Testing and Interpretation of Visual Perceptual Skills

Philip C. Bugaiski OD FCOVD FCSO

Our Goals

- develop an understanding of how optometric tests of vision perception are conducted
- be able to identify sub-optimal test results that indicate a visual problem
- be able to identify “normal” test results that may also indicate a potential visual problem

More (important?) Goals

- learn how test results correspond with patient symptoms and parent observations
- communicate the connection between testing and the patient's daily life using language the patient and parent can understand
- apply knowledge of the above when planning optometric vision therapy activities

Standardized Tests

- Test of Developmental Eye Movements
- Test of Visual Perceptual Skills (7 subtests)
- Beery-Buktenica Visual Motor Integration
- Wold Sentence Copy
- Piaget Left-Right
- Gardner Reversal Frequency
- Birch-Belmont Auditory-Visual Integration

History

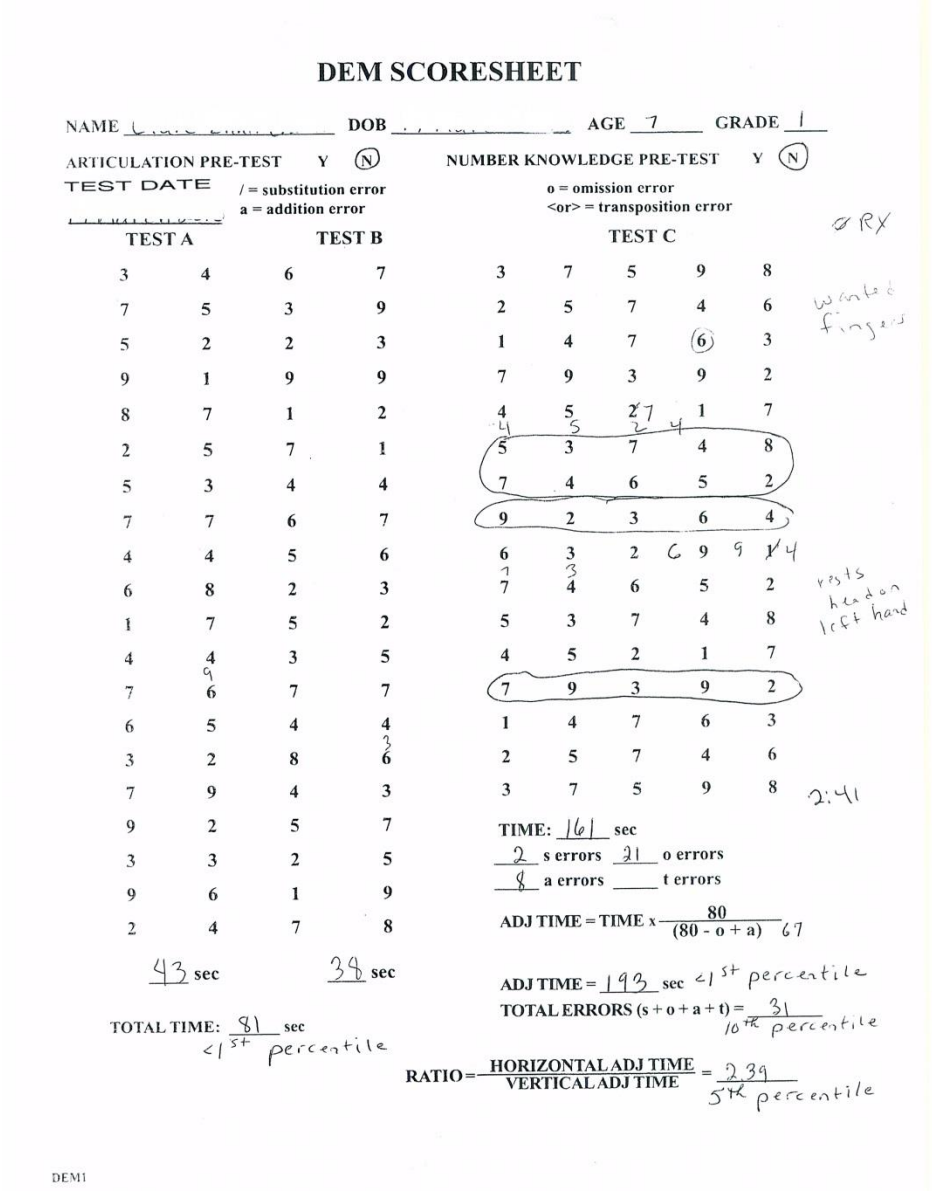
- Parent History
- Patient History
- Teacher History
- History History History History History History History

The Biological Communication Ratio

Standardized Tests

- What does the test measure (or what do the designers of the test say that it measures)
- What to watch for during the test
- Potential symptoms associated with the test (this is the biggie)

Test of Developmental Eye Movements



DEM SCORESHEET

NAME [redacted] DOB [redacted] AGE 7 GRADE 1

ARTICULATION PRE-TEST Y (N) NUMBER KNOWLEDGE PRE-TEST Y (N)

TEST DATE [redacted]

/ = substitution error
a = addition error
o = omission error
<or> = transposition error

TEST A		TEST B	
3	4	6	7
7	5	3	9
5	2	2	3
9	1	9	9
8	7	1	2
2	5	7	1
5	3	4	4
7	7	6	7
4	4	5	6
6	8	2	3
1	7	5	2
4	4	3	5
7	6	7	7
6	5	4	4
3	2	8	6
7	9	4	3
9	2	5	7
3	3	2	5
9	6	1	9
2	4	7	8

43 sec 38 sec

TOTAL TIME: 81 sec
<1st percentile

TEST C				
3	7	5	9	8
2	5	7	4	6
1	4	7	(6)	3
7	9	3	9	2
4	5	7	1	7
5	3	7	4	8
7	4	6	5	2
9	2	3	6	4
6	3	2	6	9
7	4	6	5	2
5	3	7	4	8
4	5	2	1	7
7	9	3	9	2
1	4	7	6	3
2	5	7	4	6
3	7	5	9	8

TIME: 161 sec
2 s errors 21 o errors
8 a errors ____ t errors

ADJ TIME = TIME x 80 / (80 - o + a) 67

ADJ TIME = 193 sec <1st percentile
TOTAL ERRORS (s + o + a + t) = 31
10th percentile

RATIO = HORIZONTAL ADJ TIME / VERTICAL ADJ TIME = 2.39
5th percentile

DEM1

Test of Developmental Eye Movements

- Speed and Accuracy of Saccadic Eye Movements
- Comparison of horizontal to vertical saccadic ability
- Normative data from age 6.0 to 13.11.
  - (13.11 is considered to be adult level)

Test of Developmental Eye Movements

- Ratio is important: Horizontal to vertical reading/tracking speed
  - High ratio: rapid vertically, but slow horizontally
- Vertical speed can be negatively impacted by speech problem, non-specific automaticity difficulties
- Errors are scored only in horizontal subtest, but are considered when determining baseline speed from vertical subtest
- Watch for:
  - Head movement
  - Tendency to use finger as place marker (despite instructions to the contrary)
  - Fast and inaccurate or Slow and accurate
- Results usually reinforce history and observations from initial evaluation

Test of Developmental Eye Movements

- Misreads or skips words, small words in particular
- Skips or rereads lines
- Uses ruler or finger-pointing to keep place
- Says the words seem to move or jump on the page
- Loses place/searches for place to start on the page
- Falling behind in reading, below grade level
- Problems with Fluency and/or Comprehension
  - Poor fluency, good comprehension (slow and accurate)
  - Good fluency, poor comprehension (tracking is a mental drain)
  - Poor fluency, poor comprehension (it's all a mess! how is listening?)
  - Good reader in general (imagine how much better it could be)
- Fatigue, especially associated with head movement

Test of Developmental Eye Movements

- Fast and inaccurate approach is usually a reflection of avoidance, an attempt to complete an unpleasant, uncomfortable, or sometimes painful task as quickly as possible. (This approach may or may not be reflected on other tests.)
- What is the significance of a good performance on the DEM in the presence of vision-related reading symptoms?

