VISUAL FATIGUE AS RELATED TO SPEECHREADING

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CHAPTER I

Introduction

Nature of the Problem

One of the concerns of educators, and particularly educators of the deaf is student performance at the end of the school day. A specific concern of education of the deaf is due to fatigue related to speechreading. Speechreading is a visual skill that helps a child acquire the language patterns used in the oral world (Butt, Chreist 1968). Milesky (n.d.) states that in the oral education of deaf children, speech and lipreading are tools which can mean the difference between achievement and failure, integration and isolation. Of the two, lipreading being the receptor skill, appears to be the more important.

In working with sixth grade hearing impaired students in a Texas public school program who were mainstreamed for three courses during the school day, it was observed that there appeared to be a decrease in student performance as the day progresses. For example, the students were mainstreamed for art and writing at 10:15 a.m., for math at 12:30 p.m., and for social studies at 1:15 p.m. Each student did well in art and writing, a little worse in math, and still worse in social studies. It is possible that the content being taught, the way it was presented, and the teacher would have some bearing on their grades. Also in conjunction

with this, it is possible that the students were tiring and their speechreading skills were decreasing due to the demands of watching the lips and face of the teacher.

It appears that occasionally speechreading when dealing with the deaf child and mainstreaming is often ignored. In public school, speechreading is more necessary for the hard of hearing child than it was in a school specifically for the deaf. Frick (1973) stated:

> A child who has been taught primarily with an auditory approach, and who functions well in a special class of six to seven children in a sound-treated room where a group aid helps the teacher's voice override noise, finds that these advantageous listening circumstances do not exist in a public school classroom. Instead, the child is usually faced with an uncarpeted room, a fan, and 25 other children who move around, whisper, talk in small groups, and very effectively mask out the teacher's voice unless she is right next to him. He must supplement what he is able to hear with lipreading. (p. 38)

It appears that many teachers of the deaf are concerned that fatigue is in fact related to speechreading. This view mandates then that speechreading abilities need to be considered in planning, scheduling, and especially in the mainstreaming of deaf students. It would appear that deaf students would do better in classes with the hearing students if they were mainstreamed in the morning and early afternoon classes and then return to classes specifically for the deaf in the afternoon. This would be beneficial because in the classes for the deaf, total communication -- the use of sign

language and oral communication simualteanously, is used, and therefore they would not have to rely totally on their speechreading and auditory channel to receive information.

Purpose of Study

The purpose of this study was to investigate if, when, and to what extent speechreading skills decreased throughout the day. To accomplish this end, performance on a speechreading and reading test was identified as the dependent variable and fatigue was identified as the independent variable of interest. Assuming there would be a positive finding, it was anticipated that the results would be beneficial in speaking with supervisors and principals about the mainstreaming of deaf students in regular classes.

Null Hypothesis

For purposes of this study, it was hypothesized that deaf children and hearing children alike would perform significantly poorer in visual tasks at the end of the day than they did at the beginning of the day. In the null form: There will be no difference in performance in visual tasks at the end of the day as compared to the beginning of the day for deaf and hearing children.

CHAPTER II

Review of the Literature

The History of Speechreading

In reviewing the literature, it was found that the history of speechreading dates back to near the end of the nineteenth century when attention turned to helping hard of hearing adults to comprehend the speech of another person. Up until then, there were many methods of teaching speech to the deaf, from as early as the sixteenth century, but no methods of teaching speechreading had come into being. At the end of the nineteenth century when speechreading did come into view, it was interwoven and confused with the teaching of articulation to deaf children (Jeffers, Barley, 1971).

The true history of speechreading begins with the oral method of teaching hearing handicapped children (Bender, 1970). The Clarke School for the Deaf was the beginning of the oral method in the United States in 1867. Prior to this, manual schools came into existence in the United States around 1816 when the Connecticut Asylum was established (Jeffers, Barley, 1971). Following the opening of the Clarke School, Alexander Graham Bell opened his School of Vocal Physiology (DeLand, 1908). In the beginning, Bell did not believe it was possible for the deaf to understand through

speechreading, but later changed his mind. When his school opened, he advertised that he could give instruction in "Lip-reading or the art of understanding speech by watching the mouth, including practical methods of teaching the art to those who are deaf" (DeLand, 1931 p. 119).

In the 1870's, speechreading was finally considered to be a separate skill and was to be taught apart from the teaching of articulation to deaf children (DeLand, 1931). The first actual teachers of speechreading were Sarah Fuller and Mary True, who taught speechreading just as though they were teaching articulation, and they used the same time-honored approach -- working from the part to the whole, i.e., from the "element to the syllable to the word to the phrase" (DeLand, 1931 p. 128).

