Relationship of Speechreading Performance and Facial Hair

1975

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RELATIONSHIP OF SPEECHREADING PERFORMANCE AND FACIAL HAIR

BY

RONALD GOLUBA
B. S., Illinois State University, 1971

THESIS

Submitted in partial fulfillment of the requirements for the degree of Master of Arts in the Graduate Studies Program of Florida Technological University

Orlando, Florida
1975
This Thesis is affectionately dedicated to all of my speechreading students
ACKNOWLEDGEMENT

My appreciation is extended to all those individuals that helped make this study possible.

To my Committee Chairman, Dr. Thomas Mullin, whose encouragement and attention to detail made my experiences as a graduate student more enjoyable.

My gratitude is further extended to other members of my Committee, Dr. Albert Pryor, who gave unselfishly of his time and his expertise when it was most urgently needed, to Dr. Robert Arnold for his constant encouragement.

Finally, my appreciation is extended to my typist, Maggie, for her never ending patience, speed and understanding.
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Introduction and Rationale

It has been stated that communication is the primary handicap of deafness (Thomas, 1962; Davis and Silverman, 1970). Man’s quest for communication with his fellow man is possibly his greatest need and the fulfillment of other needs and desires is largely dependent upon, or at least greatly facilitated by, his ability to satisfy this basic drive (Davis and Silverman, 1970).

Berlo (1960), reported 70 percent of the average American's active hours are spent communicating verbally. This verbal communication consists of listening, speaking, reading, and writing, in that order.

A severe hearing loss causes interference with the most frequently occurring facet of communication, listening, and puts the handicapped individual at a serious disadvantage (Thomas, 1962).

Communicative Process

The simplest reciprocal form of communication behavior is the use of an action by one person, which could be accompanied by a material object, as a stimulus to another person in such a way that the second person perceives the experience of the stimulating person (Smith, 1946). According to Dickens (1963), individuals communicate thoughts and emotions through the use of voice, language, and/or bodily action.

English words are composed of vowels and consonants which are
sometimes referred to as "Sounds". The normal ear is equipped with a mechanism which can hear and differentiate between sounds, and which can distinguish between the fine modifications that occur when sounds are combined into words (Ewing and Ewing, 1946).

**Communication Breakdown**

An individual suffering from a hearing impairment has at least partially lost the ability to communicate, depending upon the degree of hearing impairment.

In normal oral communication the articulators, the tongue, lips, palate, and teeth, serve as modulators of the air stream. The resulting output takes form as consonants and vowels which are detected by the ear of a listener and passed on for interpretation in the higher brain centers. For the individuals with moderate to severe hearing loss, the visual shape and movement of the speaker's articulators become the important communicative elements (O'Neill and Oyer, 1961). Hearing impaired children often depend on visual perception in the communication process to a greater extent than do hearing children, due to decreased auditory sensitivity (Harris, 1971; Oyer and Frankman, 1975).

Speechreading is the process through which an individual, regardless of the state of his hearing understands speech by carefully watching the speaker (Silverman, 1948). Professional individuals involved in aural rehabilitation prefer to use the term speechreading while the public uses the term lipreading more frequently (Berger,
1972). In speechreading there are several variables, one of which is facial exposure of the speaker (Stone, 1957). The speechreading ability related to facial exposure is a variable to be considered in this study.

**Hearing Loss**

Hearing loss is defined as a malfunction of the auditory mechanism causing a loss of sensitivity (Davis and Silverman, 1970). In a mediocolegal context hearing impairment implies a severity sufficient to affect personal efficiency in the activities of daily living specifically in regard to communication (Zemlin, 1968).

There are three basic types of hearing losses: (1) conductive, (2) sensorineural, and (3) mixed (Berry and Eisenson, 1956; Davis and Silverman, 1970; Rose, 1971).

A conductive loss is a hearing impairment due to interference with the acoustic transmission of sound to the sense organ, usually in the outer or middle ear (Rose, 1956). One of the characteristics of a conductive hearing loss is the fact that it is medically or surgically treatable; whereas, the sensorineural type is rarely influenced by medical or surgical intervention (Shanbaugh, 1967).