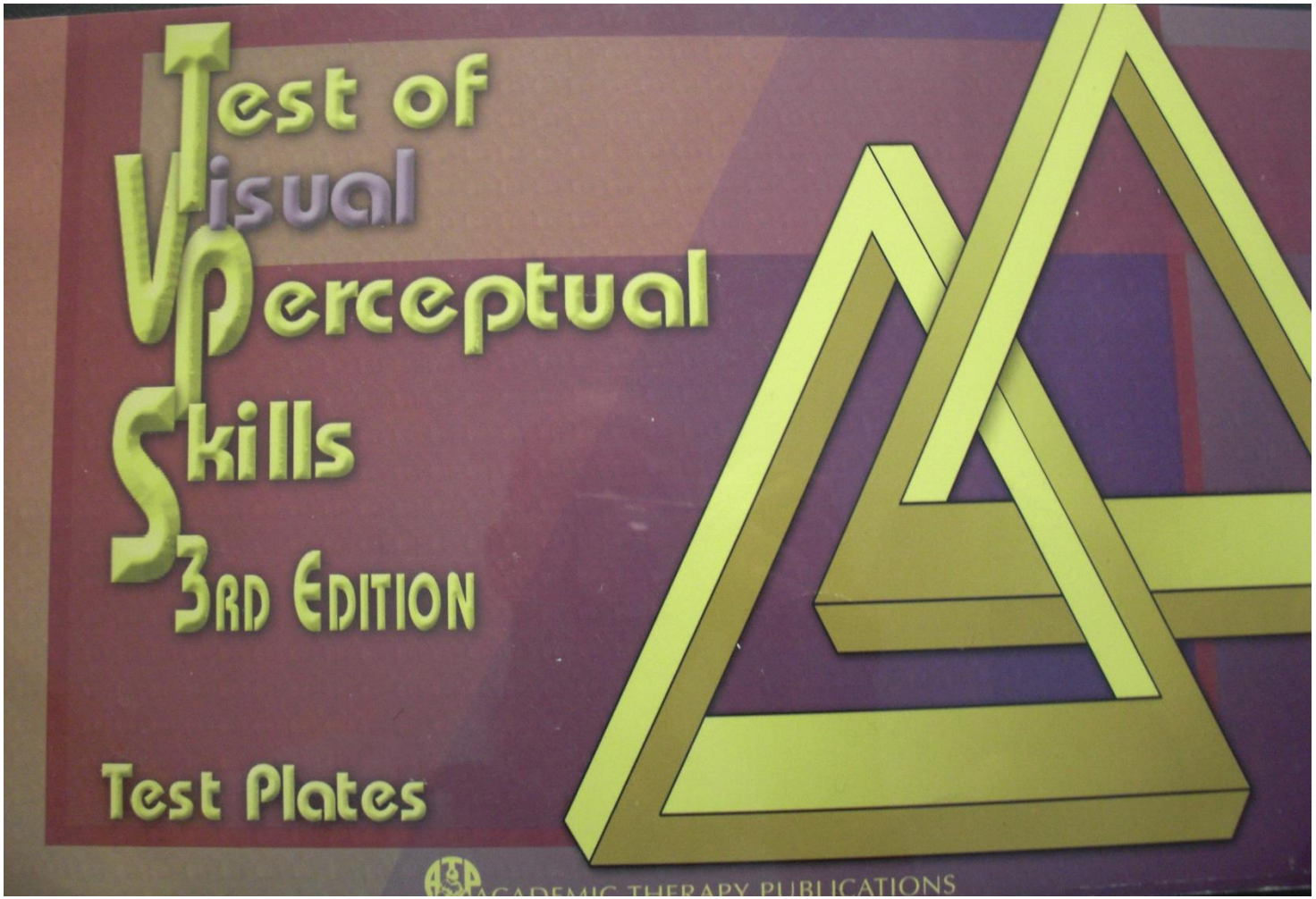
Test of Developmental Eye Movements

- Considerations for Treatment

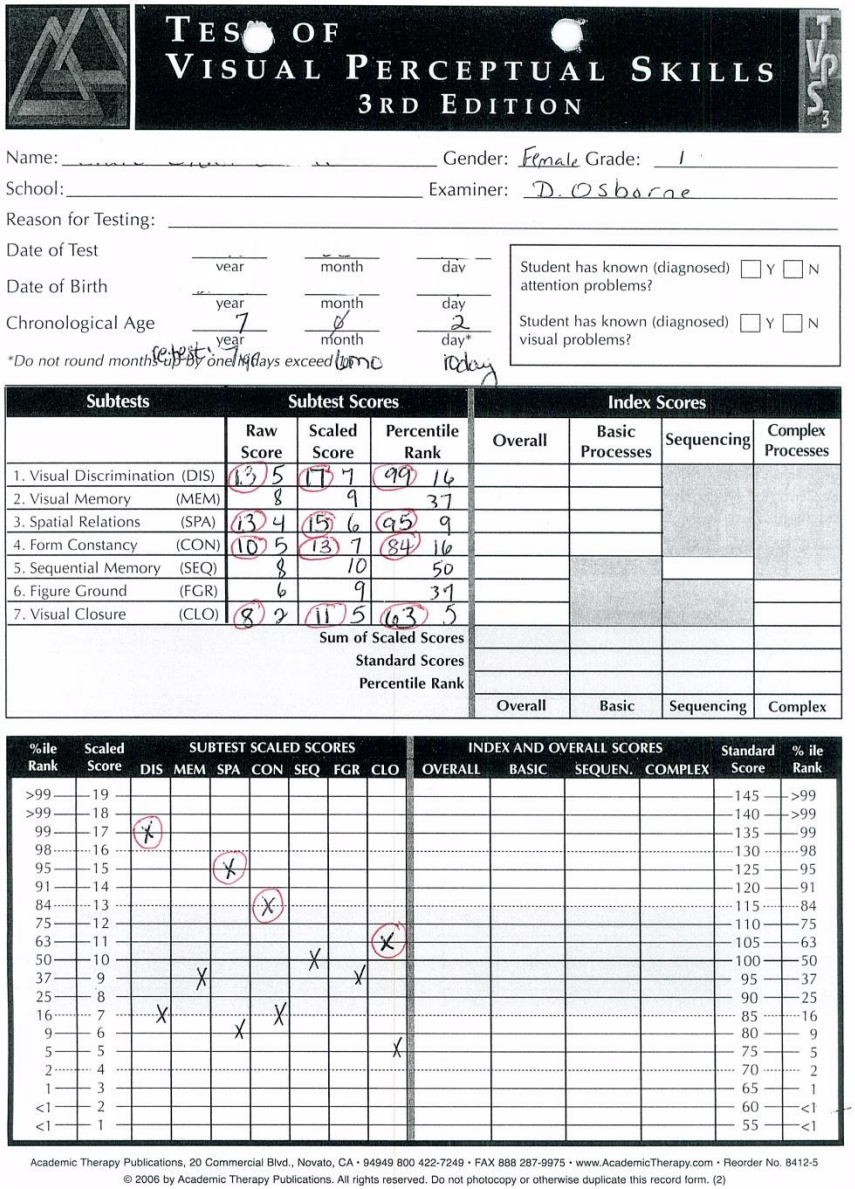
  (Preparing the parents and the patient)

  - How to arrange conditions for the patient's needs
  - Peripheral-Central Integration and Saccades
  - Starting with the easy stuff
  - Classroom Accommodations
    - Enlarged print
    - Vertical math
    - Extra time and/or reduced workload

TEST of VISUAL PERCEPTUAL SKILLS



TEST of VISUAL PERCEPTUAL SKILLS



TEST OF VISUAL PERCEPTUAL SKILLS
3RD EDITION
TVPS3

Name: _____ Gender: Female Grade: 1

School: _____ Examiner: D. Osborne

Reason for Testing: _____

Date of Test — year: _____ month: _____ day: _____

Date of Birth — year: _____ month: _____ day: _____

Chronological Age — year: 7 month: 0 day*: 2

*Do not round months up by one if days exceed current today

Student has known (diagnosed) attention problems? ☐ Y ☐ N

Student has known (diagnosed) visual problems? ☐ Y ☐ N

Subtests	Subtest Scores			Index Scores			
	Raw Score	Scaled Score	Percentile Rank	Overall	Basic Processes	Sequencing	Complex Processes
1. Visual Discrimination (DIS)	13 5	17 7	99 16				
2. Visual Memory (MEM)	8	9	37				
3. Spatial Relations (SPA)	13 4	15 6	95 9				
4. Form Constancy (CON)	10 5	13 7	84 16				
5. Sequential Memory (SEQ)	8	10	50				
6. Figure Ground (FGR)	6	9	37				
7. Visual Closure (CLO)	8 2	11 5	63 5				
Sum of Scaled Scores							
Standard Scores							
Percentile Rank							
				Overall	Basic	Sequencing	Complex

%ile Rank	Scaled Score	SUBTEST SCALED SCORES: DIS	MEM	SPA	CON	SEQ	FGR	CLO	INDEX AND OVERALL SCORES: OVERALL	BASIC	SEQUEN.	COMPLEX	Standard Score	%ile Rank
>99	19												145	>99
>99	18												140	>99
99	17	X											135	99
98	16												130	98
95	15			X									125	95
91	14												120	91
84	13				X								115	84
75	12												110	75
63	11							X					105	63
50	10					X							100	50
37	9		X				X						95	37
25	8												90	25
16	7	X			X								85	16
9	6			X									80	9
5	5							X					75	5
2	4												70	2
1	3												65	1
<1	2												60	<1
<1	1												55	<1

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A rough analogy:
"Processing"
happens between
"Input"
and
"Output"

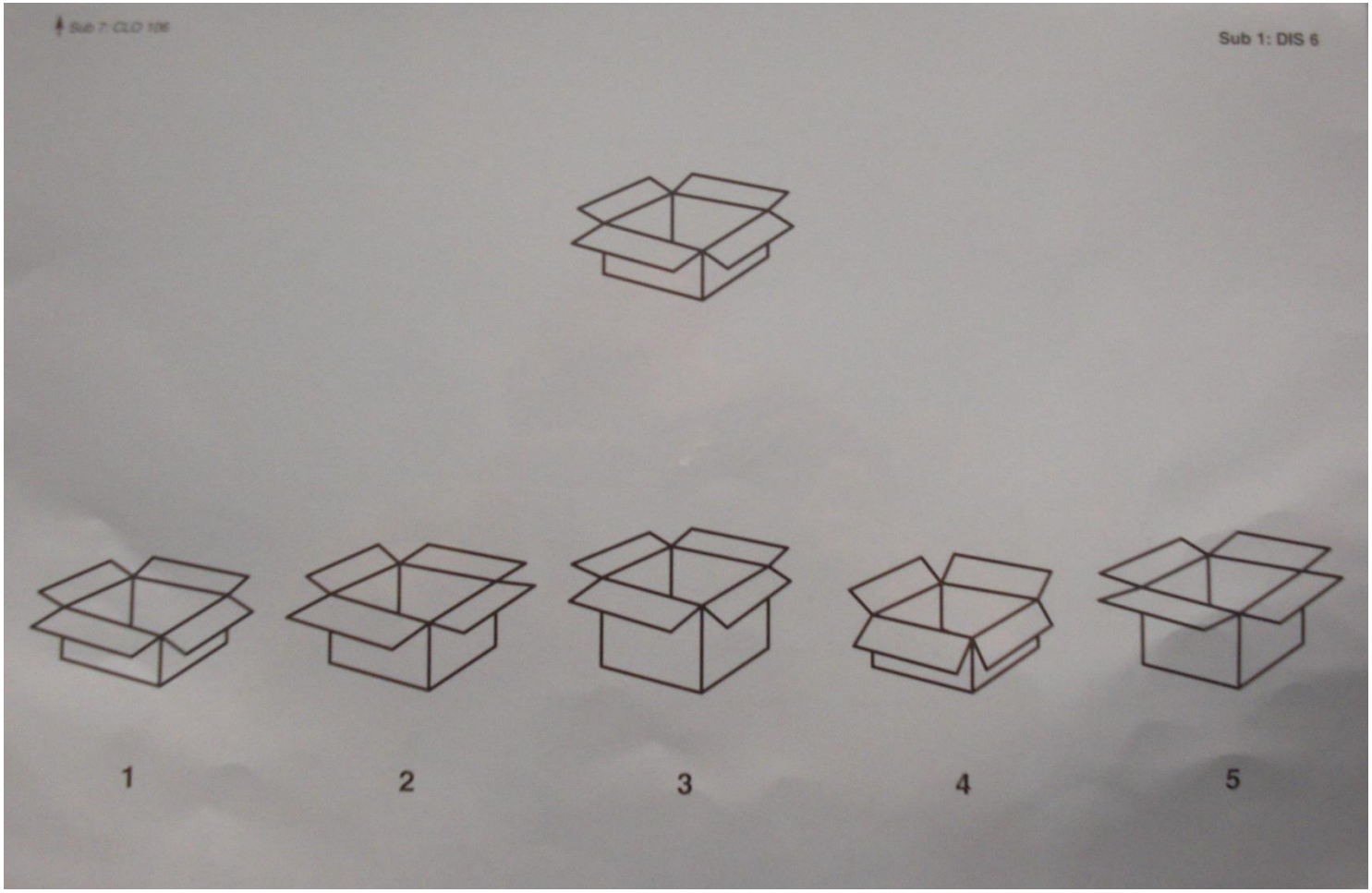
TEST of VISUAL PERCEPTUAL SKILLS
Visual Discrimination

