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The relationship between performance on the Stanford Achievement Test and the Peabody Individual Achievement test for a group of hearing-impaired children

Carol S. Bayersdorfer

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The Relationship Between Performance On The
Stanford Achievement Test And
The Peabody Individual Achievement Test
For A Group of Hearing-Impaired Children

Independent Study
Carol S. Bayersdorfer
May, 1982

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INTRODUCTION

Achievement testing is an integral part of the educational process for both hearing and hearing-impaired children. Such assessment allows educators to evaluate their students' academic progress and their strengths and weaknesses in most areas of instruction. Numerous assessment tools are available to the educator; the choice between these tools is usually dependent upon the purpose of the testing being considered. Some tests evaluate a wide range of subject matter and information while others measure only one specific area such as reading, science, or math. When selecting an instrument for use with hearing-impaired children, the educator must consider other factors in addition to those pertaining to the content and purpose of the instrument. Among the prime considerations is the amount and type of language required, the time involved in the administration of the test, and the applicability of the test to children within the age range being considered.

The Stanford Achievement Test (SAT; Madden, Gardner, et. al., 1973) is one such instrument that has gained wide acceptance among deaf educators. It meets the main criteria for use with hearing-impaired children, with the exception perhaps of the time element. The Office of Demographic Studies at Gallaudet College has developed a special edition of the Stanford for use with hearing-impaired children. The Stanford is a group-administered test that provides measurement and assessment

of learning at different levels of the educational process. It was designed to measure the important understandings, skills, and abilities that are the desirable outcomes of the elementary and junior high school curriculums.

The Peabody Individual Achievement Test (PIAT; Dunn & Markwardt, 1970) also fulfills many of the criteria for use with hearing-impaired children. Although hearing-impaired norms are not available, the test can be administered to a large age-range of students, regardless of their grade level. The Peabody is an individually administered achievement test that provides a wide-range screening measure of achievement in the areas of mathematics, reading, spelling, and general information. While the Stanford requires approximately 7 1/2 hours to administer, the Peabody requires only 45 minutes to 1 hour. The significant difference in time for the two tests is a prime consideration when testing. If the Stanford and the PIAT are comparable measures, the PIAT would be more practical, economical, and efficient than the Stanford, particularly in a clinic setting where only one child is being tested.

The Stanford Achievement Test and the Peabody Individual Achievement Test are both achievement tests that evaluate a wide range of information. Several of the subtests contain relatively comparable material. While the Stanford has been shown to be a useful measure with hearing-impaired children, the Peabody has not been tested with that group. Sanner and McManis (1978) found substantial correlation between the two

tests in Reading and Spelling for average achievers with normal hearing. The Reading Recognition correlation was .76; Reading Comprehension - .85; and Spelling - .77 for the Level 3 Stanford.

Hearing-impaired children often exhibit widely different skill levels in different achievement areas. Because of this, they may be given a test form which is too low or too high. If they are given a form which is too low, they frequently hit the ceiling of the test and do not earn as high a score as they could. If given a form which is too high, they could attain an elevated grade score, based on random responding (Elliott & Healey, 1971). Because the PIAT covers a wide grade-level range and allows the examiner to determine a basal and a ceiling for each subtest, the problem of selecting the most appropriate level for each skill area is overcome. Because the Stanford is far more comprehensive than the Peabody, it is a more accurate measure of achievement, when the appropriate level is used. When groups of children are being tested, the Stanford is probably the best choice. However, in clinical settings where one child is being tested, the Stanford is impractical, due to its time requirements.

Therefore, this examiner would like to know whether overall grade levels on a comprehensive test, such as the Stanford, can be estimated from a clinically more efficient test, such as the Peabody.

STANFORD ACHIEVEMENT TEST

The Stanford Achievement Test and the Peabody Individual Achievement Test were administered to a group of hearing-impaired children. The findings concerning the relationship between the two tests are reported in this study.

The Stanford is comprised of eleven subtests, two of which, Word Study Skills and Communication Comprehension, are not recommended for use with hearing-impaired children. Therefore, nine multiple-choice format subtests were administered: Vocabulary, Reading Comprehension, Mathematics Concepts, Mathematics Computation, Mathematics Applications, Spelling, Language, Social Science, and Science.

In the following section each of the subtests are described along with alterations made in administering to the hearing-impaired.

Stanford Subtests -

Test 1: Vocabulary

The examiner dictates a sentence and the subject selects the word that correctly completes the sentence. Because this is a dictated subtest, the directions were altered by writing the sentences on chart paper for the children to read so that the task does not become a lipreading one. Level 3 contains 37 questions and Level 4, 45. (See Figure 1).

Figure 1 -

Stanford - Vocabulary

Level 3:

If you obtain a reward, you
hate it lose it get it

Level 4:

To settle a question is to make -
1. a criticism 3. a decision
2. a plan 4. an announcement

Test 2: Reading Comprehension -

The student reads sentences, paragraphs, or poetry and answers questions about the reading. Skills tested include choosing the best word to complete a thought, answering detail questions, selecting the best title, and interpreting poetry. Level 3 contains 70 items and Level 4, 42. (See Figure 2).

Stanford - Reading Comprehension

A strange noise wakes me up. I am very quiet, listening. I hear the wind blowing the branches above the tent, and I can also hear footsteps. Some paper is rattled. All of a sudden a garbage can lid is tossed on the ground. I jump from my bed. My flashlight reflects two pairs of bears' eyes in the light beam, one from each trash can. This is so exciting to a city boy that I find it hard to go back to sleep in my sleeping bag.

Who is the story teller of this story?

- 43 ① a city boy ③ a girl scout
 ② a hunter ④ a forest ranger

This story is about a -

- 44 ⑤ motel room ⑦ plane trip
 ⑥ camping trip ⑧ visit to the zoo.

Whose footsteps are heard?

- 45 ① boys' ③ policemen's
 ② bears' ④ girl scouts'

How does the person in this story feel?

- 46 ⑤ amused ⑦ excited
 ⑥ bored ⑧ sleepy

The uninvited guests arrived -

- 47 ① in the morning ③ at night
 ② after lunch ④ in the afternoon.

Level 3

In October, 1969, the lonely mountain town of Sunspot, New Mexico (about forty miles from Alamo-gordo), began to gain attention. Dr. John L. McLucas, chief scientist of the United States Air Force, helped dedicate there a new three-million-dollar telescope, described as the most important solar instrument built in a decade. The telescope can be seen fifty miles away. The visible part of it looks like a white needle rising through pine trees atop Sacramento Peak, which is at a 9200-foot altitude. Most of the equipment, however, goes down 227 feet into a hole carved out of the rocky ridge. Since the new telescope will give the clearest image man has yet had of the sun's changing surface, scientists believe it will help predict sun flares more exactly and unravel some of the sun's deeper mysteries.

- 55 Sunspot, New Mexico, is now best known as the location of -
 1 a rocket-launching site
 2 an observatory
 3 a lighthouse
 4 a powerful solar telescope 55 ① ② ③ ④

- 56 The visible part of the New Mexico telescope looks like a -
 5 cable 7 needle
 6 globe 8 spike 56 ⑤ ⑥ ⑦ ⑧

- 57 Sunspot, New Mexico, is located -
 1 in a valley
 2 in the mountains
 3 near a large city
 4 on the shore 57 ① ② ③ ④

- 58 According to this paragraph, the new telescope will reveal important information about -
 5 the sun 7 Mars
 6 the moon 8 Jupiter 58 ⑤ ⑥ ⑦ ⑧

- 59 What kind of scientist would you most likely find working in Sunspot?
 1 rocket expert
 2 radiation technician
 3 radar man
 4 astronomer 59 ① ② ③ ④

- 60 Most of the scientific equipment for the New Mexico telescope is -
 5 50 miles away
 6 in a valley
 7 below ground
 8 on the moon 60 ⑤ ⑥ ⑦ ⑧

- 61 The top of this telescope is visible -
 1 227 feet away
 2 9200 feet away
 3 50 miles away
 4 from the ocean 61 ① ② ③ ④

Level 4

Test 4: Mathematics Concepts -

This test is dictated at Level 3, with the written form on chart paper. Basic mathematical principles and concepts such as place value, mathematical properties, grouping, math vocabulary, and relationships are tested. Level 3 contains 32 dictated items and Level 4, 35. (See Figure 3).