A sensorineural hearing loss is due to abnormality of the cochlea, the auditory nerve, the brain or any combination of these and as mentioned previously, is rarely helped through medical or surgical means (Littler, 1965). The communication problem created by this type of loss may often be relieved through amplification, speechreading,
auditory training or a combination of these.

Rehabilitation

A comprehensive review of the historical aspects of lipreading is provided by O'Neill and Oyer (1961). The use of speechreading as a rehabilitative measure began with Juan Pablo in 1620 who was interested in lipreading, and felt it was an art acquirable by only a few deaf persons. In 1648, John Bulwer, an English physician, published The Deafe and Dumbe Man's Friend, which advocated using lipreading as a means for teaching the deaf to speak. In 1687, John C. Amman, a Swiss physician, published Surdus Loguens in which he described the way he taught deaf-mutes to speak and lipread. Henry Baker, naturalist and poet, became interested in the instruction of a young deaf girl in 1720. He taught her to read, write and lipread but was so secretive about his technique that it was said he asked a bond of 100 pounds from each pupil to insure their secrecy. During this same period, Charles M. de l'Epee, trained as a priest and lawyer, began a school for the aurally handicapped children of Paris. Due to the great number of students who attended his school he was forced to teach the manual method. Samuel Heinicke (1729-1790) thought the deaf could learn to understand speech by carefully watching the speaker's lips and so promoted the oral method in Germany.

Education for the deaf came to America in 1815. John Braidwood, grandson of Thomas Braidwood (1715-1806) who taught lipreading in
Great Britain, migrated to America and with financial help from a wealthy Virginian set up a small school for deaf persons using the manual approach. Until 1867 the manual approach prevailed in America except in some very small private schools. At this time, John Clarke donated money to establish the oral school which bears his name. The teaching of lipreading was limited to children until the 1890's. Then adults were allowed to learn with the children in small schools. At a meeting of the American Association to Promote the Teaching of Speech to the Deaf in 1894, Mrs. A. G. Bell presented a paper in which she stressed the need to stop teaching students to analyze mouth positions for the various speech sounds and to begin stressing the importance of grasping the speaker's meaning. From 1900 to 1930 Martha Bruhn, Edward B. Nitchie, Cora Kinzie, and Anna Bunger all developed methods for teaching lipreading. Since 1930 no distinct method of teaching lipreading has evolved although a few have produced lipreading materials on film.

Today speechreading training is offered in many colleges to prospective teachers of the deaf and the Veteran's Administration accepts it as an effective form of rehabilitation. Oyer (1961) found that speechreading could be taught using television. He revealed that college students improved their scores on a filmed test of speechreading lessons presented through a closed circuit television system. Larr (1959) found that upper torso exposure and viewing speech from the front or at a 45 degree angle was the most
effective for televised speechreading instruction.

An approach to teaching the hearing impaired called "Total Communication" is presently winning favor because it utilizes speechreading, speech, and manual language simultaneously (Berger, 1972).

Speechreading Abilities

No single factor fully accounts for speechreading efficiency, but rather a combination of circumstances which include natural aptitude, easy command of the language, acquaintance with the vagaries present in speech, and a large functioning vocabulary (Silverman, 1957; Fusfeld, 1958; Davis and Silverman, 1970).

The process of speechreading involves three steps: (1) sensory reception of the motor or movement pattern, (2) perception of the pattern, and (3) association of the pattern with meaningful concepts (Jeffers and Barley, 1971).

Environmental Factors. Unfavorable conditions of extraneous nature such as uncertainties of light, position, movement and distance of the speaker often make speechreading unpredictable (Fusfeld, 1958).

Visibility of the speaker's face can be partly or wholly effected by factors in the environment thus affecting speechreading performance. These factors are the unsatisfactory conditions of a poorly lighted room which throws deep shadows on the speaker's face or a seating arrangement that causes the speechreader to look into
a bright light (Davis and Silverman, 1970).

