camera equipped with an F 1.8 lense.

Screen.--A DaLite Versatol Screen was used. This was a portable home movie screen which measured 40 x 40 inches.

Stop Watch.--A manually operated stop watch was used to measure response intervals of six seconds.

Movie Film.--Kodak, Kodachrome II color film was used to make the test film.

Materials

Answer Sheet.--A three-page answer sheet was devised. The format included labeled blanks for routine data such as name, age, date, sex, and seat number; written instructions; word numbers; syllable numbers; and response blanks (See Appendix B).

Test.--The Test of Visual Accent Placement (TVAP) which was constructed by the investigator especially for this study consisted of sixty, three-syllable, nonsense words. These words were constructed by taking a pronouncing dictionary and randomly turning to a page; then upon finding the first three-syllable word, the first syllable of that word was recorded as the first syllable of a nonsense word. This had

to be repeated three times in order to construct one three-syllable, nonsense word (See Appendix A).

Test Film.--The filmed test was used as visual stimulus material. The film was silent and in color. The female talker was filmed while enunciating the polysyllabic, nonsense, test words. Throughout the filming the talker attempted to maintain a natural facial expression. The filmed view of the speaker included only the area from the head to the upper shoulders.

Test Situation

The room in which the experiment was conducted was equipped with built-in, black-out shades, at the windows, for movie viewing. The screen was situated in the front of the room. The distance from the top of the screen to the floor measured six feet and four inches. There were three rows of chairs. The front row consisted of five chairs which were placed eight feet away from the screen. The back row consisted of four chairs whihh were placed fourteen feet away from the screen. Each chair was equipped with a writing arm. The projector was placed fifteen feet away from the screen and was focused so that the picture covered the viewing area of the screen in its entirety, (See Appendix D).

Procedure

Before the subjects entered the room all of the necessary equipment had been properly arranged and answer sheets and pencils had been placed on the writing arm of each chair. Once seated, the subjects were asked to fill in the routine data at the top of the sheet. Next, they were asked to read the instructions silently while the investigator read them aloud. The instructions were as follows:

> You will view sixty (60) nonsense words all of which have three syllables. Check the number of the syllable which you think is accented. Do this for each word. If you can not decide which syllable is accented, make a guess. You must have an answer for each item even if it is only a guess. Are there any questions?

After the above instructions had been read, the questions which the subjects had concerning what they were expected to do were answered. Additional oral instructions were given. They were as follows:

> The number of each word will be spoken aloud before the word appears on the screen. The answer blanks are numbered. Make sure the blank in which you respond has the same number as the number that is spoken aloud. You will have six seconds to answer.
>
> So that you can get an idea of what the test is like, we will have a short practice session. The first and second words I will say aloud two times, then I will go through only the lip movements, and you will be asked to tell which syllable of that word was accented. Now, for the first word (the procedure described above was used for each word individually).

The three practice words used were: amethyst, projector, and happiness. The actual test words were, of course, not real words.

The film was stopped after each word was projected to allow six seconds for the subjects to respond. The number of each word was spoken aloud by the female assistant, before it appeared on the screen.

The film was shown three times in order to accommodate all of the subjects. The test film was viewed only once by each subject. Fifteen subjects viewed the first showing, seven viewed the second showing and eight viewed the third showing.

CHAPTER IV

RESULTS AND DISCUSSION

Results

The data consisted of a raw score for each subject. The raw scores were tabulated by counting the number of words in which the accented syllable had been correctly identified by the subject (See Appendix C).

For the purpose of review, the null hypotheses that were tested, as stated in Chapter One are:

1. The mean score on Test I of the TVAP is less than or equal to the chance score of 33.3 per cent.
2. The mean score on Test II of the TVAP is less than or equal to the chance score of 33.3 per cent.
3. The mean score for TVAP, Test I is equal to the mean score for TVAP, Test II.
4. The variance of the scores on TVAP, Test I is equal to the variance of the scores on TVAP, Test II.

For the purpose of this study the data were subjected to *t* tests.[1] The data were divided into two distinct sets.

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[1]Hubert M. Blalock, Social Statistics (New York; McGraw-Hill Book Company, Inc., 1960), p. 148.

The raw scores from the TVAP, Test I composed the first set, and the raw scores from the TVAP, Test II composed the second set. A *t* test analysis was performed on both sets of data, individually. The data were also subjected to a statistical analysis of variance.

