Portland State University

PDXScholar

Dissertations and Theses

Dissertations and Theses

1985

The influence of situational cues on a standardized speechreading test

Maria Navarro Montserrat
Portland State University

Follow this and additional works at: https://pdxscholar.library.pdx.edu/open_access_etds

Part of the [Speech Pathology and Audiology Commons](#)

Let us know how access to this document benefits you.

Recommended Citation

Montserrat, Maria Navarro, "The influence of situational cues on a standardized speechreading test" (1985). *Dissertations and Theses*. Paper 3546.
<https://doi.org/10.15760/etd.5430>

This Thesis is brought to you for free and open access. It has been accepted for inclusion in Dissertations and Theses by an authorized administrator of PDXScholar. Please contact us if we can make this document more accessible: pdxscholar@pdx.edu.

AN ABSTRACT OF THE THESIS OF Maria Navarro Montserrat for the Master of Science in Speech Communication with emphasis in Audiology presented November 20, 1985.

Title: The Influence of Situational Cues on a
Standardized Speechreading Test

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

[REDACTED]
James Maurer, Chairman

[REDACTED]
Mary Gordon

[REDACTED]
Rodney Pelson

[REDACTED]
David Krug

Aural rehabilitation programs recommend the use of situational cues by hearing-impaired individuals to facilitate understanding in everyday communication. Although this practice is generally accepted, little is known about the use of situational clues as an adjunct to speechreading performance.

The purpose of the present study was to determine the influence of situational cues on a standardized speech-reading test in order to assess an individual's natural speechreading ability. The widely used, standardized Utley Lipreading Test was selected to which photoslides of message-related situational cues were added. The Utley Lipreading Test consists of two relatively equivalent test lists, containing series of unrelated sentences.

Two groups of twenty older adults differing in auditory status, participated in the study. One group consisted of normal-hearing individuals and the other was hearing-impaired. The age for all subjects ranged from 61 to 83 years. The mean age for the normal-hearing and hearing-impaired adults were 74.3 and 75.2 years, respectively. Each subject received two experimental speechreading tasks. One condition was a live presentation without situational cues; the other condition occurred with the addition of situational cues. The situational cues were presented via color slides, shown prior to each sentence presentation. The two speechreading conditions were counterbalanced in order. Subjects were instructed to indicate verbally what they thought the speaker may have said. One point was assigned to each word correctly identified, regardless of word order. Results were analyzed through a t-test analysis.

Findings indicated improved speechreading performance by both hearing-impaired and normal-hearing groups when

situational cues were added to the speechreading test. The method utilized in the present study did not demonstrate that hearing loss results in high performance scores among hearing-impaired and normal-hearing individuals. For a variety of reasons, one of which may be difficulty of the test material, none of the subjects within the study scored and maintained superior performance under the condition with added message constraints. Finally, differential improvement in the sentence items were observed when situational cues accompanied the sentences.

THE INFLUENCE OF SITUATIONAL CUES ON A
STANDARDIZED SPEECHREADING TEST

by

MARIA NAVARRO MONTSERRAT

A thesis submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN SPEECH COMMUNICATION:
with emphasis in
AUDIOLOGY

Portland State University

1985

TO THE OFFICE OF GRADUATE STUDIES AND RESEARCH:

The members of the Committee approve the thesis of
Maria Navarro Montserrat presented November 20, 1985.

James Maurer, Chairman

Mary Gordon

Rodney Pelson

David Krug

APPROVED:

Theodore G. Grove, Head, Department of Speech Communication

Jim F. Heath, Dean of Graduate Studies and Research

DEDICATION

In memory of Shari Kazdoy, who was my mentor, academic advisor, thesis director, counselor, and dear friend. Shari believed in me when I had no faith or confidence in myself. Her support and guidance made it possible for me to grow professionally and personally.

I will always remember her teachings, and my admiration for her shall never cease. I miss her dearly.

ACKNOWLEDGEMENTS

Thank you so much Dr. Jim Maurer for being my thesis director. In spite of your busy schedule, you have made time for my needs, and supported me throughout this study.

A very, very special thanks to Mary Gordon for all her help. Her knowledge and expertise, as well as her patience and kindness, are deeply appreciated. Thank you for believing in me, and sharing my joy and happiness in the completion of this study. Shari would have been so proud of us.

To Dr. Rod Pelson - I will forever be grateful for all your teachings and guidance. You have truly been one of the key persons who has greatly guided and influenced my studies and professional career. Thank you so very much!

My deepest appreciation is extended to Dr. David Krug and Jane Porter for their participation in the thesis orals. Your suggestions were most helpful.

Thanks a million to Steve and Jon for the use of their cameras. A special thanks also goes to the audio-visual staff who has made it so easy for me to check out the slide projector. I surely could not have done it without your help, cooperation and patience. Thanks a bunch!

My heartfelt thanks is extended to all participants in the study as well as those who posed in the slides.

Sincere thanks to the ladies and gents of the Terwilliger Plaza who made it possible for me to complete the study. Their enthusiasm and support have definitely made it easier for me in recruiting participants for my study. I have learned a great deal in my association with them.

To my precious friends, who have cheered me on and shared all my anger, sorrow and frustrations, joy and happiness: Jan, Mary, Jill, and especially, Jon. Thank you all for being a part of my life.

Most of all, to my dear family.....I am so fortunate to have all of you. Thank you so very much for your patience and understanding, especially when I had burdened you with my work. Your constant love and support have helped me make it through my daily undertakings.

Most importantly, I thank my parents for providing me with the most invaluable gift of education. I would have been truly lost without your love and encouragement.

TABLE OF CONTENTS

	PAGE
DEDICATIONS	iii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
CHAPTER	
I INTRODUCTION AND STATEMENT OF PURPOSE	1
Introduction	1
Statement of Purpose	3
Definition of Terms	4
II REVIEW OF THE LITERATURE	5
Variables in Speechreading	5
Speaker	6
Environment	7
Stimulus or Message	8
Speechreader	9
Age	9
Degree and onset of hearing loss	10
Educational background	11
Intelligence	11
Visual acuity	12
Speechreading Tests	12
Utley Lipreading Test	14
Situational Cues	17
Influence of Situational Cues on Speechreading Performance	19

	PAGE
III METHODS	26
Subjects	26
Speechreading Materials	27
Equipment	27
Procedures	28
Scoring Procedures	31
Analysis of Data	31
IV RESULTS AND DISCUSSION	33
Results	33
Question 1	33
Question 2	35
Question 3	37
Question 4	39
Discussion	39
V SUMMARY AND IMPLICATIONS	50
Summary	50
Implications	51
SELECTED BIBLIOGRAPHY	54
APPENDIX	60

LIST OF TABLES

TABLE	PAGE
I Mean Scores and <u>t</u> -Values for All Subjects for Each of the Two Speechreading Conditions, With and Without Situational Cues	34
II Mean Performance Scores and <u>t</u> -values for Normal-Hearing and Hearing-Impaired Subjects Under Each of the Two Speechreading Conditions	36

LIST OF FIGURES

FIGURE	PAGE
1. Seating and Equipment for Each Speechreading Session	29
2. Four Speechreading Treatments	30
3. Speechreading Performance Scores in Percent Correct for the Normal- Hearing and Hearing-Impaired Adults for the Two Speechreading Conditions	38
4. A Graphic Representation of the Mean Number of Correct Words for Each Test Sentence Item from List A of the <u>Utley Lipreading Test</u> for Each of the Two Speechreading Tasks . .	40
5. A Graphic Representation of the Mean Number of Correct Words for Each Test Sentence Item from List A of the <u>Utley Lipreading Test</u> for Each of the Two Speechreading Conditions .	41
6. A Graphic Representation of the Mean Number of Correct Words for Each Test Sentence Item from List B of	

the <u>Utley Lipreading Test</u> for Each of the Two Speechreading Tasks . .	42
7. A Graphic Representation of the Mean Number of Correct Words for Each Test Sentence Item from List B of the <u>Utley Lipreading Test</u> for Each of the Two Speechreading Conditions .	43

CHAPTER I

INTRODUCTION AND STATEMENT OF PURPOSE

Introduction

Hearing is generally considered the primary sensory modality through which communicative information is received (Berger, 1972; Sanders, 1982). When an individual suffers a loss of hearing, he may need to rely to a greater degree upon the visual modality in order to comprehend a spoken message. For a hearing-impaired individual, vision becomes a more important variable in the communicative process; it begins to play a more critical communicative role, used as a supplemental or alternative mode to audition.

As early as the 1600s, educational and rehabilitative programs were based on teaching and training hearing-impaired adults to recognize speech through visual cues (Davis and Hardick, 1981). The use of visual stimuli, traditionally termed "lipreading", refers to watching the speaker's oral structures in order to obtain spoken information (Jeffers and Barley, 1971). In more recent years, many audiologic rehabilitation programs have expanded the concept of lipreading a step further and have begun to provide training in speech perception

(Davis and Hardick, 1981). Rather than concentrating solely on the speaker's lips, training also emphasizes the use of facial expressions and gestures. In addition, other important factors, including the social situation and the physical ("contextual") environment, are now considered. The process of attending to various clues has been termed "speechreading" (Jeffers and Barley, 1971; Davis and Hardick, 1981; Sanders, 1982).

For hearing-impaired individuals, speechreading ability can be assessed by means of standardized tests. Formal sentence tests of speechreading can provide a measure of an individual's natural ability to speechread, and can provide useful data for planning intervention programs (Jeffers and Barley, 1971; O'Neill and Oyer, 1981). One of the best known and most widely used standardized test is the Utley Lipreading Test, developed by Jean Utley in 1946 (Utley, 1946; Jeffers and Barley, 1971). It consists of a list of unrelated sentences that are presented without the use of voice.