Thomas (1962) investigated the variable of lighting and found that the percent of recognition during speechreading does tend to decrease as illumination intensity decreases. In studying the relationship between speechreading performance and visual acuity, Irion, Oyer and Hardick (1970), found that people with relatively minor visual acuity problems will obtain significantly lower scores on a speechreading test than those with normal vision. Erber (1971) reported that direct illumination of the mouth and surrounding facial area and decreasing the distance that separates the talker and the observer improved intelligibility. The ideal distance between the speaker and observer appears to be about six feet. (Davis and Silverman, 1970).

**Visibility Factors.** The visibility of speech to the speechreader is pointed out by Vernon (1972).

There is overwhelming ambiguity inherent in speechreading. Two-thirds of the forty-two sounds that make up the English language are either invisible or else they look just like some other sound on the lips. The few sounds that are visible for speechreading must be grasped in the fleeting seconds that they appear on the mouth of the speaker. The world's best speechreaders get about one-fourth of what is said and they are not deaf (p.530).

From one-twelfth to one-thirteenth of a second is the average time per movement in ordinary speech (Nitchie, 1930).

Homophenous words are those which sound different but look alike on the lips and provide a real challenge to the speechreader (Berger,
Jeffers and Barley (1971) reported that there is not a single consonant sound that has a characteristic lip or jaw movement of its own which would enable it to be recognized on the basis of vision alone.

**Psychological Factors.** Some factors are variables relative to the individual speechreader and partially determines the degree of success he may have in speechreading. The intellectual level and personality of the speechreader are sometimes considered variables. O'Neill and Davidson (1956) and O'Neill and Oyer (1961) revealed that there appears to be no significant relationship between speechreading skills and general intelligence although scores on the Draw-a-Man Test of Intelligence revealed that more intelligent hearing impaired children were the most proficient speechreaders (Myklebust, 1969).

The relationship between lipreading ability and certain behavioral or personality factors were investigated by Wong and Taafe (1958). They discovered high scores in general activity, emotional stability, and personal relations were related to speechreading performance. Alertness, flexibility, and attitude of the lipreader are factors that effect speechreading ability according to Fusfeld, (1958). Davidson and Tatoul (1961) found that the variable of synthetic ability, that is, the ability to anticipate the whole from the knowledge of a few of its parts, is an important aspect of speechreading ability.

**Speaker Factors.** Silverman (1957) points out that the
character of the talker's speech which may be influenced by precision and rate of articulation, sectionalisms, facial expressiveness and the familiarity of the speechreader with the speaker contribute to the overall effectiveness of the verbal exchange. The influence of the speaker and his message are also important determinants of speechreading efficiency (McEachern and Rushford, 1958).

Fusfeld (1958) reports other contributing speaker factors include the amount of animation the talker uses, his speech mannerisms, and his manner of articulation.

The mobility of the lips, facial expression and amount of the speaker's face which is visible in addition to his lips are related to how efficiently an individual can speechread is revealed by Greenberg and Bode (1968).

It was reported by Stone (1957) that:

A speaker whose lips are normally mobile will be more successfully speechread than a speaker whose lips are less than normally mobile. A grim, rather than a smiling expression is more likely to be speechread successfully. Subjects exposed to the "mouth only" condition received, on the average, lower speechreading scores than subjects exposed to greater portions of the face and body (p.7).

Popelka and Berger (1971) add that extra-facial gesturing enhances speechreading performance substantially.
Statement of the Problem

With the advent of more men entering the fields of deaf education, speech pathology, and audiology, the variable of facial exposure is becoming increasingly important since the growth of beards and/or mustaches is also increasing. As with the many variations possible with light, movement, distance and lip mobility there are also variations in the length and shape of beards and mustaches. The growth of facial hair is a variable the speechreader cannot control.

The relationship between facial exposure and speechreading has been researched by Stone (1957), however, there is no available research on the effect facial hair has on speechreading efficiency. Knowledge in this area is important from a practical standpoint so that the development of maximum speechreading abilities in individuals will be permitted.

The purpose of this study is to measure the differences, if any, in the speechreadability of speakers with full beards and mustaches, mustaches only, and clean shaven.
Methodology

Test Site

All audiological, visual and speechreading testing was conducted in the Auditory Research Laboratory at Florida Technological University in Orlando, Florida.

Hearing screening was through the "sweep" technique described by Newby (1964). All classrooms had a light level of at least 150 foot candles as specified by the Illuminating Engineering Society (1959) for lipreading.