Thus speechreading began its long climb upward through the years, and through the many different methods of teaching speechreading. Miller (1958) has summarized some of the various methods:

> Traditionally, the teaching of speechreading has had various approaches. The Muller-Walle method, brought to this country in 1902 by Martha Bruhn, has the characteristic of rapid, rhythmic syllable drills. The Jena method, described and developed in the United States by Anna Bunger in 1927, aims to develop kinesthetic awareness of speech; to teach the pupil to imitate visable speech and to recognize that speech rhythms are aids to understanding. . . . .through analytical syllable drills. The Nitchie method gave attention to. . . . .mind training and eye

> training. . . . .to grasp thought as a whole. The Kinzer method has combined the careful presentation of sound by Muller-Walle method with the psychological approach of the Nitchie. Little has been done by way of experimentally evaluating the success in speechreading of any of these methods. (p. 474)

Each method has its advantages and disadvantages , but most important, each method has played its part in the growth of speechreading. Each method has helped educators to become more familiar with the art of speechreading, and the many different points that need to be considered in teaching it.

Research on Speechreading

It has been agreed upon by all writers that speechreading is a skill. Myklebust (1960) sees speechreading as a process of comprehension arrived at by associating meaning with lip movement, thus dependent on the visual channel. Bunger (1932) includes auditory input as part of speechreading. Some authors state that speechreading is the reading of an already learned language, and therefore can never exceed the rate of language growth (Craig, 1964; Pauls, 1960). Others claim that it is a visual skill that helps a child acquire the language patterns used in the oral world (Butt, Chreist 1968). There are professionals who, from experience in teaching speechreading, see that there is a wide variance in abilities, and feel a special talant may be involved. Some people can do well in

speechreading, and others never succeed. Pettingill (1965) stated in a speech at the American Speech and Hearing Association convention in Chicago on October 31, 1965.

> The ability to be a fluent lip-reader or speaker, although totally deaf is a gift of God! Unfortunately, it is an art that is not bestowed to every deaf child. Let me try to explain.
>
> If a piano salesman came around with a child prodigy to demonstrate. . .and told you that with the proper teacher, the proper training, your child could also be a child prodigy, would you believe him? Maybe some of you would have hope, and figure it worth trying. Maybe out of 1000 children who took lessons, there would be one standout. Some would learn, but never be outstanding. A few would never make any progress and would want nothing at all to do with piano lessons. (p. 5,6)

According to Pettingill, some students will have the natural ability to speechread, while others, even after taking many hours of speechreading lessons will never be able to master the skill.

According to Jeffers and Barley (1971), organization of the research done on speechreading, with respect to a theoretical construct, should serve a number of purposes. First, it should permit us to see what factors have been found to be associated with speechreading and which factors that appear to be reasonably associated are in need of further investigation. Second, it should give some indication of the relative weight or importance of aspects of the total process of speechreading.

The theoretical model developed by Jeffers and Barley

divides two major factors of visual proficiency and the ability to put two and two together into primary and secondary factors. Jeffers and Barley (1971) state:

> The primary factors are derived from an analysis of the task requirements -- of what the speechreader does -- and in essence constitute the processes encompased by the skill. There would appear to be three major subfactors or subskills under this heading. They are visual perceptual proficiency, synthetic ability and flexibility. The secondary factors are the 'back up' factors. They include training, knowledge of language, and emotional attitudes or sets that facilitate the acquisition of speechreading skill. (p. 21, 22)

Primary Factors

Visual Proficiency. Included under the visual proficiency factor are subfactors of visual perception, speed of perception, and peripheral perception. It is believed that the good speechreader possesses a high degree of visual proficiency, has above average visual perception, and has good eyesight, or eyesight which can be corrected through glasses. Regarding visual proficiency, Jeffers and Barley (1971) state:

> The basic physical and psychological attributes believed to underly visual perceptual proficiency are those of visual acuity, visual attention, speed of focusing, and peripheral vision. (p. 25)

Synthetic ability. Synthetic abilities with regard to speechreading may be defined as "the ability to make associations and to arrive at perceptual and conceptual closures when a good part of the sensory information is

either missing or not perceived" (Kitson, 1915). Thus, the speechreader must make a tentative identification of words, What was It? What did I see? -- this is the process of perceptual closure. Next the speechreader must organize and group the words which have been perceived into a tentative idea and supply missing words (Jeffers, Barley 1971). This activity is called conceptual closure, and the speechreader asks himself, What did he say?

