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The construction of a picture test for speech sound discrimination

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THESIS

THE CONSTRUCTION OF A PICTURE TEST
FOR SPEECH SOUND DISCRIMINATION

Submitted by

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TABLE OF CONTENTS

CHAPTER	PAGE
I. THE PROBLEM, DEFINITIONS, AND JUSTIFICATION . . .	1
Statement of the problem	1
Definitions of terms used	2
Speech sound discrimination	2
Young speech handicapped child	2
Perceptual properties	2
Anatomical terms	3
Justification	3
Ultimate goal in testing speech sound discrimination	3
How speech sound discrimination is tested . .	3
Need for a picture test in speech sound discrimination	4
II. REVIEW OF PREVIOUS RESEARCH	6
Summary	10
III. PROCEDURE	13
Selection of speech sounds	13
Illustration of the words	16
Order of presentation	17
Administration and scoring the test	18
Summary	19
IV. FINDINGS OF THE STUDY	21
Means and standard deviation	22

CHAPTER	PAGE
Frequency and type of errors	25
The order of difficulty in discriminating the paired speech sounds	27
V. CONCLUSIONS	29
Interpretations	29
Limitations of the study	30
Recommendations for further research	30
BIBLIOGRAPHY	33
APPENDIXES	36
Appendix A	36
Travis-Glaspey speech sound discrimination test .	36
Appendix B	38
Directions for administering picture test of speech sound discrimination	38
Scoring sheet	40
Picture test	42

LIST OF TABLES

TABLE	PAGE
I. Paired Speech Sounds	14
II. Perceptual Properties and Anatomical Terms of the Paired Consonant Speech Sounds Used in the Instrument	15
III. Number of Errors Made by the Speech and Reading Groups on the Instrument	22
IV. Frequency and type of Errors per Item by Each Group	23
V. Order of Difficulty in Discriminating the Paired Speech Sounds with the Percent of Errors on Each Pair for the Two Groups	26

CHAPTER I

THE PROBLEM, DEFINITIONS, AND JUSTIFICATION

A routine clinical examination of a young speech handicapped child generally includes a picture articulation test, speech sound discrimination test, pure-tone audiometric test, and an interview with both the child and parent by the examiner. Procedures deviate from this typical situation from time to time. Continued effort is being expended to seek clearer concepts of the operating factors in speech handicaps. Refinements of diagnostic instruments is a part of this effort.

I. STATEMENT OF THE PROBLEM

It was the purpose of this study: (1) to incorporate the use of pictures, together with verbal stimuli, in an instrument to test speech sound discrimination abilities of young speech handicapped children; (2) to design an instrument useful in existing clinical examinations of the speech handicapped; and (3) to make a comparison between speech handicapped and reading handicapped children in their abilities to discriminate speech sounds presented in a picture test of speech sound discrimination.

II. DEFINITIONS OF TERMS USED

Speech sound discrimination was interpreted as a judgment by an individual calling for a distinction among meaningful speech sounds.

Young speech handicapped child was interpreted as a child whose chronological and mental age place him in the primary grades in school; whose speech "deviates so far from that of other people that it calls attention to itself, interferes with communication, or causes its possessor to be maladjusted."¹

The perceptual properties of the consonant speech sounds are:²

1. Voiced--presence of vocal cord vibration
2. Voiceless--absence of vocal cord vibration
3. Nasal--emission of sound is through the nostrils, oral emission being almost entirely precluded
4. Stop-plosive--a stoppage, then an explosion of the breath
5. Semi-vowel--a vowel-like sound made while the articulatory organs are moving so as to increase the size of the opening through which the sound is emitted

¹ C. Van Riper, Speech Correction Principles and Methods (New York: Prentice Hall, 1947), p. 15.

² G. Fairbanks, Voice and Articulation Drillbook (New York: Harper & Bros., 1940), pp. 51-52.

6. Fricative--characteristic quality produced by forcing air through a restricted opening.

Anatomical terms pertaining to the speech mechanism in characteristic articulatory positions are:¹

1. Labial--breath stream is impeded, stopped or diverted by the lips.
2. Labio-dental--breath stream is restricted by interaction of the tongue and upper teeth.
3. Post-dental--breath stream is restricted, stopped, or diverted by elevation of the tip or body of the tongue to the region behind the upper anterior teeth.
4. Velar--breath stream is stopped or diverted by elevation of the rear portion of the tongue to the raised or lowered velum.

III. JUSTIFICATION

Ultimate goal in testing speech sound discrimination.

The ultimate goal in testing speech sound discrimination is the possibility of the speech error being related to the poor speech sound discrimination abilities of an individual.

How speech sound discrimination is tested.