A major drawback with the Utley Lipreading Test and other traditional speechreading tests is that the test sentences are presented out of context, with no situational or contextual clues. If the current philosophy is to train a hearing-impaired person to use all possible environmental clues, then the incorporation of certain other important cues into the speechreading test may better assess the client's speechreading ability.

Statement of Purpose

The purpose of this study was to determine the influence of situational cues on the speechreading abilities of normal-hearing and hearing-impaired adults when given a standardized speechreading test.

This study sought to answer the following primary research question:

- 1) Will normal-hearing and hearing-impaired adults improve their scores on the standardized Utley Lipreading Test when situational cues are added?

This study also addressed three secondary research questions:

- 1) Will hearing-impaired subjects demonstrate significantly better speechreading performance as measured by higher speechreading scores than do normal-hearing subjects?
- 2) Do the same individuals who demonstrate superior performance (beyond two standard deviations above the mean) under the speechreading condition without situational cues, maintain their superiority when situational cues are added?
- 3) Does an "item analysis" show that the sentences on the Utley Lipreading Test differentially improve when situational cues are added?

Definition of Terms

For the purpose of this study, the following operational definitions were utilized:

Auditory closure - process by which the meaning of the whole message is obtained on the basis of incomplete information. It involves associating words, mentally filling in missing words and making an educated guess as to the entire thought or message. Closure is usually based on previous experience with the stimulus (Jeffers and Barley, 1971; Davis and Hardick, 1981).

Contextual cues - physical environment, topic of conversation and general appearance of the speaker (Sanders, 1982).

Lipreading - skill of watching the speaker's oral structures in order to improve comprehension (Jeffers and Barley, 1971).

Situational cues - social situations including the contextual environment (defined above) and the "role" of the speaker. A "role" is often assigned to the speaker, particularly in situations where the person wears an easily recognizable uniform, a particular clothing or if the person is engaged in a specific activity (Sanders, 1982).

Speechreading - process of observing the speaker's lips, jaw and tongue movements, as well as his facial expression and gestures in order to identify the speaker's thought. Speechreading also involves assessing the environment and social situations in order to complete the communicative exchange (Jeffers and Barley, 1971; Sanders, 1982).

CHAPTER II

REVIEW OF THE LITERATURE

Many variables and complex factors are involved in successful learning and use of speechreading. Although all factors are not known, it is important to consider some of the known and presumed variables involved in the speechreading process.

This literature review addresses those variables in speechreading as well as research that pertains to the present area of study. The following issues are discussed:

- 1) variables in speechreading, 2) tests of speechreading,
- 3) the Utley Lipreading Test, 4) situational cues, and
- 5) the influence of situational cues on speechreading tests.

Variables in Speechreading

O'Neill and Oyer (1981) described possible variables which may be considered in any experimental study in the speechreading process. The variables fall into four categories: a) speaker, b) environment, c) stimulus or message, and d) speechreader. The discussion which follows includes these four components.

Speaker

Some of the speaker variables mentioned in the literature as being of possible importance are visibility of the speaker, rate of presentation, amount of lip movement, and sex of the speaker. Research has shown that the visibility of the speaker's face, or to a greater extent the speaker's facial area and torso, improves speechreading scores as compared with exposure to the speaker's lips alone (Stone, 1957; Greenberg and Bode, 1968; Berger, Gardner and Sudman, 1971). Another factor thought to influence the visibility of the speaker's face is the viewing angle of the speaker. Iarr (1959) and Nakano (1961) found the highest speechreading performance scores occurred when the viewing angles were at 0 and 45 degrees, and the poorest scores occurred at a 90 degree angle.

The rate of presentation of the test material by the speaker also appears to alter performance ability of speechreaders. In a study by Bonilla (1976), results indicated a decrease in speechreading skill when the rate of speech was increased. Conversely, Byers and Lieberman (1959) found no significant difference in performance scores when the rate of speech presentation was increased.

The effects of lip mobility on a speechreading task have also been examined. Results have revealed that exaggerated articulatory movements either enhanced

performance (Franks, 1976) or showed no significant change (Vos, 1965) in speechreading ability. It is apparent, however, that utilization of normal lip movement facilitates performance, whereas minimal or tight lip movement inhibits performance, as observed by Stone (1957).

As for the effects of the sex of the speaker on a speechreading test, Aylesworth (1964) found no significant difference among speechreading scores as a function of differences in sex of speakers. Interestingly, Sahlstrom (1967) reported that male speakers tend to demonstrate greater intensity of facial movements than do females.

Enironment

Many studies have been conducted regarding the effects of various distances on speechreading performance (Franks and Oyer, 1967; Berger, DePompei and Droder, 1970; Erber, 1971). Obviously, as the distance is increased, speechreading ability becomes more difficult. No significant difference in scores were found between 4 and 20 feet of presentation (Franks and Oyer, 1967; Berger 1970; Erber, 1971). From the available evidence, Berger (1972) suggested that distances up to perhaps 20 to 24 feet has no significant effect on performance if the individual has normal or corrected vision.

In speechreading, it is obvious that an individual cannot speechread in total darkness. Based on a report by Thomas (1969), speechreading is possible until the

light level on the speaker's face reaches the one-half foot candle level. Based upon the limited research findings available, one can conclude that typical classroom lighting seems sufficient for optimum speechreading.

The final aspect of environmental factors affecting performance is the peripheral visual distractions during the speechreading task. Keil (1968) found no significant effects in speechreading performance when various environmental backgrounds accompanied the speechreading test. Other investigators, however, have discovered that additional environmental cues enhance (Pelson and Prather, 1974) or reduce (Popelka and Berger, 1971) speechreading ability.

Stimulus or Message

The speechreader needs to have some mastery of the basic elements and structure of the speech stimuli he is to understand. Spoken language is a rapid succession of syllables consisting of sounds that vary in audibility and visibility. Nitchie (1916) and Bruhn (1949) claim that approximately 40 to 50 percent of the speech sounds are visible on the lips. Some of those sounds that look alike on the lips are called homophones. Homophenous sounds tend to be difficult to identify, especially when presented out of context (Berger, 1972).

The difficulty in differentiating the speech signal by vision is influenced by a number of factors affecting

the identification of the speech sounds. Four such factors, as indicated by Sanders (1982) are the degree of visibility of the articulatory movements, rapidity of the articulatory movements, similarity of the visual characteristics of the articulation, and variations of the visibility of the articulation between speakers.

O'Neill (1954) found that vision contributed to 29.5 percent to vowel recognition, 57 percent to consonants, 38.6 percent to words, and 17.4 percent to phrases. In two studies (Lloyd and Price, 1971; Berger, 1972), frequently-used words were shown to be more easily recognized through speechreading than infrequently-used words.

Another stimulus factor, i.e., sentence length, was found to be related to speechreading performance. Clouser (1976) demonstrated that the ability to speechread short sentences (three words) was easier than long sentences (six to nine words).

Speechreader

Many individual factors seem to affect speechreading performance of individuals in need of training. Some of the parameters outlined are age, degree and onset of hearing loss, educational background, intelligence, and visual acuity.

Age. Aging appears to have a linear relationship to speechreading performance up to a certain point above which a plateau is reached. There tends to be no

significant improvement in speechreading ability after the age of 11 years, according to Heider (1943). Some researchers, on the other hand, found that improvement in speechreading performance can still be observed in the second and third decades of life (Farrimond, 1959; Goetzinger, 1963; Shoop and Binnie, 1979). According to the results of these studies, performance begins to decline at age 60 years. Relationships between speechreading performance and age do not clearly emerge from various reports. Obvious discrepancies between many studies remain to be reconciled.

Degree and onset of hearing loss. Pintner (1929) found that there was some relationship between the age of onset and degree of hearing loss and speechreading performance. Utley (1946), on the other hand, discovered a low correlation (0.10) between the Utley Sentence Test and age of onset of hearing loss. Based on her findings, Utley concluded that speechreading skill could not be predicted from age of onset of deafness.

Comparing speechreading ability to duration of hearing loss (mean duration of 18.7 years, SD of 15.0), a significant correlation of 0.51 was obtained by Simmons (1959).

Studies comparing the degree of hearing loss and speechreading ability have revealed variable results. Hard-of-hearing adults were found to score higher on a speechreading test than did matched normal-hearing

subjects (Cavender, 1949). Other studies, however, found no significant difference in speechreading performance between normal-hearing and hearing-impaired individuals (Coscarelli, 1968; Keil, 1968).

Educational background. The relative importance of educational background to speechreading performance is not entirely clear from available evidence, but reported correlations have been moderately high. Individuals with high achievement scores as it relates to speechreading ability demonstrated a correlation of 0.51 (Pintner, 1929; Utley, 1946). A non-significant correlation ($r=0.09$) between speechreading and accumulated grade point average for college students has been reported (Berger, 1972).

The length of speechreading training as it relates to speechreading ability of hearing-impaired adults was found to show no significant correlation (Coscarelli, 1968).

Intelligence. In general, there have been no significant correlations obtained between general intelligence level and speechreading ability. Pintner (1929) and Reid (1946) found nonsignificant or very low correlations between speechreading and intelligent quotient scores. It has been suggested that perhaps this lack of relationship may be due to the types of subjects tested, the measurement tools utilized and many other uncontrolled, intervening variables (Berger, 1972).

Visual Acuity. Visual acuity refers to the ability of the eye to discriminate between fine details (Berger, 1972). For the most part, there has been no significant correlation established between speechreading and visual acuity. Goetzinger (1963) found no difference in speech scores between binocular, monocular dominant eye and monocular non-dominant eye vision. One study (Lovering, 1969) did demonstrate improvement in speechreading ability when visual acuity improved from 20/100 to 20/80, from 20/80 to 20/60 and from 20/60 to 20/40. When visual acuity altered from 20/40 to 20/20, however, no significant change in speechreading performance was observed. Hardick, Oyer and Irion (1969), utilizing the Utley filmed Sentence Test, found a significant relation between speechreading and visual acuity. Nonetheless, these findings may be questioned due to the varying distances of presentation.

