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A review of studies reported in the literature concerning subjects with articulatory problems and voice problems and their ability to make speech-sound discriminations has been presented. Evidence relating articulatory ability and voice problems to pitch discrimination ability has been cited. This study was designed to investigate the effect of pitch discrimination training on speech-sound discrimination ability.

Fifty-four Ss, 32 boys and 12 girls, were selected from the speech therapy caseload of four elementary schools in rural North Carolina communities. They were randomly assigned to two groups, an experimental group of 27 Ss receiving pitch discrimination training, and a control group of 27 Ss receiving no training. The Ss received the training in groups of three and four, for 20 minutes, twice a week for five consecutive weeks.

The experimental group had fewer errors in phonetic discrimination (adjusted mean, 2.78) after treatment than did the control group (adjusted mean, 6.72). Statistical analysis of the results obtained by Forms I and II of the Wepman Auditory Discrimination Test revealed significance at the .01 level of confidence. Since the experiment satisfied the demands of the design and method of analysis used (analysis of covariance), it can be concluded that the improvement in speech-sound discrimination ability was due to the pitch discrimination training, and not to differences existing among the subjects prior to the experiment.

A STUDY OF THE EFFECTIVENESS OF PITCH DISCRIMINATION TRAINING AS A METHOD OF SOUND DISCRIMINATION TRAINING

by

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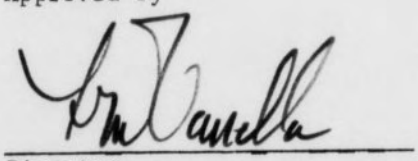

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APPROVAL SHEET

This thesis has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

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INTRODUCTION

Johnson (Johnson, Darley, Spriestersbach, 1963) reports that there are between 40 and 50 different speech sounds used in the three main dialects of English spoken in the United States. The ways in which the speaker produces these sounds is defined as articulation. Articulatory errors are errors of sound substitution, addition, omission, or distortion. Children with functional articulation problems, that is faulty production of a sound or sounds resulting mainly from faulty learning, and lack of adequate motivation or stimulation, constitute the bulk of the school speech clinician's caseload (JSHD, Monogr. Suppl. 8, pp. 1-163).

The therapy plan for the correction of articulatory problems is usually constructed around a number of sub-goals, designed to lead the child to normal speech by means of planned, appropriate activities. Berry and Eisenson (1956, p. 134) suggest the following outline to be followed in planning therapy for the child with articulatory problems.

a. Development of an awareness of environment and of himself in relation to his environment.

b. Increasing acoustic perception through training in auditory stimulation and discrimination.

c. Increasing perception of articulatory positions by strengthening visual-kinesthetic cues.

d. Developing articulatory flexibility.

e. Setting the new pattern in isolation, in structured speech in the clinical situation and in free conversational speech.

Many texts in speech correction are in agreement with Berry and Eisenson that ear training should be among the first steps in the therapeutic treatment of articulatory defects (Van Riper, 1954; Curtis, 1956; Johnson, 1952). Bryngelson and Mikalson (1959) state:

> The right sound comes by itself, without specific teaching, once the child learns to listen for and recognize the differences between sounds--differences that he missed in the early years when his speech patterns were being formed.

Ear training, then, consists of teaching the child to recognize the error sound, to distinguish between the error sound and the correct sound; that is, ear training is teaching the child to recognize the distinguishing characteristics of the new sound to be learned. An integral part of this ear training is training in speech-sound discrimination. Van Riper (1954) defines speech-sound discrimination thus:

> . . . training in comparing the correct sound with the error, in hearing the differences between the two sounds, and in recognizing the contrasts involved (Van Riper, 1954, p. 224).

Many subjects with articulatory problems do not have a clear auditory impression of what the correct sounds should be or in what manner they differ from the error sounds or in hearing variations of sounds. Sounds such as [s] and [θ], [s] and [f], [ʃ] and [tʃ], [t] and [k] are acoustically similar in expression and reception. It has been suggested that the inability to discriminate, auditorally, between and among speech sounds may be of significance in the etiology and/or maintenance of articulatory problems in children (Curtis, 1956, p. 121).