The existing tests for speech sound discrimination are one of

¹ Ibid., pp. 52-53.

three forms: lists of paired vowel and paired consonant sounds; speech sounds presented by a series of recordings; speech sounds in paired phonetically balanced words illustrated for additional motivation. In the first two tests the individual is asked to state whether a pair of sounds are alike or different. In the last test he is required to point to an illustration after a word has been spoken.

Need for a picture test of speech sound discrimination.

Since the existing instruments to test speech sound discrimination vary in length, form, and presentation of speech sounds the need for a more adequate instrument to test this ability in young speech handicapped children is evident. Such an instrument should involve presentation of speech sounds in phonetically balanced words illustrated in paired pictures for a higher degree of concentration by the young child.

The use of a picture test to obtain a concept of the child's speech errors is a highly motivating factor in clinical examinations. Most speech clinics are being taxed to a maximum both as diagnostic and therapeutic centers. Long, meticulous tests are restricting elements in a speech clinic whose efforts must be expended to serve an ever-increasing demand for aid. Accuracy in diagnosis is not to be shunted; however, diagnosis does not stop after the initial interview.

The desirability of an instrument to become part of a diagnostic procedure with the young speech handicapped child should embrace a higher degree of motivation than existing tests of speech sound discrimination and accuracy through suitable length and content. This study is an effort to construct such an instrument for testing the speech sound discrimination abilities of young speech handicapped children.

CHAPTER II

REVIEW OF PREVIOUS RESEARCH

One of the primary objectives of a speech examination as stated by Johnson and Others¹ is "to obtain a careful description of the speech errors and the factors which seem to be related to them as causes or maintaining conditions." Van Riper² maintains speech errors may be attributed to poor speech sound discrimination ability in the handicapped.

The majority of existing tests for speech sound discrimination are modified forms of the Travis and Rasmus³ Test. Three hundred and sixty-six pairs of speech sounds comprise the Travis and Rasmus Test. These sounds are all compared on a basis of likeness or difference in quality.

The pairs are arranged in a chance order. Each consonant sound is compared with all other consonant sounds and with itself to comprise three hundred paired consonant sounds. The vowel "ah" is combined with each consonant. Vowel and consonant sounds are not compared.

¹ W. Johnson, and Others, Speech Handicapped School Children (New York: Harper & Bros., 1948), p. 105.

² Van Riper, op. cit., p. 135.

³ L. E. Travis, and B. J. Rasmus, "The Speech-Sound Discrimination Ability of Cases with Functional Disorders of Articulation," Quarterly Journal of Speech Education, April, 1931, Vol. 17, pp. 217-226.

The Iowa Speech Clinic Speech Sound Discrimination Test¹ has a total of seventy paired speech sounds. All sounds to be discriminated are consonants. There are eighteen pairs which are the same sound and the remainder are different sounds. The consonant sound is combined with vowel "ah."

The short form of Templin's² Test of sound discrimination has seventy paired syllables. Seventeen pairs are similar combined sounds. The consonant sounds are combined with the vowels \bar{a} , \bar{e} , and \bar{o} . The average number of errors on this test using thirty normal-speaking children stated by Van Riper³ are:

Grade	Average Number of Errors
2	14.2
3	11.8
4	10.1
5	10.2
6	10.1

Ten or more errors above the averages given are considered as indications of poor speech sound discrimination. Van Riper,⁴ in administering this test, stresses the great care

¹ Johnson, op. cit., pp. 428-430.

² M. Templin, "A Study of Sound Discrimination Ability of Elementary School Pupils," The Journal of Speech Disorders, Vol. 8, No. 2, June, 1943, pp. 127-132.

³ Van Riper, op. cit., p. 138.

⁴ Loc. cit.

which is necessary to ensure attention and prevent fatigue in order to gain satisfactory results.

Hensen¹ included the Travis-Glaspey Test, another modification of the Travis and Rasmus Test, in his studies of speech sound discrimination. This test contains ninety paired speech sounds and fifteen paired words. The inclusion of words in this test enabled Hensen to test speech sounds in initial, medial, and final positions. A copy of the Travis-Glaspey Test may be found in Appendix A, Page 36.

The Robbins'² Speech Sound Discrimination Tests include a picture test for use with younger children. This test has one hundred and eight paired speech sounds presented by naming two hundred and sixteen pictures. The speech sounds are arranged in nine groups.³

1. Vowels
2. Semi-vowels
3. Nasals
4. Unvoiced plosives vs. unvoiced fricatives
and sibilants

¹ B. F. Hensen, "The Application of Sound Discrimination Tests to Functional Articulatory Defectives with Normal Hearing," Journal of Speech Disorders, Vol. 9, No. 4, December, 1944, pp. 347 ff.

² S. D. Robbins and R. S. Robbins, Speech Sound Discrimination Tests (Boston: Expression Co., 1948), pp. 6-26.

³ Ibid., p. 1.

