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Manual and slide presentation of PUCO Vision Therapy Diagnostic Test Battery

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Manual and slide presentation of PUCO Vision Therapy Diagnostic Test Battery

Abstract
The purpose of this project was to produce an instructional slide presentation of the PUCO Vision Therapy Diagnostic Test Battery. It has been designed to introduce fourth year optometry students to the test battery at the start of their VT rotation. It is hoped that this project will improve the consistency of the presentation of the diagnostic battery. Practicing optometrists interested in Vision therapy may also find it useful. The manual and accompanying slides contain descriptions of 17 tests that are commonly used to evaluate VT patients at PUCO. Each test description includes step by step instructions on how to administer and score the test as well as information about the purpose of the test, indications for using it, apparatus and setup required, behaviors to look for, and a general critique. The accompanying slides are provided to illustrate and clarify key points of the tests. A separate packet of diagnostic test handouts is also included at the end of the slide presentation script. These handouts, which contain information and references about each individual test, can be used independently of the slides.

Degree Type
Thesis

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MANUAL AND SLIDE PRESENTATION OF PUCO VISION THERAPY DIAGNOSTIC TEST BATTERY

By

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A thesis submitted to the faculty of the College of Optometry Pacific University Forest Grove, Oregon in partial fulfillment for the degree of Doctor of Optometry May, 1989

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ABSTRACT

The purpose of this project was to produce an instructional slide presentation of the PUCO Vision Therapy Diagnostic Test Battery. It has been designed to introduce fourth year optometry students to the test battery at the start of their VT rotation. It is hoped that this project will improve the consistency of the presentation of the diagnostic battery. Practicing optometrists interested in vision therapy may also find it useful.

The manual and accompanying slides contain descriptions of 17 tests that are commonly used to evaluate VT patients at PUCO. Each test description includes step by step instructions on how to administer and score the test as well as information about the purpose of the test, indications for using it, apparatus and setup required, behaviors to look for, and a general critique.

The accompanying slides are provided to illustrate and clarify key points of the tests. A separate packet of diagnostic test handouts is also included at the end of the slide presentation script. These handouts, which contain information and references about each individual test, can be used independently of the slides.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Beery Visual-Motor Integration Test (Beery VMI)</td>
<td>3</td>
</tr>
<tr>
<td>Auditory-Visual Integration Test (AVIT)</td>
<td>6</td>
</tr>
<tr>
<td>Dyslexia Determination Test (DDT)</td>
<td>9</td>
</tr>
<tr>
<td>Getman Visual Manipulation Test (VMT)</td>
<td>13</td>
</tr>
<tr>
<td>Getman Visual Recall Test</td>
<td>16</td>
</tr>
<tr>
<td>Groffman Visual Tracing Test</td>
<td>18</td>
</tr>
<tr>
<td>I/CT’s Visagraph Eye-Movement Recording System</td>
<td>20</td>
</tr>
<tr>
<td>King-Devick Saccade Test (KD)</td>
<td>31</td>
</tr>
<tr>
<td>MKM Monocular and Binocular Reading Test</td>
<td>32</td>
</tr>
<tr>
<td>Peabody Picture Vocabulary Test (PPVT)</td>
<td>35</td>
</tr>
<tr>
<td>Piaget Left-Right Awareness Test</td>
<td>41</td>
</tr>
<tr>
<td>Pierce Saccade Test</td>
<td>44</td>
</tr>
<tr>
<td>SUNY Developmental Test Battery</td>
<td>47</td>
</tr>
<tr>
<td>Standing Angels-in-the-Snow</td>
<td>48</td>
</tr>
<tr>
<td>Chalkboard Circles</td>
<td>49</td>
</tr>
<tr>
<td>3:3 Alternate Hopping</td>
<td>50</td>
</tr>
<tr>
<td>Circus Puzzle</td>
<td>51</td>
</tr>
<tr>
<td>Winterhaven Copy Forms</td>
<td>53</td>
</tr>
<tr>
<td>Pegboard Test</td>
<td>54</td>
</tr>
<tr>
<td>Test of Visual Analysis Skills (TVAS)</td>
<td>58</td>
</tr>
<tr>
<td>Test of Visual Perceptual Skills (TVPS)</td>
<td>60</td>
</tr>
<tr>
<td>Visual-Aural Digit Span (VADS)</td>
<td>64</td>
</tr>
<tr>
<td>Wold Sentence Copying Test</td>
<td>68</td>
</tr>
</tbody>
</table>
INTRODUCTION

Of the various testing tools available to the optometrist, the perceptual tests covered in this booklet tend to be poorly understood and therefore underutilized by optometrists. This is unfortunate because they are diagnostically useful for problems not revealed by more familiar testing methods. This booklet has been organized in an easy reference format so that the optometric intern or practitioner can quickly find an appropriate test for perceptual problems likely to be confronted in practice. Obviously this is a great advantage over the alternative of relying on memory and often falling to come up with an appropriate test.

Every effort has been made to present each test in a simple straightforward manner in order to minimize the time required to prepare to administer it. Slides are provided to visually aid the intern or practitioner in the administration and scoring of these tests.

A few comments about general procedures for administering perceptual tests are in order. A familiar visual exam can be performed almost automatically by the optometrist. For unfamiliar tests however, conscious thought is required. The doctor can inadvertently influence the patient's response and thus invalidate the tests results when performing tests which are unfamiliar to him. An exhaustive account of all the factors which can influence test results is beyond the scope of this introduction but the examiner must be aware that these factor exist and strive to minimize their effect.

Special characteristics of the patient must be noted. For instance, age group, and social and cultural traits are important factors to consider. Frank disability must be ruled out or compensated for. The same norms can not be applied to normal and disabled subjects. A hearing impaired child, for instance, will probably have more difficulty understanding directions. Obviously any condition interfering with sight must be identified before testing visual function.

Subject sophistication can also influence testing results. A subject already familiar with testing methods or subject matter may perform better than would be expected. The doctor should factor into account secondary test exposure in the results of patients who have been tested previously.

Many variables such as time of day, hunger, anxiety level of the patient, and so on can affect responses. The doctor must eliminate as many confounding variables as possible. Distractions in the test area should be minimized. White clinic jackets may cause anxiety in young children, while toys and games in the area or even bright posters may hold the young patients attention better than the task at hand.

The doctor must also be aware of stimulus characteristics that
interact with each other, such as illumination, contrast, print quality and working distance. Sequencing effects must also be considered. Does what was done previously have an effect on the tests that follow?

An appropriate test must be selected. It must relate to the problem of the patient and be appropriate relative to the patient's abilities. The doctor is responsible for presenting instructions in a consistent manner controlling his/her wording, tone of voice, pace, and non-verbal communication of approval or disapproval. Rosenthal has written extensively on what he calls "experimenter expectancy effects." Basically, the person giving the test may expect a certain outcome. For instance, "I'll bet this kid has eye-tracking problems." Possibly his expectations can influence not only the doctor's perception of the patient's performance but can actually influence the patient's response. This can be done by non-verbal cues such as facial expressions, postural changes, and intonation and emphasis at key times during the instructions. The patient often tries to please the doctor by giving what he perceives as the "right" response.

Attributes of the doctor that influence the patient's response include the age of the doctor, his gender, race, religion, anxiety level, need for approval, hostility, authoritarianism, intelligence, dominance, personal warmth, experience level, and prior contact with the patient. Fortunately, perceptual tests are affected less than other psychological tests by these variables. The exact effect of many of these variables is not known.

For our purposes, we hope this discussion has served to heighten the awareness of those who read this and leads to more valid application of these tests.

References

**Name of Test:** BEERY VISUAL-MOTOR INTEGRATION TEST (BEERY VMI)

**Purpose of Test:** The Beery VMI is primarily designed to serve as a screening device to help prevent learning and behavioral disorders through early identification of difficulties.

**Indications:** This test is designed for preschool and early grade school children but may be utilized for anyone ranging from age two years through adulthood. The test can be used for group or individual screenings.

**Apparatus and Setup:** The test utilizes an administration manual, student test booklet, blank paper, and a #2 pencil without an eraser.

**Time Required:** Variable. This is not a timed test.

**Preset (Administration):** The test booklet is turned over so the bound edge is toward the child. There are 24 geometric forms which are to be copied in order. Only one try on each form is allowed (no erasing). Make sure the test booklet and each child’s body remain "centered and squared" with the desk throughout testing. Since the test booklets are reused, place a sheet of paper in so the child can draw the test figures directly below. Have the child open his booklet by turning from the top. Make sure the booklet is opened correctly and the child is seated properly. Point to form one and say, "can you make one line like that?" Point to the child’s sheet of paper which is aligned directly below the first form and say "you make yours right here". Encourage the child but do not provide clues by tracing the stimulus. Continue prompting the child for as many forms as necessary. When the child understands say "go right ahead and do the rest of them. You may turn to the next page when you have finished this one". If the child does not understand a task or fails the first three forms, turn to the back of the first sheet and make repetitive vertical pencil marks. Invite the child to draw marks like yours. Repeat this procedure using horizontal lines and then circles. If the child succeeds on any of these forms let him try again to copy the forms directly. Testing may be stopped after the child has "failed" on three consecutive forms.

**What to Look For:** For each geometric form of the Beery VMI, there is a page of scoring criteria in the test manual. Each page gives the age norm and the requirement for passing (or failing) each geometric form. The scoring criteria start on page 43 of the manual. If there is any doubt whether a form should be marked "passed" or "failed" after the criteria have been studied, mark it as "passed". Inexperienced scorers sometimes tend to be too strict in their judgement of the forms.
**Scoring Test:** To determine the VMI age equivalent for a child, add up the number of forms passed up to three consecutive failures. This total is the child's raw score. For example, if a child passed the first ten forms, failed the next three forms, and then passed the next one, his raw score would be 10. Refer to the table on page 93 of the manual to find the age equivalent that corresponds with the child's raw score. Percentile and standard score equivalent of raw scores for various ages will be found in the tables on pages 94-103.

**Critique of Test:** The Beery utilizes geometric forms and is relatively culture independent. This makes the test useful for children in the United States and many other countries. The test is particularly useful in screening preschool and elementary school age children with learning disabilities involving visual-motor integration. The Beery VMI is easy to administer and can be given individually or in groups. More than 50% of children aged 9 years 6 months passed form 18 but it is not until age 10 years 7 months that the average number of correct forms totals 18. This illustrates that the sequence is not perfect. The geometric forms do not progress from easiest to most difficult in perfect sequence. Generally speaking the forms are arranged in order from simple to complex. Additionally, strengths and weaknesses within performances of individuals will be found.

In utilizing this test it is important to keep in mind that a child may have a high IQ and perform very poorly if he has poor motor abilities. An example of this may be a bright child with cerebral palsy.

The Beery VMI is well standardized but has a limited geographic distribution. Scoring the Beery VMI is fairly subjective. Reliability correlations for two or more scores have ranged from .58 to .99.

Reliability correlations for the same children taking the VMI test twice have ranged from .63 to .92.

In terms of concurrent validity, correlations between the VMI and measures of handwriting and reading have averaged .42 and .50 respectively. Correlation with reading and other academic achievement tests have tended to be higher for the primary grades than for the upper grades. Brain injured, educable mentally retarded and partially sighted children have done less well on the VMI than their peers.

In terms of predictive validity, researchers have found the VMI to be valuable when used in combination with other measures. In one study, the VMI found to be particularly sensitive in predicting high risk boys in kindergarten who subsequently had reading difficulties. Comparison of a battery of prekindergarten test scores with same children's subsequent achievement at the end of kindergarten and first grade indicated that the VMI, in combination with an auditory-vocal association test, best predicted achievement. However, predictive correlation declines as children move up the grade levels.

In summary, the VMI is a useful test but does have some drawbacks.
Studies indicate that more refined scoring should be developed and additional reliability and validity studies should be done. Children exhibiting delays on the VMI (e.g. falling 6 months or below their chronological age) will require further diagnostic testing to determine the nature of their problem.

References


Name of Test: AUDITORY-VISUAL INTEGRATION TEST (AVIT)
aka "Birch-Belmont Test"

Purpose of Test: The purpose of the AVIT is to test the level of
development of intersensory integration between audition and vision as an
indicator of reading readiness. The hypothesis underlying the AVIT is that
reading involves integration between auditory and visual sensory
modalities. This integration is believed to develop after the individual
sensory modalities have developed. Since poor intersensory integration
has already been shown to correlate with poor reading ability when the
senses of vision, touch and kinesthesia were studied, it was hypothesized
by Birch that poor auditory-visual integration would also be a reliable
predictor of poor reading readiness.

Indications: The most meaningful results have been obtained when
testing children in first and second grade. Many kindergarten-aged
children (15%) achieve scores equivalent to guessing. Norms have been
established for kindergarten through 5th grade, but it shows the highest
correlation to reading in the first and second grades. The AVIT can be
useful as part of a battery of reading-readiness testing, or as part of a
battery of tests to determine specific deficits contributing to poor
reading.

Apparatus and Setup: The examiner utilizes a card with 13 Stimulus
Patterns printed on it. The child will be shown a series of 4" x 7"
cards with three visual spatial patterns on each, one of which will correspond
to each stimulus pattern. The examiner holds a pencil to tap out patterns,
and something to act as a visual screen behind which to hide the arm
holding the pencil.

Time Required: Approximately 5 minutes is required for the
administration of the AVIT.

Preset: The child and examiner face each other, seated on opposite sides
of an exam table. The examiner holds a pencil in one hand, with that hand
and forearm shielded from the view of the child. The examiner states, "I
am going to tap out some patterns." The child is shown Response
Card A. The examiner states, "Each pattern you hear is going to be
like one of the dot patterns you see here. Let me show you." The
examiner points to the first set of dots. "These are two dots close
together. Listen to what they sound like." The examiner taps
twice, with about a one-half second pause between taps. "These are two
dots far apart." The examiner taps twice, with about a one-second
pause between taps. "These are three dots close together." The
examiner points to the third set of dots. "Listen to what they sound
like." The examiner taps three times, with about one-half second
intervals. "Now you are going to hear one of these. Listen and
tell me which one it is." The examiner taps any one of the previous
patterns. The examiner verifies or corrects the child's responses.