Flexibility. Because many sounds are homophenous and so much information is missing, the speechreader must be flexible. Flexibility in this context is the ability to revise tentative closures if the first decisions do not result in a message which is both meaningful and appropriate (Jeffers, Barley 1971).

Secondary Factors

Secondary factors are considered to be subservient to the primary factors. The secondary factors are indirect -- they are stepping stones -- the essential foundation requisite to the development of speechreading ability (Jeffers, Barley 1971).

Training. As stated earlier, training is very important in achieving maximal skill in speechreading. It is also possible that a child may be taught speechreading every year he is in school, and still not be able to master the skill. As a result of training, the student is likely

to identify words and phrases more readily and can more quickly call to mind multiple associations (Jeffers, Barley 1971).

Language Comprehension. In order to comprehend a language one must have: (a) a knowledge of the grammar or structural system of the language, (b) a knowledge of vocabulary or the lexicon of the language, and (c) a knowledge of colloquial and idiomatic expressions (Jeffers, Barley 1971). In the Volta Review (1968), Quigley emphasized that there is a pressing need for the development of valid and reliable measuring instruments on all aspects of communication. Quigley points out that until such instruments are devised, research on most aspects of the language problems of deaf children is likely to proceed slowly.

According to Jeffers and Barley (1971), language comprehension is the essential secondary factor in the attainment of speechreading skill -- the foundation upon which the skill is built. They give a definition of speechreading as "the visual recognition (aided by partial hearing) of known language." (p. 33) Jeffers and Barley also state that subfactors which can have an effect both on the efficiency of training and on the development of language comprehension are age, age at which the loss was incurred, duration of loss, extent and pattern of loss, auditory discrimination, and intelligence.

Emotional Attitudes or Sets. This secondary factor refers to the fear of failure, patience, and the ability to

relax and learn to speechread. It should also be emphasized that this should not be interpreted to mean that all good speechreaders are well adjusted people, but only that such adjustment facilitates learning.

The secondary factors -- training, language comprehension and emotional attitudes are presented in Table I (Jeffers, Barley 1971).

TABLE I

Association of Secondary Factors with Speechreading Ability--Combined Results of All Studies Reviewed

Factor	No. Stat. Sig Comparisons to Total	Range of Pearsons "r's"*	Percent Total Variance⁂
Training	4/4		
Indices: Chronological age and grade placement	10/13	.31-.65	10%-42%
Language Comprehension--			
Children Indices: Reading and ed. achievement; vocabulary level	12/13	.37-.688	14% to 47%
Emotional Attitudes	5/15	-.20 to .31	4% to 10%
Ancillary Factors--Training and Language Comprehension			
Age of onset; duration, extent of loss, discrim.	7/16	.10-.51	1% to 14%
General Intelligence	0/6		
Performance intelligence (WISC and W.B. Adult)‡	5/12	.38-.63	14% to 40%

* All r's significant at .01 or .05 levels.
⁂ Estimates based on Index of Forecasting Efficiency, "E".
‡ Because of the nature of three of the subtest, Performance Intellignece as measured by the Wechsler Scales is believed to be more importantly asso. with Primary rather than Secondary Factors

The primary factors -- perceptual proficiency, synthetic ability, and flexibility have not been researched to a substantial degree. Nontheless, some of the factors have been studied, and occasionally trends have emerged and can be viewed with reasonable certainty. These factors are represented in Table II (Jeffers, Barley 1971).

TABLE II

Association of Primary Factors (Believed to Determine Speechreading Ability) with Speechreading

Factor	No. Stat. Sig. Comparisons to Total	Range of r's*	Estimated Percent Total Variance ⁑
Perceptual Proficiency	0/0		
Visual perception	3/4	.38 to .68	14% to 46%
Speed of perception	0/4		
Peripheral perception	0/0		
Ancillary Factors-- Perceptual Proficiency			
Visual acuity	2/3	.59 to .65	45% to 42%
Visual attention	0/1		
Speed of focusing	0/0		
Peripheral vision	0/0		
Synthetic Ability	0/0		
Perceptual closure (plus visual perception)	8/8	.56 to .778	31% to 38% (stories) 47% to 60% (sentences)
Conjectural perception	6/16	.45 to .68	20% to 47%
Conceptual closure	0/0		
Conjectural closure	3/4	.40 to .65	16% to 42%
Flexibility	0/0		
Ancillary factors-- synthesis and flexibility			
Visual memory	11/15	.42 to .594	18% to 35%
Rhythm	4/8	.46 to .47	21% to 22%
Abstract Reasoning	12/21	.27 to .514	7% to 26%
Verbal reasoning	4/13	.27 to .44	7% to 19%

* All R's significant from .01 to .05 level
⁑ Estimates based on Index of Forecasting Efficiency "E."