5. Cognate plosives
6. Cognate fricatives and sibilants
7. Voiced plosives
8. Unvoiced fricatives and sibilants
9. Voiced fricatives and sibilants

Twenty-four pictures are used in each group.

The pictures are arranged in three columns and four rows on a page. The opposite page contains the remaining twelve pictures of the group. "Before he is given the test, the child is taught the names of every picture on each page in the order in which the pictures appear."¹ The examiner presents the names in a random order after the child has memorized the names of all pictures on a given page. The child is asked to point to each picture as it is named.

The Robbins' Test² for older children uses the same nine groups of speech sounds presented in word context. There are six hundred and thirty words presented in three-word groups. Two words are identical: the third differs in only one speech sound. The child is asked to report if "all three words are alike, or whether the first, second, or last word is different from the other two words."³

¹ Ibid., p. 3.

² Ibid., pp. 27-34.

³ Ibid., p. 3.

The authors advise giving word-pairs instead of three-word groups if the child has difficulty in following instructions. The child is asked to report whether the two words are alike or different. Two hundred and ten paired speech sounds are presented by eliminating the repetition of the same word in the three-word groups.

In addition to the speech sound discrimination tests the Murphy¹ Test of auditory discrimination used in the field of Reading Readiness was considered. This test employs pictures of single objects for auditory discrimination. This test contained words with similar initial but different final sounds, similar sounds at the end but different in the beginning, similar beginning and ending sounds but a slight difference in the middle.

Absence of identical phonetic environments in the word lists of the Murphy² Test limits its use as a diagnostic instrument in speech sound discrimination.

SUMMARY

1. The Travis and Glaspey³ Test and the Robbins⁴ Test were the only tests reviewed in speech sound

¹ Helen A. Murphy, "Group Test for Auditory Discrimination," (unpublished test, Boston University, 1941), pp. 1-4.

² Loc. cit.

³ Hensen, op. cit.

⁴ Robbins, op. cit.

discrimination which included speech sounds in word context.

Johnson and Others¹ point out the following:

For most of us, adults as well as children, the speech sound is not an entity, a meaningful unit of any sort, and we don't hear it as an entity. Nor do we very often learn it as an entity. What we hear, and what we learn, are words, and the individual speech sounds which make up those words are for the most part somewhat amorphous and undifferentiated pieces of the whole complex auditory pattern.

Therefore, speech sounds in context appear to be a desirable factor in a test for speech sound discrimination used with the young speech handicapped child.

2. The tests for speech sound discrimination considered varied in length from seventy to three hundred and sixty-two paired speech sounds. The monotony of listening to long lists of nonsense syllables may be a restraining determinant for the young speech handicapped child to accurately discriminate speech sounds.

The overwhelming number of pictures necessary to determine satisfactory or unsatisfactory speech sound discrimination in the Robbins' Test limits its application as an instrument in routine clinical examinations. The method of presentation of the pictures by an examiner appears to limit discrimination since the pictures are not paired; random location of the pictures on the page make visual

¹ Johnson, op. cit., p. 144.

discrimination an important variable. If the examiner presents the words in pairs, such as "ball--bell," it would be necessary for the child to consider twelve illustrations before arriving at the desired pictures; sequence of selection may not parallel sequence of presentation. The child may point to "bell" just as though it was the first word given by the examiner.

The above limitations of the existing tests considered make evident the need for an instrument whose length, presentation of speech sounds in word context, and use of pictures to test speech sound discrimination abilities of young speech handicapped children make it applicable to a clinical examination. The present study is an effort to combine these factors into a suitable instrument.

CHAPTER III

PROCEDURE

The tests for speech sound discrimination considered in the previous chapter presented three principles for selection of speech sounds to be discriminated: pairing each consonant and each vowel sound with all other consonant and vowel sounds on a basis of quality; pairing voiceless and voiced consonant sounds; pairing consonant and vowel sounds in their respective perceptual group.

Selection of speech sounds. The basis for selection of the speech sounds to be discriminated in this study was governed by:

1. Illustration of easily recognizable objects whose names contributed phonetically balanced words.
2. Words whose phonetic environments were comparable and within the vocabulary limits of primary grade children.
3. Perceptual and anatomical properties closely allied to the specific paired speech sounds.

The words to be illustrated for the instrument were selected from Thorndike and Lorge.¹ At least one word of each pair

¹ Edward L. Thorndike and Irving Lorge, The Teacher's Word Book of 30,000 Words (NY: Bureau of Publications Teachers College, Columbia University, 1944).

illustrated was listed as a word appearing one hundred or more times per million words and "should be taught for permanent knowledge"¹ in the primary grades.

The paired speech sounds presented in word context are underlined in Table I.