Berger (1972) indicated that visual acuity measurement as tested by the Snellen Chart requires the subject only to read small prints of letters. In speechreading, however, quick integration of rapid articulatory movements are required, along with use of linguistics and other clues. The limited available evidence suggests that 20/40 vision is sufficient in most situations.

Speechreading Tests

The need for a valid and reliable speechreading test for use in the measurement of visual perception

ability has long been of concern to rehabilitative audiologists and teachers of the hearing-impaired. As enumerated by O'Neill and Oyer (1981), an effective test of speechreading should serve the following purposes: 1) measure the basic speechreading performance of an individual, 2) measure the results of speechreading practice or training, 3) aid the proper placement of hearing-impaired persons within a training program, 4) determine efficacy of a particular rehabilitative measure with respect to pre- and post-training speechreading performance scores, and 5) provide a valid and reliable test of speechreading performance for research purposes.

Over the years, a number of speechreading tests for adults have been published. Tests of speechreading for adults have included presentations of consonant-vowel syllables, such as the Lipreading Screening Test CV Syllables by Binnie, Jackson and Montgomery (1976) and isolated words, such as the Word Test, Part II of the Utley Film Test, "How Well Can You Read Lips?" (1946) and the Semi-Diagnostic Test by Hutton, Curry and Armstrong (1959). Speechreading tests which present lists of unrelated sentences have also been developed, including the Sentence Test of the Utley Film Test (1946), A Film Test of Lipreading (Taafee, 1957), Barley Speechreading Test CID Everyday Sentences (Jeffers and Barley, 1971), Denver Quick Test of Lipreading Ability (Alpiner, 1978), and CID Everyday Speech Sentences (Davis and Silverman,

1978). Tests of speechreading involving films depicting life situations and including conversational dialogue were developed as long ago as in the 1940's, including Life Situation Motion Picture - A Contextual Approach for Speech Reading (Morkovin and Moore, 1948-1949) and the Story Test, Part III, of the Utley Film Test (1946). These speechreading tests have been administered to normal-hearing college students, as well as hearing-impaired adults under live, face-to-face, or film presentations.

Utley Lipreading Test

The standardized Utley Film Test, "How Well Can You Read Lips?" has been "among the best known and most widely used test of lipreading ability" (Jeffers and Barley, 1971). The test was developed by Utley in 1946 to provide a standardized, reliable and valid measure of speechreading skills of individuals from the third grade through the adult level. The complete test consists of three parts: 1) Part I, the Sentence Test; 2) Part II, the Word Test; and 3) the Story Test. Since a high correlation (0.984) has been found to exist between the Sentence Test and the complete Utley Film Test, Jeffers and Barley (1971) suggest that the Sentence Test is likely as good a test of speechreading skill as the whole test, and it can be used by itself to constitute a test of speechreading.

The Sentence Test consists of two, highly correlated (0.866) test forms (Utley, 1946). Each sentence list,

A and B, contains 31 sentences. The words constituting the test were selected from the Thorndike list of the ten thousand most frequently used words. These words were combined to form idiomatic sentences and common expressions. The completed Sentence Test was then recorded on black and white film and administered to 761 deaf and hard of hearing individuals. Each sentence is presented only once without the use of voice. Normal rate of speech rhythm and stress is used. Appropriate facial expression is employed, ensuring no exaggeration of lip or jaw movement. Before the actual test, five practice sentences are presented. Each subject is asked to write his response. One point is assigned to each correct word (Utley, 1946; Jeffers and Barley, 1971).

Standardization of the Utley Film Test has been based on raw scores and percentile ranks. Since then, many other speechreading sentence tests have been correlated with the Utley Film Sentence Test to establish test validity (O'Neill and Stephens, 1959; Jeffers and Barley, 1971; Alpiner, 1978).

Although the Utley Film Test is widely used, it has been criticized in the literature as being especially difficult, particularly in the filmed version (Heider, 1947; DiCarlo and Kataja, 1951; Jeffers and Barley, 1971). The speaker in the film used very little jaw movement and maintained the same smiling countenance regardless of the content of the message. While clear lip movements

facilitate speechreading ability, other verbal and nonverbal clues, such as facial expression, body tension and semantic evaluation of the situation, are also communicatively important.

Although filmed or videotaped administration of speechreading tests provide more standardized stimuli presentation, there are some questions regarding their use (DiCarlo and Kataja, 1951; Alpiner, 1978). Some of these variables, like those found in the Utley Film Test, may include: a) distractions caused by the tester holding up a card with the number of the item, b) presentation mode of showing the speaker only from the shoulders upward and c) dated clothing and hair styles which may be distracting to the speechreader. These factors may create an artificial test environment. Obviously, there are limitations to any manner of presentation. Unlike a filmed test, speechreading sentences presented through a "live" modality vary for each presentation. An advantage to a live presentation, however, is that test items can be received in a more true-to-life, three-dimensional manner. In addition, as indicated by Jeffers and Barley (1971), live presentations yield significantly better scores than filmed presentations.

The most persistent criticism in the Utley Film Sentence Test has been the lack of situational clues (DiCarlo and Kataja, 1971; Jeffers and Barley, 1971); Alpiner, 1978). This probably contributes to a major

portion of the difficulty encountered in the test. Without cues, the individual cannot utilize his ability to capitalize on minimal clues in order to narrow his mental set in anticipating what he is about to speechread (Sanders, 1982).

Situational Cues

Situational cues have been referred to as a preparatory set, which may indicate an individual's readiness to utilize all clues (O'Neill and Oyer, 1961). Recognizing situational cues may assist the individual in successfully identifying the topic of conversation, and perhaps in illuminating some words or phrases within the spoken message. The utilization of situational cues may further enhance the process of "closure", where incomplete information is obtained as a whole. This process involves filling in missing information and making an educated guess as to the entire spoken message.

Situational cues include the following: a) general background or physical environment, b) people in the environment, c) relationship of the speaker to the people in the environment, d) speaker's general appearance, e) "role" of the speaker, f) cues directly related to the message, and g) gestural and facial expressions. When these situational variables are present, the accuracy in predicting the verbal message is considerably increased. A general setting in a bank or grocery store, for example,

can provide a context for the spoken message. Additionally, the people in the background, as well as their relationship to the speaker, may further help to increase the number of constraints to that message. When a speaker wears a particular clothing, such as an easily recognizable uniform, or is of a certain age level, build or sex, a conclusion can be made regarding the type of person the speaker portrays. More importantly, the "role" of the speaker, such as a policeman or a store clerk, makes it possible to identify the speaker's status or group membership. According to Reusch and Kees (1956), those who can easily recognize roles and who are sensitive to the shifting nature of roles, have an advantage in dealing with social situations.

Moreover, cues directly related to the message may help to regulate the conversation of people for predicting what the speaker may say. These cues can arise from knowledge of the topic of conversation, awareness of the speaker's general manner or conduct, or from simply observing the physical action or activity in which the speaker is engaged. Gestural cues, such as a look of puzzlement, often connote expressions associated with emotion evoked by certain situations. Some movement tend to serve as a substitute for spoken words, including an extended hand or a nod of the head. These gestures are used to illustrate a point, emphasize, explain or interrupt. In normal conversational speech, the meaning of the gesture is often closely related to the act itself,

and often cannot be isolated from the verbal components of the speech (Reusch and Kees, 1956).

The awareness of the social situation can help arrive at a conclusion combined to form all features into an integral pattern. Nitchie (1912) refers to an individual's "intuitiveness" as having the ability to "make predictions based on minimal patterns of verbal and non-verbal cues." "In the truest sense it is the social situation that determines context and the nature of any communicative exchange" (Reusch and Kees, 1956).

Influence of Situational Cues on Speechreading Performance

A review of the existing literature does reveal experimental evidence concerning the effects of situational cues on speechreading performance. Arthur (1962) constructed two series of six films each to determine whether contextual (situational), non-verbal cues are important to the speechreading process. The films with contextual information were stories produced in settings believed to be familiar to the average adult. The films of the contrasting, non-contextual series presented the identical script material, but contained no contextual information. Miminal cues of facial expressions, gestures or objects were utilized throughout all presentations. The two sets of films were alternately administered to normal-hearing and hearing-impaired subjects and then evaluated

by three different methods, i.e., correct word, correct meaning, or correct interpretation. Results indicated that regardless of the method of scoring, all subjects performed better when contextual cues were provided.

Appropriate gestures (body movements) related to the spoken message have been shown to improve speechreading ability substantially. In a study by Popelka and Berger (1971), five groups of 12 college students, each received speechreading sentences under one of five conditions. The first group was presented test sentences without use of gestures. The second group of subjects received test items accompanied by "appropriate" body gestures. For instance, in the sentence "Lift that box a little higher," the gesture involved the right hand, with the palm up, ascending from the waist to the shoulder level. The gestures were presented "continuously" from the beginning until after the last word of the sentence. The third group of subjects was presented with test sentences which included "discrete" gestures (gestures initiated within the sentence). The fourth and fifth groups respectively received "inappropriate" gestures, presented continuously and discretely. Inappropriate gestures consisted of randomly selected body movements used in the other test items. Under all conditions, the examiner wore a mask so that facial expression could not be observed. The speechreading test sentences, constructed for the five conditions, consisted of simple, six-word sentences.

Each sentence contained an idea or concept which could easily be represented by bodily gestures. The study concluded that appropriate gestures, regardless of their temporal relationship to the oral message, significantly enhanced speechreading performance.