- Patient's ability to distinguish similarities & differences

- Just-noticeable-differences (JNDs) demand gradually increases
  - designs complicated by directionality, figure-ground

- Watch for tactile strategy
  - (Tracing the form with their finger)

TEST of VISUAL PERCEPTUAL SKILLS
Visual Discrimination



TEST of VISUAL PERCEPTUAL SKILLS
Visual Discrimination

- Confuses similar shaped words
  /where/ - /when/ /these/ - /those/

- Confuses similar looking letters (eg. i as j, 5 as S or 3 as 8)

- Reading music: Difficulty distinguishing similar looking but different notes or symbols on a staff

- Poor ability to perceive small changes in the world around them
  (parent may volunteer examples, e.g. poor proofreading)

- Patient might need to touch things to feel like they really know it

TEST of VISUAL PERCEPTUAL SKILLS
Visual Memory

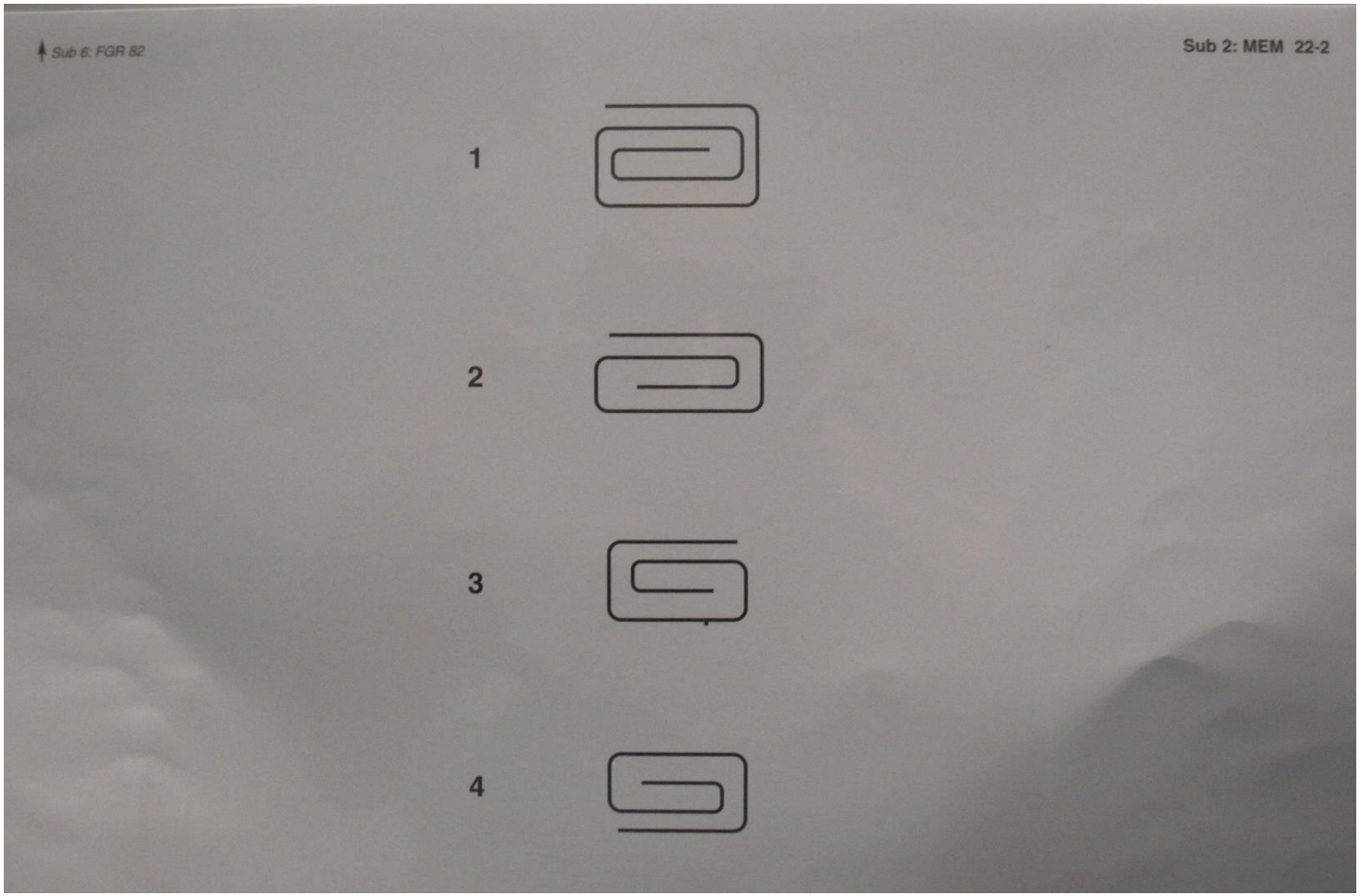
- Gestalt Memory (big picture)

- Ability to recall a visual image over time

  Find it among a mix of other similar shapes

- Ask, “How are you remembering that?”
  - Visually
  - Auditorily (lip movement)
  - Tactile (finger tracing)

TEST of VISUAL PERCEPTUAL SKILLS
Visual Memory



TEST of VISUAL PERCEPTUAL SKILLS
Visual Memory

- Difficulty recognizing the same word a few sentences later
- Difficulty remembering the main idea of a story
  - Poor visualization skills, can't see the "big picture"
- Might remember story via listening, but not reading
- Learns spelling list by Thursday night, but forgets it Friday morning under the visual stress of the test, and/or when writing the same word in a story later
- Make the same mistake over and over
  - May or may not perceive they are doing so
- Forgets what happened yesterday
- Parental frustration is common

TEST of VISUAL PERCEPTUAL SKILLS
Visual Memory

- A visually competent individual generally accesses visual images when recalling as opposed to auditory lists or kinesthetic movement:
  - Mona Lisa example - *Many have visualizations of the painting, but each is individual to that person's experience of the painting (saw it in a book vs standing in the Louvre)*

- Think of the house you grew up in example - *Evokes many visual images rather than an auditory description*

- Other Types of Memory: When asked to recall a favorite song, you imagine hearing the music. When asked to think about your golf swing, you move as if you were swinging a club. But auditory and kinesthetic (muscle memory) strategies are generally ineffective in the classroom.

TEST of VISUAL PERCEPTUAL SKILLS
Visual Memory

- Strong Results often associated with strong "Episodic Memory", recall of math facts, social skills

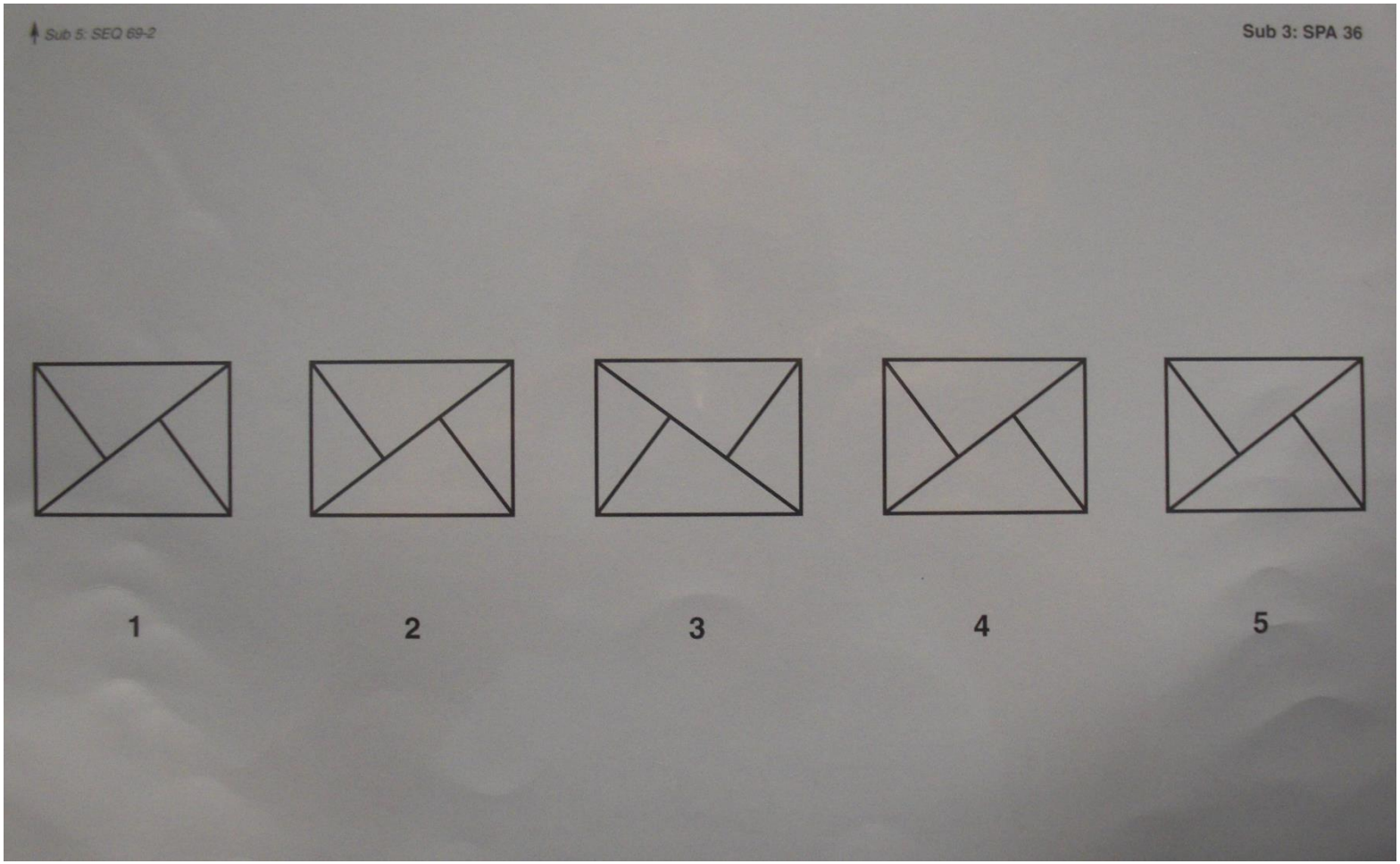
- Strong Results often might not correlate with academic success