TABLE I
PAIRED SPEECH SOUNDS

<u>p</u> ole-- <u>b</u> owl	<u>c</u> url-- <u>g</u> irl	<u>g</u> lass-- <u>g</u> lass
<u>b</u> oy-- <u>t</u> oy	<u>z</u> oo-- <u>sh</u> oe	<u>g</u> um-- <u>g</u> un
<u>v</u> ase-- <u>f</u> ace	<u>c</u> at-- <u>b</u> at	<u>t</u> rain-- <u>ch</u> ain
<u>p</u> icture-- <u>pit</u> cher	<u>s</u> oup-- <u>s</u> uit	<u>i</u> ce-- <u>e</u> yes
<u>p</u> en-- <u>p</u> in	<u>b</u> eans-- <u>b</u> eads	<u>c</u> lown-- <u>c</u> rown
<u>m</u> itten-- <u>k</u> itten	<u>l</u> ake-- <u>r</u> ake	<u>c</u> up-- <u>p</u> up
<u>m</u> outh-- <u>m</u> ouse		<u>ch</u> ip-- <u>sh</u> ip

The "l" and "r" sounds were paired three times because they are two of the sounds most frequently defective in children's speech.² The "t" sound is the most frequently used consonant in the English language;³ therefore, the blend word "train" was compared with "chain" whose initial sound (ch) is a consonant combination and one of "the ten sounds most frequently defective."⁴

¹ Ibid., p. XI.

² Fairbanks, op. cit., p. 54.

³ Ibid., p. 64.

⁴ Ibid., p. 100.

TABLE II
THE PERCEPTUAL PROPERTIES AND ANATOMICAL TERMS
OF THE PAIRED CONSONANT SPEECH SOUNDS
USED IN THE INSTRUMENT

Paired Speech Sounds	Perceptual Properties	Anatomical Terms
p	stop-plosive voiceless	labial
b	stop-plosive voiced	labial
t	stop-plosive voiceless	post-dental
b	stop-plosive voiced	labial
f	fricative voiceless	labio-dental
v	fricative voiced	labio-dental
k	stop-plosive voiceless	velar
g	stop-plosive voiced	velar
sh	fricative voiceless	post-dental
z	fricative voiced	post-dental
k	stop-plosive voiceless	velar
b	stop-plosive voiced	labial
l	semi-vowel voiced	post-dental
r	semi-vowel voiced	post-dental
m	nasal voiced	labial
n	nasal voiced	post-dental
d	stop-plosive voiceless	post-dental
n	nasal voiced	post-dental
s	fricative voiceless	post-dental
z	fricative voiced	post-dental
p	stop-plosive voiceless	labial
k	stop-plosive voiceless	velar
th	fricative voiceless	lingua-dental
s	fricative voiceless	post-dental
m	nasal voiced	labial
k	stop-plosive voiceless	velar
p	stop-plosive voiceless	labial
t	stop-plosive voiceless	post-dental

The paired consonant sounds listed on the preceding page vary either perceptually or anatomically. The "ch" sound is a voiceless, post-dental, consonant combination of "t" and "sh"; therefore, it was compared with "t" and "sh" in the instrument.

Two front vowel sounds, "e" as in "hen" and "i" as in "vim," complete the speech sounds to be discriminated.

Illustration of the words. The words selected for illustration were to be simple objects easily recognized by the children. Visual perception was not being tested; therefore, large, colorful illustrations were the most applicable for the instrument. The artist consulted felt a form of cartooning would be the most pleasing style for the illustrations.

The two words which presented any difficulty in attaining a clear concept of the objects were "chip" and "zoo." The final selection of a thin disc, such as a poker chip, seemed preferable to illustrating chips or wood, to avoid plurality. The use of the lion in a cage seemed acceptable for illustrating "zoo."

The order of the illustrations in the instrument was divided between side-by-side and top and bottom. This

arrangement was to serve a dual purpose: if the child is beginning to read, side-by-side objects would be helpful in decreasing visual discrimination as a factor in the test; illustrations of certain objects were from top to bottom to make all objects comparable in size.

Each page of illustrations presented the following order for the paired words:

object (a)	object (a)	object (b)	object (a)
object (a)	object (b)	object (b)	object (b)

In cases of top and bottom, the order was:

object (a)	object (b)
object (a)	object (a)
object (a)	object (b)
object (b)	object (b)

A complete form of the instrument may be found in Appendix B, Page 42.

Order of presentation. The pictures were numbered from left to right and these numbers were selected by chance to determine the order of presenting each pair of words on each page. The scoring sheet found in Appendix B, Page 40 lists the paired words as determined by this chance method of presentation.

The pictures were presented in the following order:

- | | |
|----------------------|--------------------|
| 1. pole--bowl | 11. pen--pin |
| 2. boy--toy | 12. kitten--mitten |
| 3. vase--face | 13. soup--suit |
| 4. curl--girl | 14. beads--beans |
| 5. zoo--shoe | 15. rake--lake |
| 6. cat--bat | 16. eyes--ice |
| 7. grass--glass | 17. clown--crown |
| 8. gum--gun | 18. cup--pup |
| 9. chain--train | 19. mouse--mouth |
| 10. picture--pitcher | 20. chip--ship |

All the number "ones" were considered, then the "twos," etc. until the child had seen each page four times in the order listed above. Since pictures number one through seven were the only side-by-side illustrations, these were considered first.