In recent years, several studies reported in the literature have indicated that a relationship does exist between a subject's ability to discriminate between speech sounds and his ability to articulate.

Findings by Kronvall and Diehl, (1954), added some support to the hypothesis that auditory discrimination techniques should constitute a part of the therapy for functional articulation disorders. Thirty elementary grade children with severe functional articulatory defects were matched on the basis of age, sex, grade, and intelligence with 30 normal speaking children. All of the subjects were tested individually by the Templin Speech Sound Discrimination Test. Statistical analysis of the data, using the t-test, showed that the difference between the mean discrimination errors of the two groups was significant at less than the .001 level of significance. It was concluded by the authors that the elementary school

children tested with severe functional articulatory disorders exhibit significantly more errors in speech sound discrimination than their normal-speaking counterparts.

In 1963, Cohen and Diehl designed a study to duplicate the investigation by Kronvall and Diehl (1954). As in the earlier study, thirty children with severe functional articulation defects were matched on the basis of age, sex, grade and intelligence with thirty normal speaking children. The subjects were tested individually with the Templin Speech Sound Discrimination Test. The results of the later study indicated that, as a group, elementary-grade children with severe functional articulation defects show statistically significant more errors in speech-sound discrimination than a matched group of normal-speaking children. Statistical analysis indicated that children with functional articulation defects tend to improve in sound discrimination ability with maturation; however, when compared with normal speaking children at corresponding grade levels, their performance continues to be inferior.

Farquhar (1961) added support to the previous research. It was concluded that children with defects of articulation have inferior ability in auditory discrimination. Tests of imitation and auditory discrimination were administered to fifty kindergarten children with "mild" articulatory problems and fifty with "severe" articulatory problems, to determine the prognostic value of these tools. Although the study did not report that auditory discrimination ability had prognostic value,

it did indicate that the "severe" group had inferior ability to discriminate and strongly supported the need for a structured program of training in auditory discrimination as an integral part of the therapy program for children with articulation disorders.

Both past and recent studies have reported a relationship between pitch discrimination ability and articulatory ability. Travis and Davis (1927) defined the sense of pitch as measuring the least perceptible difference in pitch.

> The sense of pitch measures the least perceptible difference in pitch and, from the standpoint of speaking, is an index to the capacity for hearing variations in pitch (Travis and Davis, 1927, p. 73).

The authors reported that the sense of pitch enters into the function of speech, and that certain types of speech defective cases give lower scores on tests designed to measure the sense of pitch than individuals selected in regard to their special abilities as good speakers.

Van Riper (1954) states that the student with a pitch disorder should be given extensive ear training, concentrated upon the identification and comparison of pitch levels and the recognition of the types of inflections. According to Van Riper (1954, p. 294) many students with defective pitch have difficulty in carrying tunes, in matching the pitch given by the teacher, and in identifying and imitating inflections. He suggests the use of pairs of tones with possible playing of the Seashore musical tests as part of ear training.

Mange (1960) compared a group of 35 children with functional misarticulation of [r] and a group of 35 matched normal-speaking children using the Seashore measures of Pitch, Loudness, and Timbre; a test of auditory flutter fusion rate; and a test of word synthesis. The difference between group means for pitch discrimination as measured by the use of t-tests was significant at the one per cent level ($t = 3.56$). The author concluded that pitch discrimination appeared to be related to normalcy or defectiveness of articulation.

Sommers, Meyer, and Fenton (1961) administered the pitch subtest of the Tilson-Gretsch Music Test to 65 subjects in grades 3-12 having articulation errors on either [r] or [s] and to a comparable group of normal-speaking subjects. The subtest consisted of 25 pairs of tones, with the subjects indicating whether the second of the two tones is higher or lower than the first. The study found that those subjects with articulation errors on [r] and [s] perform poorer on a test of pitch discrimination than do children with normal speech. The mean number of correct responses for Ss with articulatory problems was 11.72 and the mean number of correct responses for the normal-speaking group was 13.85.

