THE RELATIONSHIP BETWEEN LIPREADING AND INTELLIGENCE

by
Richard C. Smith, Michigan State University, East Lansing
James W. Hillis, George Washington University, Washington, D.C.
Dale W. Kitchen, Plymouth (Mich.) State Home and
Training School

Historically, the diagnostic and rehabilitative audiologic profession has concerned itself only intermittently with the hearing problems of the mentally retarded. A great number of the research endeavors in this area have focused on the incidence of hearing loss among mentally deficient populations (Birch & Matthews, 1951; Foale & Patterson, 1954; Schlanger & Gottsleben, 1956; Johnston & Farrel, 1957; Kodman, et. al., 1958; Rittmanic, 1959; Siegenthaler & Krzywicki, 1959; Schlanger, 1961; Webb, et.al., 1964; Lloyd & Reid, 1967). Other investigators have sought to explore the feasibility and reliability of applying specific audiometric techniques to the retarded (Webb, et. al., 1964; Lloyd & Reid, 1966; Hogan & Graham, 1967; Fulton, 1967; Lloyd, Spradlin & Reid, 1968; Lloyd, et. al., 1968). Beyond the diagnostic literature, however, the profession of audiology has not characterized itself through concern for the programming and treatment of the hearing handicapped retardate. Only a limited number of articles (Hartman, 1958; Rittmanic, 1959; Candland & Conklyn, 1962; Schiefelbusch, et. al. 1964; Christensen & Schlanger, 1964; McCoy, 1967; Moore, Miltenberger & Barber, 1969) specifically have described procedures for aural rehabilitation in the context of mental retardation.

Although incidence figures vary considerably, the number of hearing handicapped persons in a mentally retarded population typically is higher than the number in a normal population (Webb & Kinde, 1968). This greater incidence of auditory problems in mental retardation, coupled with a dearth of experimental research on the treatment of the retardate, points to a profound need for systematic exploration into various aspects of aural rehabilitation and mental retardation. From this, the following statement of purpose was set forth for this investigation: It was the purpose of this research to investigate the hypothesis that lipreading ability increases as a function of increased intelligence. This represented an attempt to determine how lipreading test

scores, obtained in a face-to-face presentation, are related to varying degrees of mental retardation. An H_0 of no significant difference in lipreading performance, as a function of varied levels of intelligence, was also generated. The level employed in testing the null hypothesis was set at the .01 level of significance.

METHOD

Subjects

The subjects for this study consisted of 120 mentally retarded adults between the ages of 16 and 34 years, randomly selected from three state-supported institutions for the retarded. All subjects had normal hearing and normal vision. Table 1 summarized the subject sample according to I.Q., sample size, and test instrument.

TABLE 1

INTELLIGENCE SCORE, MEASURING INSTRUMENT AND
SAMPLE SIZE EACH OF THE TEN POPULATIONS

Population	Intelligence Score	Sample Size	Intelligence Test
1	30-34	12	Revised
2	35-39	12	Stanford Binet
3	40-44	12	Forms L or M
4	45-49	12	
5	50-54	12	
6	55-59	12	Wechsler
7	60-64	12	Adult
8	65-69	12	Intelligence
9	70-74	12	Scale
10	75-79	12	

It can be seen that these ten groups of subjects were defined by full scale scores on the WAIS or the Revised Stanford Binet. A review of the WAIS test manual reveals that this instrument is not recommended for measurement in the 30-40 I.Q. range, thus, the Stanford Binet was included as an index of the lower I.Q. levels.

The rationale for the range covered in each I.Q. classification is based, in part, on the research of Dunn and Hottell (1962) who have suggested that differences in progress made by subjects of different I.Q.'s needs to be studied by assigning subjects into groups of smaller I.Q. intervals. In this study, the trend for more homogeneous grouping, according to I.Q. levels, was carried to an extreme in order to provide a more sensitive measure of the relationship between intelligence and lipreading.

Materials

The test, utilized to index lipreading performance, consisted of two forms (16 unrelated sentences in each form) of a lipreading test with a Pearson r between forms of .94 corrected for length. This test was developed as part of a Master's study at Michigan State University (Katt, 1964).

The responses of the subjects were recorded on scoring sheets which contained the subject's name, I.Q., sex, age, psychological test, and residential setting. The scoring sheet also contained sentence numbers and response lines.

Procedure

Adjoining rooms were utilized, connected by a two-way window. The test room, in which the subject was seated, was treated with acoustic tile to reduce the effects of ambient noise. The subject's chair was on line with the midpoint of the observation window and back two feet, as was the examiner's chair in the control room. During the experiment, the subject's view of the talker was limited to the upper thorax, neck, and head. The examiner's face was illuminated by two 100 watt bulbs to reduce shadows which could have an effect on the ease of lipreading.

Two male graduate students at Michigan State University served as talkers in this research. Subjects were seated in the test room with one of the examiners who recorded the

subject's responses verbatim. The other examiner, who presented the first 16 stimulus sentences, was seated in the control room. The following directions were given to each subject: "Mr. S---- is going to talk to you through this window, but you won't hear him. Look at him and see if you can guess what he is saying."