Administration and scoring the test. The instrument was used to test thirty-eight speech handicapped children and thirty reading handicapped children. Ten of the speech handicapped children were tested by a speech correction teacher in a public school system. The writer tested the remaining fifty-nine children.

The reading handicapped children were tested because of the relationship of auditory discrimination in reading difficulties. A comparison of abilities of speech handicapped and reading handicapped children to discriminate speech sounds as measured by the instrument was made.

Each child was tested individually by an examiner. The child was instructed to point to the illustration on the card that represented the two words spoken by the examiner. If any difficulty was noted in selection of an illustration regarding sequence of paired speech sounds, the examiner asked the child to "point to the picture which says 'bowl--pole.'"

The examiners scored each item immediately after the response by placing a check mark in the appropriate column. One item on the scoring sheet may be marked:

	R	4	3	2	1
1. pole--bowl					x
2. pole--pole				x	
3. bowl--pole				x	
4. bowl--bowl				x	

The incorrect responses were noted to aid in evaluating the child's difficulty in speech sound discrimination.

Complete directions for administering the test may be found in Appendix B, Page 38. There is no time limit on this test.

SUMMARY

The construction of the instrument described was the completion of the primary purpose of this study--to incorporate the use of pictures together with verbal stimulus in an instrument to test speech sound discrimination abilities of young speech handicapped children.

The use of phonetically balanced words to present the paired speech sounds to be discriminated achieved a second step in the purpose of this study--to design an instrument useful in existing clinical examinations of the speech handicapped. Since a picture articulation test precedes a speech sound discrimination test in obtaining a description of the young child's speech errors, words presented in pictures compliment the motivation established by a picture articulation test.

The third purpose of this study, to make a comparison between speech handicapped and reading handicapped children in their abilities to discriminate speech sounds presented in a picture test of speech sound discrimination, was achieved by using the instrument to make the comparison.

CHAPTER IV

FINDINGS OF THE STUDY

The purpose of this study was: to incorporate the use of pictures together with verbal stimulus in an instrument to test speech sound discrimination abilities of young speech handicapped children; to design an instrument useful in existing clinical examinations of the speech handicapped; to make a comparison between speech handicapped and reading handicapped children in their abilities to discriminate speech sounds presented in a picture test of speech sound discrimination.

The results of the test were analyzed to determine:

1. The means and standard deviations of each group
2. Frequency and type of errors for speech handicapped children and reading handicapped children
3. The order of difficulty in discriminating the paired speech sounds.

TABLE III

NUMBER OF ERRORS MADE BY THE SPEECH AND READING
GROUPS ON THE INSTRUMENT

No. of Errors	Speech	Reading
1	2	0
2	2	7
3	1	4
4	3	4
5	2	2
6	3	3
7	4	2
8	2	2
9	3	1
10	0	1
11	1	3
12	2	0
13	1	0
14	1	0
16	2	0
18	1	0
19	2	0
20	1	0
21	1	0
24	1	1
27	1	0
28	1	0
37	<u>1</u>	<u>0</u>
	38	30

The range of errors for the speech handicapped children was 1 to 37 with a mean of 10.67 and a SD of 8.33. The range of errors for the reading handicapped children was 2 to 24 with a mean of 4.1 and a SD of 4.24.

TABLE IV

FREQUENCY AND TYPE OF ERRORS PER ITEM BY EACH GROUP

			Speech				Reading				Total	
			4	3	2	1*	4	3	2	1	S	R
1	pole	- bowl		6	3							
2	pole	- pole	2									
3	bowl	- pole	1			1			1			
4	bowl	- bowl		1		1					15	1
1	boy	- boy			1							
2	toy	- toy	1			1						
3	toy	- boy	3									
4	boy	- toy		1				1			7	1
1	vase	- face	2	7	5			2	5			
2	vase	- vase	1	2		1				1		
3	face	- face	1			1						
4	face	- vase		4	2	1		2			27	10
1	curl	- girl		2	2				1			
2	girl	- curl				1				1		
3	girl	- girl										
4	curl	- curl							1		5	3
1	zoo	- shoe	1		3				1			
2	shoe	- zoo		4		2				3		
3	shoe	- shoe										
4	zoo	- zoo		1						1	11	5
1	cat	- cat			1			1				
2	bat	- cat		3		2						
3	cat	- bat			3	1			2			
4	bat	- bat									10	3
1	grass	- glass	3		3			1		1		
2	glass	- grass	2	1		1			1		2	
3	grass	- grass			2							
4	glass	- glass									12	5
1	gum	- gun	2	2	4			1	2			
2	gum	- gum		3		3						1
3	gun	- gum			2	3				1	1	
4	gun	- gun		1		1				1	1	21 8

* These numbers (4-1) indicate which illustration the child pointed to when making incorrect response.