As can be seen from Tables I and II, research in the area of speechreading still has room for expansion. Speechreading has been taught to the hard-of-hearing in the United States for nearly one hundred years (Jeffers, Barley 1971). Early in the 1900's, various texts were published dealing with methods of instruction. In examining these texts, it was found that more similarities exist than differences. It needs to be pointed out that the differences are mainly differences in emphasis. Different authors place varying amounts of emphasis on visual clues, association, the importance of rhythm, stress, tactile clues, phrasing, and so on. Almost all authors followed the part to whole approach -- from phoneme to syllable, to phrase, to sentence, to paragraph (Jeffers, Barley 1971).

Considering the research which has been done in the many areas of deaf education, there are abundant opportunities for further work in every area. Researching the particular area of literature dealing with fatigue as related to the visual process of speechreading, the writer found no research, either current or in the past history of speechreading, that links the two variables.

CHAPTER III

Procedures

Subjects

The six hearing impaired students used in the study were part of the Regional Day School Program for the Deaf in Wichita Falls, Texas. The subjects used are shown in Table III.

TABLE III

Hearing Impaired Students

	Age	Sex	Hearing Loss	Onset of Deafness	I.Q.
S_1	13	M	Profound, Bilateral Sensorineural 125 dB - Left 125 dB - Right	Birth	106 WISC-R
S_2	13	M	Severe to Profound Bilateral Sensorineural loss 92 dB - Left 103 dB - Right	Birth	117 WISC-R
S_3	14	F	Severe, Bilateral Sensorineural loss 77 dB - Left 70 dB - Right	Birth	114 WISC-R
S_4	13	M	Severe to Profound Sensorineural loss 80 dB - Left 100 dB - Right	Birth	108 WISC-R
S_5	13	M	Severe Bilateral Sensorineural loss 70 dB - Left 83 dB - Right	Birth	96 WISC-R
S_6	14	M	Moderate Bilateral Sensorineural loss 47 dB - Left 52 dB - Right	Birth	Low Avg. WISC-R

The six hearing students were enrolled in Cunningham Elementary School in Wichita Falls, Texas. Each hearing student used in the study was 12 years old. The age, sex and academic abilities (according to each student's home room teacher) is shown in Table IV.

TABLE IV

Hearing Students

	Age	Sex	Academic Abilities
S_1	12	M	Low Average
S_2	12	M	Average
S_3	12	M	Above Average
S_4	12	F	Average
S_5	12	F	Above Average
S_6	12	F	Above Average

Instruments

To estimate the amount of fatigue during the day, the examiners began each day with a speechreading inventory. The sentence section of the Craig Lipreading Inventory was used. No voice was used in administering the Craig Lipreading Inventory. The reason for this decision was based on the fact that the hearing students used in the study would have too great an advantage over their hearing impaired peers. In using no voice, this placed both hearing impaired and hearing students on approximately the same

level. Forms A and B, provided with the test were used. Along with these two forms, the writer devised two additional forms, C and D, in order to more effectively control for the learning effect. It was found in the pilot test that the students were remembering the sentences used with forms A and B. For this reason, the two additional test forms were devised. A list of all forms is provided in the appendix.

The reading section of the test was devised for purposes of this study, and consisted of 108 simple words, broken up into groups of twelve. From a pool of 108 words, the test words were randomly selected and assigned to be presented in the morning, mid-day, and afternoon. For example, the three words "table," chair," and "desk" were chosen. The word "table" was assigned to Day 1, morning. The word "chair" was assigned to Day 1, mid-day, and "desk" was assigned to Day 1, afternoon. This process was continued until 26 words, or 12 groups of three words were chosen for each of the three days. A list of the words used for each testing period is provided in the appendix.

Research Design and Procedures

The experimental group used in the study consisted of six hearing impaired students and the control group consisted of six hearing students. The examiners were three teachers of deaf students. Each teacher tested one group of four students, two deaf and two hearing, on the two

separate sections of the test. The entire test used in the study consisted of two parts -- speechreading and reading.