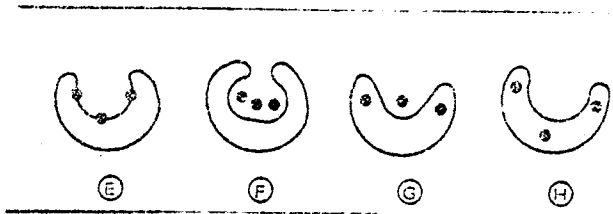
Test 5: Mathematics Computation -

This tests the concept of greater than, less than, and is equal to as well as basic mathematical calculations and functions. Addition, multiplication, subtraction, division, and fractions are included. Level 3 has 40 questions or problems and Level 4, 45. (See Figure 4). Scratch paper is provided for this subtest. The subtest is divided into two parts, A and B. Only the directions for Part A are supposed to be read and discussed with the subjects. However, for hearing-impaired children, it has been found to be necessary to discuss both sets of directions and to complete the samples for both parts.

Figure 3 -

Stanford - Mathematics Concepts

Which interior region has 3 dots?



Mark the number that belongs in the frame.

$$47 + 79 = 79 + \square$$

- 47
79
80
100
(A)
(B)
(C)
(D)

Which is another name for the Arabic numeral 9?

$$9 =$$

- IV
IX
VIII
XI
(E)
(F)
(G)
(H)

Level 3

5 What number comes next in this series?

$$22 \quad 19 \quad 16 \quad 13 \quad \square$$

- a 9 b 12 c 14 d 10 5 (a) (b) (c) (d)

6 $(3 \times 1000) + (4 \times 10) + (7 \times 1) =$

- e 347 g 3471
 f 3047 h 3407 6 (e) (f) (g) (h)

7 Which sentence means "4 times some number is 12"?

- a $n = 4 \times 12$ c $4 \times n = 12$
 b $n \times 12 = 4$ d $4 + n = 12$ 7 (a) (b) (c) (d)

8 What digits are in the thousands period in 4,352,647?

- e 52 g 647
 f 352 h 2 8 (e) (f) (g) (h)

Level 4

Figure 4 -

Stanford - Mathematics Computation

Level 3:

$$(9 + 3) + 5 \quad \bullet \quad 8 + (3 + 5) \quad \begin{matrix} > \\ (a) \end{matrix} \quad \begin{matrix} < \\ (b) \end{matrix} \quad \begin{matrix} = \\ (c) \end{matrix}$$

$$\begin{array}{r} 45 \\ \underline{\times 7} \end{array}$$

- (a) 325
- (b) 285
- (c) 315
- (d) 335
- (e) NH

Level 4:

$$1/3 + 1/4 \quad \bullet \quad 1 \quad \begin{matrix} > \\ (a) \end{matrix} \quad \begin{matrix} < \\ (b) \end{matrix} \quad \begin{matrix} = \\ (c) \end{matrix}$$

$$485 \div 5 =$$

- (a) 96
- (b) 97
- (c) 91
- (d) 87
- (e) NH

(a) (b) (c) (d) (e)

Test 6: Mathematics Applications -

Test 6 contains 28 word problems at Level 3 and 40 at Level 4. Some of the problems are related to charts and graphs. Again, the children may use scratch paper. The subjects must solve the problem and determine whether or not the answer is there. If it is not there, the subject marks the space designated NH. If it is there, the correct answer is marked. (See Figure 5).

Test 7: Spelling -

Test 7 is divided into two parts, each of which involves a different skill and task. Part A consists of four phrases, each with a different homonym. The child must select the correct phrase. Therefore, the various meanings of the word must be understood and the correct spelling for this particular meaning be known. Part B contains groups of four words. The children must select the word that is misspelled in each group. Additional samples are provided on chart paper for this subtest and again, the instructions for both parts are presented and discussed. Level 3 has 50 items and Level 4, 60. (See Figure 6).

Stanford - Mathematics Applications

Use this chart to answer questions 6-8. Each boy and girl in our class named the school subject he liked best. Here are the choices.

What I Like Best in School	Boys	Girls
Arithmetic		
Reading		
Science		
Art		
Music		

Each | means one choice.

6 How many in our class liked science best?
 6 4 2 42 NH
 (F) (G) (H) (J) (K)

7 The girls most often chose -
 music reading science arithmetic art
 (A) (B) (C) (D) (E)

8 How many times were art and music chosen all together?
 5 2 3 4 NH
 (F) (G) (H) (J) (K)

9 Larry worked 20 arithmetic problems. If 5 were wrong, how many were correct?
 25 100 4 15 NH
 (A) (B) (C) (D) (E)

10 Our class has 28 pupils. Only 10 are girls. How many are boys?
 38 28 18 10 NH
 (F) (G) (H) (J) (K)

11 Claude walked 10 blocks in one-half hour. At this rate, how many blocks would he walk in a whole hour?
 5 10¹/₂ 20 10 NH
 (A) (B) (C) (D) (E)

34 Six children gave 50¢ each, and 4 children gave 25¢ each to the Red Cross. Which sentence will tell how much they gave all together?

- f $10 \times (.50 - .25) = \square$
- g $(6 \times .50) + (4 \times .25) = \square$
- h $4 \times .25 \times \square = 6 \times .50$
- j $10 \times (.50 + .25) = \square$
- k $6 \times .50 - \square = 4 \times .25$

34 (f) (g) (h) (j) (k)

35

0	1	3	2
---	---	---	---

0	2	4	8
---	---	---	---

Here are two readings of miles shown on Glen's bicycle. How many miles did he go between readings?

- a 380
 - b 116
 - c 16
 - d 480
 - e NH
- 35 (a) (b) (c) (d) (e)

36 A wagon costs \$8.95, and a dart board costs \$4.98. The cost for both is nearest to -

- f \$13
 - g \$12
 - h \$14
 - j \$15
 - k \$11
- 36 (f) (g) (h) (j) (k)

37 If each package has 60 marshmallows, and 12 children share one package, how many marshmallows will each child have?

- a 48
 - b 20
 - c 2
 - d 5
 - e 72
- 37 (a) (b) (c) (d) (e)

38 What change should Nancy get back? She gave a quarter and 3 dimes to pay for paper that cost 47¢. The tax is 2¢.

- f 6¢
 - g 8¢
 - h 11¢
 - j 3¢
 - k NH
- 38 (f) (g) (h) (j) (k)

Figure 6 -

Stanford - Spelling

Level 3:

part A:

- (1) rays of light
- (2) due at the library
- (3) toe the car
- (4) a flow of water

part B:

- (1) factory
- (2) television
- (3) human
- (4) pause

Level 4:

part A:

- (1) knew the answer
- (2) wood like to go
- (3) have seen him
- (4) hear the song

part B:

- (1) farewell
- (2) soldier
- (3) pigen
- (4) bury

Test 8: Language

The language subtest is divided into several parts with a different skill and task for each. Level 3 tests punctuation and capitalization and elements of grammar such as verb tense and agreement, word order, time in language, and understanding meaning from context. There are 57 items requiring 4 different tasks. Level 4 contains 79 items in four parts. The skills tested include punctuation and capitalization, verb tense and agreement, ability to identify or construct a complete sentence, phonics, and dictionary skills. Again, directions and samples for each part were presented and discussed, contrary to the standard directions for administering the test. (See Figure 7).