An experimental group of 90 subjects with voice problems and a control group of 87 unselected subjects were tested for pitch and loudness discrimination ability using the Seashore Measures of Musical Talent (Eisenson, 1958). The voice defective

group was found to be significantly poorer than either the control group or the Seashore standardization group in pitch discrimination. On the test for pitch discrimination, the standardization group had a mean percentage score of 75.90, the control group 74.74 and the experimental group 66.98. Fifteen Ss with voice defects from the experimental group were retested after a 15-week course in voice improvement which emphasized procedures in training for pitch discrimination. The mean score of the group before voice therapy was 68.94 and after therapy 75.60. Comparison of the two sets of scores using the t-test indicated a statistical difference, significant at the two per cent level. These results indicate that the ability to discriminate pitch can be learned.

Many authors advocate ear training and speech-sound discrimination training as an important part of therapy. Kronvall and Diehl (1954) point to the need for research in this area:

> If it could be objectively demonstrated that auditory discrimination is a learned response, the continued use of the diagnosis of functional articulatory defect for individuals with no associated organic impairments who score low on a test of discrimination could be justified. As it stands currently, however, the use of this diagnostic term is debatable inasmuch as poor auditory discrimination may involve physiological processes (Kronvall and Diehl, 1954, pp. 337-338).

Since a relationship does appear to exist between speech defectiveness and ability in pitch discrimination and since

training in pitch discrimination with voice defectives does appear to result in improvement in pitch discrimination, it was decided to use pitch discrimination training as a method of sound discrimination training. The present experiment is designed to test the effectiveness of a method of sound discrimination training. No attempt will be made, in this study, to determine etiological factors that may be involved in speech-sound discrimination ability.

PROCEDURE

In order to test the effectiveness of pitch discrimination training as a method of sound discrimination training, a total of 16 groups of elementary school children from grades 1 through 4 were used in the experiment. The subjects in each of the groups were enrolled in speech therapy at one of four elementary schools located in rural North Carolina communities. The 16 groups were randomly divided into a control group containing 29 subjects, and an experimental group containing 28 subjects. One S from the experimental group moved during the experiment, leaving a total of 27 Ss, 15 boys, and 12 girls. One S was eliminated from the control group due to a severe hearing loss, and one subject was not included in the study as her score on the speech-sound discrimination test was judged invalid based on the cutting score, X = 15 errors or less. This left a total of 27 Ss in the control group, 17 boys and 10 girls. None of the Ss had any known organic impairment. All Ss passed a pure-tone audiometric sweep test administered, individually, at 20 db, in both ears at six frequencies (250, 500, 1000, 2000, 6000) as measured by a Maico, Model F-1 audiometer.

The Wepman Auditory Discrimination Test (Appendix I and Ia) was administered to the Ss before and after the

discrimination training. After reviewing several other auditory discrimination tests, the Wepman test was chosen because of the nature of the test, its ease in administration, attempts at standardization, and because there are two equated forms of the test permitting test-retest comparisons. The test consists of paired comparisons of 13 initial consonants, four medial vowels, thirteen final consonants, and ten false choice pairs. The word pairs were matched within phonetic categories to avoid discriminations being made on differences in articulatory position rather than on auditory discrimination. Based on the testing of 533 unselected first, second and third grade children in both urban and non-urban communities, the test-retest administration showed a reliability of .91 (N = 109) (Wepman, 1958).

Form I of the Auditory Discrimination Test was administered individually to each of the 54 Ss before the discrimination training sessions were begun, and Form II was administered after the last training session was held. Instructions given to Ss were based on those suggested in the Manual of Directions (Wepman, 1958) (Appendix II). Following the instructions, each S was presented several practice word-pairs to assure comprehension of the assigned task. After the child heard a word-pair, he answered with "same" or "different". When it was ascertained that the task was being performed correctly, the S was seated with his back to the experimenter, at a distance of approximately two feet from the experimenter. Word-pairs were presented live, by the

experimenter. Care was taken to read the word-pairs slowly and clearly, with as little change as possible in intensity level or inflection pattern, and with a one-second pause between words. The experimenter scored the subject's responses as they were given on the form provided. The X score recorded indicated the number of times the child said "Same" to word-pairs that were different, and the Y score indicated the number of times the child said "Different" to word-pairs that were the same. All tests showing an X score more than 15 or a Y score more than three were put aside as invalid, as directed in the Manual of Directions. Y scores were not used in the statistical analysis as they were included in the test to judge the validity of the test (Wepman, 1958).