The child is then shown Response Card B. The examiner states, "Listen
again, and then show me what you heard." The examiner taps out
Stimulus Pattern B, and then verifies or corrects the child's response.
This procedure is repeated with Response Card C.

Next, the examiner states, "Now we are going to do the same
thing, except this time I won't show you the card until after you
hear the dots. So listen carefully and try to remember." The
examiner then taps out Stimulus Pattern 1, and shows the child Response
Card 1. This is repeated for all ten Stimulus Patterns and Response Cards.
Remember not to show the Response Card until AFTER the stimulus is
given. Do not correct the child's responses.

**What to Look For:** The examiner should look for correct responses.
Spontaneously self-corrected responses may also be counted as correct.

**Recording Responses:** One point is scored for each correct response.

**Scoring the Test:** The total number of correct responses is the score. A
perfect score is ten correct. For fourth and fifth grade children, twenty
stimuli may be presented, making 20 a perfect score.

**Critique of Test:** The AVIT has been criticized for 1) being based on
faulty hypotheses, 2) not being a dependable tool at the Kindergarten level,
when a predictor of reading ability is needed, and 3) not being highly
correlated with reading ability after 4th grade.

1. Birch's research failed to investigate three factors which provide
alternative explanations for his findings: a) the possibility of earlier
development of intersensory integration as ascertained by Infant studies.
b) the possibility that the same results could be obtained by intra-modal
conditions, thus eliminating the need for an intermodal explanation. c)
purely temporal-spatial ability was not measured independently of the
intermodal condition.

Although not conclusive, later research indicated that it is the
temporal-spatial task which best correlates with reading age. It was
found that learning-disabled children did not improve their
temporal-spatial abilities, while normal children did improve with age.
Even more recently, research has shown that both the temporal-spatial
ability and the intermodal integration are related to reading ability, and to
each other. Auditory temporal stimuli are more easily decoded than visual
temporal stimuli, probably because the auditory system is better adapted
to temporally-distributed stimuli (such as language), while the visual
system is better adapted to spatial pattern decoding (such as pictures).

2. At the Kindergarten level, a large number of children have difficulty
conceptualizing the task they are asked to perform on the AVIT. By the end of Kindergarten, half of the children achieved a score of 5 or less. Only the upper 10% of children were able to achieve a score of 8.

3. The correlation of the AVIT with reading ability is strongest at the end of grade 1, and then declines gradually through grade 5, although it remains significant. It may be that the strong role played by phonics in reading (an auditory-visual process) at the primary level explains the higher correlation in these grades. One author was surprised to find a correlation between the AVIT and both mental and written arithmetic in the intermediate (4th and 5th) grades.

In conclusion, the AVIT is a useful tool in testing for reading readiness. The highest degree of correlation with reading is obtained when a battery of readiness testing is administered, such as the AVIT, Grooved Pegboard, Visual Memory (Tachistoscope), and Six-Figure Divided Form Board. Such a combination may account for up to 50% of the variation in reading skills among a group of primary students. The AVIT is most useful in grades 1 and 2, although it maintains a significant correlation through at least grade 5.

References


Name of Test: DYSLEXIA DETERMINATION TEST (DDT)

Purpose of Test: The DDT is used to identify individuals who exhibit dyslexic pattern of responding in the areas of reading, writing, and spelling.

Indications: The test is indicated for any child suspected of having a learning disability.

Apparatus and Setup: The apparatus and setup includes an examiner's instruction manual (52 pages), recording pages (2 pages), and a booklet of word lists (23 pages).

Preset and Administration: The DDT tests three basic types of dyslexia; Dysnemkinesia (reversal problems), Dysphonesia (phonetic problems in reading and spelling words), and Dyseidesia (eidetic problems in reading and spelling words. It is administered as a one-on-one procedure.

1. Dysnemkinesia is "a deficit in the ability to develop motor gestalts...for written symbols." It is assessed by requiring the patient to write the numbers 1-10 and to print the entire alphabet in upper case, and then in lower case, letters.

What to Look For: The examiner should look for handedness used in printing, reversed letters and numbers, omissions, poor posture, pencil grip irregularities, and any other observed problems.

Recording Responses: The examiner records impressions on the front side of the Interpretation Recording Form.

Scoring the Test: A score is obtained by counting the number of 1-10 reversals and adding to that the number of alphabet reversals, either upper or lower case, whichever is greater. Guidelines are given in the manual to identify the grade level equivalent of the patient's letter- and number-formation skills.

First grade: A total of nine reversals.
Second grade: A total of seven reversals.
Third grade: A total of five reversals.
Fourth grade: A total of three reversals.
Fifth grade: No reversals expected, but an occasional one may be considered within normal limits. (p. 3, Manual)

Comparison is then made to actual grade level placement to identify the patient as experiencing mild, moderate, marked or no dysnemkinesia.
2. **Dysphonemia** is a deficit in symbol sound integration, and the inability to develop phonetic word analysis synthesis skills.

3. **Dysseidesia** is a deficit in the ability to perceive whole words as visual gestalts and match with auditory gestalts.

Both Dysphonemia and Dyseidesia are assessed using a booklet of word lists, ranging from the preprimer to college level, each containing 10 words.

The first subtest assesses the patient's ability to decode words. Testing should begin two years below the patient's reported reading level. The patient views the word list (Form A) at his usual reading distance, while the examiner views the Decoding Patterns Form. The first part of this subtest assesses encoding, by requiring the patient to attempt to orally sight-read words exposed for 2 seconds. This is eidetic ability. The examiner places a dot or dash in the "E" column to signify words read correctly. The examiner must verbally instruct the patient to "go on to the next word" if the patient lingers on a word for more than 2 seconds. As long as 50% or more of the words are correctly identified, the patient is allowed to proceed to the word-list for the next grade level.

The patient is then required to attempt to read the words missed on the first part of the test, allowing 10 seconds of exposure. This is phonetic ability. The examiner puts a dot in the "P" column on the score sheet if the word is read correctly in a 10 second time period. These are classified as "untimed-known." Words not read correctly are classified as "unknown" and a dot is placed in the "U" column. Decoding testing should continue until at least ten unknown ("U") words are recorded.

**What to Look For:** The examiner simply looks for correctly read words.

**Scoring the Test:** To score, the test columns are totalled for each grade level. The highest grade level of 50% sight-word recognition is entered as the DDT grade level. A value judgement is made as to whether the patient uses a more phonetic or a more eidetic mode of processing.

The second subtest focuses on encoding, requiring the patient to spell words eidetically and phonetically. Starting with the patient's DDT Grade Level, the examiner reads aloud odd-numbered words that were known eidetically by the patient ("E" column), working backward to lower grades until a total of ten words is reached. The child writes the words called on the back of the Interpretation Form.
What to Look For: The examiner looks for correctly spelled words.

Recording Responses: The patient writes his eidetic words on the back side of the Interpretation Recording Form.

Scoring the Test: The number of correctly spelled words is recorded as a ratio (e.g. 2/10 or 20%) on the front side of the Interpretation Recording Form. Table 1 shows this scoring procedure.

<table>
<thead>
<tr>
<th>Score of encoding of flash-known words</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(100%) 10/10</td>
<td>Above normal</td>
</tr>
<tr>
<td>(80%) 8/10</td>
<td>Normal</td>
</tr>
<tr>
<td>(60%) 6/10</td>
<td>Borderline normal</td>
</tr>
<tr>
<td>(40%) 4/10</td>
<td>Mild Dyseidesia</td>
</tr>
<tr>
<td>(20%) 2/10</td>
<td>Moderate Dyseidesia</td>
</tr>
<tr>
<td>(0%) 0/10</td>
<td>Marked Dyseidesia</td>
</tr>
</tbody>
</table>

Then the examiner calls out ten Unknown ("U") words for the patient to spell.

What to Look For: The examiner judges words correct if the patient recorded the "phonetic equivalent" of the list word (e.g. "sord" for "soared").

Recording Responses: The patient writes his phonetic words on the back side of the Interpretation Recording Form.

Scoring the Test: The number of correctly spelled words is recorded as a ratio (e.g. 8/10 or 80%) on the front side of the Interpretation Recording Form.

Critique of Test: In the instruction cassette, but not in the manual, examiners are cautioned not to use the DDT in isolation, but only as a part of a battery of general ability and achievement tests. In some parts of the test, the examiner is instructed to make a qualitative value judgement, which would not be reliable for an inexperienced examiner. No information regarding standardization or normative data is available. This limits the diagnostic value of the DDT, and restricts it to a screening role, which is it's designated purpose. This test is not commonly utilized nonoptometrically and is therefore largely unrecognized outside of the profession of optometry.
Name of Test: GETMAN VISUAL MANIPULATION TEST (VMT)

Purpose of Test: The VMT assesses the skill of manipulating one's visualizations, and indirectly tests visualization itself. Visual manipulation is the skill an architect uses to draw the face of a building, and then, in his mind's eye, go inside the imaginary building and look back out, so he can draw the interior view. The VMT is useful not only for diagnosis, but also to monitor the progress of a training program, and to dramatically illustrate to parents and teachers the problems which the child is experiencing.

Indications: The VMT can be used as part of any developmental exam when the patient is of Kindergarten to primary age, and even older in extreme cases of learning disability. Young patients having difficulty in letter formation, especially when letter reversals are a problem, reading or spelling, are candidates for this test. The VMT can also be used to monitor progress in a vision training program aimed at developing visual manipulation skills.

Apparatus and Setup: The test utilizes 4 Geometric Forms, as shown, each on an 8 1/2" by 11" sheet of paper, or as vinyl "stick-ons" with a plexiglass sheet replacing the paper. VMT-1 is a triangle. VMT-2 is a half-circle. VMT-3 is a sideways "T". VMT-4 is an "L". Orientation of these figures must be correct in order for scoring key to be valid.

In addition, the test utilizes 4 Worksheets (VMW-1 through -4), as shown, each displaying three rows of a geometric form in various orientations. The basic form is the same as the corresponding test form. For example, VMW-1 displays triangles in various orientations.

Pencils for marking answers are also utilized.

Time Required: Less than 10 minutes depending on the developmental level of the child.

Preset (Administration): Examiner sits across the desk, facing the patient. Worksheet VMW-1 is placed in front of the patient on the desk. Test Form VMT-1 is held in a VERTICAL position in front of the patient, approximately 20 inches away, centered straight out from the patient's nose. The dark-colored bar must be at the top of the card (or window). Figure as shown here facing the patient.

Visual Manipulation Test Questions:
1. "Looking at the top row of shapes on the worksheet, can you point to the one that looks like the shape on this window (test card)?"
2. "Can you pretend you are sitting where I (the examiner)
am sitting? Now, mark the shape in the top row of the worksheet that would be like this shape if you were seeing it from my (the examiner's) side."

3. "Can you pretend that I (the examiner) have flipped this window from top to bottom so the black colored line on the top is now down instead of up? Now, mark the shape in the second row of the worksheet that this shape would be like after I (the examiner) flipped the window."

4. "Can you pretend again that you are sitting where I (the examiner) am sitting and still pretend that I have flipped the window? Now, mark the shape in the third row of the worksheet that this flipped shape would be like if you were sitting in my (the examiner's) chair."

The same questions are repeated for Test Forms and Worksheets numbered VMT-2 & VMW-2, VMT-3 & VMW-3, and VMT-4 and VMW-4.

What to Look For: The first question in each series is not scored; it is only asked to be sure the patient is fully understanding the test procedure on each change of shapes. Make sure the figure presented to the child is oriented as shown.

Scoring the Test: The first question in each series is not scored. One point is given for each correct choice, on the last three questions in each series (each test form). The maximum score is 12 points. There are no half-points given because there is no "maybe" answer to any of the questions; the choice is either correct or it is not.

Score the number correct over the total possible correct (12). A perfect score would be recorded "VMT 12/12." If only seven were correct, for instance, the score would be recorded "VMT 7/12."

Critique of Test: Not much literature is available on this test. The Getman Visual Manipulation Test was actually developed by Dr. Steven Marcus and Chris Henderson at the Pathway School in the mid-70's, in consultation with Getman. It was reported by Getman in the OEP "Optometric Dialogue" paper in February 1976, in Vol. 48 of the Continuing Education Courses. In ongoing clinical application of the test, Dr. Marcus feels that it tests the visual skill most closely related to classroom performance. He feels there is almost a one-to-one relevance between this test and the child's performance in spelling.
**Answer Key:**

<table>
<thead>
<tr>
<th>Question:</th>
<th>W-1</th>
<th>W-2</th>
<th>W-3</th>
<th>W-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1 (top row)</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No. 2 (top row)</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>No. 3 (2nd row)</td>
<td>8</td>
<td>6</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>No. 4 (3rd row)</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

Age norms have been established for the Visual Manipulation Test by Dr. James L. Cox in a 1977 study of 717 primary-age children in California.

- Kindergarten = score of 4
- Grade 1 = score of 5
- Grade 2 = score of 6
- Grade 3 = score of 7
- Grade 4 = score of 8

**References**

Name of Test: GETMAN VISUAL RECALL TEST

Purpose of Test: The Visual Recall Test assesses the VISUALIZATION skills of the patient. Visualization is a skill closely related to classroom performance, particularly in spelling. A word about to be written must be visualized by the writer, and then transmitted to the proprioceptive and motor systems for action. Visualization is essential to decoding information from graphic symbols on a page; it replaces earlier dependence on tactile, olfactory, auditory, gustatory and direct visual experience. The primary purpose of our visual system (at least in the classroom) is the acquisition of knowledge from the symbolic contexts of our culture. Spelling and reading are visual-spatial phenomena. Every word has its own spatial organization.

The Visual Recall Test is similar in concept to the Monroe Visual 3, in that it presents a series of shapes to which little, if any, meaning can be attached. The Getman cards begin with fewer and/or simpler forms, thus avoiding the problem encountered with many children who would not attempt the Monroe second card because they were intimidated by the first card.

Indications: The Visual Recall Test can be used as part of any developmental exam when the patient is of Kindergarten through primary age. Young patients labeled as having learning disabilities, (especially in spelling, writing, or letter reversals) are candidates for this test.