TABLE IV (continued)

			Speech				Reading				Total	
			4	3	2	1	4	3	2	1	S	R
1	clown	- crown		2	9		3	1	3			
2	clown	- clown										
3	crown	- crown	1		2	3	1		1			
4	crown	- clown		1	2	3			1	23	10	
1	cup	- pup	1	2	6		1					
2	pup	- pup				3						
3	cup	- cup	1									
4	pup	- cup		4		1				18	1	
1	mouse	- mouse			1			1				
2	mouth	- mouse	1	3		4		1	1			
3	mouse	- mouth	4		2	2			2			
4	mouth	- mouth		2	1	1				21	5	
1	chip	- ship	4	1	6		1		7			
2	ship	- ship	2	1		1						
3	chip	- chip	4		1	1			2			
4	ship	- chip		4	3	2			2	2	30 15	
Total Errors:										427	176	

The speech handicapped children made 46% of their errors in Table IV by pointing to an illustration with two similar sounds when given two different sounds; 21% of their errors occurred by identifying the different sounds in incorrect order; 20% of their errors occurred when given a similar pair of sounds and pointing to an illustration with opposite sounds; 13% of the errors occurred when similar sounds were presented and paired similar sounds of the opposite illustration were identified.

The reading handicapped children made 36% of their errors in Table IV by pointing out an illustration with similar sounds when given two different sounds; 28% of their errors occurred by identifying the different sounds in incorrect order; 19% of their errors occurred when similar sounds were given and an illustration of opposite sounds was pointed out; 17% of the errors occurred when similar sounds were presented and similar sounds of the opposite illustration was indicated.

TABLE V

THE ORDER OF DIFFICULTY IN DISCRIMINATING THE PAIRED
SPEECH SOUNDS WITH THE PERCENT OF ERRORS
ON EACH PAIR FOR THE TWO GROUPS

Speech Handicapped Children		Reading Handicapped Children	
Speech Sound	% of Errors	Speech Sound	% of Errors
1. t-ch	20	1. t-ch	23
2. e-i	13	2. e-i	19
3. sh-ch	7	3. sh-ch	8
4. p-t	7	4. p-t	8
5. v-f	6	5. l-r (clown-crown)	6.5
6. l-r (clown-crown)	5	6. f-v	6
7. d-n	5	7. m-n	4
8. s-th	5	8. d-n	4
9. m-n	5	9. s-z	3
10. k-p	4	10. s-th	3
11. p-b	4	11. l-r (glass-grass)	3
12. r-l (rake-lake)	3	12. z-sh	3
13. r-l (grass-glass)	3	13. ch-tr (chain-train)	2
14. z-sh	3	14. r-l (rake-lake)	2
15. k-b	2	15. k-b	2
16. s-z	2	16. k-g	2
17. ch-tr (chain-train)	2	17. p-b	.5
18. b-t	2	18. b-t	.5
19. k-g	1	19. k-p	.5
20. m-k	1	20. m-k	0

The paired speech sounds present in "picture-pitcher" and "pen-pin" were the most difficult for both groups to discriminate, as shown in Table V.

The most frequent type of error for both groups in discriminating "picture-pitcher" was pointing to "picture-picture" on all four attempts to discriminate "t-ch."

Vowel discrimination is limited in most tests as this ability is considered fairly accurate in most children. However, "e-i" were the only vowels to be discriminated in the instrument and they were the second most difficult paired speech sounds for both groups to discriminate.

Mispronunciation of these four words by others than handicapped children is a common occurrence. The pairing of "t-ch" in "picture-pitcher" and "e-i" in "pen-pin" indicate speech sounds presented in word context employing illustration will disclose errors of discrimination.

The paired "p-t" consonant sounds were one of the two paired speech sounds tested in the final position of sounds in words. Only the anatomical terms of these sounds varied, yet equal difficulty was noted for both groups. The position of the sounds in "soup-suit" may contribute to the difficulty of discriminating as well as the place of articulation.

The highest errors on the paired "l-r" consonant speech sounds occurred in "clown-crown" for each group. The phonetic environments of these words differ greatly from the

phonetic environments of "grass-glass." The errors made on "clown-crown" by the speech handicapped were thirteen instances of pointing to "crown-crown." The total errors on this item were twenty-three. The reading handicapped child made five out of ten errors in the same manner.

The paired "m-k" consonant sounds presented one of the least difficult pairs for the speech handicapped children to discriminate. The reading handicapped children made no errors on this pair. The perceptual properties and anatomical terms of these two sounds varied more than any other paired consonant speech sounds in the instrument (See Table II).