In 1972, Smith and Kitchen also demonstrated improved performance on a speechreading test when additional cues were provided. Printed one-word cue cards were presented to ten normal-hearing college students prior to a live presentation of speechreading test sentences. Speechreading test items consisted of four-word sentences. The cue word that accompanied each test item, was related to the topic of the test sentence, but it was not a word which actually appeared in the sentence. Some examples are the cue word "fashion" paired with the sentence "She wears short skirts" and "sports" paired with "The team played well." It was not indicated whether appropriate facial expressions and gestures were utilized. All subjects demonstrated a significant level of improvement when cue cards preceded the test sentences. The results supported the notion that verbal contextual cues do assist speechreading performance.

A study by Pelson and Prather (1974), utilizing message-related photoslides with a speechreading test, further indicated improved speechreading ability. Photoslides were taken of various scenes, such as a man painting a room or a person reading the newspaper, and then paired

with sentences the authors created. Like Utley, Pelson and Prather constructed two relatively equivalent speech-reading lists based on the Thorndike-Lorge list of 10,000 most frequently used words. Other factors considered during the construction of the test were equivalent number of phonemes (sounds), syllables and words in each sentence; equivalent mean coefficient of sentence visibility (i.e., visibility of the sounds articulated); and similarity of sentence structure (equal number of declarative and imperative sentences) in each list. For example, the scene of a man mowing his lawn corresponded with the sentence "Mowing the lawn is good for you" and the scene of an activity in the bowling alley was paired with "Bowling is a popular sport." The test was administered to young normal-hearing college students, older normal-hearing adults and older hearing-impaired adults. Throughout the testing, the speaker maintained a neutral facial expression. The findings showed that sentences with message-related cues were identified better than sentences with no message-related pictures. More interestingly, the older hearing-impaired adults showed greater improvement of performance than either age group from the normal-hearing subjects.

A more recent study by Garstecki and O'Neill (1980) investigated the influence of situational cues on the speechreading ability of normal-hearing and hearing-impaired adults. Test items were derived from the Central Institute for the Deaf (CID) Everyday Speech Sentences (Davis and

Silverman, 1978). Sentences selected were those which contained words or phrases that could easily be portrayed "optically" or "acoustically." Two lists of eighteen sentence items were generated. Five of the sentences contained scenes with related optical, but unrelated acoustic cues. For instance, the sentence "The water is too cold for swimming" was accompanied by a photoslide of a swimming pool (related) and the sound of birds chirping (unrelated) in the background. Another set of five sentences were matched with unrelated optical, but related acoustic cues. An example is the sentence "Did you forget to shut off the water?", presented with a photoslide of children entering a theater (unrelated) and the sound of running tap water (related). An additional eight sentences were presented with unrelated optical and unrelated acoustic cues. In the sentence "If we don't get rain soon, we'll have no grass," for example, the scene of a factory building (unrelated) and horses heard trotting (unrelated) were presented in the background. The entire test was videotaped with the photoslide scenes appearing behind the speaker. Acoustic cues were dubbed into the videotape. There was no indication of the use of facial expression in the study. Overall scores of each subject were found to improve when related optical and acoustical cues accompanied the speechreading task.

Research has shown that the addition of situational cues do facilitate comprehension of the spoken message,

thereby improving performance on a speechreading test. Nevertheless, each of the reviewed studies contained one or more weaknesses in the selection or presentation of test materials, including: a) non-use of natural facial expressions and gestures, b) use of taped versus live presentation, c) biased selection of test items, d) failure to standardize or use standardized test material. In addition, while the various studies looked at a group dynamic for speechreading performance with situational cues, they did not consider the management implications inherent in individual performance data. By looking at each subject's performance, there may be an indication of whether the person is a "poor" or "good" speechreader. A subject who receives a "high" score (80-100%), for instance, in the speechreading task with situational cues, and a "low" score (40% and below) in the speechreading task without situational cues, indicates that training should be based on attending primarily to articulation and lip formations of sounds. On the other hand, another subject receiving better scores in the speechreading condition without added situational cues would likely require training only in attending to situational cues.

Although a standardized speechreading test cannot accurately (100%) indicate a person's "natural" ability to speechread, it can be of help to hearing rehabilitation in forming a foundation for an acceptable assessment of a person's ability to communicate. For this reason, the

present study was designed to investigate the possibility that situational cues may enhance speechreading performance for a given standardized speechreading test.

CHAPTER III

METHODS

Subjects

Subjects consisted of twenty normal-hearing and twenty hearing-impaired adults. The normal-hearing adults ranged between the ages of 62 to 82 years ($\bar{X}$ = 74.3 years). Each subject passed a bilateral pure tone audiometric screening at 20 dB or better for the frequencies of 500, 1000 and 2000 Hz, and at 35 dB for 4000 Hz (ANSI, 1969; Rowland, 1971-1975).

The hearing-impaired adults ranged in age from 61 to 83 years ($\bar{X}$ = 75.2 years). The subjects in this group had a pure tone average (PTA) sensorineural hearing loss of 40 dB HL (ANSI, 1969) or greater in the better ear for the frequencies of 500, 1000 and 2000 Hz. The participants in this hearing-impaired group indicated in a personal interview that the onset of hearing loss had occurred within the last 15 years. Each subject has been wearing a personal amplification system in one or both ears for several years.

All subjects demonstrated adequate visual acuity (with correction, if needed) by reading the 20/20 line on the Snellen Chart at a distance of 5 feet (Rosenstein,

1985). The forty subjects graduated from high school or had passed a high school equivalency test. All participants demonstrated no apparent speech or language difficulty during the personal interview (Appendix A). None reported any previous formal speechreading training. Each individual signed a release form authorizing participation in the study (Appendix B). All subjects resided in the greater Portland Metropolitan area.

Speechreading Materials

The speechreading materials used were from the Utley Lipreading Test, Sentence lists A and B (Appendices C and D) (Utley, 1946). The correlation coefficient of the two lists is 0.866.

Photoslides of various scenes were taken by the investigator, then paired with each test sentence from both lists. The photoslides consisted of different situational scenes, such as a man pointing to his pocket (paired with the sentence "I have nothing") or a man tapping someone's shoulder (paired with the sentence "Excuse me") (Appendices E and F).

Equipment

The materials used included calibrated (ANSI, 1969) Beltone Model 10D audiometer for the audiometric testing, the Snellen Chart for vision screening, Sentence lists A and B of the Utley Lipreading Test, a 35 mm camera,

photoslides, and a slide projector.

Procedures

Prior to the test administration, the subjects participated in a personal interview to ensure each met the criteria for the study. The interview took place in a reasonably quiet area, where hearing testing and vision screening could be administered.

In the test room, the lighting was maintained at a subjectively sufficient level. Viewing of the speaker's face was at a zero degree angle, and the distance between the subject and the speaker was approximately 5 feet (see Figure 1 for seating and equipment arrangement).

The subjects were tested individually. All participants received an identical set of instructions prior to testing (Appendix G). Each subject was instructed to indicate verbally whatever he thought the speaker may have said. Guessing was encouraged. No clues were given as to whether the photoslides would be helpful in the speechreading process. Three speechreading practice sentences were given to the subject prior to the presentation of the actual test material. Each test item was presented in a live, face-to-face manner.

During the test administration, the Utley Lipreading Test, Sentence lists A and B, were alternately administered for two speechreading presentations (Figure 2). In one presentation without situational scenes, the speaker's face,

Figure 1. Seating and equipment placement for each speechreading session.

		FIRST PRESENTATION	SECOND PRESENTATION
		List A	List B
Treatment 1 (n=10)		with situational cues	without situational cues
		List A	List B
Treatment 2 (n=10)		without situational cues	with situational cues
		List B	List A
Treatment 3 (n=10)		with situational cues	without situational cues
		List B	List A
Treatment 4 (n=10)		without situational cues	with situational cues
		List B	List A

Figure 2. Four speechreading treatments. Ten subjects, 5 normal-hearing and 5 hearing-impaired were used in each treatment.

lips and natural gestures provided the only cues available to the subject. In the other presentation, a message-related photoslide was shown three seconds prior to each sentence to provide additional situational cues. The alternating presentations of the photoslides, as defined above, were used to reduce possible order effect. The photoslides remained on the screen until seven seconds after the sentence presentation. This allowed enough time for the subject to review each photoslide and consider his response.

When testing was completed, the subject was instructed not to discuss the study with other participants.

Scoring Procedures

The two methods of scoring for the Utley Lipreading Test have been by correct idea (or meaning) or by correct number of words recorded. These two methods of scoring have resulted in a correlation coefficient of 0.98 in normal-hearing individuals and 0.97 in hearing-impaired subjects (Utley, 1946). In this study, the more objective scoring method was used. One point was assigned to each word correctly speechread, regardless of the word order. A maximum of 125 points was possible for each sentence list.

Analysis of Data

A comparison of speechreading performance was made for the two speechreading conditions, i.e., with and without situational cues. To analyze the results, the

paired-difference test was utilized to eliminate variations between individual performances, and determine whether a difference existed between the two speechreading conditions (two population means of dependent sampling) (Mendenhall, 1983; Magwire, 1985). The level of significance (α) was chosen to be 0.05.

The t-test was used to investigate whether a difference existed in the mean response for the two groups of subjects, i.e., normal-hearing and hearing-impaired. The level of confidence for the t-values under each of the speechreading conditions was selected to be significant at the 0.05 level.

The number of subjects who demonstrated superior performance (scored beyond two standard deviations above the mean) under both speechreading conditions, was expressed in mean performance score and described accordingly.

To determine if the sentences on the Utley Lipreading Test differentially improved when situational cues were added, the large sample inference method was used (Mendenhall, 1983; Magwire, 1985). This procedure indicated whether a difference existed between a sentence with added situational cues and the same sentence without additional situational scenes. The level of significance was selected to be 0.05.