Figure 7 -

Stanford - Language

Level 3:

_____ liked our report very much.

- | | |
|---------------|---------------|
| (1) Mrs. finn | (3) mrs. finn |
| (2) Mrs. Finn | (4) Mrs Finn |

Mother _____ popcorn.

- (5) didn't buy me no
- (6) didn't buy me any
- (7) didnt buy me any
- (8) didnt buy me no

You can't go to that movie _____ it lasts too long.

- (1) after
- (2) while
- (3) because
- (4) although

sent to the store to get a pound of butter and a dozen eggs.

- (5) Thomas had been
- (6) even though he had been
- (7) Thomas along with his brother
- (8) complete

Level 4:

Often a town started near a _____ perhaps near a lake.

- 1. river, Or
 - 2. river. Or
 - 3. river or
 - 4. river, or
- 3 (1) (2) (3) (4)

Such names _____ a lot of history with them.

- 1. has brung
 - 2. have brung
 - 3. have brought
 - 4. have brang
- 31 (1) (2) (3) (4)

Test 9: Social Science -

Level 3 contains 44 questions and Level 4, sixty. These items test basic social studies, geography, and history concepts and facts. Some map reading on Levels 3 and 4 and some graph reading on Level 4 is required. (See Figure 8).

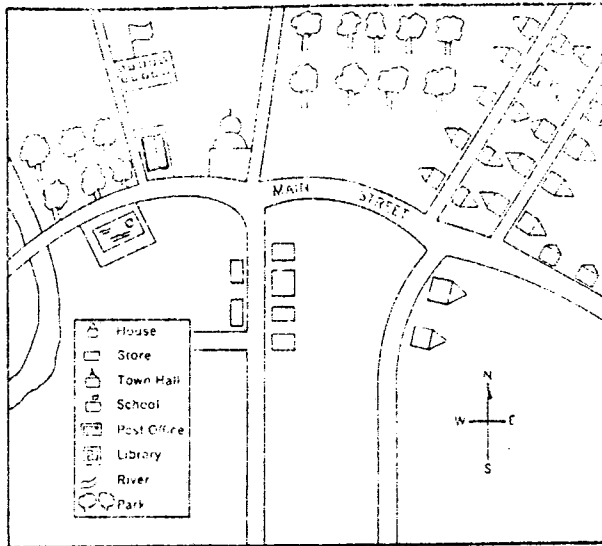
Test 10: Science -

Level 3 contains 42 items and Level 4 contains 60. Physical and biological science concepts are tested. The test items include diagrams, charts, and graphs which the children must read and interpret, as well as some basic factual multiple choice questions. (See Figure 9).

Figure 8 -

Stanford - Social Science

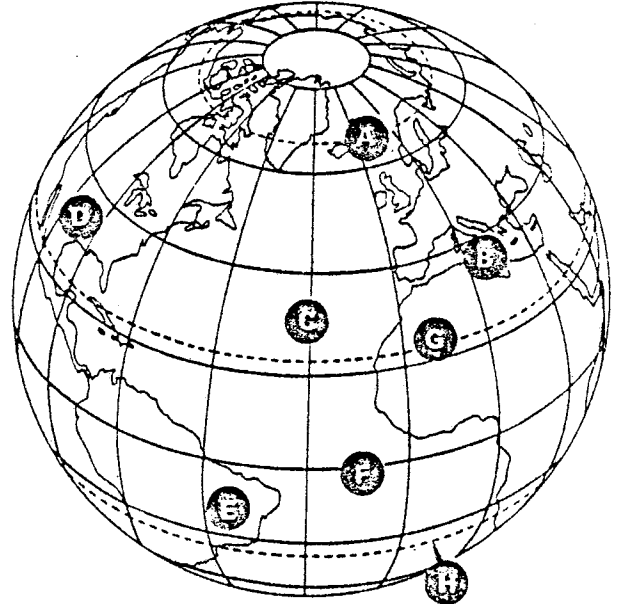
Questions 26-30 are based on the map below.



- 26 The school is closest to which of these?
 ⑤ houses ⑦ library
 ⑥ post office ⑧ stores
- 27 How many parks does this town have?
 ① one ③ two
 ② three ④ five
- 28 In which part of town do most people live?
 ⑤ northwest ⑦ southwest
 ⑥ northeast ⑧ southeast
- 29 To go from the library to the town hall, a person would walk -
 ① west ③ east
 ② north ④ south
- 30 There is probably a bridge nearest to the -
 ⑤ houses ⑦ school
 ⑥ town hall ⑧ post office

Level 3

Questions 38-42 are based on the globe below.



- 38 Line A represents the -
 5 Tropic of Capricorn
 6 Arctic Circle
 7 Tropic of Cancer
 8 Antarctic Circle 38 ⑤ ⑥ ⑦ ⑧
- 39 Area E is in -
 1 Africa
 2 India
 3 South America
 4 Canada 39 ① ② ③ ④
- 40 The area marked B is known as the -
 5 Atlantic Ocean
 6 Caribbean Sea
 7 Indian Ocean
 8 Mediterranean Sea 40 ⑤ ⑥ ⑦ ⑧

Level 4

Figure 9 -

Stanford - Science

Which of these animals does not lay eggs?

- ① an owl
- ② a bear
- ③ a turtle
- ④ a frog

A heavy box can be most easily moved on—

- ⑤ wheels
- ⑥ concrete
- ⑦ sand
- ⑧ carpet

The wool in a sweater comes from —

- ① an insect
- ② a factory making plastics
- ③ a mammal
- ④ a green plant



Starting with the eggs (A) in the drawing above, which order of letters best shows how an animal develops?

- ⑤ A → B → C → D
- ⑥ A → B → F
- ⑦ A → B → C
- ⑧ A → B → D → E

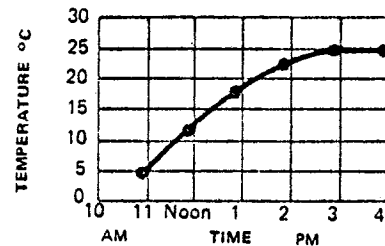
Elephants are not found in the desert because —

- ① they are too heavy
- ② the desert does not provide enough water
- ③ nobody brought them there
- ④ they are cold-blooded, and the desert would heat their blood

Level 3

For questions 18-19, see information below.

A bottle was filled with cold water and placed in a warm room. The temperature of the water was taken every hour until it warmed up to room temperature. The graph below shows the results.



- 18 The time at which the experiment began was —
 - 5 3 P. M.
 - 6 4 P. M.
 - 7 10 A. M.
 - 8 11 A. M.
- 19 How many hours did the experiment take?
 - 1 4
 - 2 2
 - 3 3
 - 4 5
- 20 Which of the following does not revolve around the sun?
 - 5 the earth
 - 6 a star
 - 7 another planet
 - 8 the moon
- 21 In the following food chain, which is the primary producer?
 - corn → mice → snakes → hawks
 - 1 corn
 - 2 hawks
 - 3 mice
 - 4 snakes

Level 4

Figure 10 shows the time allotted for the child to complete each subtest. This does not include the time needed for reading and explaining the directions, doing and discussing the examples, answering children's questions, distributing materials, etc.

Figure 10 -

Stanford Subtest Times

Subtest	Time (in minutes)	
	Level 3	Level 4
Vocabulary	20	25
Reading Comprehension	35	35
Mathematics Concepts	20	25
Mathematics Computation	35	35
Mathematics Applications	25	35
Spelling	15	20
Language	35	35
Social Science	25	30
Science	25	30
TOTAL	235	270

The hearing-impaired edition is adjusted in accordance with the observed performance trends of hearing-impaired students. The Vocabulary subtest is keyed at a lower level than the Reading Comprehension while the Spelling and Mathematics Computation are keyed at a higher level.