TEST of VISUAL PERCEPTUAL SKILLS
Visual Spatial Relationships

- Ability to perceive the orientation of objects, especially in relation to other objects

- Sometimes complicated by figure-ground
  - Kind of a “specific” visual-discrimination

TEST of VISUAL PERCEPTUAL SKILLS
Visual Spatial Relationships



TEST of VISUAL PERCEPTUAL SKILLS
Visual Spatial Relationships

- Reversals of letters and words with similar shapes particularly past 2nd grade
- Misreading words, or guessing at words because they are unsure of the word
- Errors when copying mirror-image letters
- Transposing numbers eg. 26 as 62, or 15 as 51
- May be problems distinguishing Left and Right

TEST of VISUAL PERCEPTUAL SKILLS
Visual Spatial Relationships

- Directionality: Left-Right discrimination of printed material

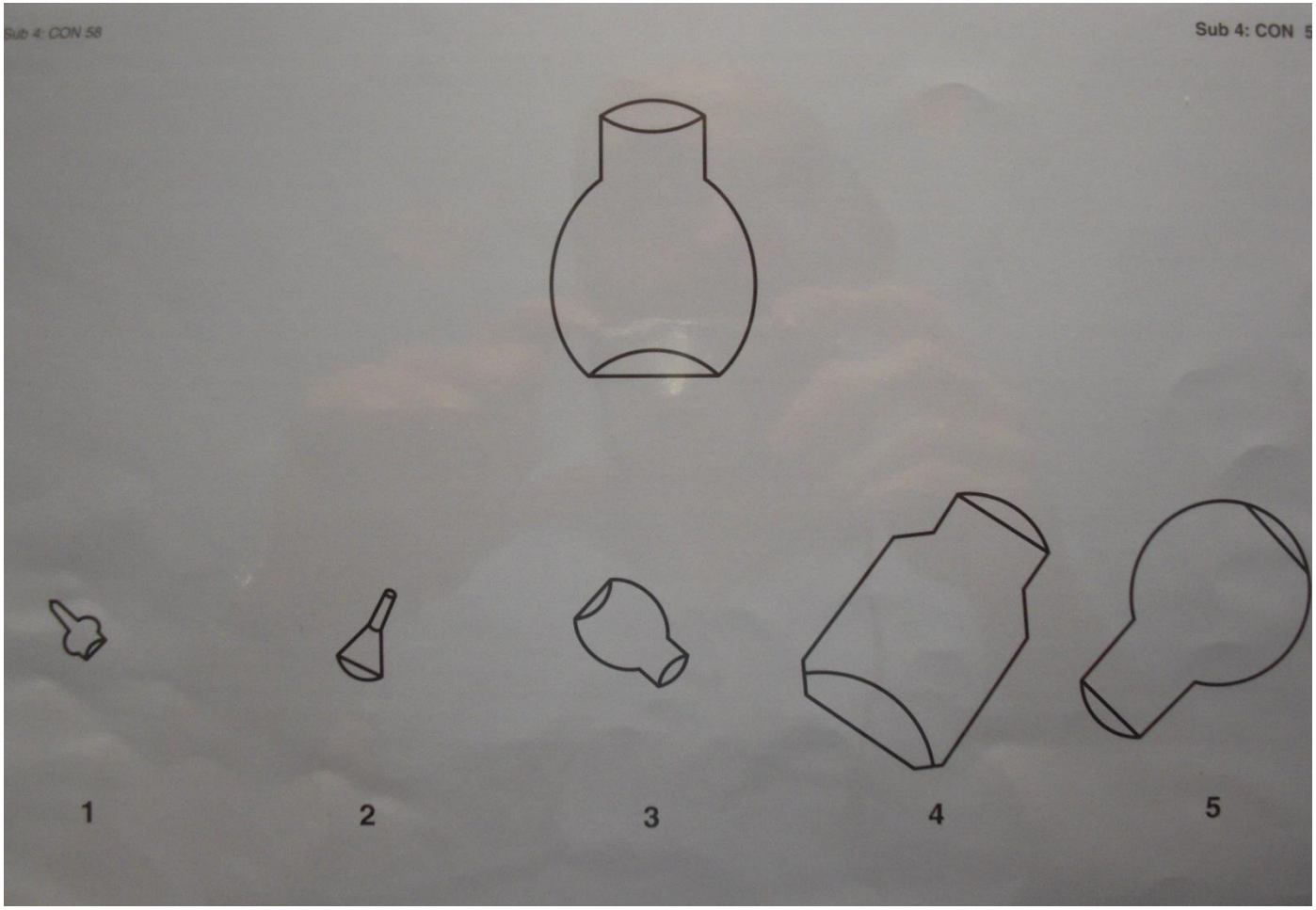
- Recognizing “flipped” images
  - rotated along the Y-axis (vertical axis)

- The interpretation should also consider patient’s performance on:
  - Piaget Left Right
  - Gardner Reversal Frequency

TEST of VISUAL PERCEPTUAL SKILLS
Form Constancy

- Ability to perceive the same object or shape when it appears in a different orientation, size or different surrounding

TEST of VISUAL PERCEPTUAL SKILLS
Form Constancy



TEST of VISUAL PERCEPTUAL SKILLS
Form Constancy

- Ability to recognize that *the shape is the same shape* regardless of how big or small it is, which way its pointing, or if there are distracting lines drawn around it

TEST of VISUAL PERCEPTUAL SKILLS
Form Constancy

- Child is unable to recognize the same shape in different orientations, sizes or surroundings: e.g. a square is still a square regardless of its size, what surrounds it, or even if it is resting on its point
  - it is still a square  *not* a diamond 
- Early readers may not recognize that an “a” is an “a” whether it appears at the beginning, middle or end of a word or if it appears in a different font: a a **ɑ** **a** *a*
- Difficulty recognizing phonemes, roots, prefixes or suffixes, e.g. -tion generally matches with “shun” sound -gress is a root in Congress, Egress, Progress

TEST of VISUAL PERCEPTUAL SKILLS
Form Constancy

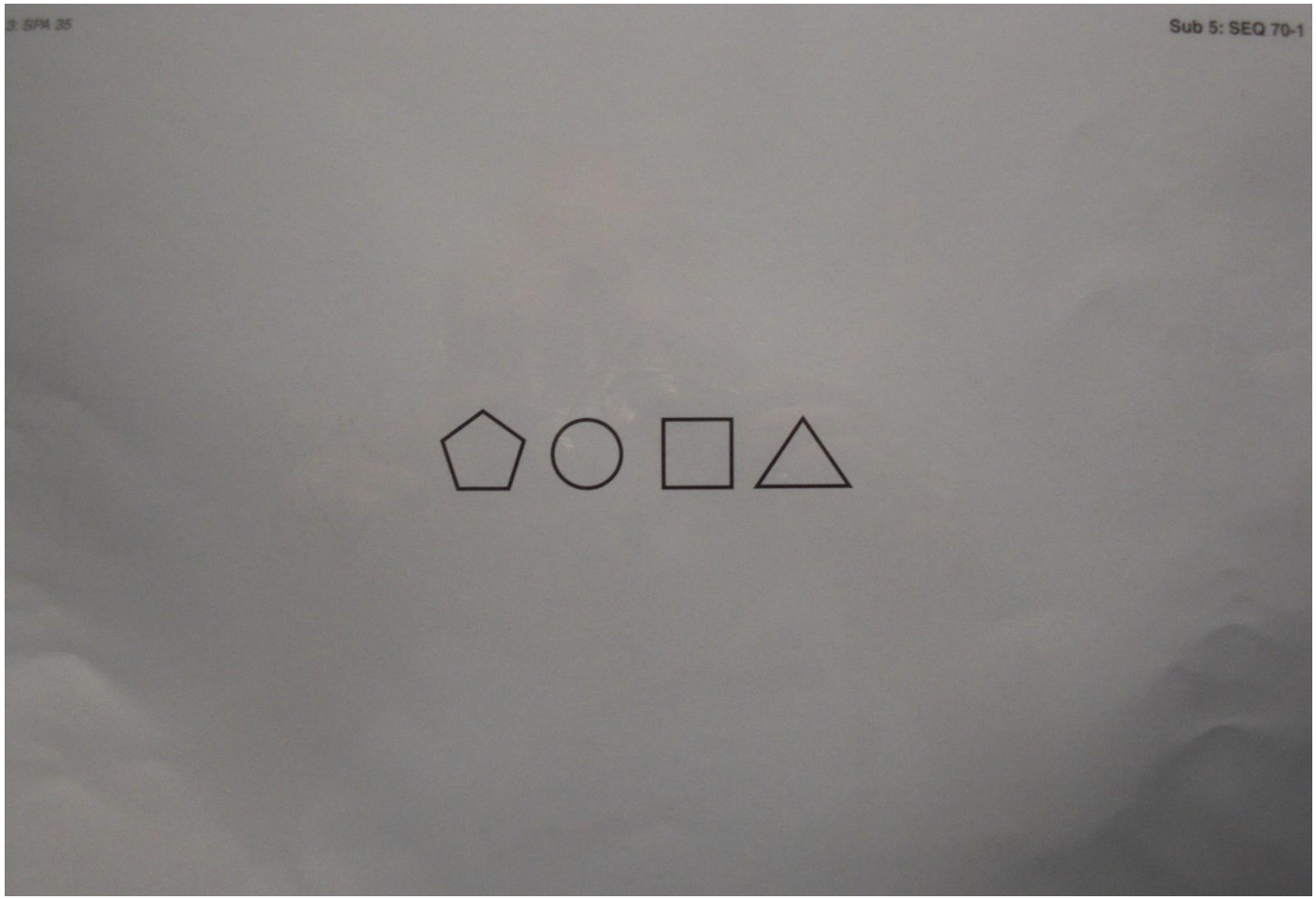
- Misreading words, or guessing at words because they don't recognize it as a word they know (consider visual memory too)
- In sheet music, child is unable to recognize the notation
  - A note rotated vertically & horizontally has the same value