Apparatus and Setup: The test utilizes 9 pattern cards, as shown here. Three sheets of blank 8 1/2" by 11" paper, ruled into 3 horizontal sections and pencils for drawing are utilized as well.

Time Required: Less than 10 minutes depending on the developmental level of the child.

Prescribed (Administration): Each of the first three cards (one form per card) are presented to the patient for five seconds of viewing. After each card is viewed it is removed and the patient is instructed to draw what he saw. (Adequate time is allowed for drawing).

The second three cards (two forms per card) are presented for ten seconds each, and the last three cards (three forms per card) are presented for fifteen seconds each. (Adequate time is allowed for each card for drawing).

What to Look For: Assess the accuracy of form reproduction. Size matching is not necessary, but all parts of a form must be recognizable
and correctly oriented to be given full credit.

**Scoring the Test:** Each correctly drawn figure receives one point. If the form reproduced is recognizable, but partially incorrect, a score of 1/2 point is given. For example, rotations and reversals would be given 1/2 point.

**Critique of Test:** Not much literature is available on this test. The Getman Visual Recall Test was actually not developed by Getman, but by Drs. Steven Marcus and Chris Henderson at the Pathway School in Audubon, Pennsylvania in the mid-70's. Getman merely reported on it, and spoke of it very positively, in an OEP paper, Vol. 48, Optometric Dialogue series, January 1976. As mentioned earlier, it has the advantage of having a simpler beginning level than the Monroe Visual 3, which is beyond the ability of many adults, thus being much too difficult for primary-age children experiencing difficulties with visualization.

The Visual Recall Test has been normed in a study of 717 primary-age children in Downy, CA, by Dr. James L. Cox in 1977. The normative scores, by grade, are:

- Kindergarten = score of 8
- Grade 1 = score of 9
- Grade 2 = score of 10
- Grade 3 = score of 11
- Grade 4 = score of 12

Lack of specific scoring protocol and examiner subjectivity to whether a form is partially/fully correct may affect inter-examiner reliability of the test.

**References**

**Name of Test:** GROFFMAN VISUAL TRACING TEST

**Purpose of Test:** This test is designed to evaluate pursuit ability.

**Indications:** The Groffman is indicated for anyone who is experiencing or suspected of having difficulty in eye movement skills. It is typically utilized with students aged 7 to 12 years.

**Apparatus and Setup:** The test utilizes a Demonstration Card, Test Form "A", Test Form "B", and a Visual Tracing Test Record Form. A stopwatch is used for timing.

**Time Required:** Variable, depending on the child’s ability, although generally less than 10 minutes.

**Preset (Administration):** The examiner hands the demonstration card to the student and says "This is a test to see how quickly and accurately you can follow a line using only your eyes. Look at the line that starts at the letter "A". Follow it with your eyes. When it reaches another line (examiner points to the first intersection), follow it straight ahead and do not turn off onto a line which crosses the line you are traveling on. At the end of the line you trace will be a number. You will report this number to me. Do you understand?" When this is understood, continue. "Now we are going to trace 5 more lines. Your score will depend on accuracy and speed, so work quickly, but try not to make a mistake." The examiner places the test card before the patient and times each letter on the test diagram individually. Be aware if the patient attempts to use his/her finger to trace the line, you must stop and start over. The patient should not handle the test card.

**What to Look For:** The examiner should watch for the following behaviors:

1. Attempting to use finger.
2. Excessive head movement.
3. Improper distance from the paper.
4. Unusual head posture.
5. Unusual body posture.
6. Unusual facial expression.
7. Unusual verbal comments.
8. Unusual body movement.
9. Any other unusual behavior.
Scoring the Test: If after the tracing the number reached is incorrect, a score of 0 is given. If the number reached is correct, record the time and read from table 1 to translate this into points. For example, if the time elapsed was between 26-30 seconds, a score of 7 would be given for that tracing. Total all the points for the five letters and record this as a "score/score for age from table 2."

The correct answers for the five letter tracings are:

Form A & B; A-3, B-4, C-1, D-5, and E-2

Critique of Test: The Groffman Visual Tracing Test is a quick and easily administered test of visual tracing and eye-movement ability in addition, it requires the subject to discriminate figure from ground. It can be used with a wide range of ages but is normed for ages 7 through 12 and over. It can be used as a device for screening and/or testing, and it can also be used to evaluate progress in a vision training program. This test is not used outside the profession of optometry.

References

**Name of Test:** I/CT'S VISAGRAPH EYE-MOVEMENT RECORDING SYSTEM

**Purpose of Test:** The Visagraph system records and analyzes eye movements or oculo-motor activity and allows for direct objective evaluation of a reader's visual efficiency and an indirect judgment about his/her effectiveness. The results of eye movement recordings can also be used in conjunction with teacher evaluation and standardized tests to measure changes in both the efficiency and effectiveness of the total reading process. Eye movement recording provides a way of measuring the efficiency of a person's reading eye movements by measuring the components of efficiency: Fixations (number of eye pauses/100 words), regressions (number of reverse eye movements/100 words), average span of recognition (the word or word-parts perceived during a fixation), average duration of fixation (the length of time of eye pause to perceive), rate with comprehension (words read in relation to time), and directional attack (the tendency to read in a left-to-right manner).

**Indications:** This test is indicated for any individual having or suspected of having reading difficulty relative to visual/functional, perceptual, or cognitive function. An individual's eye movements or oculo-motor patterns reflect an acquired reading performance which represents his/her visual/functional, perceptual, and cognitive adaptations and development over a period of time. As reading eye movements are relatively involuntary, they are reflective of a reader's present level of efficiency in reading. The Visagraph system can be an important diagnostic tool used in conjunction with any reading improvement program. It can also be used to evaluate learning disability adoption behavior, text tactics such as skimming and scanning, and work adaption behavior to CRT operations.

**Apparatus and Setup:** The Visagraph employs the use of electronic sensing and recording function coupled with the analytical capability of the computer. It will work equally well with the Apple II Plus (48K) or Apple Ile computer. Either the Apple IIc or Apple Ile monitor can be used. The authors recommend the IIc monitor (9" diagonal) for greatest testing flexibility. Recommended viewing distances need to observed to ensure proper print size. With the IIc monitor, a viewing distance of 18" (11" between Visagraph and monitor) is suggested whereas a 31" viewing distance (24" between Visagraph and monitor) is recommended for the Ile monitor.

The reading selections utilized are composed of 6 levels (preprimer through grade 6) with two additional levels, one through grade 7 and one through grade 10. The test selection should be one that can be read easily, therefore it should be at the subject's reading level or lower. If there is
any doubt as to the reading ability, an oral pretest contained in the Visagraph Test Selection Booklet is utilized to determine the proper reading level. A comprehension test covering the reading material is administered at the end of the reading sample. A comprehension level of 70% or better will qualify the reading performance.

Visagraph adjustments:
1. A table 4' or more in length and 33" wide will be adequate for testing (depending on which monitor being used the arrangement of the components may be different).
2. An adjustable chair or stool is recommended for seating subjects at the proper height.
3. The Visagraph should be positioned against the edge of the table and secured in place with the Visagraph clamp.
4. Place the monitor at the proper testing distance from the Visagraph.
5. By inserting the Visagraph test diskette into the disk drive and turning on the computer (Title frame will appear) vertical, horizontal, and height alignments of the monitor are made.

Preset (Administration):

Subject preparation:
A. Preliminary adjustments:
   1. Head steadiers should be open.
   2. Chin rest knob is loosened to allow the chin rest to float freely.
   3. Set LED knobs to midpoint position.
B. Seating subject:
   1. Adjust chair height for comfortable viewing. The body should be parallel to Visagraph and screen.
   2. Subject should be able to place arms comfortably along the sides of the Visagraph.
   3. Check good (forehead) adjustment (normally is left in the midposition unless forehead is extremely recessed or protruding). Some adjustment may be needed for bifocal wearers. (Subject’s head is not in the Visagraph at this point).
   4. Subject is oriented to the recording sequence:
      a. "An eye-movement recording will be made of your reading."
      b. "Listen carefully to all directions."
      c. "Read carefully so that you can answer questions."
      d. "Read the reading test only one time, don’t re-read."
      e. "Be sure to sit very still and try not to move your head while the recording is being made."
      f. "During recording, you will put your head on the chin
rest and look through the Visagraph at the computer screen."

"All directions and reading content will appear on the screen or be told to you."

"You will need to press the advance response button when I tell you and to advance the reading selection when each frame of reading is finished."

5. The subject should wear his/her glasses if used for reading or if the print is seen better without glasses, it is advisable to allow the subject to read without them.

6. Push RETURN (Title frame to date frame). Enter testing date. Press RETURN between month, day, and year.

7. Push RETURN (main menu will appear). Select 1: TEST.

8. Push RETURN. Enter subject's name.


Recording Procedure:

1. When the alignment frame appears, the subject is asked to put his/her head in the Visagraph with chin in chin rest.

2. Examiner asks if all number 1-9 can be seen. If not, vertical adjustments are made until all numbers are seen.

3. Vertical alignment "mask" is placed into position and the subject is asked if the centrally placed numbers 4,5,6 can be seen. If not, vertical adjustments are made. The chin rest is locked into place and the head steadiers are placed against the subject's temples.

4. The red and green LED lights are switched on. Rotate the LED knob until the brightest reflection is seen.

5. Remove vertical alignment mask and turn LED lights off.

6. Press space bar for the next frame. Examiner should read all instructions from this point forward. Subject is instructed to look at the center 'X'. The subject's center position is being sampled. After data is collected, an 'X' appears in a box. The LED alignment knobs are adjusted until the 'X' is small enough to fit within the box.

7. Press space bar. The 'X' will move around the frame. If the signal noise exceeds acceptable bounds, realignment may be necessary. If alignment is acceptable, press 2, continue.

8. Get Ready will now appear on the screen. Examiner says: "Now you are going to read a short story. Try to read one time only, don't re-read. Read as rapidly as you can but carefully as you will be asked questions following the reading of this selection. The reading selection will appear on several frames. As you finish
each frame, press the button and a new frame will appear. Get ready to read."

9. When the reading task is completed, CAPSULE GRAPH Y/N will appear. The subject can now remove his head from the viewer.

**Time Required**: Variable, but normally 5-7.5 minutes.

**Recording Responses**: During the reading of the test selection, 50 samples per second are taken of the subject’s eye positions. This data is translated into a capsule graph which can be viewed if desired. By viewing the graph, it can be determined if the subject exceeded the bounds of the reading area and the number of lines which were affected. If the bounds were exceeded excessively, the subject may need to be re-recorded. When the bounds are exceeded, all fixations are not visible.

If the capsule graph option is not selected, the main menu will appear. Typically 2. Calculations is entered next. The frame PRINT CALCULATIONS (Y/N).....? will appear on the screen. This allows for a printout of the calculations or viewing them on the monitor. The calculations take approximately 1min 20sec. During this time, the examiner could administer the oral comprehension test. The following calculations are made:

- **# OF FIX/100 WORDS**: Number of eye stops required to read 100 words.
- **# OF REG/100 WDS**: Number of reverse direction (right to left) eye movements occurring in 100 words.
- **DIRECTIONAL ATTACK**: Percentage of right-to-left versus left-to-right movements.
- **AVG SPAN OF RECOG**: Average number of words or word parts perceived per fixation in reading 100 words.
- **AVG DUR OF FIXATION**: Average length of eye pauses of all fixations required to read 100 words.
- **READING RATE (WRR)**: Reading rate without any re-reading.
- **READING RATE (WRR)**: Reading rate allowing for any re-reading.
- **# OF LINES READ/USED**: Number of lines read is the number of actual line excursions executed by the reader while reading the countable lines. Number of lines used is the number of countable lines in the reading selection (8 lines for levels 1-3 and 15 lines for levels 4-13).
- **REL. EFF./GRADE EQ**: The grade level equivalent of the reader’s performance efficiency.

**Test Diskettes**:
The test diskettes A, B, and C are used for:

- Testing
- Calculations (calculations for up to 100 subjects can be stored)
- Inspection of Raw Data Graphs
- Simulation
- Transfer of all subject data to the Data Diskette

The Data Diskette is used to store all subject data for:
- Raw Data Graph printouts
- Calculations

**Scoring the Test:**

A. **Interpreting recorded information:** The following describes the considerations observed in both the recording and calculations with the Visagraph.

- **Sampling:** Fifty samples per second are collected of the fixation positions of both the left and right eyes. (Available for display in "Raw Data Graph" form.)

- **Countable lines:** The data is then analyzed on all "countable" lines. The performance of the first and last lines of each reading display are eliminated as atypical. The net result is 8 "countable" lines for levels 1-3 and 15 lines for levels 4 and up (unless re-reading occurs).

- **Analysis/calculations:** The sampling of fixation positions is analyzed for: significant changes in eye-movement positions; significant duration of fixation; and repeat sweeps. Using these parameters, all significant eye movements are plotted in fixation "buckets" across lines of print, and this information is then used for all "Calculations" and for the "Fixation Graph" display. This information is also used for the "Simulation" option available in management whereby a reader's eye movements are presented on the computer screen in relation to each line of print.

B. **Results of Calculations:**

1. **Fixations:**

   a. **Nature of fixations:** The term fixation or eye stop refers to the interval in reading a line of print during which the eye is held relatively stationary for a short time and during which perception takes place. Following each fixation, the eye moves to a new fixation position. This interfixation movement is called a saccade or saccadic movement. The more efficient reader requires fewer fixations in reading a given line than the poorer reader. An individual might employ a comparatively large number of fixations for any of the following reasons:

   1. Difficulty with visual acuity or binocular coordination.
2. Conditioning of early reading experiences.
3. Perceptual inaccuracy.
4. Comprehension difficulties.

b. "Raw Data Graph"/Counting Fixations: An examiner might choose to use the "Raw Data Graph" of the Visagraph to additionally study and count fixations. Each vertical line on the graph indicates a fixation. The horizontal lines connecting fixations are interfixation movements.

c. "Raw Data Graph" Observations: It is also possible to study the "Raw Data Graph" to note individual variations in the number of fixations per line and the location of these fixations. The fewer fixations per line and the more regular the number and location of fixations per line, the more accomplished the reader.