Following the instructions, a trial sentence (not one of the test stimuli) was presented. If the subject responded he was praised generously. If he did not respond, he was encouraged to watch while Mr. S---- said it again. The examiner then told the subject what was said, and the stimulus was presented a third time. Following this orientation, testing was begun. When the talker had given the first 16 sentences, the subject was informed, in simplified language, that the first talker and the other examiner would change places. With the second examiner as a new talker, the second 16 sentences were given in exactly the same manner as the first. This procedure was followed exactly for all subjects.

Results

The data were in the form of raw scores obtained on the lipreading test by each subject. These scores were derived by computing the percentage of words identified correctly in each sentence and by taking the mean percentage of correct identifications over all sentences. Table 2 summarized the mean and standard deviation for each I.Q. classification.

TABLE 2

MEAN AND STANDARD DEVIATION FOR EACH OF TEN I.Q. GROUPS

I.Q. Group	Mean	Standard Deviation
30-34	1.0	1.5
35-39	4.9	5.9
40-44	7.0	7.6
45-49	10.6	9.4
50-54	9.4	9.3
55-59	17.5	12.0
60-64	17.0	10.5
65-69	18.0	11.5
70-74	20.0	9.5
75-79	22.0	16.0

These data were submitted to a Kruskal-Wallis one way analysis of variance by ranks. The value of H obtained was 43.41. Since an H of 24.72 is required for significance at the .01 level of confidence, the H_o of no difference is lipreading performance, as a function of varied levels of intelligence, was rejected.

Discussion

The analysis of the data indicates that a significant difference in lipreading scores exists among I.Q. groups. In an effort to observe how this difference is related, seven percentile values were computed for each group and plotted graphically as in Figure 1.

A study of Figure 1 reveals some interesting differences in the lipreading scores as intelligence increases. First, the score of the difference in variance among the ten groups which led to the significant value of H and subsequent rejection of the null hypothesis, is distributed over all of the I.Q. groups. This is clearly evidenced by noting the difference between the 99th percentile and the 1st percentile for each I.Q. group. While this distribution is not equal from one group to the next there seems to be a definite trend of increased variability of lipreading scores as intelligence increases. The lowest I.Q. group shows the least variability while the highest group shows the greatest variability.

Another difference in the lipreading scores can be seen by noting the upward trend of all seven percentile curves as intelligence increases. By focusing attention on the 50th percentile curve, the trend of improved lipreading scores with increased intelligence can be clearly noted. This improvement is relatively consistent from one group to the next.

The reader will recall that subjects were designated to the three lowest I.Q. groups on the basis of Stanford-Binet scores, while those above an I.Q. of 44 were selected according to scores on the WAIS. None of the five percentile curves show discrepancies at the point where the basis for determining I.Q. was changed. This would seem to support the investigators' decision to employ two measures of intelligence for the research.
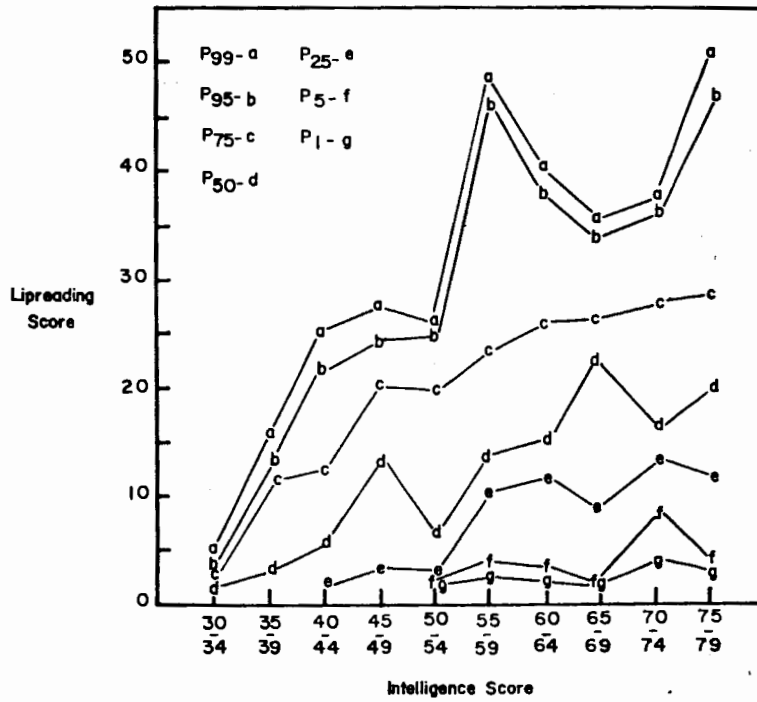
Figure 1. Showing the Relationship Between Lipreading Performance and Intelligence

The results of this investigation have shown a relationship between I.Q. level and lipreading. This would seem to infer a definite need for a careful consideration of intelligence as one attempts to prognosticate success for a hearing handicapped retardate and, subsequently, to project specific treatment goals within the realm of aural rehabilitation. Failure to comply with this can result in treatment failure for a particular individual with an educationally significant hearing deficit.

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