CHAPTER IV

RESULTS AND DISCUSSION

The results are presented and discussed in this chapter. The results section answers the four research questions which were posed through the findings of the present study. It includes the overall mean performance scores and standard deviation data obtained by the normal-hearing and hearing-impaired subjects under the two speechreading conditions. The section also presents an item analysis for each of the Utley Lipreading Test sentences, and describes mean and variances in the number of words correctly identified per test item. The discussion section offers possible explanations for the findings obtained in the present study and describes whether these findings support the data in the existing literature.

Results

Will normal-hearing and hearing-impaired adults improve their scores on the standardized Utley Lipreading Test when situational cues are added?

The answer to the above question is in the affirmative. Overall mean performance scores and standard deviations are shown in Table I. Under the speechreading condition without situational cues, the mean performance

TABLE I

MEAN SCORES AND t-VALUES FOR ALL SUBJECTS FOR
EACH OF THE TWO SPEECHREADING CONDITIONS,
WITH AND WITHOUT SITUATIONAL CUES

SPEECHREADING CONDITIONS	SUBJECTS		SPEECHREADING CONDITIONS	
	Normal- Hearing	Hearing- Impaired	Without Cues	With Cues
	$\bar{X}$	SD	$\bar{X}$	SD
Without Situational Cues	$\bar{X}=35.80$			
		SD=20.27		
			d.f. = 19	
			$t=6.05^*$	$t=5.38^*$
With Situational Cues	$\bar{X}=51.05$			
		SD 21.77		

*Significant at the 0.05 level of confidence.

score for the normal-hearing subjects was determined to be 35.80 and for the hearing-impaired, 39.00. When situational clues were provided, however, mean performance improved to 51.05 and 57.85, respectively. The t-values comparing the two conditions for each of the two groups of subjects were found to be 6.05 and 5.38, both significant beyond the 0.05 level of confidence.

The improved speechreading performance scores for each subject under each of the speechreading conditions are shown in Appendix H. Examination of the various raw scores shows that five subjects (2 normal-hearing and 3 hearing-impaired) demonstrated no improvement in speechreading performance under the second condition utilizing situational cues. Subject 25 maintained the same score under the two speechreading conditions. The other four subjects, numbers 1, 18, 29, and 35, showed slight decreases in performance under the second condition.

Will hearing-impaired subjects demonstrate significantly better speechreading performance as measured by higher speechreading scores than do normal-hearing subjects?

The answer to question two is that analysis of results showed no statistically significant difference between the normal-hearing and hearing-impaired adults for either of the two speechreading conditions. Table II shows that under the speechreading condition without situational cues, the hearing-impaired group received a mean difference in

TABLE II

MEAN PERFORMANCE SCORES AND t-VALUES FOR
NORMAL-HEARING AND HEARING-IMPAIRED
SUBJECTS UNDER EACH OF THE TWO
SPEECHREADING CONDITIONS

SUBJECTS	SPEECHREADING CONDITIONS				SPEECHREADING CONDITIONS			
	Without Cues	SD	$\bar{X}$	With Cues	SD	Degrees of Freedom	Without Cues	With Cues
	$\bar{X}$			$\bar{X}$		d.f.	t-value	t-value
Normal-Hearing	$\bar{X}=35.80$		$\bar{X}=51.05$					
	SD=20.27		SD=21.77					
Hearing-Impaired	$\bar{X}=39.00$		$\bar{X}=57.85$			d.f. = 19	t=1.12	t=0.95
	SD=18.27		SD=23.83					

*Significant at the 0.05 level of confidence.

correct word response of 3.20 over the normal-hearing adults. When contextual information was provided, the hearing-impaired showed a 6.80 improvement in mean correct word response over the normal-hearing individuals. A t-test analysis of the mean performance between the two groups of subjects, however, resulted in nonsignificant t-values of 1.12 for the non-contextual condition and 0.95 for the contextual task.

The mean speechreading performance scores shown in Table 2 are presented graphically in percent correct response for the normal-hearing and hearing-impaired adults in Figure 3. The graph displays the amount of improvement in performance as measured by the increase in percent correct response. The hearing-impaired individuals demonstrated a non-substantive 3 percent improvement over the normal-hearing subjects when situational information accompanied the speechreading task.

Do the same individuals who demonstrate superior performance (beyond two standard deviations above the mean) under the speechreading condition without situational cues maintain their superiority when situational cues are added?

The question above cannot be answered adequately since only one subject performed at two standard deviations above the mean. This normal-hearing subject received a raw score of 86 points under the condition without cues, and 82 points when situational cues were provided.

To further analyze the relationship between

Figure 3. Speechreading performance scores in percent correct for the normal hearing and hearing-impaired adults for the two speechreading conditions. Percent difference scores for the speechreading tasks are shown in parenthesis.

speechreading with and without contextual cues, a Pearson product moment correlation (Pearson r) between the two conditions was computed. The resultant Pearson r of 0.77 (significant at the 0.01 level of confidence) demonstrated a strong relationship between the two experimental tasks.

Does an item analysis show that the sentences on the Utley Lipreading Test differentially improve when situational cues are added?

The item analysis results demonstrated a tendency for improvement in sentence identification when related situational cues were provided. Figures 4 through 7 show graphical representations of mean number of words correctly identified for each sentence item of the Utley Lipreading Test. The large sample inference method was used to demonstrate whether a difference existed in the mean number of correct words for each sentence. Of the 64 speechreading test sentences from the combined Utley lists A and B, 23 sentences showed significant improvement beyond the 0.05 level of confidence. An item analysis of each of the sentences in lists A and B of the Utley Lipreading Test is shown in Appendices I and J.

Discussion

The results obtained in this study demonstrated improved performance for the normal-hearing and hearing-impaired subjects when situational cues were added to the speechreading task. The application of contextual and

Figure 4. A graphic representation of the mean number of correct words for each test sentence item from List A of the Utley Lipreading Test for the two speechreading tasks.

Sentence items of the Utley Lipreading Test (List A)

*No improvement in score when situational cues were added.

*Significant improvement at 0.05 level of confidence.

Figure 5. A graphic representation of the mean number of correct words for each test sentence item from List A of the Utley Lipreading Test for the two speechreading conditions.

*No improvement in score when situational cues were added.

*Significant improvement at 0.05 level of confidence.

Figure 6. A graphic representation of the mean number of correct words for each test sentence item from List B of the Utley Lipreading Test for the two speechreading tasks.

Sentence items of the Utley Lipreading Test (List B)

*No improvement in score when situational cues were added.

#Significant improvement at 0.05 level of confidence.

Figure 7. A graphic representation of the mean number of correct words for each test sentence item from List B of the Utley Lipreading Test for the two speechreading conditions.

*No improvement in score when situational cues were added.

*Significant improvement at 0.05 level of confidence.

situational message-related information increase message redundancy. This increase in information appears to assist the speechreader in anticipating the message to follow. During the testing, many of the subjects indicated their awareness of how the photoslides were to assist them in the speechreading task. This awareness may have provided a preparatory set for the subjects, thereby enhancing their performance.

Another possible explanation for the improved speechreading scores is that the static picture of various situations may simply draw attention to cues available within the still-life photography. These static pictures may have provided the subjects more time for evaluation of each situation than otherwise available within a dynamic situation. It would be interesting to observe possible differences in results if motion pictures or any other dynamic presentation of situational scenes were utilized in comparison to static cues.

In the present study, it was anticipated that each subject would show a greater amount of improvement in the speechreading task with the situational cues provided. In the Pelson and Prather (1974) study, improvement in percent response correct was 36 percent while the present study only demonstrated approximately half that amount. Possible explanations for the difference in results may be due to the difference in the test sentence lists and accompanying situational cues, variability in the subjects'

ages and degrees of hearing loss, and manner of presentation.

Additionally, while all the subjects in the Pelson and Prather (1974) experiment showed improvement, data obtained in this present study revealed some individuals who demonstrated poorer performance when situational cues were provided. Some of the reasons for lower scores include fatigue, inappropriate situational scenes, visual distractions, inappropriate interpretations of additional cues, and the single presentation of the sentence item.

For the most part, message-related information as provided in the present study seems to facilitate speechreading performance. Merely introducing related additional information, such as contextual and situational cues, to one's attention and then providing experience along this line, may be one of the best approaches to facilitating speechreading ability.

The second experimental question posed in this study attempted to identify the effects of long-standing sensorineural hearing impairment upon speechreading performance. Although a marked difference in mean performance may be expected due to the presence of hearing loss, a large performance difference was not observed. As in the study by Simmons (1959), non-significant differences were obtained when a relationship between hearing loss and speechreading performance was measured. Simmons found a positive correlation between extent of hearing loss and

speechreading performance. As indicated by Jeffers and Barley (1971), a stronger correlation was not obtained since Simmons failed to control for the duration of hearing loss.

The main concern then is whether or not the presence of hearing loss tends to improve speechreading performance. It was pointed out earlier that the visual mode begins to play an important part in communication when hearing deteriorates. In this study, however, the deterioration of one sensory modality did not appear to demonstrate improved ability with another supplementary mode.

In the third experimental question, individual differences in performance were analyzed. As indicated in the results, none of the subjects scored two standard deviations above the mean. It is possible that the test may have been too difficult for the subjects to obtain higher scores. An item analysis in question 4 may provide some explanations for failure of subjects to excel in such a speechreading test.

More importantly, the aging process may provide a marked deterioration in performance requiring perception of speech stimuli through the visual modality. The results obtained in the Pelson and Prather (1974) study provided confirmation of the marked difference in performance between the younger adults and older individuals. The subjects in the present study were older ($\bar{X} = 75.7$ years).

Jeffers and Barley (1971) have suggested that some

parameters seem to have particular importance with respect to speechreading ability by older individuals. They considered good perceptual proficiency to be an important aspect to speechreading process. Although normal vision or normal corrected vision was required in the present investigation, indices of visual acuity do not measure all of the factors which may influence visual perception. As indicated earlier, one should not assume a one-to-one relationship between visual acuity and speechreading. While a test of visual acuity requires identification of static letters, speechreading is a dynamic process. Speech provides for about thirteen articulatory movements per second, but the normal eye can perceive about only eight movements per second (Berger, 1972). Age may tend to diminish performance on more complex visual tasks.