Subjects

All 90 individuals were taken from the student body at Florida Technological University and met the requirements of having hearing within normal limits not exceeding 25 dB in either ear as described by Davis and Silverman (1970), (Appendix A) and normal vision. In addition, persons having any history of central nervous system disorders, any active observable ear pathology or previous participation in any speechreading training or experiment were eliminated.

Due to the large number of subjects the six segments of video tape were shown in groups of one to eight individuals.

Speakers

The speakers were two volunteers with full beards and mustaches (Figures I and II). The speakers had the hair trimmed so that both the upper and lower lips were completely visible. Both speakers
Figure 1

Full Beard With Mustache.
Just a Mustache.
had normal lip mobility and were free of any speech defects as judged by a panel of three deaf educators. The two men wore light blue shirts with a beige background for video taping.

**Instrumentation**

All audiometric testing was accomplished in a testing suite (Industrial Acoustic Company Series 1200). "Sweep" audiometric screenings were performed using a clinical audiometer (Grayson Stadler 1702) with a matched set of earphones (Telephonics TDH 39) using MX 41 AR cushions. A daily biological check of calibration of the audiometer prior to testing was performed and appropriate modifications completed, if needed. The five second 1,000 Hz warning tone was provided with a portable audiometer (Zenith ZA-110T).

A visual acuity test for distance was accomplished with a ten foot Snellen Wall Chart.

A Light Meter (General Electric Type 213) was used to measure for adequate lighting at the experimental test site. The same level was obtained for all observers.

All video taping was accomplished at the Auditory Research Laboratory at Florida Technological University. Video taping was performed using a black and white camera (Sony AVC-3210) and a recorder (Sony, model 3650) along with a 23 inch educational monitor (Selchell Carlson, model 2100SD). A microphone (Electrovoice 1750) was also used in the recording process. At the test site the recorder and the 23 inch monitor was used.
The speechreading materials video taped were the practice sentences and all test sentences contained on Form B of the Utley Lipreading Sentence Test (Utley, 1946), (Appendix B). Jeffers and Barley (1971) point out that there is no standardized lipreading test available.

Design

A single factor design was used in this experiment. The three treatments of facial hair, (1) beard, (2) mustache only, and (3) clean shaven made up the independent variable.

The dependent variables were the two methods of scoring the results of the lipreading tests. Each answer form was analyzed giving one point for each word exactly lipread from the video tapes and re-evaluated assigning one point per word if the meaning was correct (Utley, 1975). It was possible to score no more than the original number of words spoken regardless of how many were used by the subject in conveying the meaning of the passage. Homophenity of words was not considered.

Procedure

Both speaker volunteers recorded all test and practice sentences from the Utley Lipreading Sentence Test, Form B, in each of the three facial treatments, (1) full beard and mustache, (2) mustache only, and (3) clean shaven. All video taping was accomplished with the upper torso exposed and all sentences were recorded with live voice. Later the voice was dubbed out of the
31 test sentences but left in on the five practice sentences. All facial expressions and gestures were eliminated as much as possible so that understanding of the messages would have to come from the facial area.

Each speaker was video taped in such a manner that he was on the screen two seconds before and after reciting each sentence. After each sentence was recorded there was a 30 second black out period for the subjects to write down what they saw. At the end of this 30 second period there was a 1,000 Hz tone presented in order to warn the subjects that the next sentence would be given in five seconds. Each segment of video tape was appropriately labeled.

All experimental subjects were seated between five and nine feet from the viewing monitor. None of the subjects were more than 30 degrees along the horizontal viewing angle as described by Gordon (1971).

After reading and understanding the instructions (Appendix C), answer forms (Appendix D) were distributed to each subject. During presentation the first five practice sentences were shown silently. After completion the practice sentences were again presented with voice. The 31 test sentences were then given as described earlier.

Upon completion of the test each subject was asked to answer the following question: Was there anything about the speaker or presentation that hindered your ability to lipread the messages?
Results

In order to test the effects of the three treatments on speechreadability a one-way analysis of variance was performed. The data for both confederates was combined in this initial manipulation. The $F$ ratio did not approach the designated .05 level of significance for either dependent measure.