The remaining paired consonant sounds presented varying degrees of difficulty for each group. The selection of these sounds in the paired words appeared to be substantially equal in perceptual properties and anatomical terms.

CHAPTER V

CONCLUSIONS

The primary purpose of this study was to construct a picture test of speech sound discrimination. The test was administered to sixty-eight children, thirty-eight speech handicapped and thirty reading handicapped.

Interpretations. The instrument provided a high degree of motivation for all the children tested. The writer administered each test in less than thirteen minutes; the ten children tested by one other person were given a rest after half the pictures had been presented. The average time to administer the test for the ten children was thirty minutes.

The motivating factor was attributed to two items: the "game" of pointing and the attractiveness of the illustrations. These lessened anxiety on the part of the young children in the test situation. Once a picture was placed before the children and conversation commenced about identifying some of the items, rapport was easily attained.

The attention of the children was held throughout the test, indicating accuracy was achieved in most instances. This factor embraces the value of the instrument for a diagnostic purpose in a speech clinic.

The use of eight illustrations on each page in the instrument made it possible to test each pair of speech sounds in four combinations: a-a; b-a; a-b; b-b. The errors occurring by indicating "b-a" when "a-b" was presented may be considered a confusion of illustration sequence. Since a child pointed to "b-a", he heard a difference. A primary purpose of testing speech sound discrimination was fulfilled, for the two words did not sound the same to the child.

The speech correction teacher who administered ten of the sixty-eight tests in this study pointed out "the repetitions of two 'likes' out of four " pairs of illustrations were confusing to some of the children.

Limitations of the study. The following limitations of the study are noted: (1) the limited number of handicapped children tested; (2) absence of certain paired speech sounds; (3) inability to locate suitable pictures to illustrate additional phonetically balanced words.

Suggestions for further research. The following suggestions for further research are made:

1. The test be given by more than two examiners, applying further techniques to establish validity and reliability.
2. Repeat the test, eliminating one of the illustrations of opposite paired speech sounds.

3. Correlate the errors of normal and speech handicapped children.
4. Correlate the errors of speech sound discrimination and speech errors of speech handicapped children.
5. Explore possibilities of means to illustrate other speech sounds not tested.

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APPENDIX A

TRAVIS-GLASPEY SOUND DISCRIMINATION TEST

A	B	C	D
1. pe-be	1. fi-vi	1. ne-ne	1. vo-wo
2. te-te	2. se-se	2. je-le	2. vi-mi
3. ke-ge	3. he-pe	3. we-le	3. te-de
4. ve-le	4. vo-vo	4. dze-tse	4. ge-ge
5. be-be	5. se-ze	5. tse-se	5. fe-ve
6. me-we	6. ce-ge	6. me-me	6. se-se
7. ne-me	7. je-dze	7. se-se	7. we-we
8. de-de	8. fo-vo	8. me-ne	8. se-se
9. je-je	9. de-de	9. si-tsi	9. dze-se
10. dze-dze	10. we-ve	10. mi-wi	10. si-zi
E	F	G	H
1. tse-tse	1. fo-fo	1. zo-zo	1. in-ih
2. sai-fai	2. lo-jo	2. we-le	2. ke-te
3. fai-fai	3. re-re	3. fe-se	3. a-a
4. ki-ti	4. so-zo	4. wi-wi	4. mai-mai
5. de-ve	5. vo-fo	5. rai-wai	5. o-o
6. ce-te	6. tsi-tsi	6. dze-ke	6. me-we
7. lai-wai	7. de-ge	7. fi-fi	7. lai-rai
8. ke-ke	8. me-me	8. zai-fai	8. se-se
9. te-de	9. se-se	9. le-le	9. dai-gai
10. pe-pe	10. se-me	10. me-ve	10. fi-zi
I	J	K	
1. iy-eh	1. yellow-bellow	1. way-whey	
2. le-we	2. butter-better	2. hiss-his	
3. re-ve	3. shoe-chew	3. hows-house	
4. ke-ge	4. whee-whee	4. mouth-mouse	
5. ti-di	5. she-see	5. some-thumb	
6. mi-ni	6. flutter by-		
7. si-si	butterfly		
8. mi-wi	7. chip-ship		
9. i-i	8. zoo-zoo		
10. i-ai	9. rouge-ruse		
	10. sheet-cheat		