TEST of VISUAL PERCEPTUAL SKILLS
Sequential Memory

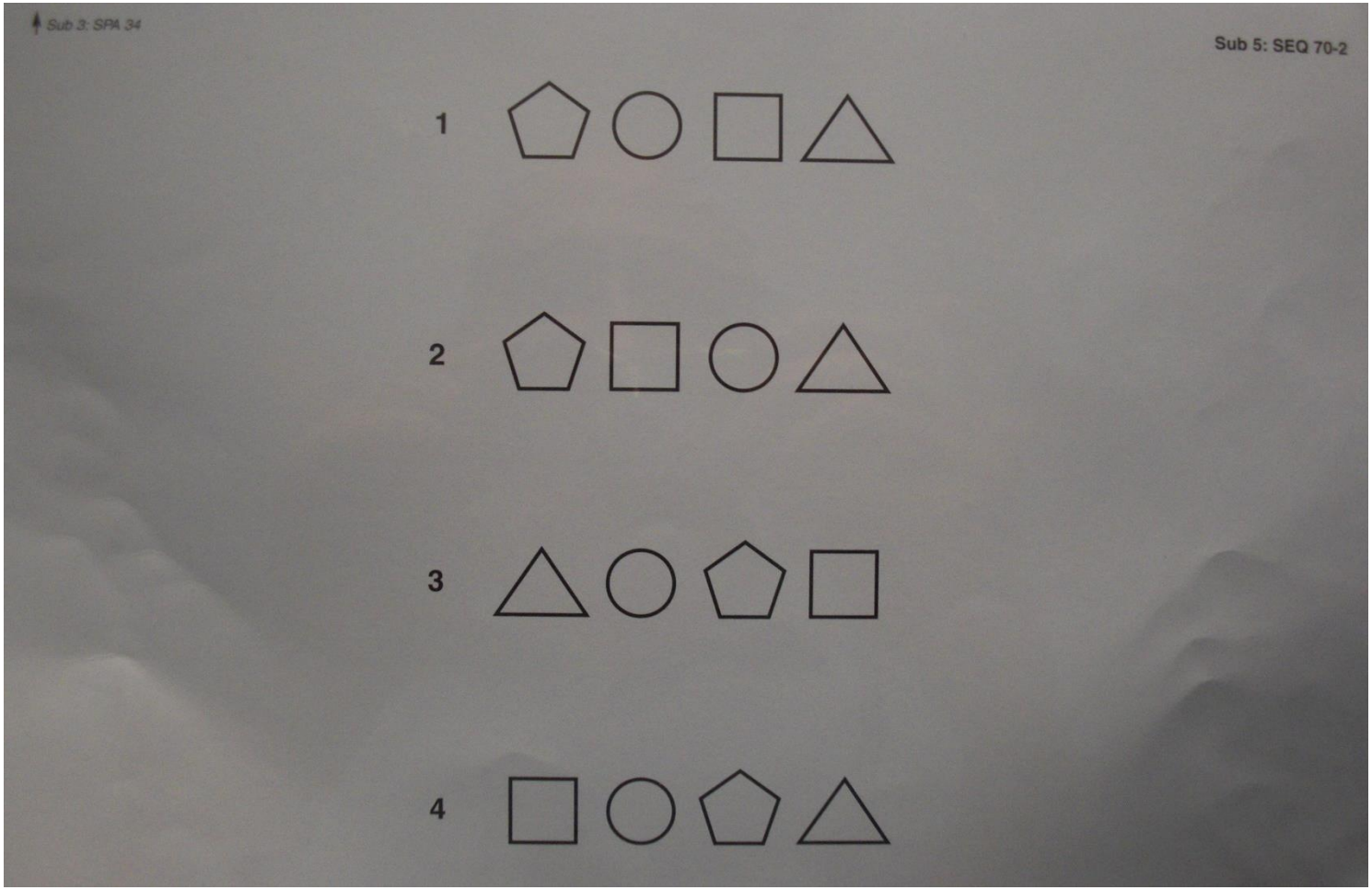
- Ability to remember a certain sequence of simple objects or shapes (as distinct from Gestalt)

- Number of objects in sequence increase as test progresses

TEST of VISUAL PERCEPTUAL SKILLS
Sequential Memory



TEST of VISUAL PERCEPTUAL SKILLS
Sequential Memory



TEST of VISUAL PERCEPTUAL SKILLS Sequential Memory

- Reveals patient strategy for recalling sequences:
  - Visual and/or Auditory
  - Is child building visual images of the sequence, or are they naming the items in the sequence and repeating them (silently or aloud)

- Tester asks child, *"How did you manage to do that?"* for insight into strategy (and awareness thereof)

TEST of VISUAL PERCEPTUAL SKILLS
Sequential Memory

- Reading problems: decode a word in one sentence, but must re-decode it in another sentence…
- Spelling problems: No visual memory of a word, do not recognize that a word is misspelled, scores low on spelling tests even though child seemed to know the word during drills
- Auditory approach: generally try to spell word phonetically. eg. school=skul, what=wut
- Suggests child is not using or is unable to use visualization to recall the sequence
- Algebra: have trouble remembering the sequence in which the problem should be solved
- May remember routines, but not variation in routine

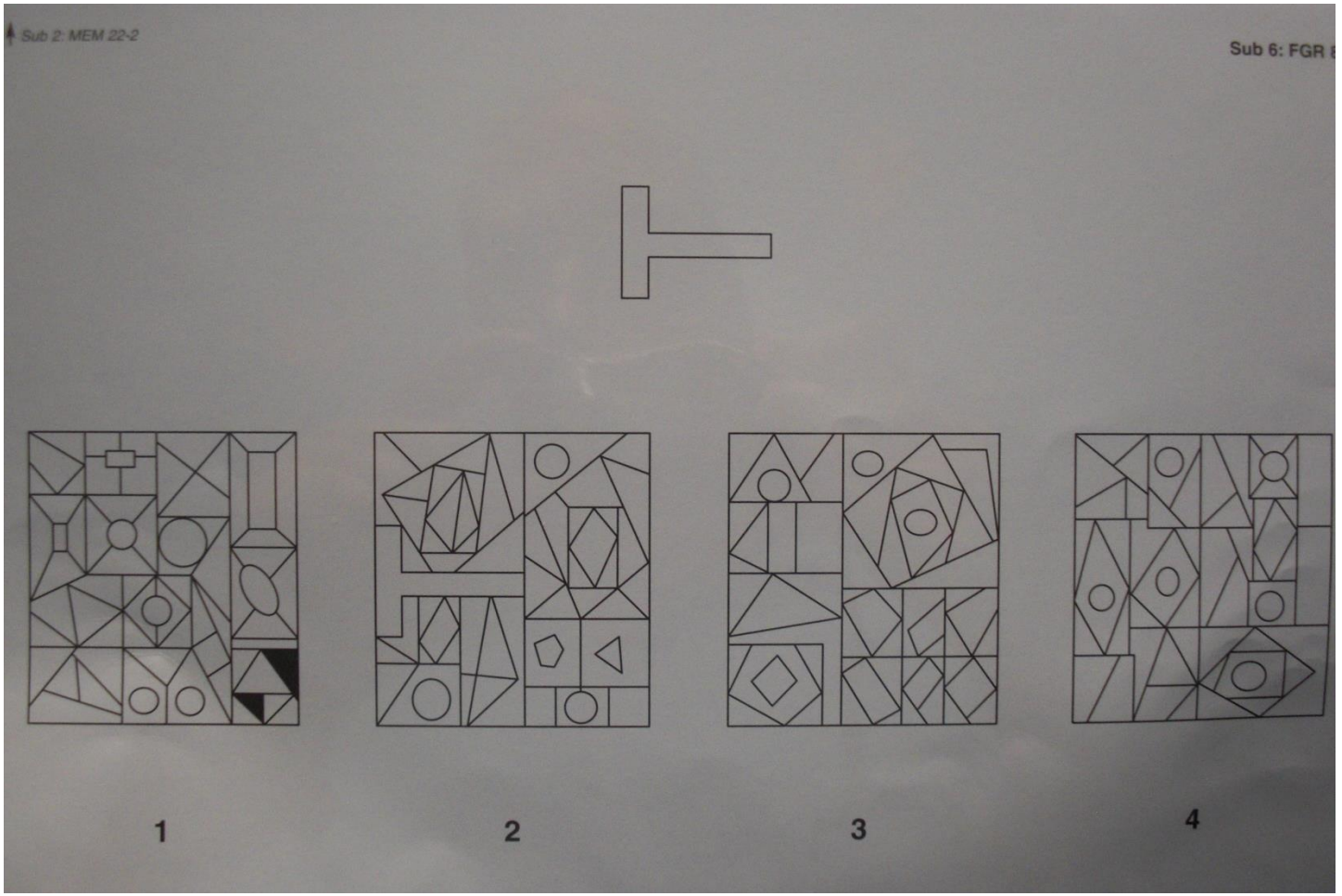
TEST of VISUAL PERCEPTUAL SKILLS
Sequential Memory

- Difficulty following step by step directions or instructions, in order (even with subvocalization)
- Parent tells child to do several tasks, but child only does one or two, the rest don't get done
- Has difficulty remembering any complex list of instructions
  - chores, how to clean up your room, preparing food
- *"Pick up your clothes, put them in the basket, fold your socks and put them in a drawer, get fresh towels from the closet and replace the old towels with the new ones, then put the dirty towels in the basket."*
  - *Child picks up the clothes and puts them in the basket, and nothing else.*

TEST of VISUAL PERCEPTUAL SKILLS
Figure Ground

- Test ability to direct visual attention at an object of regard in a busy background

TEST of VISUAL PERCEPTUAL SKILLS
Figure Ground



TEST of VISUAL PERCEPTUAL SKILLS
Figure Ground

- Can child find what they want to find in a busy visual environment
  - (Where is the point of regard?)