Since an inspection of the means (see Tables 1 and 2) indicated a good deal of variability between the results of the two confederates, the data were separated for subsequent analysis. Accordingly, a one-way analysis of variance was computed for each confederate for both scoring methods. The only $F$ value found to be statistically significant ($p<.05$) is shown in Table 3. This analysis revealed that the treatments did cause significant differences ($p<.05$) for Confederate I on the exact wording plus meaning method of scoring. This result was further specified by significant ($p<.05$) $t$ ratios of 2.24 and 2.18 when comparing the Confederate I clean shaven treatment with the mustache only and bearded treatments, respectively. Thus, the clean shaven treatment scores for Confederate I on exact wording plus meaning were significantly higher than in either of the remaining conditions. In general, scores tended to increase for Confederate I as facial hair was removed regardless of the scoring method utilized.
<table>
<thead>
<tr>
<th>Treatments</th>
<th>Beard</th>
<th>Mustache</th>
<th>Clean Shaven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confederate I</td>
<td>24.9</td>
<td>25.7</td>
<td>31.1</td>
</tr>
<tr>
<td>Confederate II</td>
<td>44.9</td>
<td>52.9</td>
<td>36.1</td>
</tr>
</tbody>
</table>
TABLE 2

Mean Scores for All Treatments:
Exact Wording Plus Meaning

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Beard</th>
<th>Mustache</th>
<th>Clean Shaven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confederate I</td>
<td>28.3</td>
<td>28.6</td>
<td>37.9</td>
</tr>
<tr>
<td>Confederate II</td>
<td>52.8</td>
<td>59.2</td>
<td>44.7</td>
</tr>
</tbody>
</table>
TABLE 3

Analysis of Variance of the Scores Obtained by Normal Hearing Adults using the Exact Wording plus Meaning Method of Scoring for Confederate I in all Treatments

<table>
<thead>
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<th>Source of Variation</th>
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<tr>
<td>Treatments</td>
<td>890.71</td>
<td>2</td>
<td>445.36</td>
<td>3.41*</td>
</tr>
<tr>
<td>Experimental Error</td>
<td>5485.60</td>
<td>42</td>
<td>130.61</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6376.31</td>
<td>44</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* F.95 (2,42) = 3.23
The treatments did not produce reliably different scores for Confederate II although the _F_ ratio, 3.13, did approach significance on the exact wording scoring method (_F_95 (2,42) = 3.23). Subjects that speechread Confederate II scored much higher than subjects that speechread Confederate I in all six cells shown in Tables 1 and 2. Confederate II tended to do best in the mustache only condition regardless of the scoring method used.

Since the scores between the two confederates were so divergent their means were compared with _t_ tests. Using the exact wording method of scoring, the _t_ ratios between the two confederates were 4.50, bearded treatment, 3.95 for the mustache treatment and 1.14 for the clean shaven treatment. All but the clean shaven treatment produced a significant _t_ ratio (_p_ < .05) with Confederate II's scores being higher. Using the exact wording plus meaning method of scoring, the _t_ ratios between the confederates were 5.15, bearded treatment, 4.34 for the mustache treatment and 1.35 for the clean shaven treatment. Again, all but the clean shaven treatment revealed a significant _t_ ratio (_p_ < .05) with Confederate II's scores being higher. Thus, Confederate II achieved significantly higher scores than Confederate I in four of the six possible comparisons, and nonsignificant higher scores in the two remaining conditions.

Upon completion of the test each individual was asked the question: Was there anything about the speaker or the presentation that hindered your ability to lipread the messages?
This open ended question provided the experimenter with data which might help identify variables relevant to Confederate II's superior scores. The data (see Table 4) showed that Confederate II received a greater number of negative comments on five source characteristics. These were Rate of Speech too Fast, Rate of Speech too Slow, Rate of Speech Inconsistent, Lack of Facial Expression, and Mouthing of Words. Confederate I received a greater number of negative comments on four source characteristics. These were Poor Articulation, Beard was Distracting, Mustache was Distracting, and Distracting Eye Movement. The likelihood that one or more of these source characteristics contributed to Confederate I's poorer lipreading scores or to Confederate II's better lipreading scores is taken up in the discussion section.
<table>
<thead>
<tr>
<th>Responses</th>
<th>Confederate I</th>
<th>Confederate II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Speech too Fast</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Rate of Speech too Slow</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rate of Speech Inconsistent</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Lack of Facial Expression</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Poor Articulation</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Beard was Distracting</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mustache was Distracting</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Visual Distractions</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Distracting Sounds</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Mouthing of Words</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Distracting Eye Movement</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Presentation too Long</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>No Hindering Factors</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>
Discussion