Age-based percentile norms allow the examiner to compare the child to other hearing-impaired children and grade equivalent scores are available for comparison to normal hearing children. The Stanford is available for the primary level through the advanced level, approximately grade 1-6+. The norms cover ages 8-20+ and grades 1.0-10.5+. Because this is a written test, the child does not use any oral language. Some lipreading is required on the Levels 3 and 4 Vocabulary and Level 3 Mathematics Concepts subtests; this is compensated for by presenting the items both orally and in written form to the subjects.

PEABODY INDIVIDUAL ACHIEVEMENT TEST

The PIAT consists of five subtests: Mathematics, Reading Recognition, Reading Comprehension, Spelling, and General Information. All of the subtests, except Reading Comprehension, contain 84 items and several training items. The Reading Comprehension subtest has only 66 items; the lower level reading comprehension skills are tested in the Reading Recognition subtest. Only a sample of the items from each subtest is administered, based upon the subject's basal and ceiling.

The PIAT is untimed and the amount of time required is dependent upon the subject's performance. A basal, the lowest item in a series of 5 consecutive correct responses, is determined for each subtest. Testing continues upward until a ceiling item, 5 errors in any 7 consecutive responses, is reached. The ceiling item is the last item in such a series. The raw score, obtained by subtracting the number of errors from the ceiling item, is used to determine the starting point for the following subtest and to calculate the various scores available from the PIAT. These include grade and age equivalents and standard scores.

In the following section, each of the subtests are described, along with alterations made in administering to the hearing-impaired.

Peabody Subtests -

Test 1: Mathematics -

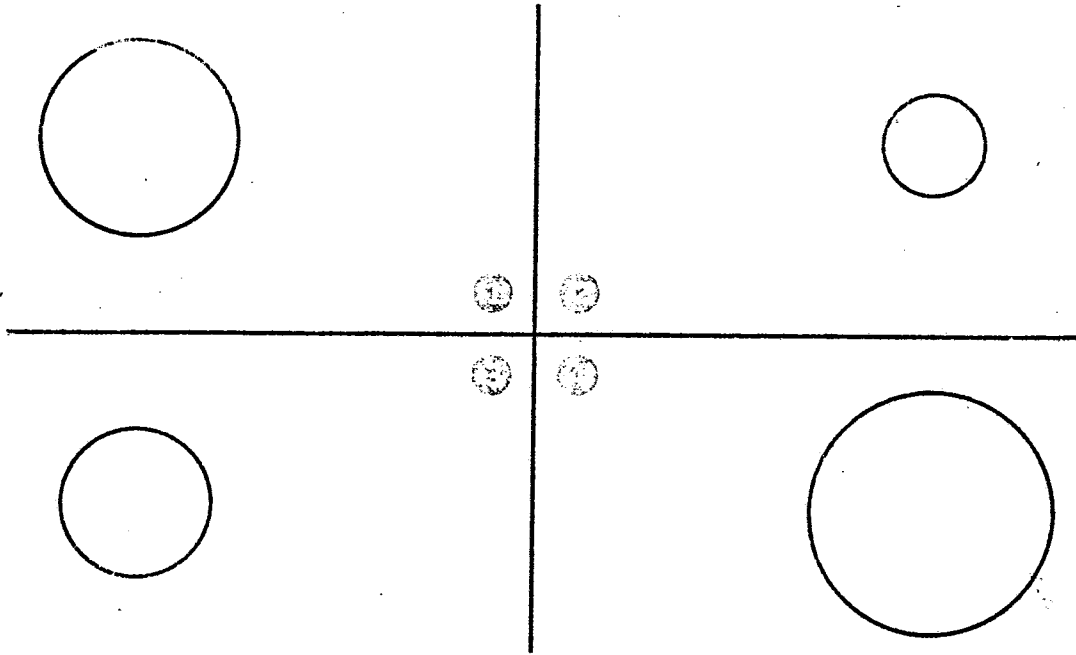
The mathematics subtest is a four-choice multiple choice format that tests early skills such as matching, discrimination, and recognizing numerals through advanced concepts in geometry and trigonometry. The task involves the application of mathematical concepts to solve a problem. Because of the oral format of the test, the content of this subtest is restricted to problems that can be solved mentally. The examiner reads the problem or question to the subject, the subject looks at the problem and the answer choices, selects the answer, and responds with the number of the answer he has chosen. (See Figures 11-13). While the items on this subtest are presented orally, most of them are also presented in writing for the subject. For those items which do not provide the written form, the examiner presented it to the subject on index cards.

Figure 11 -

PIAT - Mathematics

Look at the shapes. Find the biggest one.

(Do *not* substitute another word for biggest.) Point to it. (4)



Item #5

Figure 12 -

PIAT - Mathematics

A storekeeper had twelve pineapples. He sold five of them.
Point down here to the number of pineapples that he had left. (2)

12

5

17

7

5

8

Item #24

Figure 13 -

PIAT - Mathematics

How many *inches** are there in a *yard**? (3)

*The appropriate pointing procedures are not repeated in the instructions to all items. However, the examiner is to use them whenever he believes they will be helpful to the subject.

$$\boxed{\begin{array}{c} ? \\ \text{inches} \end{array}} = \boxed{\begin{array}{c} 1 \\ \text{yard} \end{array}}$$

32	24
36	12

Item #40

Test 2: Reading Recognition -

The items on this test range in difficulty from pre-school - high school. Items 1-18 (see Figure 14) test the matching and discrimination of letters and Items 19-84 require the child to read individual words aloud. The general objective is to measure skills in translating sequences of printed alphabetic symbols which form words, into speech sounds that can be understood by others as words. The examiner determines whether or not the child's pronunciation of the words is correct, based on Webster's Third New International Dictionary, unabridged 1966.

This task presents some problems for hearing-impaired subjects, particularly if the examiner is not familiar with the child's speech skills. Most hearing-impaired children's articulation is somewhat less than "perfect". If the examiner is unfamiliar with the child's speech, he may fail to give the child credit for a word which the child is producing and pronouncing to the best of his ability. Therefore, this subtest becomes subjective when used with the hearing-impaired. In addition, the task can become one of speech rather than reading.

PIAT - Reading Recognition

(Say the following:) Now we are going to do some reading aloud. This page has rows of words on it. (Point, in a sweeping motion across each of the rows from the subject's left to right.) Read each of the words aloud, going across the rows this way. (Point again across the rows from the subject's left to right.) As you finish each row, go on to the next one. Start here (Point to the first word to be attempted) and read them to me. (If necessary, elicit responses by pointing to each word in turn, and using such phrases as: What is this word?) Give me a pronunciation you would expect to find in the dictionary.

30. blaze 'blāz	31. feath·er 'fethə(r)	32. flour 'flaü(ə)r, -aüə	33. ig·loo 'i(,)glü
34. liq·uid 'likwəd	35. purse 'pərs, 'pās	36. dan·ger·ous 'dānj(ə)rəs	37. lodge 'lāj
38. sty·lish 'stīlish, -lēsh	39. ac·ci·dent 'aksədənt	40. ru·in 'rü ən, 'rù	41. ex·er·cise 'eksə(r) ,sīz
42. pi·geon 'pijən	43. mois·ture 'mois(h)chə(r)	44. ar·ti·fi·cial 'är də 'fishəl, 'ä , tə-	45. an·chor 'aŋkə(r), 'aiŋ-

NOTE: Accept the first scoreable response, unless the subject spontaneously corrects it. Ask the subject to repeat a word only if the response is not loud and clear enough to score. If the subject is hesitant about pronouncing the words, encourage responses by such phrases as: Try it. Say it as best you can, etc. (See Part I of the manual for further instructions.)

blaze

feather

flour

igloo

liquid

purse

dangerous

lodge

stylish

accident

ruin

exercise

pigeon

moisture

artificial

anchor

Test 3: Reading Comprehension -

Reading, as a functional ability, is considered by Dunn and Markwardt, to be the facility to derive meaning from printed words. Each item on this test consists of two pages. The first contains a sentence that the child reads one time, silently. The second page, containing 4 alternate, simple, line drawing illustrations, is shown to the child after he reads the sentence. The child is then asked to select the illustration which best represents the meaning of the sentence he has just read. He may not re-read the sentence. (See Figures 15-16).