To begin testing, the teachers gave the Craig Speechreading Inventory sentences to their four students. Following the sentences, each teacher administered twelve reading problems using a film strip projector. Each group of students remained with the same teacher for both sections of the test, but rotated after each testing period. The speechreading inventory consisted of 24 sentences.

The reading section was administered using a film strip projector. Twelve simple words were presented in groups of three for two seconds to each of the three groups. The filmstrip was made with three words, then a blank frame, three more words, and another blank frame, and so on. Following each frame with the three words, the students were given all the time they needed to write the words on their papers.

After the students completed both parts of the test, the tests were scored by the examiners before the following testing period. Both speechreading and reading sections were scored as a percent correct. This entire testing process was done three times a day. These times were (1) first activity of the day, beginning at 9:30 a.m., (2) at 12:15 p.m., and (3) at 2:30 p.m. The testing took place for three consecutive days of one week -- Wednesday,

Thursday and Friday. Upon completion of all three days of testing, the scores were plotted on two separate graphs. From the individual graphs made on each child, each day, a single graph was constructed which contained summary information. This summary information is represented in Figures 1 and 2.

Statistical Analysis

Dependent t-tests were used to determine if there was a significant difference across time in reading and speechreading for both deaf and hearing students. Alpha was set at the .05 level of significance.

CHAPTER IV

Results and Discussion

The purpose of this study was to investigate if, when and to what extent speechreading skills decrease throughout the day as a result of the fatigue factor. Speechreading is considered to be very important to deaf and hard of hearing children as a means of information input. In reviewing the literature, no studies were found that actually tested the relationship between speechreading and fatigue. This study was undertaken in order to test and determine the influence of fatigue upon acquisition of content information.

A total of twelve students, six hearing and six deaf, all twelve, thirteen and fourteen years of age, were used in the study. The deaf students were all part of the Wichita Falls Regional Day School Program for the Deaf in Wichita Falls, Texas. The hearing students were all enrolled in the sixth grade of Cunningham Elementary, also in Wichita Falls, Texas. The twelve students were divided into three groups, with each group containing two deaf, and two hearing students. Three teachers in the Regional Day School Program in Wichita Falls were used as examiners and each had a different group of students for each testing period. The three testing periods were at 9:30 a.m., 12:15 p.m. and 2:30 p.m. on Wednesday, Thursday and Friday of one week.

During each testing period, the students were presented 24 speechreading sentences, using no voice, from the Craig Lipreading Inventory. The students were also presented twelve randomly selected words in groups of three for two seconds using a film strip projector. Following each testing period, the students rotated to a different teacher. This permitted them to speechread a different teacher each testing period, thereby controlling for "teacher influence".

Upon completion of all three days of testing, mean scores were obtained for both deaf and hearing subjects and are presented in Figures 1 and 2.