Examination of Tables 1 and 2 indicates that Confederate I was easier to lipread for meaning when all facial hair had been removed. These tables reveal that those subjects speechreading Confederate I were more successful as the facial hair was removed regardless of the scoring method. The results for Confederate II were quite different. Confederate II scored significantly higher on four of the six treatments regardless of the scoring method used according to resulting t ratios. When Confederate II was speechread scores increased for the mustache treatment and then dropped sharply for the clean shaven treatment for both scoring methods. This resulted in a strong, though nonsignificant, trend indicating that Confederate II was easier to lipread in the mustache only treatment and hardest in the clean shaven treatment. It is clear that the three treatments affected the lipreadability of the confederates differentially.

The large difference between the results of the two confederates, even though each performed identical tasks, suggest that the speaker characteristics are relevant to speechreadability. Every speaker has different bone, muscle, and facial structure. We all look different. Everyone makes the various speech phonemes basically the same way but, because we all look different, the
formation of the speech sounds may look slightly different for each individual. All of this may have had an effect on the results of this study.

An attempt was made to study the source characteristics listed by the speechreaders (see Table 4). Confederate I received a greater number of negative responses than Confederate II in four categories. These included Poor Articulation, Beard was Distracting, Mustache was Distracting, and Distracting Eye Movement. The Poor Articulation responses for Confederate I are in agreement with Silverman (1957) and Fusfeld (1958) who reported that manner of articulation is a speaker factor important to speechreading. These four source characteristics may explain the differences between the scores of the two confederates.

By contrast Confederate II received a greater number of negative responses in five categories. These included Rate of Speech too Fast, Rate of Speech too Slow, Rate of Speech Inconsistent, Lack of Facial Expression and Mouthing of Words. Despite these responses, Confederate II was a far more effective communicator than Confederate I. This is somewhat surprising since previous research has shown that rate of speech, lack of facial expression and mobility of the lips are contributing speaker factors to lipreading (Silverman, 1957; Stone, 1957; Fusfeld, 1958; Greenberg and Bode, 1968; Popeik and Berger, 1971). Because Confederate II received scores consistently higher regardless of the scoring method used, it might
be suggested that the negative responses given to Confederate I indicated more important source factors for speechreadability. It could be further speculated that since facial hair was kept quite constant between the two sources, the articulation and eye movement variables may be central to successful speechreadability.

It will be recalled that significant differences were not obtained for either confederate between the treatments on the exact wording method of scoring. However, the alternate dependent measure, exact wording plus meaning, produced a significant $F$ ratio ($p<.05$) for Confederate I. The finding does not really contradict the results for Confederate I on the exact wording measure since a similar, though nonsignificant, trend was observed. It is probably safe to conclude that Confederate I communicated more effectively in the clean shaven treatment than in the remaining two conditions. Further, the two dependent measures did not affect the trend for Confederate II.

**Suggestions for Further Research**

This study revealed that there were significant differences across the three treatments for one confederate when scored for exact wording plus meaning. It further revealed certain source characteristics that may have caused the resulting differences in scores between the two confederates. Since this difference could have been caused by reduction of facial hair useful studies could be accomplished on these source characteristics in relation to bearded, mustached and clean shaven speakers.

Deaf and hard of hearing subjects could be used in future studies
of the effect of facial hair on speechreading performance to see if individuals with speechreading training are affected the same way by facial hair as are normal hearing individuals. The source characteristics that interacted with facial hair in this study would also have an effect on the speechreading performance of the deaf and hard of hearing, possibly moreso since they rely on visual cues to a greater extent.