The Pitch Subtest of the Seashore Measures of Musical Talents was chosen to be used as a measuring device and as the tool to be used in discrimination training.

> In the test of the sense of pitch, 50 pairs of tones are presented. In each pair the listener is to determine whether the second tone is higher or lower in pitch than the first. The stimuli were derived from a beat-frequency oscillator through a circuit producing pure tones lacking in harmonics and overtones. The tones are at about 500 cycles and have a duration of .6 second each (Seashore, Lewis and Saetveit, 1956).

Tones 41-50 were not used in the experiment as the frequency differences between the tones in the pairs were only three cps and two cps (Seashore, Lewis and Saetveit, 1956). Inasmuch as the Seashore Measures of Musical Talents were designed for use

with subjects from the fourth grade up, and since this experiment included subjects from grades 1 through 4, it was felt that the discriminations required in tones 41-50 would be too fine.

To facilitate ease of administration, and to enable the experimenter to control the length of pauses between pairs of tones during the training sessions, the Pitch Subtest of the Seashore Measures of Musical Talents was recorded on Shamrock recording tape, 031, 1½ Mil., polyester, ¼ in. x 1200 ft., reproduced, at all times during the experiment by the same Wollensak tape recorder, Model t1500 at a speed of 7½ rpm.

Each of the eight groups in the experiment was administered the first 40 pairs from the Pitch Subtest of the Seashore Musical Abilities Test before and after the discrimination training sessions. Instructions were given as suggested in the test manual (Appendix III). From two to four sample trials were given so that the subjects understood the task, and marked the appropriate responses on the answer sheet. The Ss indicated on the scoring blank if the second of the pair of tones was higher or lower than the first (Appendix IV). The volume was adjusted to suit the room and the distance of the subjects from the Wollensak tape recorder. The score for each subject was the total number of incorrect responses. The subjects were tested in groups of three or four during their regularly scheduled therapy session.

A total of ten training sessions were held twice a week for five weeks. The training sessions were conducted for the

first 20 minutes of each regular therapy session. The remainder of the 30-minute therapy session was devoted to indirect speech therapy.

Twenty pairs of tones were used for training each session, 10 pairs from the previous session and 10 new pairs. The subjects were positioned so that they could not observe the responses of any other subject. Their task was to indicate whether the second of a pair of tones was higher or lower than the first. This was done by holding up one of two 5" x 4" black cards on which were printed in large letters, "Low" in white, and "High" in red. The following procedure was followed for each pair of tones: a pair of tones was presented, the Ss indicated their judgment, and were immediately told the correct response. Correct responses were rewarded by placing a marble in the appropriate "marble cup". (Each S had been given a "marble cup" and told that all earned marbles would belong to him.) The same pair of tones was then presented again; this time the Ss did not respond.

Matching the Ss on the usual factors, aptitude, socio-economic level, and teacher assessment of achievement, an attempt to equate two groups for the treatment effects was considered, but rejected as lacking in precision and relevance in this instance. It was decided, rather, to divide the subjects, randomly, into two groups and to use an analysis of covariance as the method of treatment for the accumulated raw data.

RESULTS

Raw data gathered were analyzed using the analysis of covariance. This method of analysis was chosen as relevant for this experiment in that the Ss would be compared on the basis of phonetic discrimination directly and not on other less direct factors. "The increase in precision is accomplished through the medium of a response variable which is known to be correlated with the dependent variable" (Ray, 1960, p. 109).

The analysis of covariance was used to determine if the dependent variable, phonetic discrimination ability, was effected by the manipulation of the independent variable, pitch discrimination training.

A test of significance of the regression of the dependent variable on the adjusting variable yielded an F of 83.47. The criterion value for 1 and 51 degrees of freedom is 7.16 at the .01 level of significance. The obtained value exceeds the criterion; therefore, the assumption that the two forms of the Wepman are correlated and are suitable for use as adjusting and dependent variables in this analysis of covariance is justified. The results of the analysis of covariance are summarized in Table 1, revealing significance at the .01 level.