2. Regressions: Regressions, or reverse fixations, are those fixations that occur following a right-to-left saccade or interfixation movement. Regressions are classified into two types:
   a. Habitual - Regressions can be caused by an inadequate formation of directional attack when learning to read or because of a lack of confidence and an ingrained need to double-check.
   b. Sporadic - This type of regression occurs mainly from difficulty with the content. Perceptual errors, inadequate interpretive or organizational ability, and/or lack of experience create the need to check back.

As with fixations, the Visagraph will automatically calculate the number of regressions for each subject. The examiner can also study the "Raw Data Graph" as with fixations to count regressions or note the consistency of regressions per line.

3. Directional Attack: The term "directional attack" refers to the characteristic tendency of the reader to perceive and organize content in a left-to-right manner. Generally, if the percentage of regressions is 10-15% or less, a reader’s directional attack can be judged efficient. If 25% or more, the reader is employing poor directional attack. The Visagraph will also calculate "Raw Data Graph" information on directional attack. The more regular the reader’s progression from left to right on each line of print, the more accomplished the reader.

4. Span of Recognition: The span of recognition refers to the amount of words or word-parts perceived during a fixation or eye pause during reading. It does not refer to the amount of material impinging on the eye. The Visagraph calculates an average visual intake. The fewer number of fixations (the
larger span of recognition) and the more regular the fixation pattern across each line of print, the more accomplished the reader.

5. **Duration of Fixation:** The duration of fixation refers to the length of time a reader's eyes pause during a fixation. In general, duration of fixation tends to shorten as the reader matures, reflecting a decrease in his reaction time and an increase in the rapidity with which he associates and comprehends. This changes very little however, after the reader reaches 4th grade or about ten or eleven years of age. The Visagraph also makes available "Raw Data Graph" information concerning duration of fixation.

6. **Rate With Comprehension:** This refers to the time required by a reader to read through a given selection with adequate comprehension. The vast majority of people vary their rate but slightly on material that could be classified as easy to fairly difficult. When comprehension is the goal, a person relies upon a characteristic manner of reading. The rate of reading regarding its use with the Visagraph is based on the following conditions:
   - The level of test material read is such that it permits a reasonable degree of fluency to demonstrated.
   - The test selections are structured so that they are reasonably complete in themselves, with their facts and ideas presented in a sequential manner.

"Raw Data Graph" information is available relative to rate of reading with comprehension.

7. **Determining the Relative Reading Efficiency/Grade Level Performance:** "Relative Efficiency" is a calculation that provides an objective numerical indication of the grade level of a subject's reading performance. It is based on the following considerations:
   - It presupposes that fixations, regressions and rate are the most important components.
   - It presupposes that a person who makes more regressions is generally less effective perceptually, and that regressions therefore should be given additional weight in the calculations.

The number obtained can be considered the Relative Efficiency of the individual reading material on a given grade level. This R.E. can be compared with grade level averages on the R.E. Scale chart in the manual.

C. **Other Management Options:** There are several other options available to the examiner. These options would be used as needed
on an individual subject basis.

1. **Display Graphs**
   a. Capsule Graph
   b. Fixation Graph
   c. Raw Data Graph

2. **Print Graphs**
   A graph showing a subject's reading performance can be printed out from the Data Diskette when the examiner feels there is a need to examine the subject's performance in greater detail.

3. **Comparisons**
   The comparison diskette is presently under development and will be released as part of a separate diagnostic and research test album. It would permit a diagnostician or researcher to transfer a subject's performance onto a comparison diskette in order to more minutely examine such factors as binocular coordination, variations and deviations in the characteristics of reading performance, and study the nature of tremors or other micromovements, etc.

4. **Simulation**
   The simulation feature is primarily an option that may be used to orient viewers to the nature of eye movement during reading. It should not be used for evaluation purposes.

5. **Transfer Data**
   This permits an examiner to transfer all subject data to the Data Diskette in the Reading Test Album.

6. **Management**
   a. Update subject records
   b. Delete subject records
   c. List subject records
   d. Modify analysis parameters

**Critique of Test:** The Visagraph Eye-Movement Recording System has proven to be a very effective device for evaluation and diagnosis of reading and/or eye-movement problems. It is a very versatile instrument which can graphically show to subjects the types of eye movements they are presently utilizing and their effect upon reading and comprehension, and also show progress after structured training has taken place.
The Visagraph Eye-Movement Recording System has two weaknesses. It does not necessarily replicate characteristically habitual postures and distance utilized in a normal reading situation. Unlike normal reading material, the Visagraph utilizes light letters on a dark background. It also prevents head movements which may be habitual. Secondly, most recent norms may be outdated, and have been derived from a different instrument more than 20 years ago.

References

Name of Test: KING-DEVICK SACCADE TEST (KD)

Purpose of Test: The clinical assessment of eye movement functioning of school age children is an integral part of a complete vision examination. Poorer readers, as a group, read more slowly than normal readers and exhibit smaller and more numerous fixations and regressions. The King-Devick is one test for the measurement of oculomotor behavior. It is a timed test of saccadic eye movement ability and visual-verbal automaticity. It is a modification of the Pierce Saccade Test. It is a convenient screening device to identify children whose visual performance is below the expected norm on a task that resembles the eye movement motor activity of reading. It is a three part norm referenced test in which the child is asked to "call out" a series of forty numbers on each part as rapidly as possible. Randomly spaced numbers are utilized on each line, hence, the ocular fixations required to perform the test are much like those used in the reading process.

Indications: The K-D can be utilized with children primarily aged 6 to 14 years of age. It can be used to screen eye movement abilities or as a test to measure improvement in skills before and after a structured therapy program.

Apparatus and Setup: The test consists of one demonstration card and three test cards, (KD-1, KD-2, and KD-3). Each of these cards is composed of eight rows, with each row having five 20/100 (@ 40cm) reduced Snellen equivalent numbers. The three parts of the test increase in complexity from KD-1 to KD-3. Subtest 1 consists of randomly spaced numbers connected by horizontal lines while subtest 2 and 3 do not have any horizontal lines. The vertical separation between rows is reduced in subtest 3 to 3/8 of an inch whereas in the first two parts it is 1/4 of an inch.

Time Required: The time for administration varies from an average of 2 minutes for 6 year olds to an average of 50 seconds for 14 year olds.

Pretest (Administration): The demonstration card is presented to the child. He/she is told to call out the numbers, in order, as fast as possible following the arrows. If the child successfully completes the demonstration card, Tests 1, 2, and 3 are subsequently serially presented.

What To Look For: The administrator of the test should look for the ease of performance of the test by the child. Watch for other types of motor involvement during the testing such as using fingers as a guide, extensive head movement, and obvious under and overshoots of eye movements. The
examiner should also make note of any episodes of losing his/her place during test performance.

**Recording Responses:** The time to complete each part of the test is recorded in whole seconds and the number of errors is noted for each subtest. Missing an entire line constitutes one error. These scores are compared to normal scores based on chronological age.

**Scoring the Test:** Scores are evaluated in terms of time in seconds to complete each part of the test with a correction factor allowed for omissions or additions. There is an individual score for each part as well as a total score, KD-T, representing the sum of the three components: 
\[ KD-T = KD-1 + KD-2 + KD-3. \] It is often implied clinically that there is an oculomotor dysfunction if the score is more than one standard deviation below the child's age expected performance.

**Critique of the Test:** The test requires minimum time to administer and interpret making it practical for use by non-optometrists and ideal for visual screening. Since it is also standardized, it can be used as part of a pre and post visual therapy evaluation. Visual attention, accommodation, fusion, visual verbal matching, etc. are all involved when performing this test. Therefore, the optometrist should use a sequence of test to probe isolated areas to make a differential diagnosis. The K-D is more useful when used in conjunction with a complete visual analysis.

There appears to have been some critical assumptions regarding the child's developmental abilities in other areas related to reading development that could significantly affect the clinical interpretation of the KD test results. One assumption is the child's ability to automatically recall and "name the number" seen during the fixations. Studies show that "naming" efficiency becomes more automatic with age and rapidly develops in the primary grades. Normal readers have been shown to be generally faster (i.e., more automatic) than poorer readers in naming digits. The KD Test (or any other similar one with a visual-verbal format) may not be solely assessing oculomotor function but automaticity as well. Therefore, it would appear that lateral eye movements as measured with the KD Test cannot simply be presumed to be deficient if a child performs poorly on these tests, especially in the lower grades. It is very possible in some learning and reading disabled children that poor performance on the KD results from deficits in automaticity and not oculomotor dysfunction. This further emphasizes the need to incorporate the use of other optometric tests along with the KD to better assess the visual skills of the individual.
References


**Name of Test: MKM MONOCULAR AND BINOCULAR READING TEST**

**Purpose of Test:** The MKM is used to detect children who may experience reading problems which may be associated with poor binocular coordination and macular suppression. The test can be utilized to determine monocular and binocular reading ability and can give an indication as to the student's basic sight word inventory.

**Indications:** The test is designed to be utilized with first and second grade children. The MKM Preschool Test can be used with children who experience difficulty reading the words in the regular version of the MKM.

**Apparatus and Setup:** The MKM contains six stereoscopic cards which are divided into two sets. Set II contains 3 cards. Set II, card #1 presents 110 Dolch basic sight words to the left eye alone. Set II, card #2 presents the same 110 basic sight words in reverse order to the right eye alone. Set I, card #3 contains the same words but some of the words are common to both eyes while some are presented just to the right or left eye alone. Set II, card #3 investigates the student's binocular reading ability while #1 and #2 investigate the student's monocular reading ability.

**Time Required:** Variable, depending on the students age and reading ability, however administration is generally less than 10 minutes.

**Preset (Administration):** Set I of the MKM Monocular and Binocular Reading Test should be used on first and second graders since most students are expected to be familiar with these words by the end of the first grade. Set II is used in the routine as Set I, but contains Dolch's 110 basic sight words that most children are expected to know by the end of the second grade. The preschool version is similar to the binocular reading card except that basic geometric forms are used instead of words.

The following procedure is utilized for the MKM: Set I, card #1 is inserted into the card holder of a Brewster stereoscope at the near position. The following instructions are then given to the student: "Here is a group of words. They do not make a story so do not try to make any sense out of them. I would like you to keep both eyes open and read these words for me the best you can. If you do not know a word, I will help you, but please try to read every word. I will say... ready, begin... and then I would like you to start reading. Ready, begin."

The procedure is then repeated with card #2. The words will be read in reverse order of card #1.

Next, the binocular test card, Set I, card #3, is placed at the near setting in the stereoscope. The instructions are repeated emphasizing...
"keep both eyes open."

**Recording Responses:** As the student reads the words the clinician records any errors to the left of the test word in the space provided on the score sheet. Reading time is also recorded. For card #2 the words will be read in reverse order so the clinician should record errors proceeding from the lower right on the score sheet. Again, the reading time should be recorded.

The words marked (L) on the score sheet are presented to the left eye alone, and those marked (R) are presented to the right eye alone. Every other line is common to both sides and presented to both eyes. Suppressed words should be circled, while errors should be written above the test word on the score sheet.

**Scoring the Test:** By analyzing the score sheet, the clinician can determine which errors were common to both eyes or which errors were made with the right or left eye alone. The presence of word reversals (was for saw, no for on, etc.), vertical reversals (but for put), internal reversals (there for three, how for who, etc.), improper vowel sounds (run for ran, come for came, etc.), and other errors can be noted.

Normally, the reading time and the number of errors is expected to be approximately the same for each eye. If the reading time of one eye exceeds the other by 20%, this indicates the presence of a binocular visual problem.

**What to Look For:** If suppression is constant, generally the right or left eye will be completely suppressed throughout the test. If no suppressions are noted the reading time can be compared to the monocular portion of the test. If the time is appreciably longer under binocular conditions the presence of a binocular visual problem would suggested. If suppressions are noted the time cannot be compared to the monocular cards as fewer words would have been read.

Some students will note that certain words tend to "float out" toward them. This is due to a binocular luster effect and should be considered normal.

In cases of suppression not related to strabismus and amblyopia, improved performance is often made possible immediately with the application of plus at near (generally from +.50 to +1.50). You may gradually increase the amount of plus until a good binocular performance is obtained. The weakest amount of plus that will eliminate the suppression could be considered as a tentative add.
Critique of Test: The MKM Monocular and Binocular Reading Test is a tool which is easily administered and can give valuable information regarding reading ability, monocular and binocular visual performance, sight word vocabulary, and suppression. The test can also be helpful in evaluating the progress of visual training students. It can also be used as a dramatic demonstration of how lenses can improve binocular reading performance.

A reliability study was conducted in 1965 to determine if the MKM was reliable on a test-retest basis. The results of the study indicated that it was reliable. In 1966 a study conducted by the authors of the test to determine if the MKM could be used as a predictor of a child's academic and reading achievement level. The MKM was administered to all students in grades one through six at the Zion Lutheran School in Rapid City, South Dakota. The students were also administered the Gates-McKillop Oral Reading Test. The students were also ranked in order from highest achievement to lowest achievement by the classroom teachers. Results of the study revealed a significant relationship between passing the MKM Binocular Reading Test and receiving a high score on the Gates-McKillop Oral Reading Test. There was also a significant relationship between passing the MKM and the teacher's subjective evaluation of the student's scholastic ability.

Additional investigations by the authors suggested that students in the upper third of the class in elementary school show a good binocular performance and do not, in general, suppress. Children in the lower third of the class in elementary school tend to show marked suppressions. Children in the middle third of the class tend to show moderate suppressions. If it is true that the MKM can yield information which helps identify children likely to have reading problems related to suppression and poor binocular coordination, then it is suggested that this test might be useful as a supplement to a routine visual examination and as a screening device for schools and reading clinics.

**References**


King JW, Michael LD. Near Binocular Performance as it Relates to Reading. Seattle: Special Child Publications, Inc.

**Name of Test:** PEABODY PICTURE VOCABULARY TEST (PPVT)

**Purpose of Test:** The PPVT is designed to provide an estimate of an individual's verbal intelligence potential by measuring his/her auding (receptive) vocabulary.