- Consider performance on this test in relationship to other tests:
  - Visual Fields
  - Impulsive saccadic eye movements?
  - Accommodation, where to look along the Z axis
- May indicate difficulty ignoring background information

TEST of VISUAL PERCEPTUAL SKILLS
Figure Ground

- Unable to find Waldo or difficulty with "Hidden Picture" or "I Spy" puzzles
- *"Mom, where is my…"*
- Child takes an open book test but can't find the answer even though it's right there
- Patient may be distracted by other objects in their environment

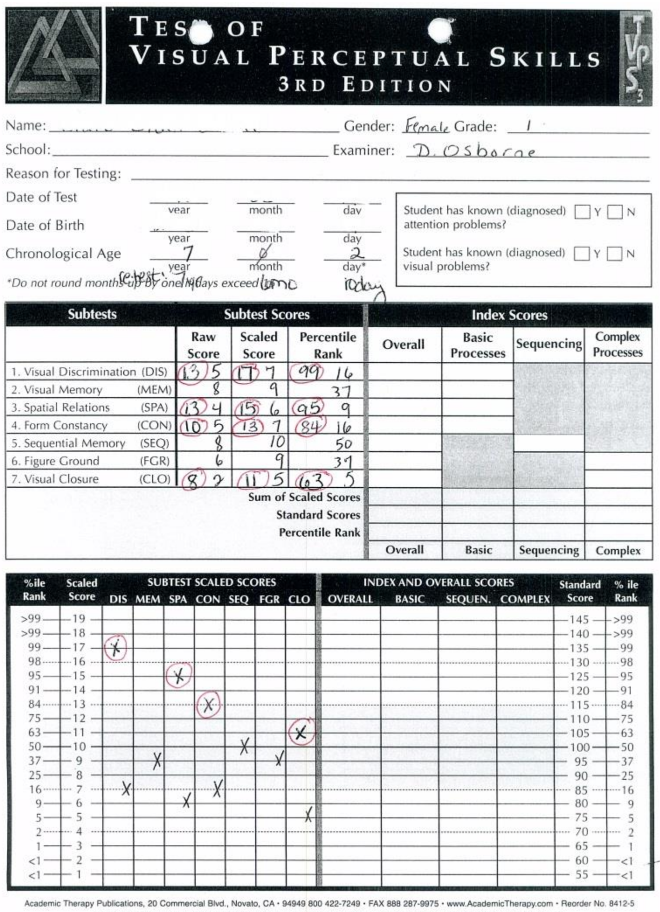
TEST of VISUAL PERCEPTUAL SKILLS
Figure Ground

- A small child may sit very close to TV, not because acuity is poor, but because they don't want to be distracted by all the objects surrounding the TV
- Overly decorated classroom may make it difficult for a child to concentrate

  e.g. Word Wall – "helpful" lists of sight words make finding a particular word very challenging

TEST of VISUAL PERCEPTUAL SKILLS

Discussion of Overall Results



TEST OF VISUAL PERCEPTUAL SKILLS
3RD EDITION

Name: ______ Gender: Female Grade: 1
School: ______ Examiner: D. Osborne
Reason for Testing: ______

Date of Test ___ year ___ month ___ day
Date of Birth ___ year ___ month ___ day
Chronological Age 7 year 6 month 2 day*
*Do not round months up by one if days exceed 15. retest: 7yo 6mo 10day

Student has known (diagnosed) attention problems? ☐ Y ☐ N
Student has known (diagnosed) visual problems? ☐ Y ☐ N

Subtests	Raw Score	Scaled Score	Percentile Rank	Overall	Basic Processes	Sequencing	Complex Processes
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4. Form Constancy (CON)	(10) 5	(13) 7	(84) 16				
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7. Visual Closure (CLO)	(8) 2	(11) 5	(63) 5				
Sum of Scaled Scores							
Standard Scores							
Percentile Rank							
				Overall	Basic	Sequencing	Complex

%ile Rank	Scaled Score	DIS	MEM	SPA	CON	SEQ	FGR	CLO	OVERALL	BASIC	SEQUEN.	COMPLEX	Standard Score	% ile Rank
>99	19												145	>99
>99	18												140	>99
99	17	(X)											135	99
98	16												130	98
95	15			(X)									125	95
91	14												120	91
84	13				(X)								115	84
75	12												110	75
63	11							(X)					105	63
50	10					X							100	50
37	9		X				X						95	37
25	8												90	25
16	7	X			X								85	16
9	6			X									80	9
5	5							X					75	5
2	4												70	2
1	3												65	1
<1	2												60	<1
<1	1												55	<1

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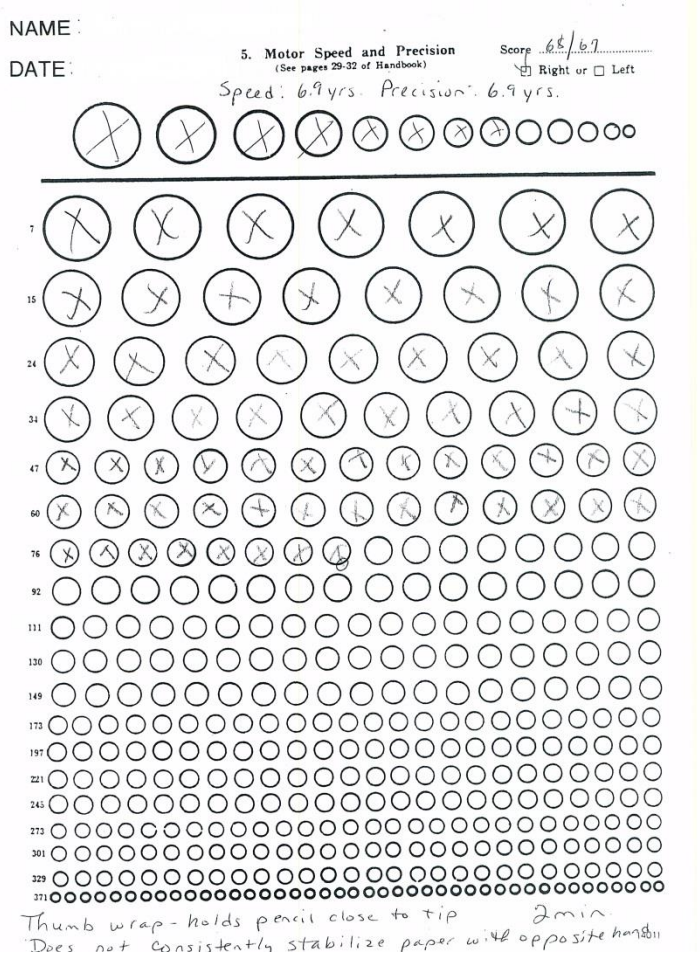
- What's up with "Basic" vs "Complex" vs "Sequencing"?
- Highs and Lows as a prognostic indicator
- How the patient's problem-solving strategy impacts treatment plan

Detroit Motor Speed & Precision


NAME:

DATE:

5. Motor Speed and Precision
(See pages 29-32 of Handbook)

Score 66/69

☒ Right or ☐ Left

Speed: 6.9 yrs. Precision: 6.9 yrs.

7
15
24
34
47
60
76
92
111
130
149
173
197
221
245
273
301
329
371

Thumb wrap - holds pencil close to tip 2 min

Does not consistently stabilize paper with opposite hand

Detroit Motor Speed & Precision

- Eye-Hand coordination and control
  - Specifically “Pencil and Paper”
    (not directly related to Hand-Eye in sports)

- How fast and accurate can patient be when
  writing X’s inside circles

- Timed Test (length varies with age of patient)

Detroit Motor Speed & Precision

- Fine Motor problem? Visual Motor problem?
  - May be either or both

- Fast & Messy: Visual Motor problem
  - Hand is fast, but visual control of movement is deficient

- Slow & Neat: Visual Motor problem? Does patient choose accuracy over speed? Or fine motor (finger difficulty)?

- Slow & Messy: fine motor, or both – not able to distinguish from this test alone
- Interpretation of this test informed by oculomotor tests, and other pencil-paper tests (i.e. Pursuits, Saccades, Wold Sentence Copy, Beery VMI)

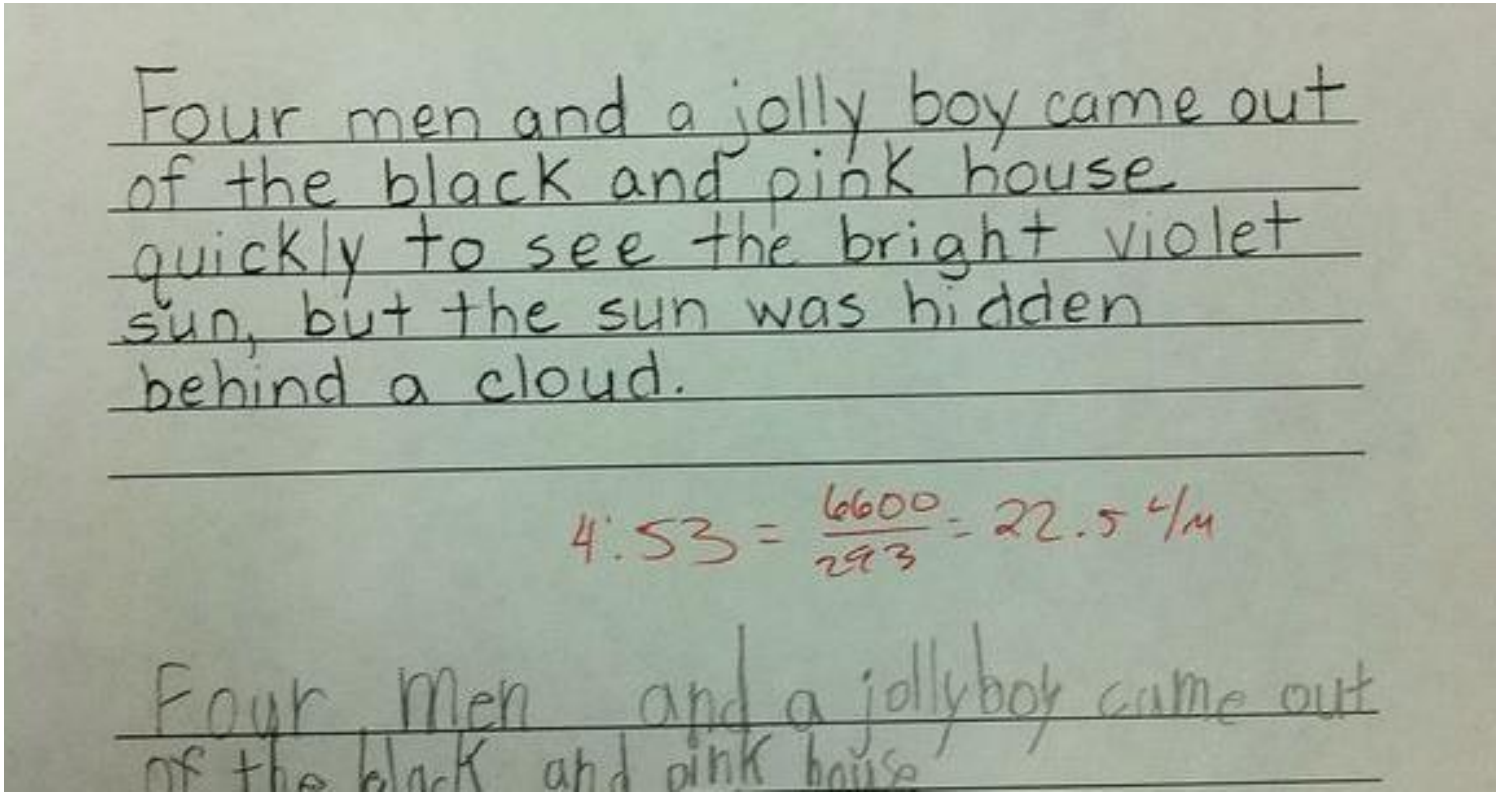
Detroit Motor Speed & Precision

- Child may have difficulty completing written work in time allowed

- Child's writing may be neat initially, but penmanship quickly deteriorates

- Child may exhibit poor pencil grip, or excessive hand/wrist/arm pressure when writing