APPENDIX B

DIRECTIONS FOR ADMINISTERING
PICTURE TEST OF SPEECH SOUND DISCRIMINATION

1. Examiner is seated beside the child.
2. Place the twenty picture cards in sequence as listed on the scoring sheet before the child.
3. Prior to the test examiner may go through all the cards and establish identity of the objects illustrated to be certain the child recognizes the objects by the names used in the test.
4. The paired words are presented as listed on the scoring sheet, all pairs numbered one are presented, then two, three, and four. Thus, the child sees each picture card four separate times.
5. The examiner scores each response immediately after the child points to one of the paired illustrations on a card. Each pair of words is numbered 1 to 4 on the scoring sheet. Across the top of each group of four paired words are R, 4, 3, 2, 1. A check mark is placed in the R square if the response is correct. An incorrect response is marked in the appropriate column 4-1 to correspond to the illustrations indicated by the child. Example:

	R	4	3	2	1
1. pole--bowl	x				
2. pole--pole	x				
3. bowl--pole			x		
4. bowl--bowl	x				

6. The first seven picture cards have the objects illustrated side-by-side; the remainder of the cards have the objects illustrated top-to-bottom.
7. Using the first card, the examiner gives the following verbal instructions to the child:

Johnny, we are going to play a game with these pictures. I am going to say two words and you are going to point to the picture of the two words. You will have to listen very carefully for I can only say the two words once. If I asked you to point to "pole--pole" you would point to this picture, for it is the picture of two poles. But if I say "bowl--pole" you would point to this one, because bowl is first (or on the left). Now, listen carefully, point to the picture of "pole--bowl."

8. Starting with the pictures of "gum" and "gun," it is advisable to demonstrate top-to-bottom order for the child. After the first time through the test, generally the child will have no difficulty in following the order of illustrations.
9. There is no time limit on the test.

	NAME	ERRORS					
			R	4	3	2	1
1	FOLE - BONE						
2	FOLE - FOLE						
3	BOVL - FOLM						
4	BOVL - BOVL						

			R	4	3	2	1
1	BOY - BOY						
2	TOY - TOY						
3	TOY - BOY						
4	BOY - TOY						

			R	4	3	2	1
1	VASE - FACE						
2	VASE - VASE						
3	FAGE - FACE						
4	FAGE - VASE						

			R	4	3	2	1
1	CURL - GIRL						
2	GIRL - CURL						
3	GIRL - GIRL						
4	GRRL - CURL						

			R	4	3	2	1
1	ZOO - SHOE						
2	SHOE - ZOO						
3	SHCE - SHCE						
4	ZOO - ZOO						

	NAME	ERRORS					
			R	4	3	2	1
1	GAT - GAT						
2	BAT - GAT						
3	GAT - BAT						
4	BAT - BAT						

			R	4	3	2	1
1	GRASS - GLASS						
2	GLASS - GRASS						
3	GRASS - GRASS						
4	GLASS - GLASS						

			R	4	3	2	1
1	GUM - GUN						
2	GUM - GUM						
3	GUN - GUM						
4	GUN - GUN						

			R	4	3	2	1
1	CHAIN - TRAIN						
2	TRAIN - TRAIN						
3	CHAIN - CHAIN						
4	TRAIN - CHAIN						

			R	4	3	2	1
1	PITCHER - FUTCHER						
2	PICTURE - PITCHER						
3	PITCHER - PICTURE						
4	PICTURE - PICTURE						

NAME ERRORS

			R	4	3	2	1
1	FEN	-	FIN				
2	FIN	-	PIN				
3	FEN	-	PEI				
4	FIN	-	PEI				

			R	4	3	2	1
1	KITPEN	-	KITTEN				
2	PITPEN	-	KITTEN				
3	KITTEN	-	PITPEN				
4	PITPEN	-	PITPEN				

			R	4	3	2	1
1	SOUP	-	SUIT				
2	SUIT	-	SUIT				
3	SOUP	-	SOUP				
4	SNIT	-	SOUP				

			R	4	3	2	1
1	BEADS	-	BEANS				
2	BEANS	-	BEADS				
3	BEADS	-	BEADS				
4	BEANS	-	BEANS				

			R	4	3	2	1
1	RAKE	-	RAKE				
2	LAKE	-	LAKE				
3	LAKE	-	RAKE				
4	RAKE	-	LAKE				

DATE AGE GRADE

			R	4	3	2	1
1	EYES	-	EYBS				
2	ICE	-	EYES				
3	EYES	-	ICE				
4	ICE	-	ICE				

			R	4	3	2	1
1	GLOWN	-	GROWN				
2	GLOWN	-	GLOWN				
3	GROWN	-	GROWN				
4	GROWN	-	GLOWN				

			R	4	3	2	1
1	CUP	-	PUP				
2	PUP	-	FUP				
3	CUP	-	CUP				
4	PUP	-	CUP				

			R	4	3	2	1
1	MOUSE	-	MOUSE				
2	MOUTH	-	MOUSES				
3	MOUSE	-	MOUTH				
4	MOUTH	-	MOUTH				

			R	4	3	2	1
1	CHIP	-	SHIP				
2	SHIP	-	SHIP				
3	CHIP	-	CHIP				
4	SHIP	-	CHIP				







