**Indications:** The PPVT provides a direct measure of auding or hearing (receptive) vocabulary, verbal-visual integration, and indirect measures of intelligence, mental age, and scholastic aptitude. It is effective with average subjects as well as other groups. Since subjects are not required to read, the scale is especially fair for non-readers and remedial reading cases. Due to the fact that responses are non-oral, it is appropriate for the speech impaired. Since the illustrations are clean, bold line drawings, most partially seeing persons are not seriously penalized by the test. With the drawing free of fine detail and figure-ground problems, the test is reportedly appropriate for at least some perceptually impaired persons. The test may be given to any English speaking resident of the United States between 2 years 6 months and 18 years who is able to hear words, see the drawings, and is able to respond either "yes" and "no" in any manner.

**Apparatus and Setup:** The PPVT test kit includes a spiral-bound book containing 150 numbered plates preceded by three example plates, an instruction manual, and Individual Test Records recording sheets which list stimulus words and keys to correct responses. The administration of the PPVT requires no special preparation other than complete familiarity with the test protocol and materials, including practice in giving the test prior to its use as a standardized measure. It is important for the examiner to use the correct pronunciation of each of the test plate words.

**Time Required:** 10 to 15 minutes are usually required to give this untimed test.

**Preset (Administration):** Important rules of administration of the PPVT are:

1) The test should be given in a quiet room away from others.
2) The examiner should be business-like, pleasant, and encouraging.
3) Praise should be given generously (but not overdone) to motivate the subject. Effective comments are: "Good! You are doing well" etc.
4) Encouragement should be given even if an incorrect response is made. If the subject says, "Did I get that one right?" say: "That was a good answer."
5) Directions to the testee should be read verbatim, rather than from
6) It is not permissible to show the subject the printed stimulus words, to use them in sentences, to define or to spell them.

7) Stimulus words may be pronounced more than once by the examiner. If two pronunciations are listed in the dictionary both are given.

8) Singular stimulus words should not be converted to the plural.

9) Stimulus words should never be preceded by an article (a, an, the).

10) The subject may take any reasonable amount of time per item to make his choice. However, after about one minute, he should be encouraged to decide. Say: "Try one. Point to one of them." A response should always be secured.

11) Record the final response if a subject changes his choice.

Introduce the test to children below 8 years of age by saying: "I want to play a picture game with you." Turn to Example A and say: "See all the pictures on this page." (Point to each.) "I will say a word, then I want you to put your finger on the picture of the word I have said. Let us try one. Put your finger on "bed". When the child makes the desired response turn to Example B saying: "That's fine. Now put your finger on "fish". Then turn to Example C saying: "Good! Show me a "butterfly". Then say: "Fine! Now I am going to show you some other pictures. Each time I say a word, you find the picture of it. When we get along further in the book you may not be sure you know the word, but I want you to look carefully at all the pictures anyway and choose the one you think is right. Point to ______." (See the instructions below for starting points).

Introduce the test to children 8 years of age and above by saying: "I have some pictures to show you, (With mature subjects, say: "I want to find out how large your vocabulary is.").) Turn to Example A and say: "See, there are four pictures on this page. Each of them is numbered." (Point to each.) "I will say a word, then I want you to tell me the number of (or point to) the picture which best tells me the meaning of the word. Let us try one. Tell me the number of (or point to) the picture which best tells the meaning of "crib". When a subject makes the desired response turn to Example B saying: "That's fine. Now, what number is "fin"? Then turn to Example C saying: "Good! What number is butterfly?" Then say: "Fine! Now I am going to show you some other pictures. Each time I say a word, you tell the number of (or point to) the picture which best tells the meaning of the word. As we advance through the book you may not be sure you know the meaning of some of the words, but I want you to look carefully at all of the pictures anyway and choose the one you think is
right. What number is ____?" (See the starting point instructions below).

Special instructions are given in the manual to introduce the test to very young children, retarded children, or very immature children.

Starting Points: For children of estimated average learning ability or above begin the test with the plate numbers listed on this slide.

<table>
<thead>
<tr>
<th>AGES</th>
<th>Begin with Plate No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages</td>
<td></td>
</tr>
<tr>
<td>Years-Months</td>
<td></td>
</tr>
<tr>
<td>below 3-3</td>
<td>1</td>
</tr>
<tr>
<td>3-3 to 4-2</td>
<td>15</td>
</tr>
<tr>
<td>4-3 to 5-5</td>
<td>25</td>
</tr>
<tr>
<td>5-6 to 7-5</td>
<td>40</td>
</tr>
<tr>
<td>7-6 to 9-5</td>
<td>50</td>
</tr>
<tr>
<td>9-6 to 11-5</td>
<td>60</td>
</tr>
<tr>
<td>11-6 to 13-5</td>
<td>70</td>
</tr>
<tr>
<td>13-6 to 15-5</td>
<td>80</td>
</tr>
<tr>
<td>15-6 to 17-5</td>
<td>90</td>
</tr>
<tr>
<td>above 17-6</td>
<td>100</td>
</tr>
</tbody>
</table>

Subjects suspected of subnormal learning ability may be started below the recommended plate in keeping with best estimates of their mental age.

From the starting point work forward until the subject makes his first error. In the event he has not made 8 consecutive correct responses prior to this first error, drop back immediately to the starting point and work backward consecutively until a total of 8 consecutive correct responses has been made by the subject. Responses above the starting point, as well as below, are to be counted for purposes of establishing this basal of 8 consecutive correct answers. Continue testing forward from the point of the first error until the subject makes 6 errors in any 8 consecutive presentations; count the last item presented as his ceiling. If inadvertently a test is started at too advanced a level, the subject will immediately make errors. Thereupon, the examiner should drop back 15, 20 or the necessary number of plates to a new starting point where the subject experiences initial success, even though it is below that which the subject's chronological age would suggest. The examiner should then proceed, as described above to establish a basal and a ceiling. The test is discontinued when a basal and ceiling have been established. Thus the test is administered only over the critical range for a particular subject.

What to Look For: The examiner simply looks for correct or incorrect responses.
**Recording Responses:** For each item administered, write the picture number (1, 2, 3, or 4) which the subject indicated in the appropriate space on the Individual Test Record. Indicate incorrect responses by drawing a line through the geometric figures.

**Scoring the Test:** The total raw score is the number of correct responses. All items below the basal point are assumed correct; all items above the ceiling item are assumed incorrect. To get the total raw score, subtract the errors from the number of the last item presented, or ceiling item.

By use of tables in the PPVT manual, the raw score can be converted to three types of derived scores: 1) an age equivalent (mental age); 2) a standard score equivalent (intelligence quotient); and 3) a percentile equivalent. Age equivalents (mental age) provide an index of the level of development for a given child. For example, a child who obtains a raw score of 75 on the PPVT is said to possess a mental age of 10 years since his ability on this test is like that of the average 10 year old. Intelligence quotient scores provide an "index of brightness" for a given subject in comparison with other children of the same age. An I.Q. of 100 on the PPVT was arbitrarily assigned to the mean raw score for subjects at each age level. The standard deviation was set at 15 I.Q. points. This provided the classification on this slide.

<table>
<thead>
<tr>
<th>INTELLIGENCE QUOTIENTS</th>
<th>PERCENTAGES INCLUDED</th>
<th>CLASSIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>125 and above</td>
<td>5</td>
<td>very rapid learners</td>
</tr>
<tr>
<td>110 to 124</td>
<td>20</td>
<td>rapid learners</td>
</tr>
<tr>
<td>90 to 109</td>
<td>50</td>
<td>average learners</td>
</tr>
<tr>
<td>75 to 89</td>
<td>20</td>
<td>slow learners</td>
</tr>
<tr>
<td>below 75</td>
<td>5</td>
<td>very slow learners</td>
</tr>
</tbody>
</table>

Percentile norms provide an "index of brightness" as do I.Q.'s, indicating how a given child compares with others of his own age. A child at the 25%ile has 25 children of his age scoring below him for every 75 scoring higher than he did.

**Critique of Test:** Numerous studies looking at test-retest repeatability have shown that the PPVT is a reliable test; that is, subjects generally score consistently from test to test. Studies looking at the validity of the PPVT (the extent to which it measures what it purports to measure) have yielded more mixed results. The general validity of the PPVT is
questionable because it was originally normed on a large but restricted sample of 4,012 white individuals residing in and around Nashville, Tennessee. In addition, minorities and females were not well represented in the stimulus plates.

Studies investigating the "congruent" validity of the PPVT (the extent to which PPVT scores compare with scorers on other vocabulary and intelligence tests) have found a wide range of correlations. PPVT mental age scores correlate fairly highly with the 1937 and 1960 Binet mental age tests (median r's of .71 and .83 respectively). PPVT I.Q.'s also correlate well with the 1937 Binet I.Q. test (median r of .71). In comparisons of the PPVT and the Weschler intelligence tests, PPVT I.Q. scores correlate much more highly with the verbal scale of the Weschler (median r of .67) than with the performance scale of the Weschler (median r of .39). The author of the PPVT concedes that the PPVT does not provide a comprehensive measure of intellectual functioning, but instead "attempts to provide a useful prediction of school success, especially in the areas which rely more heavily on verbal intelligence."

In terms of "concurrent" validity, (the extent to which PPVT scores correlate with measures of scholastic achievement), the evidence is again conflicting. Studies comparing PPVT scores with academic achievement tests have shown a wide range of correlations from a low of .04 to a high of .91. The PPVT seems to correlate equally well with language arts, social studies, and math achievement. The author of the PPVT notes that the PPVT does not measure such factors of academic success as school experiences, personal judgement, family background, and persistence.

Overall, the PPVT is a useful tool for assessing auditory (receptive) vocabulary but has questionable validity as a measure of general intelligence or as a predictor of academic success. The test is limited to English speaking residents of the U.S. between 2 years 6 months and 18 years who are able to hear words, see the drawings, and are able to indicate "yes" and "no". PPVT results should be evaluated cautiously, particularly when testing non-Caucasians or persons with different ethnic backgrounds who may have different vocabularies. When used judiciously, the PPVT has a number of advantages including the following: 1) It is quickly given in 10 to 15 minutes; 2) scoring is objective and easy; 3) no oral response is required; 4) the test covers a wide range; and 5) alternate forms of the test are provided to facilitate repeated measures. A revised version of the test, the PPVT-R, is better standardized and has higher levels of internal consistency than the original PPVT.


References


**Name of Test:** PIAGET LEFT-RIGHT AWARENESS TEST

**Purpose of Test:** The purpose of this test is to determine a person's ability to differentiate between left and right.

**Indications:** Norms for the Piaget have been established for ages 5 through 11 years of age.

**Apparatus and Setup:** The Piaget utilizes an instruction set, a pencil, a key or coin, and a watch or bracelet to be worn on the examiner's left arm.

**Time Required:** This is not a timed test. Generally this test requires less than 10 minutes to administer.

**Preset (Administration):**

Section A:
It is important to make sure the subject is paying attention. The following questions should be asked serially noting the subject's response (gesture) each time:

"Show me your right hand... show me your left hand...
touch your left ear... raise your right hand... show me your right leg... show me your left hand... point to your right eye."

Section B:
The examiner should sit opposite the subject and ask the following questions successively. Once again, the response (gesture) of the subject should be noted:

"Show me my right hand... now show me my left hand...
show me my left leg... now show me my right leg."

Section C:
Next the examiner is to place a penny on the table to the left of a pencil in relation to the subject. Ask the following questions successively:

"Is the pencil to the right or the left? And the penny - is it to the right or the left? (the subject now goes around to the opposite side of the table) Is the pencil to the right or the left? And the penny - is it to the right or the left?"

Section D:
The examiner sits opposite the subject with a coin in his/her right hand and a watch or bracelet on his/her left arm. The following questions are asked:

"See this penny? Do I have it in my right hand or in my left hand? And the bracelet (watch) - is it on my left
Section E:
The examiner places 3 objects in front of the subject: a pencil is placed to the left; a key in the middle; and a coin to the right. The following questions are asked:

"Is the pencil to the left or to the right of the key? Is the pencil to the left or the right of the penny? Is the key to the left or the right of the penny? Is the key to the left or the right of the pencil? Is the penny to the left or the right of the pencil? Is the penny to the left or the right of the key?"

What to Look For: It is necessary that the subject answer all questions in a particular section correctly in order to receive credit for that section.

Recording Responses: The examiner simply keeps track of the sections passed by the subject.

Scoring the Test: The examiner compares the sections which are passed by the subject to the normative information to establish an age score for the subject.

<table>
<thead>
<tr>
<th>Age</th>
<th>Sections Passed by 75% of Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>7</td>
<td>A, C</td>
</tr>
<tr>
<td>8</td>
<td>A, B, C, D</td>
</tr>
<tr>
<td>9</td>
<td>A, B, C, D</td>
</tr>
<tr>
<td>10</td>
<td>A, B, C, D</td>
</tr>
<tr>
<td>11</td>
<td>A, B, C, D, E</td>
</tr>
</tbody>
</table>

Critique of Test: The Piaget Left-Right Awareness Test is a quick and simple method to screen children for laterality difficulties. Many children with learning disorders demonstrate an inability to differentiate between left and right, either on themselves or in the mirror position. This difficulty is more common for girls than boys and more common among left handed individuals than among right handed people. Difficulty differentiating between left and right is also more common among children with arithmetic problems. The test cannot differentiate between 5 and 6 year olds or 8-10 year olds. It is not arranged from easiest to most difficult (section C is easier than B). The PPVT is not norm referenced or quantified by ordinal raw score. It is useful only as a screening device.
References

Name of Test: PIERCE SACCADÉ TEST

Purpose of Test: This test is designed to determine saccadic eye movement ability.

Indications: The test is designed to be utilized with persons aged 6 through adulthood. It may be used as a screening test for saccadic ability or as a performance test during evaluation. It may be possible to utilize the Pierce as a test to determine the immediate effect of lenses and prisms used to aid binocularity, however the test does lack suppression control.