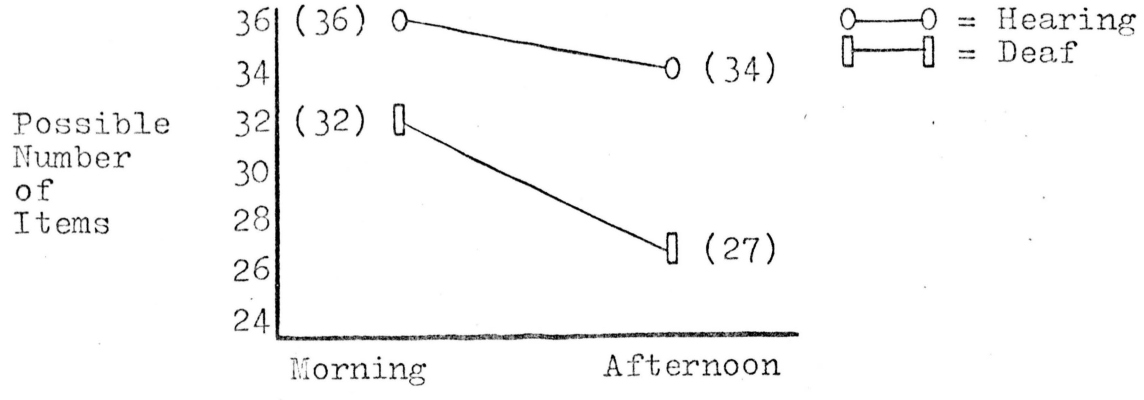

Figure 1

Mean Scores for Deaf and Hearing on Reading Tests

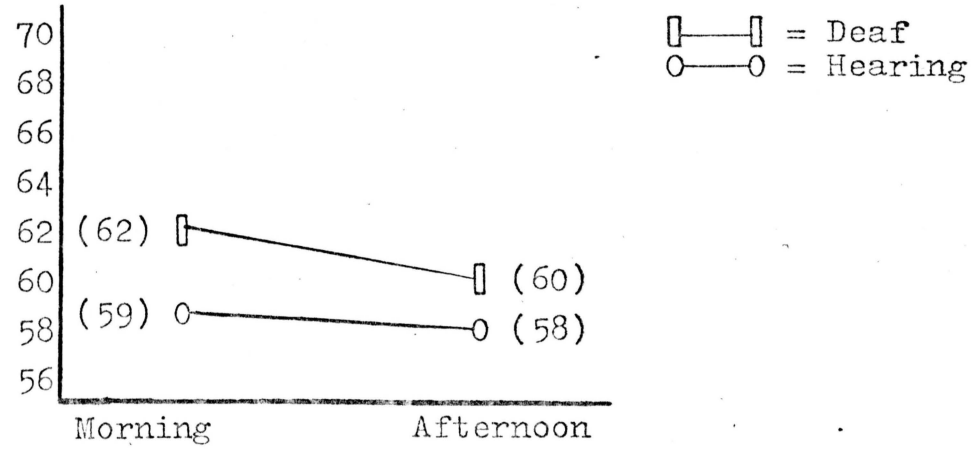

Figure 2
Mean Scores for Deaf and Hearing
on Speechreading Tests

To determine if the differences were statistically significant, the data were subjected to dependent t-tests to determine if there was significant difference between student performance in the morning and afternoon hours. Repeated t-tests on the four different contrasts were carried out. The contrasts compared were: (1) morning and afternoon speechreading tests for the deaf, (2) morning and afternoon speechreading tests for the hearing, (3) morning and afternoon reading tests for the deaf, and (4) morning and afternoon reading tests for the hearing. The data from these contrasts are presented in Table V. The chances that there may be an overall error in the data collected is .20.

TABLE V

T-Test Scores on Four Different Contrasts of Interest

Contrasts	Tabled Value .05 Level of Significance	Obtained Value	Decision
Deaf - Reading	2.57	-2.6	Sig. Diff.
Deaf - Speechread.	2.57	-1.8	No Sig. Diff.
Hearing - Reading	2.57	-5.2	Sig. Diff.
Hearing - Speechread.	2.57	-4.3	Sig. Diff.

All differences were significant, except for one, but the trend was clearly in the direction of rejecting the null hypothesis. Although the difference was not significant, it is believed that a larger number of subjects may have resulted in a reversal of the decision not to reject the null hypothesis.

In looking at all the data combined for the twelve subjects, and in comparing their mean morning scores (Deaf, $\bar{x} = 36$; Hearing, $\bar{x} = 32$) with their mean afternoon scores (Deaf, $\bar{x} = 34$; Hearing, $\bar{x} = 27$), for the three day period, it was found that for reading, there was a t-value of 3.3. This allows for the rejection of the null hypothesis at the .01 level of significance. In comparing the speechreading mean scores of both deaf and hearing across the three days of experimentation, in the morning (Deaf, $\bar{x} = 62$; Hearing, $\bar{x} = 59$) and afternoon (Deaf, $\bar{x} = 60$; Hearing, $\bar{x} = 58$), the data was again subjected to a dependent t-test. A t-value of 2.3 was obtained which allows for rejection of the null

hypothesis at the .05 level of significance. Therefore, the null hypothesis that there is no difference in performance in visual tasks at the end of the day as compared to the beginning of the day for deaf and hearing children was rejected and it was determined that there is in fact a decreade in student performance in speechreading and reading in the afternoon as compared to performance in the morning.

Discussion

This study provides evidence to suggest that there is a decrease in students ability to respond to visual tasks as the day progresses from morning to afternoon. Such information should be used when considering the classes to be taken by hearing impaired children during morning and afternoon. If this type of student relies more on the visual channel to gain information when in regular classes, due to the absence of total communication, then according to the previously stated statistics, the morning would be the best time to take advantage of the students vision.

The statistical information presented is evidence that students reading and speechreading skills do in fact decline as the day progresses. This type of information would be beneficial to present to supervisors and principals when planning and scheduling the school day for the hearing impaired child. It is important that the key administrators

understand the dependence of the hearing impaired child upon his vision.