TABLE 1

ANALYSIS OF COVARIANCE OF SCORES OF TRAINING AND NO-TRAINING GROUPS

Source	SS	df	V	F	Fc
Between training and no-training groups	241.28	1	241.28	39.74*	7.71
Combined within-sample of error	309.82	51	6.07		
Total	551.1	52			

* Significant at .01 level.

The adjusted mean for the control group was 6.72, and the adjusted mean for the experimental group was 2.78 (Table 2). Inspection of the two adjusted means reveals that the experimental group had fewer errors in phonetic discrimination, after treatment, than did the control group.

An analysis for homogeneity of sample variance yielded an F of 1.64 which is less than the criterion 1.94 at the .05 level (Table 3). The assumption of homogeneity of sample variance is justified, i.e., the effect of each treatment was constant and additive on the responses of the Ss in the group on which the treatment was imposed.

TABLE 2

MEAN NUMBER OF ERRORS ON THE WEPMAN AUDITORY DISCRIMINATION TEST, FORMS I AND II

Source	Form I	Form II	Adjusted Mean*
Control group	6.74	6.89	6.724
Experimental group	7.07	2.92	2.783

* It is a common practice to report values for the adjusted means so that the direction of the significance can be determined.

TABLE 3

ANALYSIS OF HOMOGENEITY OF THE SAMPLE VARIANCES

Source	SS	df	V	F
Control group	506.67	26	19.48	1.635
Experimental group	309.86	26	11.91	

CONCLUSIONS

The results of the present experiment provide quantitative evidence that pitch discrimination training can be used effectively to improve speech-sound discrimination ability. The analysis of covariance used in this experiment demands that the measures on the correlated response variable must be obtained under uniform conditions prior to the manipulation of the treatments or independent variable. The instructions given the Ss were standardized and presented under comparable conditions in surroundings familiar to the child (Appendix II and III). The design requires a number of random samples corresponding to the number of conditions. This requirement was met in that the subjects were divided into an experimental group, upon which the treatment of pitch training was imposed, and a control group which received no training. A further assumption, that the variances in the populations from which the samples are drawn are equal, was justified by the analysis for homogeneity of sample variances which yielded an F of 1.64 which is less than the criterion 1.94 at the .05 level. Thus, it can be stated that the control group and the experimental group were equal in their ability to make speech-sound discriminations prior to the imposition of the treatments. The F of 39.74 exceeded the Fc of 7.71; thus the null hypothesis (any observed

differences between the two sample variances is due to sampling error) was rejected.

Inasmuch as the experiment satisfied the assumptions of the design and method of analysis referred to as the analysis of covariance, it can be concluded that the improvement in speech-sound discrimination ability was due to the imposed treatment of pitch discrimination training, and not to differences among the subjects which existed prior to the experiment. The significant improvement in speech-sound discrimination ability is impressive when considered in terms of the length of the experiment, two 20-minute sessions, each week for five weeks. The pitch training may have been of increased value to the Ss in this experiment in that none of the Ss had received any formal musical training prior to the experiment.

Implementation of the pitch discrimination training activities was hampered somewhat by the unattractive and inappropriate surroundings in which the subjects were trained. Although the rooms in which the experiment was conducted are regularly used for speech therapy, they were not designed for this purpose.

The results of this study suggest the possible use of musical activities in speech therapy. Music can lend itself to stimulation and motivation in therapy by offering an opportunity to practice speech sounds in a new context, transferring the correct use of the sound then to more familiar and realistic speech activities.

The present study points to the need for further investigation of the merits of pitch discrimination training with the speech defective child, its effect on speech-sound production ability, and when and if pitch training should be used with children who have articulation problems.

SUMMARY

A review of studies reported in the literature concerning subjects with articulatory problems and voice problems and their ability to make speech-sound discriminations has been presented. Evidence relating articulatory ability and voice problems to pitch discrimination ability has been cited. This study was designed to investigate the effect of pitch discrimination training on speech-sound discrimination ability.