A study of men with beards and mustaches that have basically the same body frame, facial structure and lip size might prove interesting. The two confederates in the current study differed quite markedly in facial structure and lip size. It is not possible to ascertain the effects of these differences on the results.
Summary and Conclusions

A review of the literature reveals a lack of research on lipreading performance in relationship to facial hair. This may be due to the lack of men in the field of aural rehabilitation. Because beards and mustaches are more prevalent today it was decided to investigate the lipreadability of speakers with beards, mustaches only, and clean shaven.

Two volunteers that met the requirements of facial hair were video taped reciting the Utley Lipreading Sentence Test in the three previously mentioned treatments. 90 subjects viewed the six segments of video tape in groups ranging in size from one to eight and recorded what they saw. Each subject to only one confederate in one facial treatment. At the end of each presentation the subjects were asked to write down anything about the speaker or presentation which they thought hindered their lipreading ability.

The results of the two confederates were combined and were subjected to analysis of variance. This combined analysis produced a nonsignificant $F$ ratio for amount of facial hair. Investigation of the mean scores prompted separate analyses on each confederate. The data of Confederate I produced a significant $F$ ratio ($p<.05$) when using the exact wording plus meaning method of scoring. The subsequent results showed that the scores of Confede-
rate I were significantly higher in the clean shaven treatment than in either of the remaining treatments. The data of Confederate II approached significance ($F = 3.13 (2,42)$ df) when using the exact wording dependent measure. A series of $t$ tests indicated that Confederate II's scores were significantly above those of Confederate I in four of the six possible comparisons.

Confederate I scored higher as facial hair was removed while Confederate II scored highest in the mustache only treatment. This along with the responses by each subject to the open ended question previously mentioned suggests an interaction between facial hair and certain source characteristics on speechreadability.
APPENDIX A

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REPORT OF AUDILOGIC EVALUATION

Name: ___________________________ Date: __________ Age: ______ Sex: ______

Audiogram

FREQUENCY IN CYCLES PER SECOND

0 10 20 30 40 50 60 70 80 90 100 110

125 250 500 750 1000 1500 3000 4000 8000

NR = NO RESPONSE

DN = DID NOT TEST

CN = COULD NOT TEST

NB = NARROW BAND NOISE

FA = FLETCHER AVERAGE

HL = HEARING LEVEL

AVERAGE LEVEL FOR TEST TONES

AIRE: R: _________ dB L: _________ dB

BONE: R: _________ dB L: _________ dB

FIELD: _________ dB

SPEECH DISCRIMINATION THRESHOLDS

LIFE VOICE RINGING OTHER

\[ \text{HOLD: } \text{dB} \]

\[ \text{AIRE LEVELS OF NORMAL SRT} \]

TONE DECAY TEST

\[ \text{Ear} \quad \text{Freq} \quad \text{Decay} \]

\[ \text{Note: } \text{Right ear} \quad \text{Left ear} \]

SISI TEST RESULTS

\[ \text{Ear} \quad \text{Right} \quad \text{Left} \]

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APPENDIX B

Utley Lipreading Sentence Test, Form B.

Practice Sentences
1. Good Morning.
2. Thank you.
3. Hello.
4. How are you?
5. Goodbye.

Test Sentences
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 way around the world.
25. The office opens at nine o'clock.
26. None of them is here.
27. Take two cups of coffee.
28. Come again?
29. The thermometer says twenty above.
30. It is your turn.
31. It is hard to keep up with the new books.
APPENDIX C

Instructions:

Read the following very carefully. If you have any questions ask the testing monitor before the actual testing begins.

You are going to take a lipreading test. The first five sentences will be practice sentences and the next thirty-one sentences will be test sentences. During the test you will see a speaker recite the sentences one at a time. He will say each sentence one time. Your job is to read the lips of the speaker and write down what you see. After the speaker has said a sentence there will be a thirty second interval in which you are to write down what you have read. There will be a warning tone given five seconds before the speaker recites each new sentence.
APPENDIX D

Answer Form

Practice Sentences.
1. 
2. 
3. 
4. 
5. 

Test Sentences.
1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 
11. 
12. 
13. 