Apparatus and Setup: The Pierce is composed of four test cards, with the first being a demonstration plate and the following three making up the actual test. Each card has 15 rows of 2 numbers. The demonstration card has arrows from left to right to simulate the type of eye movements the subject is to make. The first test card has lines between the numbers and the second and third cards have open spaces between the numbers. The test also utilizes recording forms and a stopwatch.

Time Required: Variable, generally less then 5 minutes to complete tests I, II, and III.

Preset: The patient is instructed to hold the test cards in the fronto-parallel plane at his normal reading distance. The card should be illuminated by 20 to 60 foot candles of glare free and shadow free illumination. The tests have been standardized on the basis of presenting all the tests and in the following order: Demonstration card, Test I, Test II, and Test III. If the patient moves his head during the saccades on the demonstration card he is instructed to try not to move his head on the following test cards. The patient should be instructed to call out all the numbers on the card as rapidly and as accurately as possible in the manner indicated. The examiner should point to the upper left-hand number, then the upper right-hand number, then the second left-hand number, the second right-hand number and so on. The patient is asked if he/she understands and is ready. The examiner says "Ready, start", and begins timing him. The timing is stopped when he/she has completed calling out all of the numbers.

What to look for: The examiner should observe the patient during testing and rate his/her head movements according to the following scale:
- No head movement
- Slight head movement
- Exaggerated head movements
Other signs to watch for include: abnormal working distance, posture, head tilt, frowning, or squinting.

**Recording Responses:** The patient is timed in seconds during each of tests I, II, and III. The recording forms have the numbers printed to allow the examiner to follow along as the patient calls out the numbers. Errors are recorded as omissions or addition errors. Omission errors are recorded by marking a slash through the number omitted. Addition errors are recorded by circling the number that was repeated.

**Scoring the test:** The time in seconds and the errors for each test (I, II, and III) are added together to give the total time and the total errors. These are then compared to a graph to give "Age Equivalent" performance. There is also a graph showing the percent of subjects with exaggerated head movements versus chronological age. The test also has normative data that can be used to judge whether a subject's performance is normal or abnormal. An abnormal performance is indicated by scores 1 SD below the mean for the subject's age.

**Critique of test:** The Pierce Saccade Test is a test for determining saccadic ability which may also aid in determining the immediate effects of lenses and prisms used to aid binocularity. Statistical analysis has shown the Pierce to have poor repeatability, with subjects showing a significant improvement in test scores on the retest. Data has suggested the subjects became more familiar or learned to take the test, thus improving their scores on retest. Studies have concluded that the Pierce test may be a questionable test for evaluating whether improvements are due solely to oculomotor therapy. Any test with a visual-verbal format may not be solely assessing oculomotor function but automaticity as well. Therefore, it would appear that lateral eye movements as measured with the Pierce cannot simply be presumed to deficient if a child performs poorly on this test.

The graphs of total errors and total times start leveling off between the ages of 10 and 14 years. This implies there is are very small differences between a 10 and a 14 year old age equivalent where the test tops out. Therefore, this test has limited usefulness for the average adult patient but may be helpful in identification of an adult who is experiencing difficulty with saccadic ability.
References


Purpose of Test: The SUNY Developmental Test Battery consists of six tests that assess visual-perceptual development and maturity. These tests can provide valuable information about how the patient's developmental/perceptual status may be affecting school performance. The SUNY Test Battery is concerned with three general areas of visual development: 1) the invariant; 2) bilaterality; and 3) spatial organization and manipulation.

The invariant refers to a zero point or point of origin around which human beings organize space. Since there is no absolute reference point in physical space, the human child uses the only non-variant item in his environment, his own body, for a zero point. In order to assess the integrity of this "invariant" or zero point, the developers of the SUNY Test Battery hypothesize that the better the knowledge and control of the body (self), the better the invariant. The invariant is important because it is the base from which all visual behavior proceeds. The tests in the SUNY battery that evaluate body knowledge and control (and thus the invariant) include Standing Angels-in-the-Snow, Chalkboard Circles, and the 3:3 Alternate Hop.

Bilaterality, the second major area that the SUNY Test Battery assesses, is the awareness of oneself as a two sided being (left and right) and the knowledge of the difference between the two sides. Bilaterality is important because one has to know what is right and left on the body before these are developed in space. The SUNY Test Battery developers hypothesize that the state of manual dominance and the ability of the child to manually cross the midline reflect the maturity of this phase. The SUNY tests that evaluate bimanual integration (bilaterality) include the Circus Puzzle, the Pegboard Test, and the Winterhaven Copy Forms Test.

Spatial organization and manipulation, is the third major area tested. It represents the projection of bilaterality out into space. The child imposes on the environment a set of coordinates that have been developed within his own body. The developers of the SUNY Test Battery hypothesize that the relative maturity of this phase is the degree to which the child must relate visual or spatial phenomenon back to his body organization. In other words, as a child matures he depends less on motor activity and more on vision. At the mature level the child is able to handle spatial phenomena in a purely visual manner without using body tilts, paper rotations, etc.

Besides this visual-motor hierarchy, the SUNY Test Battery evaluates the maturity of spatial organization and manipulation in terms of three other factors. These factors are form matching/reproduction, visualized reversals, and visual organization. Visualized reversals refers to the ability to visually manipulate space from another viewpoint. Visual
organization means the ability to visually plan out a task in a defined spatial area. The SUNY tests that evaluate visual-motor hierarchy are the Circus Puzzle, the Pegboard Test, and the Winterhaven Copy Forms. Form matching/reproduction is assessed by the Circus Puzzle, the Pegboard Test, and the Winterhaven Copy Forms. The Pegboard Test is used to evaluate visualized reversals, and the Winterhaven Copy Forms Test is used to evaluate visual organization.

**Indications:** The SUNY Tests are indicated for any child 2 years of age or older who is suspected of having learning or developmental/perceptual difficulties. The skills tested in the SUNY battery are assumed to normalize (or maximize) between six and nine years of age. This makes the battery particularly useful in evaluating spatial organization and manipulation for children from Kindergarten to Grades 3 or 4. However, it is useful with developmental delayed older children - up to ages 12 or 13, particularly those with learning difficulties.

**Test #1: Standing Angels-in-the-Snow**

**Purpose of Test:** The purpose of the test is to assess body knowledge and control (and thus the invariant).

**Apparatus and Setup:** The examiner is seated in front of the child so that his face is level with the child's. The examiner's legs are separated so that the child is standing midway between them, with a separation distance of one foot on each side between the examiner's foot and the child's foot.

**Time Required:** Less than five minutes.

**Preset (Administration):** The examiner tells the child, "We are going to play a game called 'touch and go.' If I touch your arm, you must move only that arm until it is even with your shoulder." The examiner touches one of the child's arms, extends the child's arm, and guides it to shoulder level. The examiner then tells the child, "If I touch your leg, you must move your leg so that your foot slides on the floor until it just touches mine." (The examiner demonstrates this). "If I touch more than one thing at the same time, you must move both things I touch at the same time. Remember, you must move only the parts that I touch. While we are playing this game, try to keep looking at my face all the time." The examiner proceeds in the following order: 1) Both arms (homologous). 2) Right arm (monolateral). 3) Left arm (monolateral). 4) Right leg (monolateral). 5) Left leg (monolateral). 6) Right arm and right leg (ipsilateral). 7) Left
8) Right arm and left leg (contralateral).
9) Left arm and right leg (contralateral).

**What to Look For:** The examiner evaluates the child's ability to perform the specified movements, including homologous, monolateral, ipsilateral, and contralateral limb movements. The examiner also looks for motor overflow, which is movement of non-touched body parts. The examiner also assesses segmentation, which occurs when touched limbs are not moved simultaneously.

**Recording Responses:** The age that is most characteristic of performance is circled according to the SUNY Developmental Test Battery Chart. Next, the appropriate age square on the SUNY Profile Sheet is checked for Factor A: Body Knowledge and Control.

**Scoring the Test:** Standing Angels-in-the-Snow, like other SUNY tests, has been age normed. The child's performance of it can be compared to his chronological age.

**Test #2: Chalkboard Circles**

**Purpose:** The purpose of the test is to assess body knowledge and control (and thus the invariant). This test also provides a measure of bilateral integration and hand dominance.

**Apparatus and Setup:** The examiner tells the child: "Here are two pieces of chalk, one for this hand, and one for that hand. I want you to make two circles at the same time, one with each hand. Keep going over and over the circles that you make. I don't want the two circles to touch. I will tell you when to stop. I want you to make the two circles like this." The examiner takes the child's two arms and simulates the circles in the air. He should simulate circles of about one foot in diameter, starting with both hands at the top of each circle, first symmetrical circles both going toward the midline, then symmetrical circles, both going away from the midline. Between the two types of simulation he says: "You can do them this way or this way." The examiner then lets the child produce the circles on the blackboard. After five complete revolutions, the child is told to stop. The produced circles are then erased. The examiner then says: "Now I'd like you to make two circles again at the same time one with each hand. Again try not to let the two circles touch each other. This time I want you to make them this way." He then demonstrates reciprocal circles, with both hands moving to the child's right from the top of each
circle (the right and left hands both moving clockwise). The examiner then lets the child produce the circles on the blackboard. After five complete revolutions, (attempted or completed) the examiner says: "Now, make them go the other, the opposite way." This is the "reversed" portion of the test.

**What to Look For:** The examiner first evaluates the child's ability to use both arms at the same time. Next, the examiner assesses the child's ability to perform symmetrical circles, in which both hands go toward the midline at the same time or both go away from the midline at the same time. Third, the examiner evaluates the child's ability to perform reciprocal circles, in which one hand moves toward the body midline while the other moves simultaneously away from the body midline. In other words, both hands move clockwise at the same time or counterclockwise at the same time. Fourth, the examiner assesses whether the child can sustain the required task over time. Fifth, the examiner looks for any phase difference between the two hands, which occur when the two hands are out of synch. Finally, the examiner evaluates the quality of the child's circles including size, spacing, and eveness.

**Recording Responses:** The age that is most characteristic of performance is circled according to the SUNY Developmental Test Battery Chart. Next, the appropriate age square on the SUNY Profile Sheet is checked for Factor A: Body Knowledge and Control.

**Scoring the Test:** Chalkboard Circles, like the other SUNY tests, has been age normed. The child's performance can be compared to his chronological age.

**Test #3: 3:3 Alternate Hopping**

**Purpose of Test:** The purpose of the test is to evaluate body knowledge and control (and thus the invariant). This includes motor planning and the ability to perform integrated motor movements.

**Apparatus and Setup:** No specific apparatus is required.

**Time Required:** Less than five minutes.

**Preset (Administration):** The examiner tells the child: "I'd like you to hop in place, three times." After the child has done this, he is told: "Now I'd like you to hop in place, three times on the other foot." The examiner then says: "This time I'd like you to hop in place
three times on that foot (examiner points to right foot), then three times on this foot (examiner points to left foot), and keep doing it until I tell you to stop. I'd like you to try to do it like this."
The examiner then demonstrates one cycle of the 3:3 Alternate Hop. He then asks the child to do it. If the child has difficulty, the examiner lets him try while he holds the child's hands. This is called "support."

**What to Look For:** The examiner evaluates the child's ability to perform the specified movements, including hopping on either foot. The examiner assesses the child's accuracy in hopping the correct number of times. The examiner also looks at the child's transition in going from one side to the other (i.e., smooth or jerky, pause or no pause). Finally, the examiner assesses whether the child can sustain the task over time.

**Recording Responses:** The age that is most characteristic of performance is circled according to the SUNY Developmental Test Battery Chart. Next, the appropriate age square on the SUNY Profile Sheet is checked for Factor A: Body Knowledge and Control.

**Scoring the Test:** 3:3 Alternate Hopping, like other SUNY tests, has been age normed. The child's performance can be compared to his chronological age.

**Test #4: Circus Puzzle**

**Purpose of Test:** Circus Puzzle tests three factors. The first factor, that is assessed is bimanual integration, including the ability to cross the midline. This indicates how well developed the child's sense of bilaterality is. The second factor, that Circus Puzzle evaluates is form matching/reproduction. This is an aspect of spatial organization and manipulation. Visual-motor hierarchy, the third factor that Circus Puzzle assesses, is a measure of how dependent the child is on body involvement to organize and manipulate visual space. The more that vision operates without motor involvement, the higher the developmental level of the child.

**Apparatus and Setup:** Initially, the examiner should number the back of each piece of Circus Puzzle in the following manner: 1) Rope Climber; 2) Trapeze Man; 3) Bar Bell Lifter; 4) Trapeze Lady; 5) Lady and White Dogs; 8) Seal; 9) Elephant; 10) Clown with White Collar; 11) Lady and Bear; 12) Lady on White Horse. The examiner sits at a desk with the child sitting opposite him. The examiner places a completed Circus Puzzle flatly on the desk so that it is oriented properly in an up-down direction.
with reference to the child. The puzzle is placed so that its geometrical center is coincident with the geometrical center of the desk. The left and right sides of the puzzle should be parallel to the corresponding sides of the desk.

**Time Required:** Usually less than 10 minutes, depending on the developmental level of the child.

**Preset and Administration:** The examiner tells the child, "Here is a puzzle." The examiner then takes the piece out of the puzzle board by raising the puzzle from the desk and pushing each piece out through the cloth that lines the back of the puzzle board. The numbers on the backs of the pieces should be visible to the examiner but not to the child. All pieces with even numbers should be placed between the right edge of the desk (child's view) and all pieces with odd numbers should be placed between the left border of the puzzle and the left edge of the desk (child's view). All pieces are placed picture side up. When all pieces are so arranged the examiner says, "Now you put all the pieces of the puzzle in the places they belong. Take your time and do the best you can." Before the child begins, the examiner should ensure that the child is seated so that his body midline is aligned with the geometric center of the puzzle. The examiner carefully watches the child's performance but does not comment about it.