Figure 15 -

PIAT - Reading Comprehension

A low branch was the cause of the tumble.

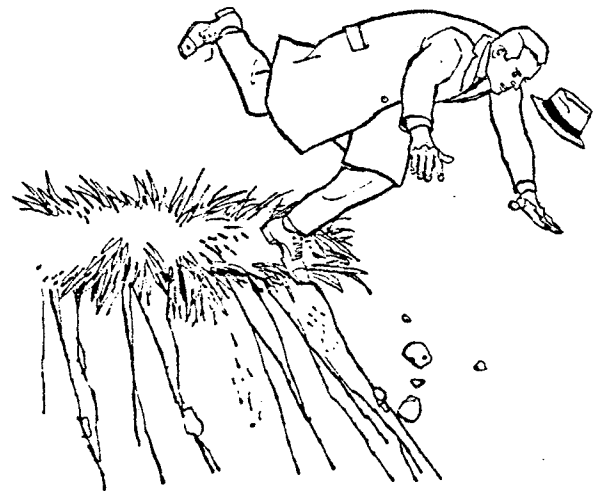
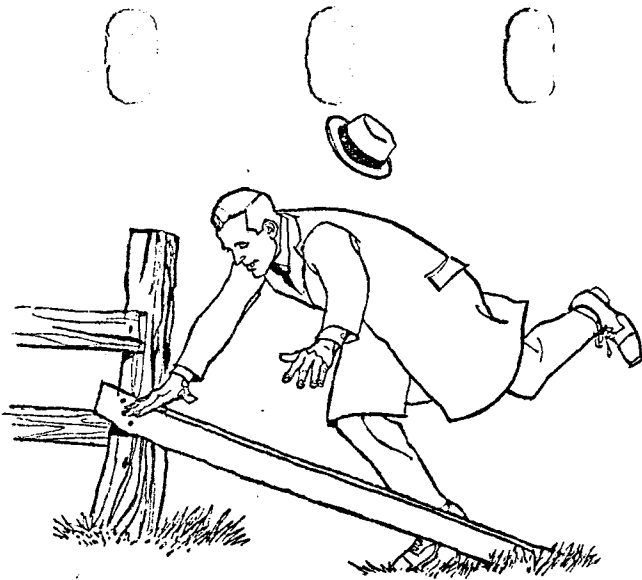
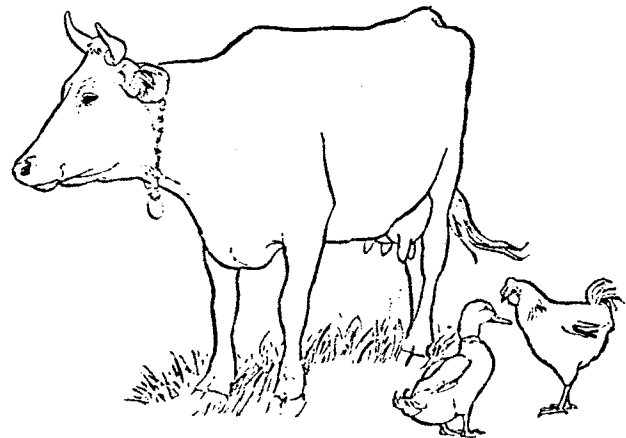
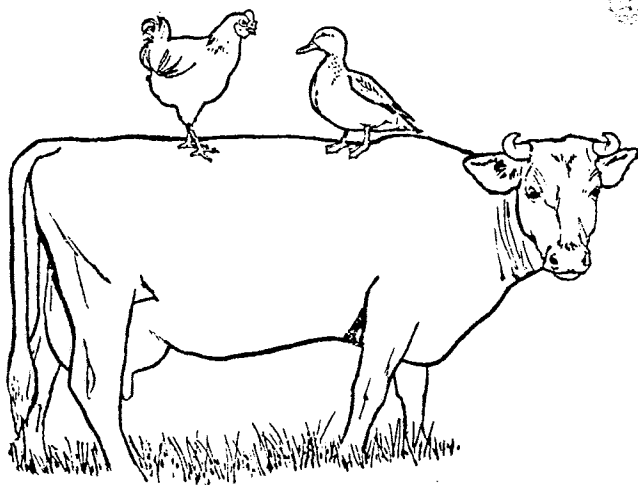
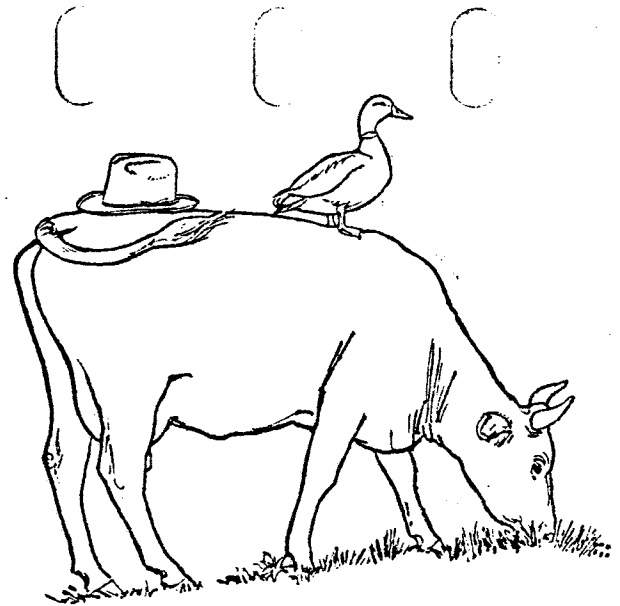
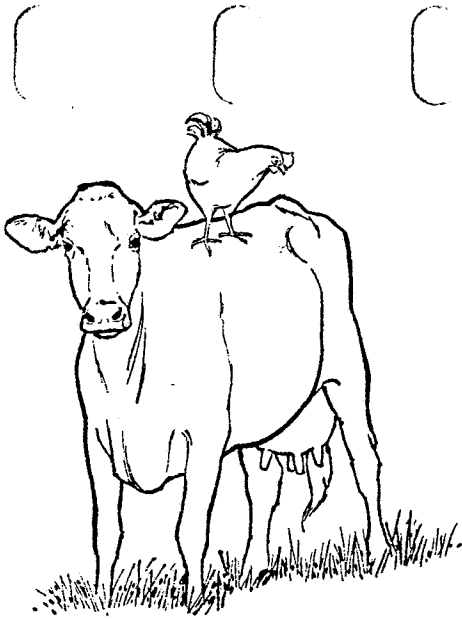


Figure 16 -

PIAT - Reading Comprehension

The rooster and a friend are the cow's passengers.



41

Item #41

Test 4: Spelling -

Items 1-10 require the pointing out of a printed letter of the alphabet as different from three other illustrations that are similar pictures of either objects, numerals, or mathematical signs. Items 11-14 require the identification of a printed letter or word from the letter or word name and speech sound associated with it. For items 15-84 individual words are pronounced and used in sentences by the examiner and the subject is instructed to point out the correct spelling for each word from among four choices. Despite the fact that the child sees the word three times on the lips and that it is used in context, a deaf child may still be uncertain, because of poor lipreading and/or auditory skills, what the word is. (See Figure 17).