Mean Scores on Test I.--With twenty-nine degrees of freedom, a *t* of 1.699 or greater is required in order to yield significance in a one-tailed test at the .05 level of confidence. The mean for Test I of the TVAP was 70 per cent. The *t* statistic for Test I of the TVAP was 28, therefore the following null hypothesis was rejected: The mean score on Test I of the TVAP is less than or equal to the chance score of 33.3 per cent. Therefore, lipreaders do score higher than would be expected by chance on Test I of the TVAP.

Mean Scores on Test II.--With twenty-nine degrees of freedom, a *t* of 1.699 or greater is required in order to yield significance in a one-tailed test at the .05 level of confidence. The mean for Test II of the TVAP was 70 per cent. The *t* statistic for Test II of the TVAP was 18, therefore the following null hypothesis was rejected: The mean score on Test II of the TVAP is less than or equal to the chance score of 33.3 per cent. Therefore, lipreaders do score higher than would be expected by chance on Test II of the TVAP.

Difference Between Means of Test I and Test II.--
The means for both, Test I and Test II were computed and compared. The mean for the scores of Test I was 70 per cent and the mean for the scores of Test II was 70 per cent; therefore the following hypothesis was not rejected: The mean score for TVAP, Test I is equal to the mean score for TVAP, Test II.

Difference Between Variances of Test I and Test II.--
The variances for both, Test I and Test II were computed and compared. The variance for the scores of Test I was 49 and the variance for the scores of Test II was 121; with twenty-nine degrees of freedom an F ratio of 1.90 or greater is required in order to yield significance at the .05 level of confidence. An F ratio of 2.10 was obtained after comparing the two variances, therefore the following hypothesis was rejected: The variance of the scores for TVAP, Test I is equal to the variance of the scores for TVAP, Test II. Therefore, the scores of lipreaders on the TVAP were not distributed with the same variance in Test I as in Test II.

Discussion

The results of the statistical analysis of the data indicates that persons who have had no previous lipreading training can, by lipreading determine which syllable of a three syllable word is accented. Since the mean score for Test I was exactly the same as the mean score for Test II,

this indicates that the subjects as a group did not respond differently between conditions when accents were assigned to syllables arbitrarily and when accents were assigned to a particular syllable in accordance with the number of times that syllable position is accented in three syllable words in the language. In both cases, however, the scores made by the subjects were much higher than the score one would expect by chance (33.3 per cent).

On Test II the variance was greater than it was for Test I. At this time, only a hypothetical answer can be given as to the cause of this. The hypothetical reason, as concluded by the investigator is that accents on the first syllable of a three syllable word are easier to detect than are accents on the second and third syllable. Since there were more words with the first syllable accented on Test I of the TVAP than there were on Test II of the TVAP, it is suspected that this, in part, accounts for the smaller variance of the scores of Test I. It is also suspected that it is possible to detect accented syllables of words due to the size of the mouth opening and the longer length of time taken to pronounce the vowel of the accented syllable.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

When auditory stimuli cannot be received by the sensory organ most suited for that purpose, other sensory organs must compensate for the disability. The eyes become one of the very important channels by which auditory stimuli are received. The aurally handicapped individual must now depend on lipreading as a substitute for hearing. He must be able to discern many details of speech and of the language by closely observing the face of the speaker.

One such detail is that of determining which syllable of a polysyllabic word is accented. The purpose of this study was to determine whether or not persons with no previous lipreading training can accomplish this, and if so, how proficient are they.

Thirty subjects were used in this study, twelve of which were males and eighteen of which were females. All of the subjects were students enrolled in undergraduate speech courses at Michigan State University. Two female talkers were used, both of whom were graduate students at the above mentioned university. One of the female speakers was filmed while enunciating the sixty, three-syllable,

nonsense words. The second female talker said aloud the item number for each word before it appeared on the screen.

The silent, color, motion-picture film was viewed by the thirty subjects. An answer sheet (See Appendis B) was provided for each of them, on which they checked the position of the syllable, for each word, which they thought was accented.

One point was given for each correct answer. The scores were analyzed by t tests and analysis of variance. The results showed that individuals having no previous lipreading training can lipread the placement of accent in nonsense words of three syllables.

Conclusions

The statistical analysis of the data revealed that lipreaders score higher than would be expected by chance on Test I and on Test II of the TVAP. It also revealed that the scores of the lipreaders on TVAP were not distributed with the same variance in Test I as in Test II.

The findings obtained in this study were significant at the .05 level of significance. Therefore, it seems reasonable to conclude that unskilled lipreaders can lipread accent placement of trisyllabic words when tested under the conditions used in this study.