The most powerful limitation of the study is the small number of students that were used. It would be difficult to generalize the results, due to the small population that was tested. Observation of the raw data used in computing the t-values, for comparing the speechreading abilities of deaf students revealed that at least one very deviant score resulted in a larger standard deviation. Large standard deviations cause the denominator in the t-test formula to be inflated, and as a consequence, it yields a smaller t-value than otherwise might be the case. However, if a larger number of subjects were used in the study, the influence of such a single deviant score would not have been so great and significance would probably have been found as was the case in the other comparisons made.

CHAPTER V

Summary

The purpose of the study was to evaluate the effect of fatigue during a school day upon speechreading ability. It was felt that fatigue as related to speechreading is a very important variable to be considered in planning, scheduling and especially in the mainstreaming of deaf and hard of hearing students.

For three consecutive school days within one week -- Wednesday, Thursday and Friday, speechreading and reading tests were administered to twelve students. The students were divided into three groups, each group containing two deaf students and two hearing students. Each day contained three periods, lasting approximately 15 minutes, and beginning at 9:30 a.m., 12:15 p.m., and 2:30 p.m. The speechreading test used in the study was the sentence section of the Craig Lipreading Inventory. The reading test consisted of twelve randomly selected reading words. All words and sentences were changed following each testing period to avoid any learning effect. Three examiners, all teachers of the deaf administered the tests.

Dependent t-tests were used to determine if there was a significant difference across time in reading and speechreading for both deaf and hearing students. Alpha was set

at the .05 level of significance.

It was found that there was a significant decline in afternoon scores of both reading and speechreading as compared with the morning scores. The largest problem with the study was that of sampling size. If a larger sample of students had been used, then the possibility of generalizing beyond the sample would have been significantly increased. However, due to the small number of students used, there are limitations imposed upon this study with regard to generalizations.

Recommendations

The null hypothesis was rejected, thus suggesting that there is in fact a decline in reading and speechreading scores as the students progress from morning to afternoon classes. Most likely this decline is attributable to fatigue. Although the study has yielded important information, it is recommended that other studies be undertaken to determine the degree that fatigue attributes to the decrease in afternoon performance. It is also recommended that, where possible, larger samples of students be used so as to increase the validity of generalizations regarding performance of both deaf and hearing students.

Appendix A

Craig Lipreading Inventory

Form A

1. A coat is on a chair.
2. A sock and a shoe are on the floor.
3. A boy is flying a kite.
4. A girl is jumping.
5. A boy stuck his thumb in the pie.
6. A cow and a pig are near the gate.
7. A man is throwing a ball to the dog.
8. A bird has white wings.
9. A light is over a door.
10. A horse is standing by a new car.
11. A boy is putting a nail in the sled.
12. A big fan is on a desk.
13. An owl is looking at the moon.
14. Three stars are in the sky.
15. A whistle and a spoon are on the table.
16. A frog is hopping away from a boat.
17. Bread, meat and grapes are in the dish.
18. The woman has long hair and a short dress.
19. The boys are swinging behind the school.
20. A cat is playing with a nut.
21. A man has his foot on a truck.
22. A woman is carrying a chair.
23. A woman is eating an apple.
24. A girl is cutting a feather.

Craig Lipreading Inventory

Form B

1. A coat is on a table.
2. A top and a ball are on the floor.
3. A boy is making a kite.
4. A boy is sitting.
5. A boy stuck his fork in an egg.
6. A cow and a pig are near the barn.
7. A baby is throwing a ball to the dog.
8. An airplane has white wings.
9. A picture is over a table.
10. A horse is standing by a new car.
11. A boy is putting a dog in a chair.
12. A big shoe is on the desk.
13. A cat is looking at the moon.
14. Three birds are in the sky.
15. A knife and a spoon are on the table.
16. A frog is hopping away from a cow.
17. Bread, meat and apples are in a dish.
18. The woman has short hair and a short dress.
19. The boys are swinging behind the tree.
20. A squirrel is playing with a ball.
21. A man has his hand on a chair.
22. A woman is carrying a shirt.
23. A man is picking an apple.
24. A girl is cutting a flower.

Craig Lipreading Inventory

Form C

1. A drum is on a table.
2. A top and a shoe are on the floor.
3. A woman is flying a kite.
4. A girl is sitting.
5. A boy stuck his thumb in a shoe.
6. A chicken and a pig are near the gate.
7. A man is throwing a stick to the dog.
8. A bird is in the nest.
9. A light is over a table.
10. A horse is standing by a new wagon.
11. A boy is putting a nail in a chair.
12. A little fan is on a desk.
13. A cat is looking at a mouse.
14. Three stars are in the sky.
15. A whistle and a spoon are on the chair.
16. A rabbit is hopping away from a boat.
17. Jello, meat and grapes are in a dish.
18. The woman has long hair and a short dress.
19. The boys are jumping behind the school.
20. A squirrel is playing with a nut.
21. A man has his hand on a truck.
22. A woman is washing a shirt.
23. A woman is eating an apple.
24. A girl is blowing a flower.