PIAT - Spelling

23	23
23	f

Item 2: Find the one that is different - not the same.
Point to it.

win	wenn
when	wen

Item 21: We eat when we are hungry.

Test 5: General Information -

This subtest measures general encyclopedic knowledge, ranging across science, social studies, the fine arts, and sports. The subtest was designed as a screening measure to sample the extent to which an individual has acquired knowledge regarding himself and his environment. The items are not heavily loaded with the history, geography and government of the U.S., nor do they emphasize memory of names, dates, etc. The examiner reads a question aloud and the subject answers it orally. This subtest and task causes several problems for deaf children. Deaf children do not acquire the environmental, life skills, experience-type knowledge tested in this subtest as readily as hearing children do. They do, however, memorize facts with relative ease. In addition, the task is one of lipreading and language for hearing-impaired children. The lipreading factor was compensated for in this study with cards containing the question in written form. The examiner read the question aloud and then the subject read it to himself. The largest problem with the subtest is in the task itself. The deaf subject must generate the oral language for the answer. Even if he possesses the information, he may not have the necessary language skills to correctly answer the question. (See Figure 18).

21. What will happen if a candle is burning inside a glass jar and a tight cover is put on the jar?

CORRECT:

Flame goes out.
Candle stops burning.
It burns out.
It gets dark.

QUESTION FURTHER:

If subject says "The cover gets hot", say:
Yes, but what else happens?

INCORRECT:

The candle melts.
It will break.
The jar explodes.

29. In what game is a ball hit with a racket?

CORRECT:

Tennis
Squash
Tetherball

INCORRECT:

Ping-Pong
Paddleball
Badminton

34. In what way is a thermometer different on a cold day as compared to a hot day?

CORRECT:

Subject needs only to indicate a lower reading on a cold day. No need to identify the liquid in the thermometer.

It rises on a hot day and goes down on a cold day.

The red line is down.

It's lower.

The needle points lower.

QUESTION FURTHER:

It's colder.

INCORRECT:

The liquid goes up.

It changes color.

The Peabody was standardized on 2889 subjects ranging from kindergarten - 12th grade. The range of applicability is 5-3 - 18-3. The PIAT requires the subject to lipread the examiner for the math, spelling, and general information subtests. No written form is provided for the subject on the spelling or general information while it is provided for the mathematics. Several modifications in procedure, discussed elsewhere in this paper, attempted to compensate for this to ensure that the task did not become one of lip-reading. Minimal expressive language is necessary on the math, spelling, and reading.

METHOD

A. Subjects -

Twenty-seven Upper School students at Central Institute for the Deaf participated in this study. The subjects included 11 females and 16 males, ranging in age from 9-5 to 17-6 with a mean age of 12-5. Subjects were selected because they had the necessary skills to complete the Level 3 Stanford.

B. Materials -

Materials for the Stanford included a test booklet, answer sheet, and pencil for each child as well as the test manual. The directions and samples for all of the subtests as well as the items from the dictated subtests were written in large chart tablets placed in front of the subjects.

The PIAT materials included the 2 test binders, an answer sheet, a pencil, and index cards with the questions from the general information subtest written on them.

C. Procedure -

All subjects were given both tests with the PIAT being administered approximately one week before or after the Stanford. Fourteen of the subjects were administered subtests from both Level 3 and Level 4. This was determined based upon their achievement test scores from the preceding school year. If the child had scored at or above 5th grade level

on a particular test last year, he was administered the Level 4 subtest for this study. If he had scored below 5th grade, he completed the Level 3.

The Stanford was administered to groups of 3-8 children. The children were seated at either tables or desks with screens placed between them to minimize distraction. The instructions on the chart tablet were placed in a position that permitted all of the subjects to see them and to lip-read the examiner. The examiner read the directions as the subjects watched the examiner and read them from the chart. The samples were completed by the entire group of subjects and the reasons for each answer discussed. The examiner answered any questions and the subjects began working. Upon completion of a subtest, the subjects were instructed to check their work, as time allowed, for that particular subtest. The examiner flashed the lights when the allotted time had passed; all of the materials were collected before the subjects left the testing room. The testing took place over a period of approximately 2 weeks; there were 7 or 8 sessions ranging from 35 minutes - 1 hour 10 minutes. One or two subtests were administered during each testing session.

The Peabody was administered in a 1:1 setting with the examiner facing the subject and the test easel between them on a table. The examiner explained what the test would be about and read the Introduction to the PIAT to the subject.

Some language modifications were made for all of the subtest instructions as well as for the Introduction; the manual stated that this was an acceptable procedure.

The examiner began the first subtest, Mathematics, eight items below the suggested starting item for that child's grade level. This was based on Wikoff's (1979) findings that the suggested basal for the mathematics subtest is actually too high, as are those for all of the subtests. He recommends starting 8 items below the suggested basal. For this study with hearing-impaired children, the examiner followed Wikoff's recommendation on the Mathematics, Reading Recognition, and Spelling subtests. For most children, because they tend to have such high reading recognition scores and such low reading comprehension scores, the reading comprehension subtest was started 12 items below the suggested basal. Again on the General Information subtest, the testing was started at a lower level than suggested due to hearing-impaired children's outstanding spelling scores and the difficulty that they have with the general information task.

Each subtest was otherwise administered following the standard procedures for establishing a basal and ceiling, accepting answers, etc. As previously stated, the General Information subtest had the questions written on cards that the subject read. Testing lasted 45 minutes - 1 hour for each subject.

RESULTS

Grade-equivalent scores were calculated for each subject on all subtests of the Stanford and PIAT. Total individual averages for both tests were also established, along with the overall mean, standard deviation, and grade equivalent for each subtest. Correlations for each PIAT subtest to each Stanford subtest were also calculated. Closer analysis of the absolute difference was made between several comparable subtests. An age analysis was also plotted to display the relationship between age and performance on the two tests.

Table 1 shows each subject's grade-equivalent scores for all subtests of the PIAT and for the overall scores.

Table 1 - PIAT Grade-Equivalent Scores

Subjects	Math	Read Recog.	Read Comp.	Spelling	Gen. Info.	TOTAL
K.B.	3.1	4.0	3.8	6.7	3.0	3.8
J.B.	10.8	4.8	4.4	5.3	6.0	5.8
J.B.	4.9	4.7	4.1	4.6	6.0	5.0
R.B.	4.9	5.6	5.0	5.8	6.0	5.3
M.C.	3.8	4.0	3.4	4.4	1.4	3.5
J.C.	4.2	4.2	3.2	4.9	4.3	4.2
S.D.	6.4	4.8	5.5	5.6	4.1	5.0
B.D.	4.6	4.7	2.7	4.6	1.9	3.6
A.D.	3.0	4.4	3.8	4.4	1.6	3.5
J.E.	1.3	3.8	3.1	5.3	2.2	2.8
A.F.	3.8	4.0	3.7	5.8	4.4	4.3
C.F.	0.4	3.9	3.3	4.2	1.0	2.6
S.G.	7.6	6.2	4.7	7.4	5.1	6.0
J.G.	12.9	4.4	3.7	6.7	4.0	5.1
K.G.	3.0	4.4	3.8	5.3	0.5	3.4
L.L.	4.9	4.2	5.8	5.8	3.5	4.5
M.L.	2.7	3.5	3.2	3.7	1.6	3.0
J.P.	6.4	4.0	3.6	4.2	3.9	4.2
M.P.	1.8	4.1	6.0	4.6	3.8	3.8
S.R.	6.0	4.2	2.7	7.1	2.9	4.0
T.S.	3.3	6.6	3.2	5.8	4.7	4.5
L.S.	2.4	5.6	2.6	4.9	4.7	3.9
R.T.	2.5	3.6	3.7	3.9	1.4	3.0
N.V.	2.5	3.6	4.5	4.6	3.4	3.5
S.W.	3.1	4.4	2.9	6.0	3.7	3.8
S.W.	7.4	8.1	3.4	7.1	5.8	5.8
S.Y.	12.9	12.4	4.2	8.0	9.4	9.0

Table 2 lists the \bar{x} and s.d. for the PIAT subtests and for the total test. The \bar{x} grade-equivalent score of the subjects in this study was 4.33 with a standard deviation of 1.31.