Wold Sentence Copy



Wold Sentence Copy

- Integration of the visual skills required for reading and for writing
- Tests the ability to copy from the top of a page to the bottom
- Timed test (stop if not complete at 3 minutes)

Wold Sentence Copy

- Normative data based on letters per minute, based on both printing and cursive.
- From 2nd to 8th grade
- Compare speed on this test with Motor Speed & Precision
  - If the patient is fast on one of them, there is likely not a severe hand or finger problem
- Consider how speeds affect sizing, spacing, staying on the line, reversals, errors in spelling, punctuation, omissions…

Wold Sentence Copy

- Messy handwriting
- Rushing to complete copying before time runs out
- Messy, inaccurate copying from board to paper
  - homework assignments, spelling lists, agenda items
- Parent can't make out homework on the child's copy
- Sometimes manifests as a mismatch between verbal and written expression: e.g. Child can tell you an answer to a question, but struggles to express the same thought in writing
- This paper to paper test may be neater than patient's copying from a distant board or when doing extended writing assignments, such as writing a story

Considerations of MS&P and Wold

- Is there potentially a hand problem complicating the vision problem?
  - Slow on both tests, and other fine motor symptoms (hand problems interfere with drawing, eating, buttons, shoe tying…)
- Does the patient rush with everything?
  - Wait and look at the next test…

Beery-Buktenica Test of Visual Motor Integration (5th edition)

The Beery-Buktenica
Developmental Test of Visual-Motor Integration

Beery™ VMI Fifth Edition

Ages 2 through 7 (SHORT FORM)

by Keith E. Beery, Norman A. Buktenica, and Natasha A. Beery

Name: _____ (Last) _____ (First) _____ Sex: ☒F ☐M

School: _____ Grade: 1

Examiner: D. Osborne

Test Date: _____ year _____ month _____ day

Birth Date: _____ year _____ month _____ day

Chronological Age: 7 years 8 months

(Count more than 15 days as one month.)

SUMMARY

See the Beery VMI manual (fifth edition) for norms.

	Beery VMI	Visual Perception	Motor Coordination
Raw Scores:	18		
Standard Scores:	96		
Scaled Scores:			
Percentiles:	39		
Other Scaling:			

Comments and Recommendations:

Thumb wrap
Holds pencil close to tip
Does not always stabilize booklet with opposite hand

PROFILE

Standard Score	Beery VMI	Visual Perception	Motor Coordination	Percentile
145	-	-	-	99.7
140	-	-	-	99.2
135	-	-	-	99
130	-	-	-	98
125	-	-	-	95
120	-	-	-	91
115	-	-	-	84
110	-	-	-	75
105	-	-	-	63
100	-	-	-	50
95	-	-	-	37
90	-	-	-	25
85	-	-	-	16
80	-	-	-	9
75	-	-	-	5
70	-	-	-	2
65	-	-	-	1
60	-	-	-	.8
55	-	-	-	.3

Begin testing on page 1. Turn booklet over with bound edge toward the student. If subtests are used, always test in this order: VMI → Visual → Motor.

Beery VMI

Beery VMI Recording and Scoring

No.	Task or Form	Age Norm (Yrs-Mos)	Score	Observations
1		1-1 Imitated Mark or Scribble		
2		1-4 Spontaneous Scribble		
3		1-9 Contained Scribble		
4		2-0 Imitated		
5		2-6 Imitated		
6		2-9 Imitated		
7		2-10 Copied	1	
8		3-0 Copied	1	
9		3-0 Copied	1	
10		4-1	1	
11		4-4	1	
12		4-6	1	
13		4-7	1	

No.	Task or Form	Age Norm (Yrs-Mos)	Score	Observations
14		4-11	1	
15		5-3	1	
16		5-6	0	
17		5-9	1	
18		6-5	0	
19		6-8	1	
20		7-5	1	
21		7-11	0	

Beery VMI Raw Score = 18 = total points up to three consecutive No Score

Record raw score on page 16.
See the Beery VMI manual (fifth edition) for scoring, norms, and teaching recommendations.

Beery VMI

- Integration of visual system with motor
- Subtests of Visual Perception
  and Motor Coordination
  - (I do not use these subtests)
- Norms from age 2 to 100 years

Beery VMI

- Grading: WHEN IN DOUBT,
  READ THE MANUAL

- Watch pencil grip and pencil **pressure**
- Body/Head Posture
- Tilting or turning the paper
- Watch location of form in the space,
  not just degree of accurate copying

Beery VMI

- Patient's ability to perceive and copy forms or shapes accurately depends in "input" and "processing"
  - Refer to previous testing when interpreting VMI
- Drawings show patient's part-to-whole processing
- Problems correspond to difficulty with praxis (motor planning) identified by OT
  - Can you interpret based on another clinician's test results?

Beery VMI

- Variations in letter size, shape, even within a sentence
- Scrawling, crowding of letters and words, inconsistent, poor spacing or seating
- Older child prints rather than using cursive, which requires fine motor control
- Some children never learned to write cursive, use keyboard instead, never learn fine eye- hand coordination.

- Difficulty with drawing, art projects
  - Human figures rendered below detail expected for age
  - Errors when copying shapes or drawings
  - Asymmetrical rendition of symmetrical subjects

Beery VMI

- Misalignment of digits in math
- Poorly formed digits (5 looks like a 2, a 7 looks much like a 4)
- Makes math errors because of misalignment
- Must recopy math homework for neatness and takes a long time to recopy
- May not even perceive that work is messy or unreadable
- Gets angry, upset because they think they have already completed the work
- Difficulty copying from the board

Beery VMI

- Slow, tedious, child labors intensely when shifting gaze from paper to board and back
- Cannot complete copying homework assignments before teacher erases it
- Often has a death grip on their pencil, leads to hand pain when writing
- Uses gross rather than fine motor to control writing instrument i.e. uses arm & shoulder (large) muscles to move the hands and fingers
- May be associated with difficulty using scissors, rulers, compass, threading a needle

Interpretation of “Output” Results

- Hand/Finger Issues
- Rushing all the time, sometimes, or not at all
- Timing of Treatment, and expectation for improvement

Piaget Left-Right

Name:

Piaget Left-Right Awareness Test Date:

Directions for Test Questions:
If the patient misses any item in A – E, they have failed that portion of the test.

A.
Show me your right hand
Show me your left leg
Touch your left ear
Raise your right hand
Show me your right leg
Show me your left hand
Point to your right eye

B.
(Sitting opposite the patient)
Show me my right hand
Show me my left hand
Show me my right leg
Show me my left leg

C.
(Place a coin on the table left of a pencil in relation to the patient)
Is the pencil to the **right** or to the left?
And the coin – is it to the right or the **left**?
(Have the patient go around to the other side of the table)
Now is the pencil to the right or to the **left**?
And the coin – is it to the **right** or the left?

D.
(Sit opposite the patient with a pen in your right hand and a bracelet or watch on your left arm)
Is the pen in my **right** or left hand?
Is the bracelet/watch on my right or **left** arm?

E.
(Place three objects in front of the patient: a pencil to the left, a key in the middle, and a coin on the right)
Is the pencil to the **left** or right of the key?
Is the pencil to the **left** or right of the coin?
Is the key to the left or **right** of the pencil?
Is the key to the **left** or right of the coin?
Is the coin to the left or **right** of the pencil?
Is the coin to the left or **right** of the key?

Norms for Piaget Right-Left Awareness Test

Age	Items passed by 75% of Age
5	A
6	A
7	A,C
8	A,B,C,D
9	A,B,C,D
10	A,B,C,D
11	A,B,C,D,E

Piaget Left-Right

- Laterality: Left-Right awareness of self

- Directionality: Left-Right awareness beyond self (other people's sidedness, and orientation among objects)

Piaget Left-Right

- Laterality (self):
  - Does patient recognize one side of self distinct from other side?
  - Inconsistent labeling is a laterality problem
  - If labels are consistently wrong, it's a labeling problem, not a laterality problem
- Difficulty understanding which way to go, which hand to use, where to turn

Piaget Left-Right

- Directionality (beyond self):
  - Does patient visually recognize that other people have consistent sidedness just as they do?

- Letter, number transpositions, letter, word reversals
- Confuses letters that are mirror images /b/-/d/ when decoding and/or writing
- Trouble giving directions when getting a ride home
- Difficulty reading a map, particularly when top of the map is not in the direction they are facing

Gardner Reversal Frequency

- Reversals test for letters and numbers

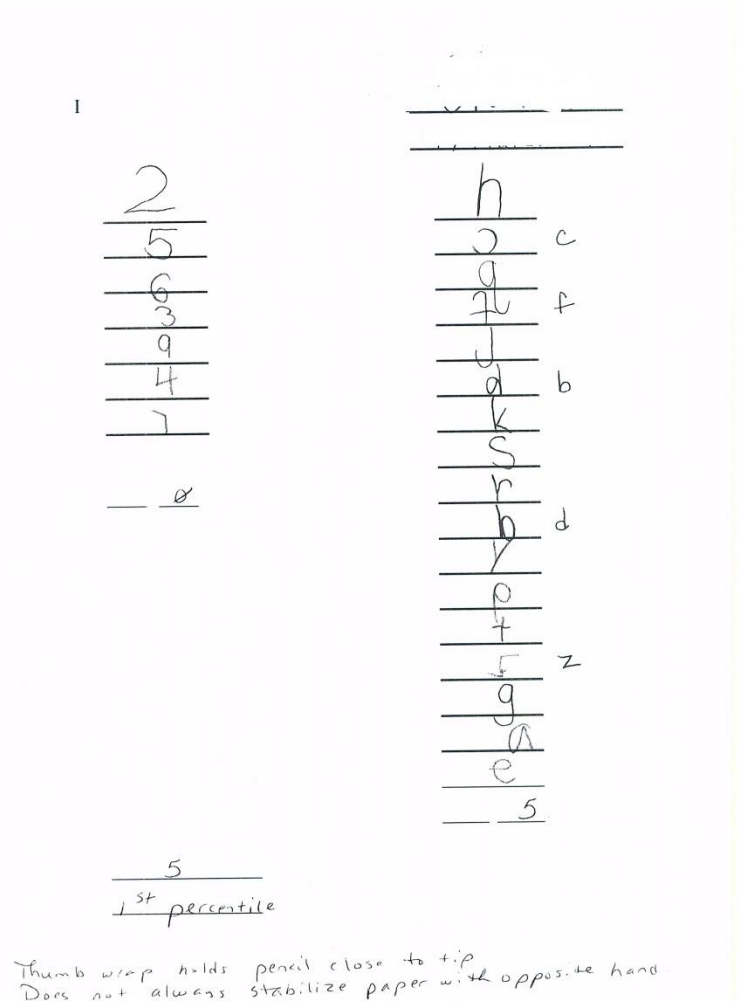
  2 subtests – Execution and Recognition