Craig Lipreading Inventory

Form D

1. A drum is on a chair.
2. A sock and a shoe are on the floor.
3. A woman is making a kite.
4. A girl is jumping.
5. A boy stuck his fork in a pie.
6. A cow and a sheep are near the gate.
7. A baby is throwing a stick to the dog.
8. An airplane is over the house.
9. A picture is over a door.
10. A boy is standing by a new car.
11. A boy is putting a dog in a sled.
12. A big fan is on the bed.
13. A cat is looking at the moon.
14. One star is in the sky.
15. A whistle and a spoon are on the table.
16. A rabbit is hopping away from a boat.
17. Bread, butter and grapes are in a dish.
18. The woman has short hair and a short dress.
19. The boys are jumping behind the tree.
20. A cat is playing with a ball.
21. A man has his foot on a truck.
22. A woman is washing a chair.
23. A woman is picking an apple.
24. A girl is blowing a feather.

Appendix B

Reading Test Words

Day 1

Morning	Mid-day	Afternoon
table	chair	desk
his	her	him
blue	green	red
girl	boy	baby
dog	cat	cow
run	walk	hop
mother	father	sister
car	truck	bus
we	us	them
room	hall	kitchen
over	under	around
board	wood	stick

Day 2

dime	quarter	penny
lamp	light	shine
blue	pink	black
sun	moon	stars
get	take	keep
book	read	study
bed	sleep	night
morning	day	afternoon
sheep	goat	horse
hair	head	face
in	out	on
arm	fingers	hand

Day 3

month	year	day
look	see	eyes
pencil	pen	eraser
shirt	pants	shoes
me	my	mine
white	yellow	brown
sit	lay	stand
hop	skip	jump
tree	flower	grass
school	home	store
ocean	lake	pond
circle	triangle	square

BIBLIOGRAPHY

Bender, R. E. The Conquest of Deafness. Cleveland, Ohio: The Press of the Western Reserve University, 1960.

Bunger, A. M. Speech Reading — Jena Method. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1932.

Butt, D., & Chreist, F. M. A speechreading test for young children. The Volta Review, 1968, 70, 225 - 235.

Craig, W. N. Effects of preschool training on the development of reading and lipreading skills of deaf children. American Annals of the Deaf, 1964, 109, 280 - 296.

DeLand, F. Dumb No Longer, Romance of the Telephone. Washington, City: Volta Bureau, 1908.

DeLand, F. The Story of Lipreading, It's Genesis and Development. Washington, D. C.: The Volta Bureau, 1931.

Frick, E. Adjusting to Integration: Some Difficulties Hearing Impaired Children Have in Public Schools. The Volta Review, 1973, 75, 36 - 46.

Jeffers, J., & Barley, M. Speechreading (Lipreading). Illinois: Charles C. Thomas, 1971.

Kitson, H. D. Psychological tests for lipreading ability. The Volta Review, 1915, 17, 471 - 476.

Lowell, E. L. Research on speechreading: Some relationships to language development and implications for the classroom teacher. Report of the Proceedings of the 39th Meeting of Convention of American Instructors of the Deaf. Washington, D. C.: U. S. Government Printing Office, 1959.

Milesky, S. D. Testing Lipreading Potential. The Volta Review, Reprint #752, Washington, D.C.

Miller, J., Ramsey, C. L., & Goetzinger, C. P. An exploratory investigation of a method of improving speechreading. American Annals of the Deaf, 1958, 103, 473 - 478.

Myklebust, H. R. The Psychology of Deafness, Sensory Deprivation, Learning and Adjustment. New York: Grune and Stratton, 1960.

Nitchie, E. B. Lip-Reading Principles and Practise. New York: Frederick A. Stokes Co., 1912.

Pauls, M. Speechreading. In H. Davis and S. R. Silverman (Eds.) Hearing and Deafness. New York: Holt-Rinehart, 1960.

Pettingill, D. G. Psychological Aspects of Manual Communication, American Speech and Hearing Association convention. Chicago, 31 October 1965.

Quigley, S. R. Language Education in Countries other than the U. S. The Volta Review, 1968, 68, 68 - 83.