Table 2 - PIAT Subtests

Test	\bar{x}	s.d.
Mathematics	4.84	3.20
Reading Recognition	4.90	1.82
Reading Comprehension	3.85	0.92
Spelling	5.43	1.14
General Information	3.71	1.98
TOTAL	4.33	1.31

n = 27

The grade-equivalent scores for each subject on the Stanford are listed in Table 3; these are for the subtests and for the test as a whole. The combined mean and standard deviation for each Stanford subtest and for the overall test are listed in Table 4. The overall mean on the Stanford was 4.42 with a standard deviation of 1.54.

Table 3 - Stanford Grade-Equivalent Scores

Subject	Vocab.	Read Comp.	Math. Conc.	Math. Comp.	Math. Appl.	Spelling	Lang.	Social Science	Science	TOTAL
K.B.	1.0	2.5	3.0	4.5	2.9	5.3	4.9	3.8	3.8	3.5
J.B.	3.2	4.8	8.4	10.5	8.6	6.8	7.6	6.8	6.8	7.0
J.B.	3.0	6.3	5.6	6.7	4.0	6.2	6.2	6.0	6.0	5.7
R.B.	2.8	5.3	5.8	6.6	4.4	6.9	6.2	5.8	5.8	5.4
M.C.	1.0	3.1	4.2	5.9	4.6	5.2	4.7	4.4	4.4	4.2
J.C.	1.0	3.0	2.1	5.6	3.3	5.0	4.5	4.9	3.5	3.7
S.D.	2.2	4.6	6.5	6.6	5.1	6.2	6.0	4.9	6.2	5.4
B.D.	2.0	4.0	5.4	5.7	3.2	6.1	5.9	4.5	5.7	4.7
A.D.	1.0	2.8	3.1	4.3	2.5	2.0	4.5	3.8	3.4	3.0
J.E.	1.9	1.7	3.0	2.0	2.1	2.7	2.1	2.7	2.1	2.3
A.F.	2.1	4.6	4.2	5.7	4.0	7.0	4.8	4.6	5.0	4.7
C.F.	2.1	2.7	1.0	2.0	1.7	2.1	2.8	3.5	2.3	2.2
S.G.	4.6	6.9	7.5	5.9	4.6	8.7	7.2	7.0	7.2	6.6
J.G.	2.2	4.8	8.4	10.5	6.5	9.0	6.5	7.0	7.4	6.9
K.G.	1.0	3.1	2.7	3.9	3.2	5.7	3.9	3.9	4.9	3.6
L.L.	1.0	3.5	4.7	7.5	4.2	5.6	4.9	3.7	2.7	4.2
M.L.	1.0	2.6	3.7	5.0	3.2	3.2	4.1	3.6	2.8	3.2
J.P.	1.5	3.8	4.2	7.5	3.7	5.1	4.9	4.6	4.8	4.5
M.P.	2.1	2.0	2.7	2.0	2.7	5.5	4.3	4.0	3.5	3.2
S.R.	1.0	2.9	3.7	6.7	3.5	5.1	5.3	3.5	3.3	3.9
T.S.	4.6	4.5	4.5	5.7	3.7	9.0	6.5	4.1	5.3	5.3
L.S.	1.0	2.9	2.4	3.2	3.3	5.2	3.8	2.7	2.5	3.0
R.T.	1.0	2.6	1.0	2.0	2.4	3.0	2.3	2.2	1.3	2.0
N.V.	1.2	2.9	3.6	5.0	3.5	3.0	4.5	3.9	3.5	3.5
S.W.	1.9	3.6	3.1	3.9	3.2	5.7	5.3	3.9	3.1	3.7
S.W.	2.5	5.9	8.4	10.5	6.0	5.7	5.9	6.4	6.1	6.4
S.Y.	3.4	5.6	10.3	10.5	6.8	7.6	9.5	7.5	7.2	7.6

Table 4 - Stanford Subtests

Test	Grade \bar{x} Equiv.	s.d.
Vocabulary	1.97	1.07
Reading Comprehension	3.815	1.36
Mathematics Concepts	4.563	2.39
Mathematics Computation	5.77	2.59
Mathematics Applications	3.959	1.55
Spelling	5.50	1.93
Language	5.15	1.60
Social Science	4.58	1.42
Science	4.45	1.74
TOTAL	4.42	1.54

n = 27

The correlations between the two tests, Table 5, and the scores for each, Table 6, indicate a highly significant correlation between the Stanford and the Peabody on almost all subtests. The only subtest which fails to show any relationship to the Stanford is the PIAT Reading Comprehension. The overall correlation between the two tests was .883, $t = 9.406$ ($p \leq .001$).

Table 5 - Correlations

	<u>PIAT</u>					TOTAL
	Math.	Read Recog.	Read Comp.	Spelling	Gen. Info.	
Vocab.	+.432	+.559	+.209	+.452	+.627	
Read Comp.	+.665	+.580	+.216	+.524	+.712	
Math. Conc.	+.896	+.677	+.272	+.615	+.726	
Math. Comp.	+.901	+.528	+.141	+.511	+.647	
Math. Appl.	+.892	+.520	+.270	+.500	+.674	
Spelling	+.650	+.470	+.198	+.655	+.619	
Language	+.821	+.704	+.245	+.641	+.786	
Soc. Science	+.848	+.599	+.236	+.561	+.729	
Science	+.771	+.533	+.222	+.522	+.613	
TOTAL						+.883

STANFORD

Table 6 - t-scores

	PIAT					Total
	Math.	Read. Recog.	Read. Comp.	Spelling	General Info.	
Vocabulary	2.39*	3.37***	1.07	2.53*	4.02***	
Reading Comprehension	4.45***	3.56***	.10	3.08**	5.07***	
Mathematics Concepts	10.09***	4.60***	1.41	3.90***	5.28***	
Mathematics Comprehension	10.39***	3.11**	.71	2.97**	4.24***	
Mathematics Applications	9.87***	3.04**	1.40	2.89**	4.56***	
Spelling	4.28***	2.66*	.97	4.33***	3.94***	
Language	7.19***	4.96***	1.27	4.18***	6.36***	
Social Science	8.00***	3.74***	1.21	3.39**	5.33***	
Science	6.05***	3.15**	1.14	3.06**	3.88***	
TOTAL						9.41***