Implications for Future Research

Information received from this study indicates that research pertaining to the factors that enable skilled and/or unskilled lipreaders to determine the accented syllable of polysyllabic words would very likely yield valuable information. For the purpose of comparison, skilled lipreaders could be used in an investigation using the same design as was used in the present study, since this study was conducted using unskilled lipreaders in the experimental population. An investigation of the ability of skilled and/or unskilled lipreaders to determine what word is being said when actual words are presented as many times as they have syllables, with a different syllable being accented each time the word is presented. seems worthwhile.

In the present study the talker happened to be the experimenter and it is possible that the experimenter might have inadvertently and unconsciously overly stressed the accented syllables during the filming of the test since she was aware of the purpose of the study. Therefore, it would seem beneficial to conduct a study using the same design as was used in the present study, but without allowing the talker to know the purpose of the study.

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APPENDICES

APPENDIX A

Three-Syllable Nonsense Test Words

kæ n'-dɪ-ʃən

brɪ'-tə-vɪl

mɪ-tɚ'-bɔl

æ n'-rɪ-blo

glʌ-bɛ'-təm

Sɛm'-lɪ-Kast

pɚ'-o-vaʋt

sKɛ'-tɪs-pənt

pju'-mɔr-tɪv

ɪn-mæ'-zu

mi'-tɪŋ-laɪz

prɪn'-te-bɪd

he'-vəs-lɚ

a'-pe-vant

Kwɛ's-grəf-poz

ple'-dɪ-rɪŋ

hɛ-gɪ'l-θiə

bam'-plæ-gard

ge-Ksə'-məs

Swa-lo-nɪ ʃ'

ʌnˊ-ho-ru

flvˊ-rɑ -lɪs

ʗdʒə-rɛKˊ-tə

mɑˊ-prɕ-ʃənd

dʒɕˊ-ʃɪ-bl

ne-zəˊ-rin

prɪˊ-rɪl-tənt

b ɑˊ-K nz-fɪk

hju-bɔˊ-vɪl

saɪˊ-tɕn-ɑ K

Kwad-mɕ-tɔˊ

aɪ-pənˊ-ʒul

gar-mɪˊŋ-bi

mɛ-təˊ-faɪ

ha-ʃɔˊr-fəl

Koˊ-dʒai-zu

nɑˊ-sɪ-nət

praɪ-tˊɒ-nəs

sno-fjuˊ- ʕ ə

tɑ ksˊ-ta-raɪz

məˊ-lɪ-pat

ʕŋˊ-gˊ-tum

Krɕ-Kəˊ-ʃən

lɪ-ju-lanˊ

sʃˊ-mɪn-naɪz

dɛ-wɪn-trˊɪ

bjˊu-nəz-aʋt

tɪ-fɔɾˊ-rol

o-lɪˊ-sɪv

æ f-Kɪŋ-ləmˊ

Kaʋˊn-wɔ-naʋns

par-kə-ʃəˊnt

sɛˊn-spo-vən

Θiˊ-Kʌm-go

dʒu-fɛk-tranˊ

mʌs-fə-brəˊ

Kʃˊ-mo-dʒɪn

Kwɪn-nˊi-rəs

æ n-tist-viˊv

hol-bˊɪ-sɪl

APPENDIX B

ANSWER SHEET

Name _____ Age _____ Date _____

Sex _____ Seat No. _____

INSTRUCTIONS: You will view sixty (60) nonsense words all of which have three syllables. Check the number of the syllable which you think is accented. Do this for each word. If you can not decide which syllable is accented, make a guess. You must have an answer for each item even if it is only a guess. Are there any questions?

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

	1	2	3
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
4.			
25.			
26.			
27.			
28.			
29.			
30.			
31.			
32.			
33.			
34.			
35.			
36.			
37.			
38.			

	1	2	3
39.			
40.			
41.			
42.			
43.			
44.			
45.			
46.			
47.			
48.			
49.			
50.			
51.			
52.			
53.			
54.			
55.			
56.			
57.			
58.			
59.			
60.			

APPENDIX C

RAW SCORES

Scores	Seat No.	Age	Sex
42	8	19	F
43	6	19	F
47	9	19	F
33	7	33	F
35	3	18	F
38	2	20	F
42	4	20	F
43	14	21	M
32	15	21	F
42	11	22	F
47	10	22	F
33	13	21	M
47	9	25	M
33	8	19	M
47	7	26	M
42	6	19	M
41	5	19	M
44	4	22	F
42	2	20	M
43	3	21	M
39	1	17	M
41	12	22	M
39	3	19	F
42	2	20	F
41	1	21	M
41	8	20	F
44	6	37	M
43	7	21	F
47	9	20	F
45	12	20	F

APPENDIX D

Floor Plan and Seating Arrangement