Another factor considered by Jeffers and Barley (1971) in speechreading tasks is the ability to identify parts or patterns, known as synthetic ability. It has been reported (Rieger, 1962) that the identification of familiar words is more difficult for older persons than younger individuals. Sanders (1982) pointed out that simple recognition ability may deteriorate in old age, such that the ability of closure may become reduced.

Equally important to synthetic ability is the parameter of flexibility. Flexibility is the ability to alter a decision if initial conclusions are not meaningful. Studies (Heglin, 1956; Welford and Birren, 1965) have shown

that older individuals tend to "perseverate" and persist with the same error, even though it is known that the response was incorrect. Greater difficulty appears to be evident in revising their first conclusion.

A final aspect of consideration is that of visual memory span. The process required in visual memory would be to retain the visual image long enough to be able to analyze what has been seen. For older individuals, studies tend to demonstrate that the aging process reduces the ability for short term memory (Bromley, 1958; McGhie, 1965). More significantly in speechreading, however, is the finding that visual short term memory appears to deteriorate faster than auditory short term memory.

With respect to the fourth experimental question, the item analysis data demonstrated some improvement in the number of words correctly identified within the test sentences accompanied by related situational scenes. From these findings, however, only twenty three out of the total sixty two sentences in the Utley test showed significant improvement when the contextual scenes were added.

There is a question regarding the test construct. As previously indicated, the Utley test utilized the list of 10,000 most frequently used words when constructing the sentences. The subjects in the present study, however, commented on the phrasing of some of the Utley sentences, such as "I had rather go now." Perhaps the problem may not be in the phrasing of the sentences but inherent in

the frequency of use of each of the sentence items. In the example, "We drove to the country," the frequency of the phrase being heard or spoken seems very rare.

There also appears to be some question regarding the difficulty of the Utley Lipreading Test. Davis and Hardick (1981) remarked that few subjects even achieve a 100 percent score while a zero percent score is common. The Utley test was standardized on 761 hearing-impaired children and adults who utilized speechreading as an important aspect of speech communication. Scores among the hearing-impaired ranged from 0 to 84, with a mean speechreading score of 33.6 correct response (27 percent of the 125 test items on the list). The best speechreader, according to Davis and Hardick (1981), only obtained 67 percent of the possible maximum score.

CHAPTER V

SUMMARY AND IMPLICATIONS

Summary

Aural rehabilitation programs recommend the use of situational cues by hearing-impaired individuals to facilitate understanding in everyday communication. Although this practice is generally accepted, little is known about the use of situational clues as an adjunct to speechreading performance.

The purpose of the present study was to determine the influence of situational cues on a standardized speechreading test in order to assess an individual's natural speechreading ability. The widely used, standardized Utley Lipreading Test was selected to which photoslides of message-related situational cues were added. The Utley Lipreading Test consists of two relatively equivalent test lists, containing series of unrelated sentences.

Two groups of twenty older adults differing in auditory status, participated in the study. One group consisted of normal-hearing individuals and the other was hearing-impaired. The age for all subjects ranged from 61 to 83 years. The mean age for the normal-hearing and hearing-impaired adults were 74.3 and 75.2 years,

respectively. Each subject received two experimental speechreading tasks. One condition was a live presentation without situational cues; the other condition occurred with the addition of situational cues. The situational cues were presented via color slides, shown prior to each sentence presentation. The two speechreading conditions were counterbalanced in order. Subjects were instructed to indicate verbally what they thought the speaker may have said. One point was assigned to each word correctly identified, regardless of word order. Results were analyzed through a t-test analysis.

Findings indicated improved speechreading performance by both hearing-impaired and normal-hearing groups when situational cues were added to the speechreading test. The method utilized in the present study did not demonstrate that hearing loss results in high performance scores among hearing-impaired and normal-hearing individuals. For a variety of reasons, one of which may be difficulty of the test material, none of the subjects within the study scored and maintained superior performance under the condition with added message constraints. Finally, differential improvement in the sentence items were observed when situational cues accompanied the sentences.

Implications

The findings in the present study suggest further areas to be studied. A few of these are as follows:

The sentences in the Utley Lipreading Test seem to be outdated or regionally oriented. Since the Utley test is widely used, familiarity of the sentences need to be investigated.

There was also some question regarding the sentence structure of each of the items in the Utley Lipreading Test. Although the sentence constructions followed the noun-verb-object structural format, it seems apparent that unusual word combinations may add to the difficulty of the test.

Another interesting study utilizing the Utley Lipreading Test may be to determine whether inappropriate situational cues reduce, enhance or produce no change in speechreading performance. The photoslides used in the present study may be rearranged and then randomly paired with each sentence item. Results may demonstrate variable responses.

A possible modification to the study is to use a dynamic approach. The use of a motion picture has been attempted with the Utley; however, the filmed version has been criticized as discussed in Chapter II. Perhaps an updated version with additional contextual and situational clues may be paired with the Sentence Test. Such an approach may provide more current real-life situations and produce somewhat different results than were observed in the current study.

Another possibility for further study is to determine whether significantly improved speechreading

performance would also be obtained by hearing-impaired subjects who have had no experience with amplification systems. Note that all the hearing-impaired subjects, who participated in the present study, wore some form of amplification system in at least one ear. Depending on the duration and degree of hearing loss, hearing-impaired individuals who have been deprived of some acoustical information and have had no assistance from amplification, may perform differently from those who have been provided with hearing aids.

SELECTED BIBLIOGRAPHY

- ALPINER, J. (1978). Evaluation of communication function. In J. Alpiner (ed.), Handbook of adult audiology. Williams and Wilkins, Co.
- AMERICAN national standards institute (1970). American national standard specifications for audiometers. New York: ANSI, S36-1969.
- ARTHUR, R. (1962). The effect of contextual and non-contextual motion pictures on the speechreading proficiency of comparable adult males. Ph.D. dissertation, University of Florida.
- AYLESWORTH, D. (1964). The talker and the lipreader in face-to-face testing of lipreading ability. Unpublished Master's thesis, Michigan State University. In J. O'Neill and H. Oyer (eds.), Visual communication for the hard of hearing. Prentice Hall, Inc.
- BERGER, K. (1972). Speechreading: Principles and methods. National Educational Press, 21-175.
- BERGER, K., DePompei, R. and Droder, J. (1970). The effect of distance on speechreading. Journal of Speech and Hearing Science, 115-122. In K. Berger (ed.), Speechreading: Principles and methods. National Educational Press.
- BERGER, K., Gardner, M. and Sudman, J. (1971). The effects of degree of facial exposure and the vertical angle of vision on speechreading performance. Teacher of the Deaf, 69, 322-326. In J. O'Neill and H. Oyer (eds.), Visual communication for the hard of hearing. Prentice Hall, Inc.
- BINNIE, C., Jackson, P. and Montgomery, A. (1976). Visual intelligibility of consonants: A lipreading screening test with implications for aural rehabilitation. Journal of Speech and Hearing Disorders, 41, 530-539.
- BONILLA, A. (1976). An investigation of lipreading performance as a function of speechreading rate. Unpublished Master's thesis, University of Iowa. In J. O'Neill and H. Oyer (eds.), Visual communication for the hard of hearing. Prentice Hall, Inc.

- BROMLEY, D. (1958). Some effects of age on short term learning and remembering. Journal of Gerontology, 13, 398-406.
- BRUHN, M. (1946). Methods of teaching lip reading. The Volta Bureau, 114. In K. Berger (ed.), Speechreading: Principles and methods. National Educational Press.
- BYERS, V. and Lieberman, L. (1959). Lipreading performance and the rate of the speaker. Journal of Speech and Hearing Research, 2, 271-276.
- CAVENDER, B. (1949). The construction of investigation of a test of lipreading ability and a study of factors assumed to affect the results. Unpublished Master's thesis, Indiana University. In K. Berger (ed.), Speechreading: Principles and methods. National Educational Press.
- CLOUSER, R. (1976). The effect of vowel-consonant ratio and sentence length on lipreading ability. American Annals of the Deaf, 12, 513-518.
- COSCARELLI, J. (1968). The relationship of visual synthesis skill to lipreading. Unpublished Master's thesis, Vanderbilt University. In K. Berger (ed.), Speechreading: Principles and methods. National Educational Press.
- DAVIS, J. and Hardick, E. (1981). Rehabilitative audiology for children and adults. John Wiley and Sons, Inc., 60-75.
- DAVIS, H. and Silverman, S. (eds.) (1978). Hearing and deafness. New York: Holt, Rinehart and Winston.
- DICARLO, L. and Kataja, R. (1951). An analysis of the Utley lipreading test. Journal of Speech and Hearing Disorders, 226-240.
- ERBER, N. (1971). Auditory and audiovisual reception of words in low frequency noise by children with normal hearing and by children with impaired hearing. Journal of Speech and Hearing Research, 14, 492-512.
- FARRIMOND, T. (1959). Age differences in the ability to use visual cues in auditory communication. Language and Speech, 2, 179-192. In K. Berger (ed.), Speechreading: Principles and methods. National Educational Press.