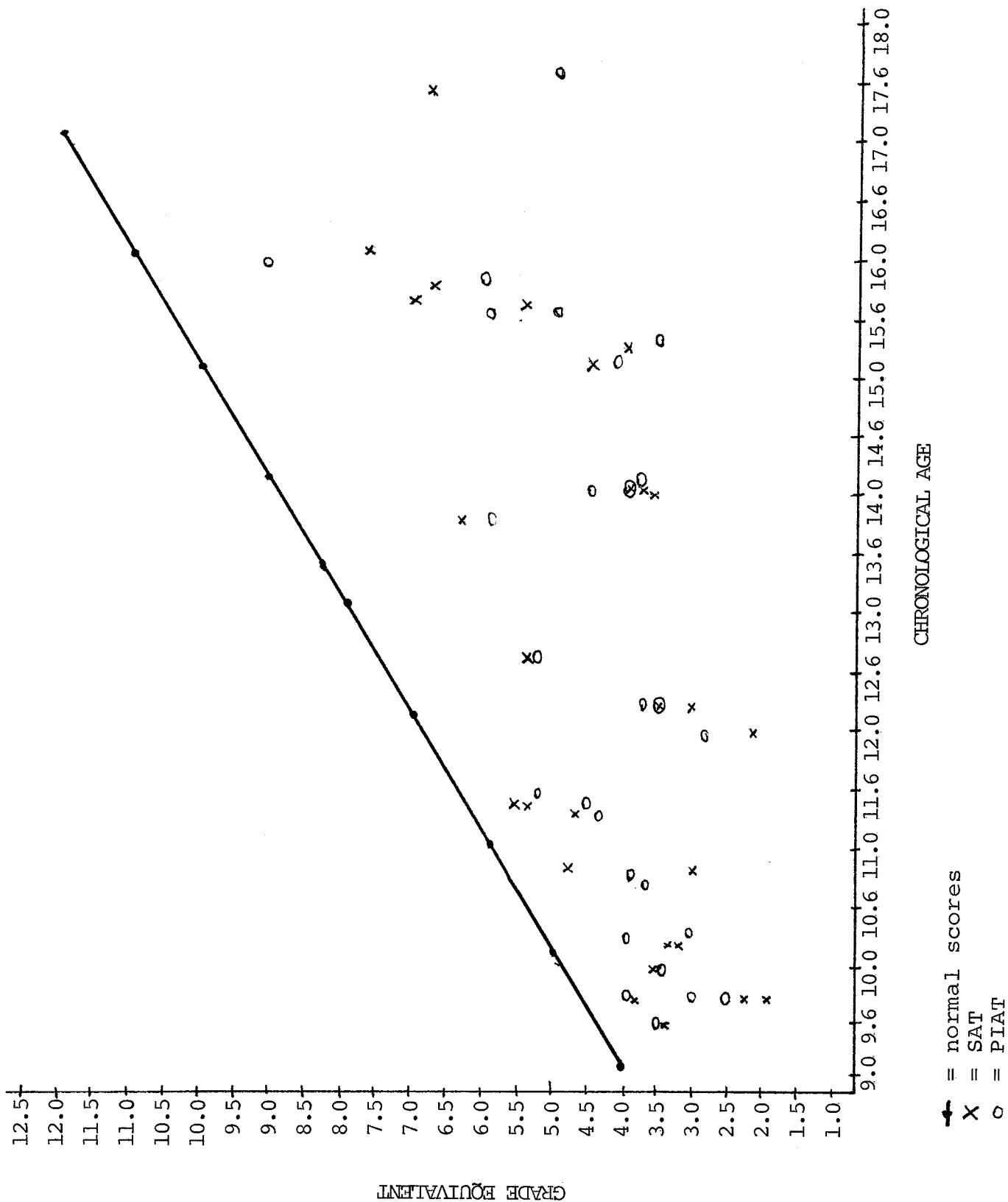
* $p \leq .05$ ** $p \leq .01$ *** $p \leq .001$

An Absolute Difference Scale, Table 7, demonstrates the grade score difference between similar subtests. Figure 19 is an age analysis of performance on both the Stanford and the Peabody. The normal scores are also plotted in this chart.

Table 7 - Absolute Difference Scale (Grade - Equivalents)

PIAT	Stanford	Difference
Mathematics	Mathematics Concepts	+ .277
Mathematics	Mathematics Computation	- .93
Mathematics	Mathematics Applications	+ .881
Reading Recognition	Vocabulary	+2.926
Reading	Spelling	- .604
Reading Comprehension	Reading Comprehension	- .035
Spelling	Spelling	- .007
General Information	Social Science	- .87
General Information	Science	- .74
TOTAL		- .09

Figure 19 - Age Distribution of Scores



DISCUSSION

The correlation between the Stanford and the Peabody, $+ .88$ ($p \leq .001$) indicates a strong relationship between the attained grade scores on the two tests. There is also good correspondence between overall grade scores averaged for this group of subjects. The average overall difference finds the PIAT grade scores less than 1 month (.09) higher than those on the Stanford. There is, however, a tendency for the PIAT to underestimate Math Computation. The difference in grade score of almost 1 school year (.93) can perhaps be attributed to the Peabody being a dictated subtest. The Mathematics subtest items are, therefore, solved without the use of pencil and paper. This is not a true measure of computation skills. Another possible explanation for this difference lies in the language requirement. The Peabody is a verbal test that is dictated to the child. Therefore, if the child has a low language level or poor lipreading skills, the score could be affected.

Word attack skills (Reading Recognition) were greatly overestimated on the PIAT, relative to the Vocabulary subtest of the Stanford. A difference of almost 3 grade levels was seen with these subjects. The average grade score on the PIAT Reading Recognition was 4.896, slightly above the overall test average; while the average grade score on the Stanford Vocabulary was 1.97, approximately 2.5 grade levels below the overall test average. The correlation between the

two subtests was, however, significant at the .001 level. There are several possible reasons for these discrepancies. First, the Reading Recognition task involves reading words; this tests the child's word attack skills, not his understanding of the meanings of the words. The Vocabulary subtest requires the child to understand the words and their meanings. While these are clearly 2 very distinct tasks and 2 different skills are being measured, the Reading Recognition is the most comparable subtest to the Vocabulary. The two require different language skills as well as levels of understanding. Most hearing-impaired children can read words; the problems begin when they have to understand the meaning of what they have read. The Stanford Vocabulary subtest measures a very important skill that the PIAT fails to measure accurately. Another possible explanation for the poor Vocabulary scores lies in the method of administration; it is a dictated subtest. The same problems associated with the PIAT and its verbal requirements apply to this subtest as well.

Scores obtained on the Stanford compare the child to both hearing-impaired and normal hearing children. The PIAT provides only normal hearing norms. As an oral educator, this examiner believes that it is important to evaluate hearing-impaired children in relation to their hearing peers. This measure is particularly useful when making placement

decisions about children. One place in which decisions such as those are made is in a clinic setting.

Clinics provide assessments and evaluations in a brief time period. The Peabody is an excellent measure for that purpose. It is a relatively short (45 minutes - 1 hour) test. Both age- and grade-equivalent scores can be derived.

The PIAT may also be a more practical measure than the Stanford for hyperactive or behavior problem children. The Stanford is a lengthy test during which the subjects must work independently in a group. This can present difficulties for the "problem" child as well as those around him. The examiner has only minimal control over that child; he frequently disturbs and distracts those who are working around him. With the PIAT, the examiner works on a 1:1 basis with the child and has complete control over him. Poor behavior can be controlled quickly without disturbing others. One of the children in this study is extremely hyperactive. During the Stanford, he was constantly fidgeting and disturbing the other children and he was not concentrating on, or applying himself to, the task. When the examiner administered the PIAT to this same child, she was able to control the fidgeting and ensure the subject's attentiveness. The differences revealed themselves in the overall grade scores for this child; he scored a full 6 months higher on the PIAT than on the Stanford.

The PIAT can be considered to be a useful measure with hearing-impaired children in several settings; the overall correlation between the tests is very high. The PIAT provides a brief assessment in some academic and skill areas but not in all of those from which the classroom teacher, school administrator, or parent usually seeks information. Therefore, it is not an optimal choice for use on a school-wide basis as the sole measure of achievement for students. The Stanford provides a much more comprehensive measure for that purpose.

Overall, the Stanford Achievement Test and the Peabody Individual Achievement Test appear to be comparable measures. While the Stanford evaluates a wide-range of information and knowledge, both tests provide similar measures and produce similar results. The Peabody does have problems, particularly the verbal aspects of the test. It does, however, provide a quick measure of achievement that compares favorably to the measure derived from the Stanford.

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