Fifty-four Ss, 32 boys and 12 girls, were selected from the speech therapy caseload of four elementary schools in rural North Carolina communities. They were randomly assigned to two groups, an experimental group of 27 Ss receiving pitch discrimination training, and a control group of 27 Ss receiving no training. The Ss received the training in groups of three and four, for 20 minutes, twice a week for five consecutive weeks.

The experimental group had fewer errors in phonetic discrimination (adjusted mean, 2.78) after treatment than did the control group (adjusted mean, 6.72). Statistical analysis of the results obtained by Forms I and II of the Wepman Auditory Discrimination Test revealed significance at the .01 level of confidence. Since the experiment satisfied the demands of the design and method of analysis used (analysis of covariance), it

can be concluded that the improvement in speech-sound discrimination ability was due to the pitch discrimination training, and not to differences existing among the subjects prior to the experiment.

APPENDIX I

APPENDIX I

AUDITORY DISCRIMINATION TEST

FORM I

			X	Y
1.	tub	- tug		
2.	lack	- lack		
3.	web	- wed		
4.	leg	- led		
5.	chap	- chap		
6.	gum	- dumb		
7.	bale	- gale		
8.	sought	- fought		
9.	vow	- thou		
10.	shake	- shape		
11.	zest	- zest		
12.	wretch	- wretch		
13.	thread	- shred		
14.	jam	- jam		
15.	bass	- bath		
16.	tin	- pin		
17.	pat	- pack		
18.	dim	- din		
19.	coast	- toast		
20.	thimble	- symbol		

			X	Y
21.	cat	- cap		
22.	din	- bin		
23.	lath	- lash		
24.	bum	- bomb		
25.	clōthe	- clōve		
26.	moon	- noon		
27.	shack	- sack		
28.	sheaf	- sheath		
29.	king	- king		
30.	badge	- badge		
31.	pork	- cork		
32.	fie	- thigh		
33.	shoal	- shawl		
34.	tall	- tall		
35.	par	- par		
36.	pat	- pet		
37.	muff	- muss		
38.	pose	- pose		
39.	lease	- leash		
40.	pen	- pin		

	X	Y
Error Score	/30	/10

Name of Child:

Date Tested: Examiner's Name:

Age: Date of Birth:

Grade: Name of School:

Disabilities: Hearing:

Reading:

Speaking:

Other:

I.Q.: Test:

Error Score:

	X	Y
Form C	30	10
Form D	30	10

Additional Comments:

APPENDIX Ia

APPENDIX Ia

AUDITORY DISCRIMINATION TEST

FORM II

		X	Y
1.	gear - beer		
2.	cad - cab		
3.	led - lad		
4.	thief - sheaf		
5.	sake - shake		
6.	jail - jail		
7.	ball - ball		
8.	lake - lake		
9.	bead - deed		
10.	rub - rug		
11.	wing - wing		
12.	gall - goal		
13.	pet - pit		
14.	lit - lick		
15.	bug - bud		
16.	lass - lath		
17.	cope - coke		
18.	pool - tool		
19.	zone - zone		
20.	fret - threat		

		X	Y
21.	bar - bar		
22.	bum - bun		
23.	lāve - lāthe		
24.	shot - shop		
25.	wedge - wedge		
26.	suck - sock		
27.	vie - thy		
28.	rich - rich		
29.	pit - kit		
30.	guile - dial		
31.	rash - wrath		
32.	chew - chew		
33.	fag - sag		
34.	phase - phase		
35.	sick - thick		
36.	wreath - reef		
37.	map - nap		
38.	muss - mush		
39.	cart - tart		
40.	cuff - cuss		

Error Score

X	Y
/30	/10

Name of Child:

Date Tested: Examiner's Name:

Age: Date of Birth:

Grade: Name of School:

Disabilities: Hearing:

Reading:

Speaking:

Other:

I.Q.: Test:

Error Score:

	X	Y
Form C	/30	/10
Form D	/30	/10

Additional Comments:

APPENDIX II

APPENDIX II

INSTRUCTIONS

Auditory Discrimination Test

I am going to read some words to you - two words at a time. I want you to tell me whether I read the same word twice or if I read two different words.

Remember, if the two words are exactly the same, you say "Same"; if they are not exactly the same, you say "Different".