**What to Look For:** Circus Puzzle evaluates three factors: Factor "B" - bimanual integration, Factor "C" - form matching, and Factor "E" - visual motor hierarchy. In terms of Factor "B" - bimanual integration, the examiner looks for: 1) Body tilt toward the side where the piece is to be placed; 2) Which hand(s) picks up pieces on right, which hand picks up pieces on left; 3) Which hand places pieces picked on right, and pieces picked on left; 4) Transfer of pieces from one hand to the other for placement; and 5) Crossing of midline. In terms of Factor "C" - form matching, the examiner assesses: 1) The number of form errors, which is the inability to fit a piece into the proper place; and 2) The number of false starts, which is putting a piece in the wrong place initially and then correcting. In terms of Factor "E" - visual motor hierarchy, the examiner determines whether the child relies on tactual judgement or visual judgement in completing the task. In other words, does the child put each piece on the board and then try to force it into place (tactual mode) or does the child visually orient each piece first before placing it on the board (visual mode)?

**Recording Responses:** The age that is most characteristic of performance is circled according to the SUNY Developmental Test Battery
Chart. Next, the appropriate age squares on the SUNY Profile Sheet are checked for Factors B, C, and E.

Scoring the Test: Circus Puzzle, like other SUNY test, has been age normed. The child's performance in terms of Factors B, C, and E are compared to his chronological age.

Test #5: Winterhaven Copy Forms

Purpose of Test: Copy Forms tests four factors. The first factor that Copy Forms evaluates is bimanual integration, including the ability to cross the midline. This indicates how well developed the child's sense of bilaterality is. Form matching/reproduction the second factor that Copy Forms assesses, is the aspect of spatial organization and manipulation. The third factor, visual organization, is a measure of the child's ability to visually plan out a task in a defined spatial area. Visual-motor hierarchy, the fourth factor that Copy Forms evaluates, is a measure of how dependent the child is on body involvement to organize and manipulate visual space. The more that vision operates without motor involvement, the higher the developmental level of the child.

Apparatus and Setup: Winterhaven Copy Forms consists of a set of seven cards, each with a geometric figure drawn on it. The child sits at a desk with the examiner sitting opposite him. A piece of 8"x11' white unlined paper is in front of the child, with the 11" side parallel to the front and back of the desk. The examiner has the cards in a pile in front of him, and each card is placed so that the figure will be properly oriented to the child.

Time Required: Usually less than 10 minutes, depending on the developmental level of the child.

Preset (Administration): The examiner tells the child: "Look, picture number one is a circle, picture number two is a cross." He thus shows the child each card, the card being flat on the desk, in the following order, verbally identifying each one; circle, cross, square, triangle, divided rectangle, horizontal diamond, and vertical diamond. After this presentation the examiner says: "Now I will show you the pictures again, one at a time. Each time I show you a picture, I want you to make one just like it on the paper. Do the best you can, and take your time. I want you to get all seven pictures on this side of the paper." The examiner then hands the child a pencil and begins the presentation of the cards again. The picture is available to the child until he shows that he is finished with the particular figure.
What to Look For: Winterhaven Copy Forms test four factors: Factor "B" - bimanual integration; Factor "C" - form matching/reproduction; Factor "D" - visual organization; and Factor "E" - visual motor hierarchy. In terms of Factor "B" - bimanual integration, the examiner evaluates: 1) Hand preference for writing; and 2) Support from the non-writing hand holding or orienting the paper. In terms of Factor "C" - Form reproduction, the examiner looks for: 1) The ability to accurately reproduce figures; and 2) Segmentation of rectangle, meaning that the inner vertical line is drawn first, and the rest of the lines are drawn as unrelated on either side; and 3) The proportionality of the drawn figures. In terms of Factor "D" - visual organization, the examiner evaluates the placement of the figures. Are figures superimposed on one another, randomly placed on the page, placed around the central circle, or consistently placed in horizontal or vertical order? In terms of Factor "E" - visual motor hierarchy, the examiner assesses: 1) Body involvement: Is the trunk, head, or tongue involved in completing the task?; and 2) Tilt of the body or paper (especially when reproducing oblique lines).

Recording Responses: The age that is most characteristic of performance is circled according to the SUNY Developmental Test Battery Chart. Next, the appropriate age squares are checked on the SUNY Profile Sheet for Factors B, C, D, and E.

Scoring the Test: The Winterhaven Copy Forms Test, like other SUNY tests, has been age normed. The child's performance in terms of Factors B, C, D, and E are compared to his chronological age.

Test #6: Pegboard Test

Purpose of Test: The Pegboard Test tests four factors. These factors include bimanual integration (bilaterality), form matching/reproduction, visual-motor hierarchy, and visualized reversals - the ability to visually manipulate space from another viewpoint.

Apparatus and Setup: Two pegboards, 10" by 10", and cylindrical red and yellow pegs are recommended for this test. The examiner sits at a desk with the child sitting opposite him. The pegboards are placed touching each other and even with each other so that the center of the line joining them is coincident with the geometric center of the desk. The bottom border of the joined pegboards should be about 6" higher than the lower edge of the desk and the sides of the pegboards should be parallel to the corresponding sides of the desk. The line joining the two boards
should also be aligned with the child's body midline.

**Time Required:** Usually less than 10 minutes, depending on the developmental level of the child.

**Preset (Administration):** The child is shown the two sets of pegs - five red, and five yellow and the examiner says, "*Which color pegs would you like?*" After the child chooses, he is handed those pegs. The examiner then says, "*Now I'd like you to close your eyes and shake the pegs in both your hands at the same time. Keep your eyes closed and keep shaking until I say 'open'.*" As the child does this, the examiner produces model pattern No. 1, as shown on page 54 of Dr. Suchoff's manual. After it is made, he tells the child to open his eyes and stop shaking the pegs. He then says, "*I want you to make the same exact picture with your pegs that I have made with mine. I want it so that if we cut your picture out of the puzzle with a saw it would fit right on top of mine. Make your picture on this side.*" (The examiner indicates the pegboard on which there are no pegs.) "*Take your time and do the best you can.*" After the child has completed the first pattern, the examiner takes his pegs out and the child is told to remove his pegs. He is then told to close his eyes and shake the pegs in his hands once again. When the examiner has placed pattern No. 2 on the other board than he placed pattern No.1, the child is told to open his eyes again and to stop shaking the pegs. The child is again directed to make the "*same exact picture that I have made with my pegs*" and is shown that it should be made on the empty board. In a similar manner, the patterns are shown by the examiner and produced by the child until all five patterns are shown. The examiner alternates the placement of the model pattern on the boards each time so that model pattern No.1 is on the child's right, model pattern No.2 is on the child's left, model pattern No.3 is on the child's right, etc. as shown on pages 54 and 55 of Dr. Suchoff's manual.

The second phase of this test is conducted in the same way as the first part described above. The same figures are again used, and the model patterns are alternated between the boards as previously described. Now the examiner has the child close his eyes and shake the pegs as he constructs model pattern No. 1. He then tells the child to open his eyes and says, "*Let's make believe that this is a flag on a flagpole.*" (The examiner indicates each part). "*Now I want you to make yours so that the flag flies the other way - the opposite way. Remember, I don't want you to make it upside-down, just opposite.*" The examiner determines whether the child understands the directions and explains further if necessary. The child then constructs the "opposite" pattern and the examiner proceeds with the model patterns previously described.
What to Look For: The Pegboard Test evaluates four factors. These include Factor "B" - bimanual integration, Factor "C" - form reproduction, Factor "E" - visual motor hierarchy, and Factor "C1" - visualized reversals. In terms of Factor "B" - bimanual integration, the examiner observes: 1) Which hand holds the pegs and which hand places the pegs; 2) Body tilt (to prevent crossing the midline); and 3) Motor control. In terms of Factor "C" - form reproduction, the examiner assesses: 1) Which patterns are accurately reproduced; 2) Lateral reversals of patterns; and 3) The ability to reproduce oblique elements. In terms of Factor "E" - visual motor hierarchy, the examiner looks for: 1) "Central to peripheral attack", meaning that the peg forming the center of the pattern is placed first and the other pegs are placed around it; and 2) Body, head, or board tilt. In terms of Factor "C1" - visualized reversals, the examiner evaluates: 1) Which patterns are accurately reversed; and 2) The ability to reverse oblique elements.

Recording Responses: The age that is most characteristic of performance is circled according to the SUNY Development Test Battery Chart. Next, the appropriate age squares are checked on the SUNY Profile Sheet for Factors B, C, C1, and E.

Scoring the Test: The Pegboard Test, like the SUNY tests, has been age normed. The child's performance in terms of Factors B, C, C1, and E can be compared to his chronological age.

Critique of SUNY Developmental Test Battery: The theoretical basis of the SUNY Developmental Test Battery is the belief that visual-spatial development involves a sequence of learning stages through which the maturing child progresses. Researchers such as Gessell and Piaget have shown in their work that learning is an adaptive process in which the initial stages serve as a foundation for the more complex stages of learning which follow. Thus, the rationale for the SUNY tests seems solidly based.

The actual evaluation used in the SUNY Developmental Test Battery has its roots in several sources including the Developmental Visual Evaluation of the Optometric Center of New York, the Purdue Perceptual Motor Survey, the Rosner Perceptual Survey, and the works of Getman and Gessell. The SUNY Test Battery has several advantages over the batteries mentioned above. First, the SUNY Test Battery has a very clearly defined model. All of the SUNY tests relate specifically back to this model. Second, the SUNY Test Battery describes performance in a specific age related manner.
The norms for the SUNY Test Battery come from several sources including Gessell's work (Copy Forms), the Optometric Center of New York's Red School House Study, and "over 100 years" of clinical experience. The primary author of the SUNY Test Battery, Dr. Suchoff, admits that many of these normed behaviors lack formal research and "should be the first to be considered as formal research becomes possible."

References


**Name of Test**: TEST OF VISUAL ANALYSIS SKILLS (TVAS)

**Purpose of Test**: The TVAS is a test of a child's ability to understand the relationship of parts to wholes. More specifically, it is a visual perceptual test that examines a child's ability to analyze a geometric pattern in an organized fashion and copy it. The author of the test also claims that teaching the child to pass the test will teach him perceptual skills.

**Indications**: The TVAS is suitable for any child between the ages of 4 and 8 who is experiencing learning difficulties.

**Apparatus and Setup**: Several versions of the TVAS have been produced since it was first developed. The initial test version had relatively large (3-1/4 inch square) stimuli and acetate-covered response spaces, on which the child drew with crayon. Later, the test was produced as a booklet in which the test items were printed on six (8-1/2 inch by 11 inch) pages on which the child drew with pencil. In a more recent version, the test patterns are printed on 2-3/4" x 2-3/4" reusable laminated cards and the child copies the respective designs on smaller maps that are contained within 2 inch squares.

**Preset (Administration)**: Give the child a pencil (or crayon, depending on the size of the response spaces), and say: "Make your side look like mine." (Point first to "his" side and then to the side with the pattern.) "Draw the lines on yours so that it looks just like mine." Continue in this manner until the child either fails two items in succession, or completes the first nine items, whichever comes first. (An item is passed if the child draws the correct number of lines and locates them on the dots accurately). If the child reaches item 10, change the instructions slightly to: "Some of the dots are missing from your side. Don't draw in the dots, just pretend they are there and draw the lines as though they were there." Continue in this manner until either all 18 items have been completed or two successive items are failed - whichever comes first. The child should be encouraged to draw his lines neatly although this is not a critical factor. Do not coach the child - he must copy the designs without assistance. Be noncommittal about the child's performance. Use words such as "okay", rather than "right", or "wrong". Children may erase if they wish. The test is not timed.

**What to Look For**: The examiner should look for correct or incorrect responses. An incorrect number of lines or an incorrect placement on the dots constitutes an error - a failed item.
**Recording Responses:** Since the TVAS is stopped when the child makes two successive errors, monitoring the test is important. For each item to be scored correct, the drawing must have the right number of lines and they must be located on the proper dots. Touching the dots, however, is not critical for a correct score. If lines are omitted or added, or if lines are located on the wrong dots, the item is scored as incorrect.

**Scoring the Test:** The TVAS score is the number of the last successfully completed item before the two consecutive errors. The significance of the score is as follows:

<table>
<thead>
<tr>
<th>TVAS Score</th>
<th>Usual Grade Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Preschool</td>
</tr>
<tr>
<td>3-7</td>
<td>Kindergarten</td>
</tr>
<tr>
<td>8-10</td>
<td>First Grade</td>
</tr>
<tr>
<td>11-16</td>
<td>Second Grade</td>
</tr>
</tbody>
</table>

The author states that if the score is below the child’s school grade level, the examiner can assume that the child’s perceptual skills are below expected level and are contributing to his school learning problem.

**Critique of Test:** A 1983 study compared two versions of the TVAS (given to 184 students at two different schools) with each other and with the Developmental Test of Visual-Motor Integration (VMI). No significant between-school, within-age-group differences were found in any of the age categories between the two versions of the TVAS. Pearson product moment correlations between the VMI and the TVAS scores of Schools #1 and #2 were .83 and .79 respectively which is significant to $P < .0005$. The outcome of this study indicates that the TVAS provides a valid measure of at least one aspect of visual perceptual skills development, regardless of which version of the test is used.

**References**


Name of Test: TEST OF VISUAL PERCEPTUAL SKILLS (TVPS)

Purpose of Test: The TVPS is a non-motor visual-perceptual test designed to determine a child's strengths and weaknesses in the areas of visual discrimination, visual memory, visual-spatial relationships, visual form constancy, visual sequential memory, visual figure-ground, and visual closure.

Indications: Children aged four through 12 years.

Apparatus and Setup: The TVPS utilizes an examiner's manual, test booklet, and recording forms. The test should be administered in an environment that is pleasant, well illuminated, and free from distractions, noises, and interruptions.

Time Required: The time involved depends primarily on the age of the child. The time varies from 7 minutes for young children to 15 minutes for older children. A limited amount of time is allowed for a child to make a choice. If a child hesitates in making a selection, he should be encouraged to make a decision. Allow approximately 10 seconds for this process.

Preset (Administration): The first subtest of the TVPS, visual discrimination, is administered as follows: State to the child, "Look at this form" (pointing to the single form above the five forms on Plate A). Then say to the child, "Find it among the five forms below" (pointing to the five forms below). If the child determines the correct response, continue with this subtest until the ceiling is reached. The ceiling is reached when the child fails four out of five consecutive items.