- FRANKS, J. (1976). The relationship of non-linguistic visual perception to lipreading skill. Journal of Academic of Rehabilitative Audiology, 1, 31-37. In J. O'Neill and H. Oyer (eds.), Visual communication for the hard of hearing. Prentice Hall, Inc.
- FRANKS, J. (1979). The influence of exaggerated mouth movements on lipreading. Audiology and Hearing Education, 5, 12-16. In J. O'Neill and H. Oyer (eds.) Visual communication for the hard of hearing. Prentice Hall, Inc.
- FRANKS, J. and Oyer, H. (1967). Factors influencing identification of english sounds in lipreading. Journal of Speech and Hearing Research, 10, 757-764.
- GARSTECKI, D. and O'Neill, J. (1980). Situational cue and strategy influence on speechreading. Scandanavian Audiology, 9, 147-151.
- GOETZINGER, C. (1963). A study of nomocular versus binocular vision in speechreading. Proceedings International Congress Education of the Deaf, 326-333. In K. Berger (ed.), Speechreading: Principles and methods. National Educational Press.
- GREENBERG, H. and Bode, D. (1968). Visual discrimination of consonants. Journal of Speech and Hearing Research, 12, 869-874.
- HARDICK, E., Oyer, H. and Irion, P. (1969). Lipreading performance as related to measurement of vision. Journal of Speech and Hearing Research, 13, 19-22.
- HEGLIN, H. (1956). Problem solving set in different age groups. Journal of Gerontology, 11, 310-317.
- HEIDER, F. (1943). Acoustic trainig helps lipreading. Volta Review, 45, 135.
- HEIDER, F. (1947). The Utley lipreading test. Volta Review, 457-458.
- HUTTON, C., Curry, E. and Armstrong, M. (1959). Semi-diagnostic test materials for aural rehabilitation. Journal of Speech and Hearing Disorders, 24, 319-329.
- JEFFERS, J. and Barley, M. (1971). Speechreading: Lipreading. Charles C. Thomas.

- KEIL, J. (1968). The effects of peripheral visual stimuli on lipreading performance. Ph.D. dissertation. Michigan State University.
- LARR, A. (1959). Speechreading through closed circuit television. Volta Review, 61, 19-22.
- LLOYD, L. and Price, J. (1971). Sentence familiarity as a factor in visual speech perception (lipreading) of deaf college students. Journal of Speech and Hearing Research, 14, 291-294.
- LOVERING, L. (1969). Lipreading performance as a function of visual acuity. Ph.D. disertaion. Michigan State University.
- MAGWIRE, C. (1985). A personal interview with Craig Magwire, Professor of Mathematics, by Maria Montserrat. Portland State University.
- MCGHIE, J. (1965). Changes in immediate memory with age. British Journal of Psychology, 56, 69-75.
- MENDENHALL, W. (ed.) (1983). Introduction to probability and statistics. Duxubury Press, Boston.
- MORKOVIN, B. and Moore, L. (1948-1949). Life-situation speech-reading through the cooperation of senses. In L. DiCarlo and R. Kataja (authors), An analysis of the Utley lipreading test. Journal of Speech and Hearing Disorders, 226-240.
- NAKANO, Y. (1961). A study on the factors which influence lipreading of deaf children. Volta Review, 68, 68-83.
- NITCHIE, E. (1912). Lip Reading: Principles and practice. Frederick A. Stokes, Co. In D. Sanders, Aural rehabilitation. Prentice Hall, Inc.
- NITCHIE, E. (1916). The use of homophenous words. Volta Review, 18, 3.
- O'NEILL, J. (1954). Contributions of the visual components of oral symbols to speech comprehension. Journal of Speech and Hearing Disorders, 19, 429-439.
- O'NEILL, J. Oyer, H. (1981). Visual communication for the hard of hearing. Prentice Hall, Inc.
- O'NEILL, J. and Stephens, M. (1959). Relationships among three filmed lip-reading tests. Journal of Speech and Hearing Research, 2, 61-65.

- PELSON, R. and Prather, W. (1974). Effects of visual message related cues, age, and hearing impairment on speechreading performance. Journal of Speech and Hearing Disorders, 518-525.
- PINTNER, R. (1929). Speech and speech reading tests for the deaf. American Annals for the Deaf, 74, 480-486.
- POPELKA, G. and Berger, K. (1971). Gestures and visual speech reception. American Annals for the Deaf, 116, 434-436.
- REID, G. (1946). A preliminary investigation in the testing of lip reading achievement. American Annals for the Deaf, 91, 403-413.
- RIEGER, T. (1962). Perception and set: A review of the literature and the study of the effects of instructions and verbal habits in word recognition thresholds for young and old subjects. Acta Psychology, 12, 224-251.
- ROSENSTEIN, D. (1985). Telephone interview with Diane Rosenstein, O.D., by Maria Montserrat. Kaiser Permanente Health Care Program. Portland, Oregon.
- ROWLAND, M. (1971-1975). Basic data on hearing levels of adults 25-74 years: United States. Hyattsville, Maryland: Department of Health Education Welfare.
- REUSCH, J. and Kees, W. (1956). Nonverbal communication. Berkeley and Los Angeles: University of California Press. In D. Sanders, Aural rehabilitation. Prentice Hall, Inc.
- SAHLSTROM, L. (1967). Objective measurement of certain facial movements during production of homophenous words. Ph.D. dissertation. Michigan State University.
- SANDERS, D. (1982). Aural rehabilitation. Prentice Hall, Inc.
- SHOOP, C. and Binnie, C. (1979). The effects of age upon the visual perception of speech. Scandinavian Audiology, 8, 3-8.
- SIMMONS, A. (1959). Factors related to lipreading. Journal of Speech and Hearing Research, 2, 340-352.

- SMITH, R. and Kitchen, D. (1972). Lipreading performance and contextual cues. Journal of Communication Disorders, 86-90.
- STONE, L. (1957). Facial cues of context in lip reading. John Tracy Clinic Research Papers, no. V. In J. O'Neill and H. Oyer, Visual communication for the hard of hearing. Prentice Hall, Inc.
- TAAFFEE, G. (1957). A film test of lipreading. John Tracy Clinic Research Papers, no. II. In J. Davis and E. Hardick, Rehabilitative audiology for children and adults. John Wiley and Sons, Inc.
- THOMAS, S. (1969). Lipreading performance as a function of light level. Unpublished Master's thesis, Michigan State University. In R. Pelson and W. Prather, Effects of visual message related cues, age, and hearing impairment on speechreading performance. Journal of Speech and Hearing Disorders, 518-525.
- UTLEY, J. (1946). A test of lipreading ability. Journal of Speech and Hearing Disorders, 11, 109-116.
- VOS, L. (1965). The effects of exaggerated and nonexaggerated stimuli on lipreading ability. Unpublished Master's thesis. Michigan State University. In K. Berger (ed.), Speechreading: Principles and methods. National Educational Press.
- WELFORD, A. and Birren, J. (1965). Behavior, aging and nervous system. Charles C. Thomas. In R. Pelson and W. Prather, Effects of visual message related cues, age, and hearing impairment on speechreading performance. Journal of Speech and Hearing Disorders, 518-525.

APPENDIX A

SUBJECT CASE HISTORY

Name _____
Address _____

Phone _____
Age _____

Background Information

	Yes	No
High school graduate or equivalent	_____	_____
Apparent speech/language impediment	_____	_____
Previous formal speechreading training	_____	_____

Preliminary Assessment:

	Pass	Fail
Hearing: Normal (screened for 20 dB at 500, 1000, 2000 Hz and for 35 dB at 4000 Hz)	_____	_____
Hearing loss (pure tone average of 40 dB or greater in the better ear)	_____	_____
(Estimated number of years with hearing impairment, if applicable)	()	
Vision: Adequate (with correction, if needed)	_____	_____

Test Results:

Speechreading scores:

	List A	List B
administered first, with cues	_____	_____
administered first, without cues	_____	_____
administered second, with cues	_____	_____
administered second, without cues	_____	_____

APPENDIX B

INFORMED CONSENT

I, _____, hereby agree to participate in the research project on Speechreading Performance on a Standardized Speechreading Test, conducted under the supervision of Dr. James Maurer, Ph.D., CCC-A.

I understand that the study involves a hearing test, vision screening, an interview and also participation in a standardized speechreading test.

It has been explained to me that the purpose of the study is to determine the rehabilitative implications of speechreading performance on a standardized speechreading test. I may not receive any direct benefit from participation in this study, but my participation may help to increase knowledge which may benefit others in the future.

Maria N. Montserrat has offered to answer any questions I may have about the study and what is expected of me in the study.

I understand that I am free to withdraw from participation in this study at any time, without jeopardizing my relationship with Portland State University.

I have read and understand the foregoing information.

Date: _____ Signature: _____

If you have any questions, please feel free to contact me (Maria N. Montserrat) at 229-3533, Speech and Hearing Department, 69 Neuberger Hall, Portland State University.

APPENDIX C

UTLEY LIPREADING TEST

Practice sentences

1. Good morning.
2. Thank you.
3. How are you?

List A

1. All right.
2. Where have you been?
3. I have forgotten.
4. I have nothing.
5. That is right.
6. Look out.
7. How have you been?
8. I don't know if I can.
9. How tall are you?
10. It is awfully cold.
11. My folks are home.
12. How much was it?
13. Good night.
14. Where are you going?
15. Excuse me.
16. Did you have a good time?
17. What did you want?
18. How much do you weigh?
19. I cannot stand him.
20. She was home last week.
21. Keep your eye on the ball.
22. I cannot remember.
23. Of course.
24. I flew to Washington.
25. You look well.
26. The train runs every hour.
27. You had better go slow.
28. I says that in the book.
29. We got home at six o'clock.
30. We drove to the country.
31. How much rain fell?

Scoring

One point was assigned to each word regardless of word order. Total of 125 points.

APPENDIX D

UTLEY LIPREADING TEST

List B

1. What happened?
2. It is all over.
3. How old are you?
4. What did you say?
5. O.K.
6. No.
7. That is pretty.
8. Pardon me.
9. Did you like it?
10. Good afternoon.
11. I cannot help it.
12. I will see you tomorrow.
13. You are welcome.
14. You are all dressed up.
15. What is your number?
16. I know.
17. It is cold today.
18. I am hungry.
19. I had rather go now.
20. What is your address?
21. What does the paper say about
the weather?
22. It is around four o'clock.
23. Do you understand?
24. They went around the world.
25. The office opens at nine o'clock.
26. None of them are here.
27. Take two cups of coffee.
28. Come again.
29. The thermometer says twenty above.
30. It's your turn.
31. It is hard to keep up with the
new books.