Let's try a few pairs for practice.

Man (pause) Man ____ Did I say the same word twice, or two different ones?

Based on directions given in the Manual of Directions, Auditory Discrimination Test by Joseph M. Wepman.

APPENDIX III

APPENDIX III

INSTRUCTIONS FOR TESTING

Seashore Measures of Musical Talents

Pitch

You are going to hear two tones, one right after the other. The second tone is either higher or lower than the first. You are to write the letter "H" on your answer sheet if the second tone is higher than the first; but mark the letter "L" if the second tone is lower than the first.

Answer every time; if you are not sure, guess. Now we are going to listen to a few practice notes.

The instructions were based on those given on Page 5 of the Manual (1956) for the Seashore Measures of Musical Talents.

APPENDIX IV

APPENDIX IV

1. _____	11. _____	21. _____	31. _____
2. _____	12. _____	22. _____	32. _____
3. _____	13. _____	23. _____	33. _____
4. _____	14. _____	24. _____	34. _____
5. _____	15. _____	25. _____	35. _____
6. _____	16. _____	26. _____	36. _____
7. _____	17. _____	27. _____	37. _____
8. _____	18. _____	28. _____	38. _____
9. _____	19. _____	29. _____	39. _____
10. _____	20. _____	30. _____	40. _____

H = High

L = Low

BIBLIOGRAPHY

BIBLIOGRAPHY

Berry, Mildred F., and Jon Eisenson. Speech Disorders, Principles and Practices of Therapy. New York: Appleton-Century-Crofts, Inc., 1956.

Bryngelson, Bryng, and Elaine Mikalson. Speech Correction Through Listening. Chicago: Scott, Foresman and Company, 1959.

Cohen, Julian, and Charles J. Diehl. "Relation of Speech-Sound Discrimination Ability to Articulation-Type Speech Defects," Journal of Speech and Hearing Disorders, 1963, 28 (2), 187-190.

Eisenson, Jon, Shulamith Kastein, and Norma Schneiderman. "An Investigation Into the Ability of Voice Defectives to Discriminate Among Differences in Pitch and Loudness," Journal of Speech and Hearing Disorders, 1958, 28 (5), 577-582.

Farquhar, Mary Stuart. "Prognostic Value of Imitative and Auditory Discrimination Tests," Journal of Speech and Hearing Disorders, 1961, 26 (4), 342-347.

Johnson, Wendell, Spencer F. Brown, James F. Curtis, Clarence W. Edney, and Jacqueline Keaster. Speech Handicapped School Children. Revised ed. New York, Evanston, and London: Harper and Row, 1956.

Johnson, Wendell, Frederic L. Darley, and D. C. Spriesterbach. Diagnostic Methods in Speech Pathology. New York, Evanston, and London: Harper and Row, 1963.

Kronvall, Earnest L., and Charles F. Diehl. "The Relationship of Auditory Discrimination to Articulatory Defects of Children with No Known Organic Impairment," Journal of Speech and Hearing Disorders, 1954, 19, 335-338.

Mange, Charles V. "Relationships Between Selected Auditory Perceptual Factors and Articulation Ability," Journal of Speech and Hearing Research, 1960, 3 (1).

"Public School Speech and Hearing Services," Journal of Speech and Hearing Disorders, 1961, Monograph Supplement 8, 1-163.

Ray, William S. Statistics in Psychological Research. New York: The Macmillan Company, 1962.

Seashore, Carl E., Don Lewis, and Joseph G. Saetveit. Seashore Measures of Musical Talents, Manual. Revised. New York: The Psychological Corporation, 1956.

Sommers, Ronald K., William J. Meyer, and Ann K. Fenton. "Pitch Discrimination and Articulation," Journal of Speech and Hearing Research, 1961, 4, 56-60.

Travis, L. E., and M. G. Davis. "The Relation Between Faulty Speech and Lack of Musical Talent," Psychological Monographs, 1927, 36, 71-81.

Van Riper, Charles. Speech Correction Principles and Methods. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1954.

Wepman, Joseph M. Manual of Directions Auditory Discrimination Test, 950 E. 59th Street, Chicago 37, Illinois, 1958.