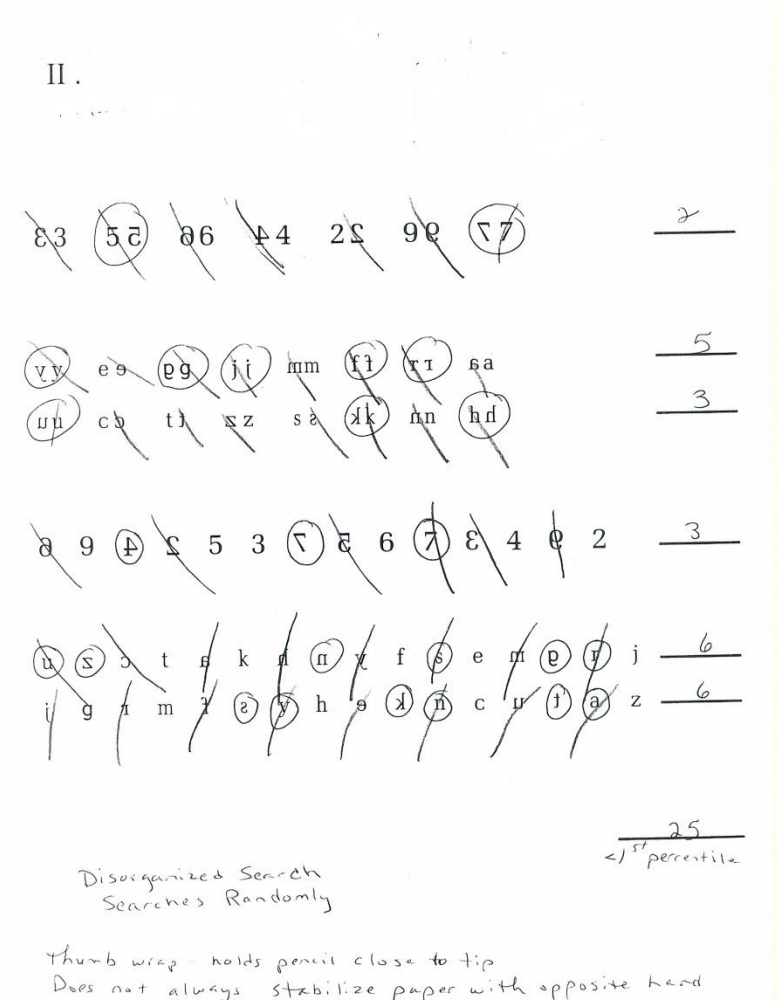
- Execution: write with correct orientation

- Visual Recognition of reversal errors

  “proofreading”

Gardner Reversal Frequency





Gardner Reversal Frequency

- Execution subtest: writing numbers and lower case letters (can be compared to neatness on Wold)
- Graded via Norms for frequency of reversals (should be extinguished by end of 2nd grade)
- Recognition subtest: cross-out the backwards letters and #s
  - Watch how they search, L to R or other
  - Watch for other strategies; do they write in the air/on the paper (kinesthetic strategies); check previous answers?

Gardner Reversal Frequency

- Misreads and/or “misspells” words
- Trouble comprehending words because of reversable letters
- May struggle to discern meaning from context
  - e.g.: “The car saw near the house.”
- May reverse letters or #s when reading and/or writing:
  - Sequence /12435/ is misread as /12345/
  - May decode /big/ as /dig/
  - Might say letters of a word correctly, but reversals when writing
  - /handle/ as /hanble/ (marked by teacher as a “spelling error”)
- When writing, may not visually recognize their reversals

Laterality/Directionality

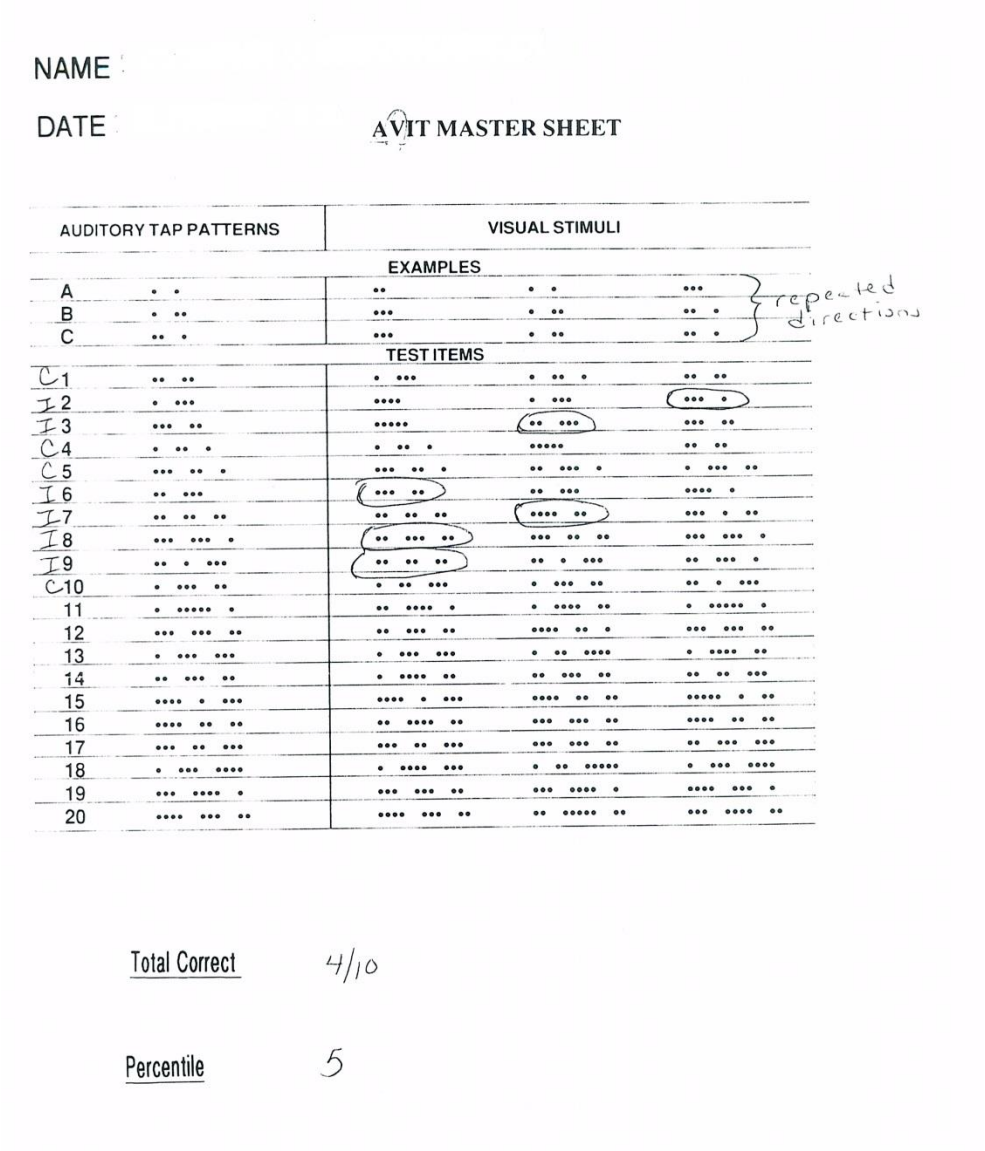
- Directionality stands on a foundation of …
- Laterality, which stands on a foundation of …
- What you have to treat first
- “What about b’s and d’s and dyslexia?”

Birch-Belmont Auditory-Visual Integration Test (AVIT)

- Provides insight into auditory processing and integration with visual skills

- Are they repeating the tap pattern or counting? (In need of extra auditory reinforcement?)
- Do they nod their head or use fingers (in need of proprioceptive reinforcement?)
- Check TVPS visual sequential memory performance to develop broader picture of patient ability

Birch-Belmont AVIT



NAME

DATE

AVIT MASTER SHEET

	AUDITORY TAP PATTERNS	VISUAL STIMULI		
		EXAMPLES		
A	• •	••	• •	•••
B	• ••	•••	• ••	•• •
C	•• •	•••	• ••	•• •
		TEST ITEMS		
C 1	•• ••	• •••	• •• •	•• ••
I 2	• •••	••••	• •••	••• •
I 3	••• ••	•••••	•• •••	••• ••
C 4	• •• •	• •• •	•••••	•• ••
C 5	••• •• •	••• •• •	•• ••• •	• ••• ••
I 6	•• •••	••• ••	•• •••	•••• •
I 7	•• •• ••	•• •• ••	•••• ••	••• • ••
I 8	••• ••• •	•• ••• ••	••• •• ••	••• ••• •
I 9	•• • •••	•• •• ••	•• • •••	•• ••• •
C 10	• ••• ••	• •• •••	• ••• ••	•• • •••
11	• ••••• •	•• •••• •	• •••• ••	• ••••• •
12	••• ••• ••	•• ••• ••	•••• •• •	••• ••• ••
13	• ••• •••	• ••• •••	• •• ••••	• •••• ••
14	•• ••• ••	• •••• ••	•• ••• ••	•• •• •••
15	•••• • •••	•••• • •••	•••• •• ••	••••• • ••
16	•••• •• ••	•• •••• ••	••• ••• ••	•••• •• ••
17	••• •• •••	••• •• •••	••• ••• ••	•• ••• •••
18	• ••• ••••	• •••• •••	• •• •••••	• ••• ••••
19	••• •••• •	••• ••• ••	••• •••• •	•••• ••• •
20	•••• ••• ••	•••• ••• ••	•• ••••• ••	••• •••• ••

repeated directions

Total Correct 4/10

Percentile 5

Birch-Belmont AVIT

- Consider relationship with saccades, TVPS Visual Memory and Visual-Sequential Memory
- Musicians often perform well on AVIT
- But strong performance does not necessarily mean no treatment…

Birch-Belmont AVIT

- Problems with sequences:
  - Following multiple step verbal directions
  - Spelling, both verbal and written
- Hears, but doesn't understand
- Child who can't translate verbal information to visual imagery has problems following or recalling directions; or remembering the beginning, middle, and end of stories
- Being visually competent makes you a better listener

The Big Question

- Is there anything in the test results that doesn't match up with what's going on day to day?