Scoring

One point was assigned to each word
regardless of word order. Total of 125 points.

APPENDIX E (CON'T)

17. What did you want? - a woman standing next to an open door, another woman is talking to her.
18. How much do you weigh? - a woman standing next to a scale, another woman is on the scale.
19. I cannot stand him. - a woman whispering to another woman, a man is sitting in the background.
20. She was home last week. - two women standing at the front door of a house, facing each other.
21. Keep your eye on the ball. - a father and son next to a pool table, the father is pointing to one of the balls.
22. I cannot remember. - two women sitting on a living room couch, one is slightly glancing up at the ceiling.
23. Of course. - a woman on the telephone.
24. I flew to Washington. - a man and a woman at the airport, the man is holding a suitcase.
25. You look well. - two men shaking hands.
26. The train runs every hour. - a man talking to a woman at the ticket counter of a(n) (Amtrak train) station.
27. You had better go slow. - a man and a woman in a car, looking at a school zone sign.
28. It says that in the book. - two students looking at a book, one is pointing to an item in the book.
29. We got home at six o'clock. - a woman talking on the telephone in her kitchen.
30. We drove to the country. - a family looking at a photo album.
31. How much rain fell? - some people outdoors, one is holding an umbrella.

APPENDIX F

UTLEY LIPREADING SENTENCE LIST B WITH CORRESPONDING SITUATIONAL CUES

1. What happened? - two women sitting on a living room couch, one of them is crying.
2. It is all over. - a man and a woman watching television, the woman is about to turn the television off.
3. How old are you? - a woman talking to a little girl.
4. What did you say? - a woman at a public phone booth, she is covering one of her ears.
5. O.K. - a woman on the telephone.
6. No. - a mother facing her son, the son is next to some wine glasses.
7. That is pretty. - two women at a store, looking at a nice scarf.
8. Pardon me. - a man tapping the shoulder of another man.
9. Did you like it? - two women standing in front of a theater.
10. Good afternoon. - a woman approaching some people.
11. I cannot help it. - two women on a sofa in the living room, one is shrugging her shoulder.
12. I will see you tomorrow. - two women standing next to an opened door.
13. You are welcome. - two women in the living room, one is holding a present.
14. You are all dressed up. - a mother talking to her daughter, the daughter is wearing a nice dress.
15. What is your number? - two women standing next to an office counter.
16. I know. - a teacher standing in front of the classroom, pointing to a student who is raising her hand.
17. It is cold today. - a husband and wife next to a fireplace.

APPENDIX G

INSTRUCTIONS FOR THE SPEECHREADING TEST

I will present a list of sentences to you without using my voice. None of these sentences are related, that is, the meaning of one sentence has nothing to do with any other. I will present each sentence only once, and then I want you to tell me what you think I said. If you are not sure, guess! Even if you just pick up a word or two, I want you to tell me. I will give you enough time to think about your answers.

(Before I present each of the sentences, a photoslides will be shown. First, I want you to look at the picture, and then look at me, so that I can present the sentence that you will lipread.) (This instruction was added when photoslides were shown.)

Let us begin with a few practice sentences.

1. Good morning. (Ask: "What did I say?")
2. Thank you. (Ask: "What did I say?")
3. How are you? (Ask: "What did I say?")

We will now begin the test. The first one is.....

APPENDIX H

SPEECHREADING PERFORMANCE SCORES FOR THE NORMAL-HEARING
AND HEARING-IMPAIRED SUBJECTS FOR EACH OF
THE TWO SPEECHREADING CONDITIONS

SUBJECT	SPEECHREADING CONDITIONS	
	Without Cues	With Cues
1	86	*82
2	60	67
3	54	88
4	53	62
5	51	63
6	50	66
7	40	58
8	40	50
9 Normal-	39	55
10 Hearing	38	45
11 Subjects	34	55
12	33	62
13	33	62
14	30	71
15	26	33
16	15	24
17	12	26
18	11	* 9
19	8	28
20	5	19
21	68	86
22	58	85
23	57	84
24	57	77
25	55	*55
26	51	92
27	51	86
28	50	62
29 Hearing-	50	*34
30 Impaired	45	61
31 Subjects	45	55
32	41	77
33	32	67
34	27	57
35	22	*17
36	21	41
37	15	36
38	13	73
39	12	20
40	10	28

*No improvement in score when situational cues were added.

APPENDIX I

MEAN NUMBER OF CORRECT WORDS IDENTIFIED AND
STANDARD DEVIATIONS FOR EACH OF THE UTLEY
LIPREADING TEST SENTENCES (LIST A) UNDER EACH
OF THE TWO SPEECHREADING CONDITIONS.

		<u>Speechreading Conditions</u>			
		Speechreading without situa-		Speechreading with situa-	
		tional cues		tional cues	
		$\bar{X}$	SD	$\bar{X}$	SD
1.	All right.	1.10	1.02	1.20	1.01
2.	Where have you been?	2.80	1.70	2.75	1.77
3.	I have forgotten.	1.00	1.12	1.45	1.32
4.	I have nothing.	**0.95	1.32	2.40	1.19
5.	That is right.	1.80	2.24	1.90	1.45
6.	Look out.	0.70	0.86	0.80	1.01
7.	How have you been?	3.05	1.54	3.45	1.15
8.	I don't know if I can.	3.70	3.08	4.50	2.52
9.	How tall are you?	2.20	1.79	2.65	1.63
10.	It is awfully cold.	**1.00	1.45	3.55	1.10
11.	My folks are home.	1.45	1.64	1.90	1.83
12.	How much was it?	2.55	3.85	2.75	1.65
13.	Good night.	0.60	1.14	0.80	1.01
14.	Where are you going?	2.25	1.89	2.80	1.79
15.	Excuse me.	0.85	1.09	1.05	1.00
16.	Did you have a good time?	2.70	2.08	2.05	2.67
17.	What did you want?	**1.85	1.69	2.85	1.31
18.	How much do you weigh?	**3.10	2.10	4.55	1.15
19.	I cannot stand him.	**0.50	1.15	1.80	1.58
20.	She was home last week.	1.75	1.97	2.00	1.92
21.	Keep your eye on the ball.	0.90	1.83	1.95	2.39
22.	I cannot remember.	**0.70	1.08	1.45	1.36
23.	Of course.	0.30	0.73	0.65	1.04
24.	I flew to Washington.	**0.15	0.49	0.65	1.14
25.	You look well.	0.60	0.99	0.80	0.95
26.	The train runs every hour.	**0.30	0.66	0.85	1.35
27.	You had better go slow.	**0.80	1.28	1.85	1.23
28.	It says that in the book.	**0.25	1.64	1.00	1.34
29.	We got home at six o'clock.	0.55	1.43	0.25	0.55
30.	We drove to the country.	**0.00	0.00	0.10	0.31
31.	How much rain fell?	**1.25	1.02	1.85	1.42

**Significant improvement in the number of words correctly identified at the 0.05 level of confidence.

APPENDIX J

MEAN NUMBER OF CORRECT WORDS IDENTIFIED AND
STANDARD DEVIATIONS FOR EACH OF THE UTLEY
LIPREADING TEST SENTENCES (LIST B) UNDER EACH
OF THE TWO SPEECHREADING CONDITIONS.

		<u>Speechreading Conditions</u>			
		without cues		with cues	
		$\bar{X}$	SD	$\bar{X}$	SD
1.	What happened?	**1.15	0.75	1.60	0.60
2.	It is all over.	2.30	1.84	2.60	1.89
3.	How old are you?	**2.30	1.87	3.65	1.09
4.	What did you say?	**2.80	1.61	3.50	1.24
5.	O.k.	1.10	1.02	1.20	1.01
6.	No.	0.25	0.44	0.40	0.50
7.	That is pretty.	1.00	1.30	2.15	1.23
8.	Pardon me.	0.35	0.67	0.30	0.73
9.	Did you like it?	1.25	1.59	1.70	1.89
10.	Good afternoon.	0.50	0.83	0.60	0.88
11.	I cannot help it.	1.30	1.84	2.20	1.88
12.	I will see you tomorrow.	1.95	1.79	3.25	2.10
13.	You are welcome.	1.00	1.30	1.15	1.57
14.	You are all dressed up.	**2.00	2.03	3.05	2.14
15.	What is your number?	2.20	1.58	2.25	1.77
16.	I know.	1.00	0.97	1.25	0.97
17.	It is cold today.	**0.05	0.22	1.35	1.76
18.	I am hungry.	0.85	1.23	1.20	1.40
19.	I had rather go now.	1.65	1.63	1.80	1.54
20.	What is your address?	2.30	1.87	2.85	1.63
21.	What does the paper say about the weather?	**1.45	1.73	3.75	3.27
22.	It is around four o'clock.	**1.10	1.52	1.90	1.97
23.	Do you understand?	0.55	0.94	0.65	1.14
24.	They went around the world.	0.50	0.89	0.55	1.19
25.	The office opens at nine o'clock.	1.10	1.80	1.95	2.39
26.	None of them are here.	**0.00	0.00	0.35	0.99
27.	Take two cups of coffee.	**0.45	0.69	1.55	1.47
28.	Come again.	0.20	0.62	0.55	1.64
29.	The thermometer says twenty above.	**0.20	0.89	1.35	1.50
30.	It is your turn.	0.40	1.10	1.15	1.66
31.	It is hard to keep up with the new books.	0.70	2.30	0.30	0.92

**Significant improvement in the number of words correctly
identified at the 0.05 level of confidence.