The second subtest of the TVPS, visual memory, is administered as follows: State to the child, "Look at this form and remember it so that you can find it on another page" (pointing to this form, which is a single item, Plate A). Then say to the child (after you have turned the page), "Find it among these forms." If the child determines the correct response, continue with this subtest until the ceiling is reached. The ceiling is reached when the child misses four out of five consecutive items.

The third subtest of the TVPS, visual-spatial relationships, is administered as follows: State to the child (pointing to the forms on Plate A), "Here are some forms that are the same; but one form is going a different way or part of one of the forms is going a different way." If the child determines the correct response, continue with this subtest until the ceiling is reached. The ceiling is reached when
the child fails four out of five consecutive items.

The fourth subtest of the TVPS, visual form constancy, is administered as follows: State to the child, "Look at this form" (pointing to the single form above the other five forms on Plate A). Then say to the child, "Find this form from among these five forms, even though it might be smaller, bigger, darker, turned, or upside down." If the child determines the correct response, continue with this subtest until the ceiling is reached. The ceiling is reached when the child misses four out of five consecutive items.

The fifth subtest of the TVPS, visual sequential memory, is administered as follows: State to the child, "Look at this form very closely" (pointing to the form on Plate A). Emphasize to the child, "Remember it so that you can find it among other forms." Then turn the page and say to the child, "Find it among these forms." (After the child has determined the correct form, say to him that these forms are going to get longer, further encouraging him to remember the exact sequence.) If the child determines the correct response, continue with this subtest until the ceiling is reached. The ceiling is reached when the child misses three out of four consecutive items. Based on the time limits used in the development of this subtest, examiners can allow an increase of time as the sequence of forms increases.

- 2 to 3 forms in sequence, 5 seconds
- 4 to 5 forms in sequence, 9 seconds
- 6 to 7 forms in sequence, 12 seconds
- 8 to 9 forms in sequence, 14 seconds

It may be necessary to prod a child to make a choice if the child takes more time than what would be considered reasonable (i.e., 6 to 10 seconds, according to the difficulty of the item, and age of the child).

The sixth subtest of the TVPS, visual figure-ground, is administered as follows: State to the child, "Look at this form" (pointing to it on Plate A). Then say to the child, "Look at the forms below," saying further, "Find the exact (or same) form from among these forms below" (emphasizing to the child that the form is hidden and that he or she will have to look very closely). If the child determines the correct response, continue with this subtest until the ceiling is reached. The ceiling is reached when the child misses three out of four consecutive items.

The seventh subtest of the TVPS, visual closure, is administered as follows: State to the child, "Look at this form" (pointing to the completed form on Plate A). Then say to the child, "Look at the figures below which are incomplete" (pointing to these forms). Ask the child to point to the one form that would be like the form above, if completed. If the child determines the correct response, continue with this subtest until the ceiling is reached. The ceiling is reached when the child misses
three out of four consecutive items.

For each subtest, let the child know that he may not be able to answer all the questions correctly. He should be encouraged to answer all items and guess when necessary.

**What to Look For:** During testing be sure the child points to only one selection or identifies a response by number. The child should be allowed to answer each sample question preceding each subtest. If the sample item is answered incorrectly the examiner should identify the correct response and explain why it is the correct answer. During testing do not let the child know whether or not he has answered correctly.

Behavioral characteristics of the child should be noted by the examiner. These characteristics may include distractibility, short attention span, difficulty in concentration, fear of failure, hypo or hyper-activity, impulsivity, withdrawn behavior, and difficulty understanding directions. These characteristics will aid the examiner in determining the validity of the test results.

**Recording Responses:** Record the child's birthdate, age (years and months), and the exam date on the recording form. Record the number corresponding to the child's response for each test item. The correct response is already printed on the form for easy comparison. The recording form should be placed so the child cannot see whether the response is marked "correct" or "incorrect." Behavioral characteristics should be recorded in the space provided on the record form.

**Scoring the Test:** Add up the number of correct responses and record in the space below each subtest. Transfer subtest scores to the front page of the recording form. These raw scores can be converted to scaled scores and visual-perceptual ages using the tables in the instruction manual. The sum of the scaled scores can be converted to perceptual quotients and percentile ranks using table 20 in the manual. The percentile quotient represents the child's overall performance.

The median visual-perceptual age from all seven subtests may be used to represent the child's average TVPS performance.

**Critique of Test:** The TVPS has several advantages as a perceptual test. The test figures are in no way language related and answers are given by the child pointing, therefore many language and cultural factors are eliminated. All children are given an equal chance. The TVPS is quick to administer and score. Administration of the TVPS does not require any advanced training which allows its use by a wide range of professionals. Speed is not a factor in the child's performance as the test is not timed.

One weakness of the TVPS is that the rationale for the development
of the test is not presented which leaves justification for its use up to the examiner. The TVPS tests the child in many areas, including visual discrimination, visual memory, visual-spatial relationships, visual form constancy, visual sequential memory, visual figure-ground, and visual closure, but there have been no factor analytic studies done to support these factors' inclusion as separate subtests.

Another problem with the TVPS is that no comparisons were made between the normative sample and a criterion group of children with visual perceptual deficits. Therefore, the examiner should be cautious in classifying a child as delayed in visual perception based on this test.

While the TVPS is well standardized, it has a limited geographic distribution. The major problem with the TVPS lies in its weak validity, especially in the areas of diagnostic and predictive validity. The predictive validity of the test for achievement scores in reading and spelling is not strong, and the rationale for this prediction is not discussed. Further studies are needed in the areas of diagnostic validity and predictive validity.

The TVPS also has some problems in terms of reliability. Reliability included only measures of internal consistency, and these were poor to fair for four of the seven subtests, with poorer reliabilities for the 10- to 12-year-olds. The total test reliability coefficients were good, and reliabilities were fair to good for three subtests.

Despite its shortcomings, the TVPS can be a useful tool to learn how a child visually perceives and interprets various forms. The test is best interpreted as a total test and in conjunction with a battery of other perceptual tests.

References


Name of Test: VISUAL-AURAL DIGIT SPAN (VADS)

Purpose of Test: The VADS is a brief assay of intersensory integration and recall, which are necessary to perform reading, spelling, and arithmetic tasks. The four subtests focus on Aural-oral, Visual-oral, Aural-written, and Visual-written integration.

Indications: VADS scores obtained on kindergarten children show a high correlation with third grade reading skills. It can be used as a test of reading readiness, or as a diagnostic tool to identify symbol-sound association and sequencing problems in a child with normal visual and auditory perception skills.

Apparatus and Setup: The examiner sits facing the child, who is also seated, with the set of number sequence cards and a copy of the VADS score sheet before the examiner, but screened from the child.

Time Required: Generally the test takes about 10 minutes to administer depending on age and ability.

Preset and Administration: The VADS Test consists of four subtests in which the examiner presents series of digits either visually or aurally to the examinee who is then instructed to recall these series in either written or oral form. The subtests are the Aural-Oral, in which the child is instructed to repeat orally a series of digits read by the examiner, the Visual-Oral, in which the child is instructed to repeat orally a series of digits after viewing each printed sequence for 10 seconds, the Aural-Written, in which the child is asked to write a series of digits following oral presentation, and the Visual-Written, in which the child is asked to write a series of digits after they have been viewed on printed cards. Two different digit spans of equal length, each successive set of increasing length, are presented until the child fails to correctly recall at least one of each series.

In each category, start with three digit series first, and if successful, go directly to the next higher series without doing the other of the same length. When the subject errs, give him the other sequence of the same length. If he gets that right, go to the next longer sequence. Testing stops when two errors are made in the same category length. Administration of the specific tests is as follows:

Aural-oral: Tell the child that you are going to read aloud some numbers, and that when you are through reading, he is to repeat them all. Read the digits at the rate of one per second.
**Visual-oral:** Have the child read the first card (number) aloud to you if there is any doubt of his being able to read numbers. Present each sequence-bearing card, one at a time, for about ten seconds, instructing him not to repeat any of them until the card is hidden. At that time, the child is to orally repeat the correct sequence.

**Aural-written:** As in Aural-oral, the child is read the sequence, and writes them down on paper after the examiner finished reading the digits.

**Visual-written:** The child is shown the number-card for ten seconds, and is asked to write the numbers down after the card is concealed.

**What to Look For:** Attention should be given to the response style of the child in order to detect indications of attention span, maturity, effort expended, confidence, and perception.

**Recording Responses:** Record the longest sequence the child was able to repeat correctly on either the first or second trial, in each test.

**Scoring the Test:** The numerical score given to each category is simply the number of digits in the longest sequence the subject was able to correctly repeat. In addition to a score for each of the subtests, six "Combination Scores" involving various combinations of the subtest scores and a total test score are computed. The six "Combination Scores" are described as follows:

- **Aural input:** The sum of the aural-oral and aural-written.
- **Visual input:** The sum of the visual-oral and visual-written.
- **Oral expression:** The sum of the aural-oral and visual-oral.
- **Written expression:** The sum of the aural-written and visual-written.
- **Intrasensory integration:** The sum of the aural-oral and visual-written.
- **Inter-sensory integration:** The sum of the visual-oral and aural-written.

Notice if any group or subgroup is strikingly higher or lower than others. Compare performance to age norms for each group. Look for patterns of organizational immaturity, form reproduction problems, or other trends. Together, these can give a picture of the subject's integrative and recall abilities. The total VADS Test score, according to the manual, "measures the entire process of perceptual-motor integration, sequencing, and recall." Two chapters on the clinical interpretations of
children's performance are provided in the test manual.

**Critique of Test:** Normative data on VADS performance and age equivalent was derived from data provided by 810 normal public school pupils, ranging from five and one-half years to twelve years, 11 months in age. No children had serious mental or physical handicaps. An equal number of boys and girls were tested. Racial breakdown was 81% white, 13% Black, 6% Hispanic, and less than 1% Asian. All testing was done by licensed psychologists.

As already mentioned, VADS scores in kindergarten had a high degree of correlation to third-grade reading, and slightly less (but still significant) correlation to third-grade arithmetic skill as measured by the CTBS. A number of studies have also found significant correlations between VADS Test scores and current performance on other achievement measures such as the PIAT and CAT. Again, the relationships appear uniformly stronger in the lower than the upper grades.

In comparisons between VADS Test performance of learning disabled and average pupils at three different grade levels, all 11 scores were found to differ significantly. The test also has been shown to discriminate between LD, MR, and average pupils.

Although the VADS percentile scores have been shown to differentiate well between levels of performance of younger children, the test does not appear to discriminate as well between high average and outstanding performance of children above age 10, since many obtain perfect scores.

The VADS author does a good job of substantiating the useability of the test. The author provides a sound clinical rationale for the test, delineates case examples for further clinic interpretation, provides a moderate research link between the VADS test and achievement, indicates the test limitations as a means for subgrouping children by mental ability, delineates the diagnostic efficiency of the test with other measures, and places the test in perspective as a possible "tool" in an overall screening battery for elementary children.

The major weakness of the test is its construct validity. The tasks employed in this test rely heavily upon attention and memory factors that are independent of intersensory integration. For example, visual presentation requires a 10-second presentation of all digits, while oral presentations are presented one digit per second. Torgesen et al.'s results suggest that the memory difference between good and poor readers is not due to modality presentation but to simultaneous vs. sequential processing.

Another serious limitation of the VADS Test is the lack of evidence on the reliability of the test for the normed sample. Most critically, the estimates for the standard error of measurement are missing for every score, subscore, and combination of scores.
The VADS Test should help diagnosticians pinpoint the underlying nature of some children's learning problems, predict later academic performance, and discriminate between children with and without learning problems. The examiner must be careful to note the construct validity problems of the test and to avoid intersensory interpretations of child performance.

References


Name of Test: WOLD SENTENCE COPYING TEST

Purpose of Test: The purpose of the Wold Sentence Copying Test is to quantify graphomotor/copying skills in school age children. This includes evaluating bimanual coordination, visuomotor hierarchy, and posture during a near point performance test.

Indications: The Wold Sentence Copying Test is suitable for children in grades 2 - 8.

Apparatus and Setup: The complete setup includes one copy of the Wold Sentence Copying Test, the child’s habitual near Rx, probe lenses, a pencil, and a stop watch.

Time Required: Usually less than 5 minutes are required to complete the test.

Preset (Administration): Test paper is placed on a desk top that is appropriately high for the child’s size and a pencil placed next to it. The child is instructed to "copy the sentence on the lines below; be careful but copy it as quickly as you can."

What to Look For: Note the time it takes the child to copy the sentence. Also observe and record: posture and working distance, fine motor control (pencil grasp), visual-motor hierarchy, bimanual integration, omissions, and reversals.

Recording Responses: A stop watch is used to record the elapsed time. It is advisable to keep the stopwatch out of view from the child. Omissions and reversals are also recorded.

Scoring the Test: A score is derived by dividing 6600 by the number of seconds taken to complete the test. (108 letters, 2 punctuations = 110 symbols, times 60 sec/min = 6600). The significance of the score is as follows:

<table>
<thead>
<tr>
<th>GRADE</th>
<th>SYMBOLS/MIN</th>
<th>SECONDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>39</td>
<td>166.3</td>
</tr>
<tr>
<td>3</td>
<td>42</td>
<td>157.0</td>
</tr>
<tr>
<td>4</td>
<td>45</td>
<td>144.1</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>130.6</td>
</tr>
<tr>
<td>6</td>
<td>54</td>
<td>121.1</td>
</tr>
<tr>
<td>7</td>
<td>58</td>
<td>113.7</td>
</tr>
<tr>
<td>8</td>
<td>62</td>
<td>105.0</td>
</tr>
</tbody>
</table>
Critique of Test: The Wold Sentence Copying Test is a quick screening test to evaluate visuomotor skills of children aged 7 to 14. It is particularly useful when used in conjunction with a motor free visual perception test such as the MVPT. Comparing the results of the MVPT and the Wold can give valuable information about the patient's visuoperceptual and visuomotor skills.

The Wold Test is as quickly scored as it is administered and therein lies a problem. The examiner is told to record omissions and reversals but there are no tables of norms to help the examiner evaluate these results.

References
