

Non-Strabismic Reading Disorders

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Disclosures

- ▶ Nothing to disclose

Course Goals

- ▶ Develop the ability to take a history for a child with reading problems, including knowledge of educational terms
- ▶ Learn specific tests for symptoms of a child with reading problems including how the tests assess for problems in visual skills that are important for reading.
- ▶ Review treatment options

Once upon a time there was a very ugly duckling. One day a beautiful princess came along and rescued him from a horrible fate. She picked him up into her hands and was kissing him when.... when....

Smith had made a promise. But could Turboland keep it? By 1961 some jabots had reached a few hundred kiloms up into the surrounding belt. But the glerf was almost a quarter of a million kiloms away! A trip to the glerf and back would take eight yims. By 1961 only one turbian had ever been up in a iabot – and for only fifteen stashes!

Blank, M. (2002). Classroom discourse: A key to literacy. In K.G. Butler and E.R. Silliman (Eds.), Speaking, reading and writing in children with language learning disabilities: New paradigms in research and practice (p. 155).

1. Summarize the paragraph in your own words.
2. Who made a promise?
3. List two goals that Turboland achieved by 1961.
4. Based on these accomplishments, did Turboland achieve what Smith had promised? Explain.
5. How do you think Turboland might have felt about Smith?

Chief Complaint

- ▶ What type of problems reading?
 - ▶ Blurry vision
 - ▶ Tired when reading
 - ▶ Words double
 - ▶ Headaches when reading
 - ▶ Blurry vision
 - ▶ Loss of place
 - ▶ Words move on the page
- ▶ May indicate visual efficiency problem

Visual Efficiency Problems

- ▶ Acuity
- ▶ Binocularity
- ▶ Accommodation
- ▶ Motility/Tracking
- ▶ When children read to learn
- ▶ Grades 3(end of year)/ 4+

Chief Complaint

- ▶ What type of problem reading?
 - ▶ Reversals
 - ▶ Letters
 - ▶ Words
 - ▶ Poor recall for material (i.e. spelling words)
 - ▶ Difficulty recognizing words
 - ▶ Problems learning alphabet
 - ▶ Sloppy handwriting
 - ▶ Problems sounding out words
 - ▶ Poor comprehension
 - ▶ Problems learning the main idea from insignificant details

Visual Processing Problems

- ▶ Visual Spatial Skills
 - ▶ Laterality/directionality
- ▶ Visual Analysis Skills
 - ▶ Visual Discrimination
 - ▶ Visual Form Constancy
 - ▶ Visual Memory
 - ▶ Visual Figure Ground
 - ▶ Visual Closure
- ▶ Important to reading, math concepts
- ▶ Earlier grades K-3 when child is learning to read

Educational History

- ▶ Current grade in school
 - ▶ Retention? When?
- ▶ On grade level for math/reading?
- ▶ Prior testing
- ▶ Interventions?
- ▶ Accommodations (public schools)
 - ▶ IEP
 - ▶ 504 Plan

Refractive Error

- ▶ Myopia
- ▶ Astigmatism
- ▶ Hyperopia

Hyperopia - Preschool

- ▶ **Vision in Preschoolers (VIP) Uncorrected Hyperopia and Preschool Early Literacy**
 - ▶ Ophthalmology 2016
- ▶ Retinoscopy $\geq +4.00$ OR
- ▶ Retinoscopy $\geq +3.00 \leq +6.00$ with decreased near acuity (20/40 or worse) and stereo (240" or worse) in 4-5 year olds
- ▶ **WORSE EARLY LITERACY** in grade K
 - ▶ TOPEL
 - ▶ Print knowledge
 - ▶ Definitional vocabulary
 - ▶ Phonological awareness

Hyperopia - School age

- ▶ **Rosner & Rosner 1997, JAOA**
 - ▶ 782 Children diverse racial & ethnic backgrounds
 - ▶ Grades 1-5
 - ▶ Result: Significantly lower achievement test scores among children with **refractive error > +1.25 (dry)**
- ▶ vanRijn et al 2014 OVS
 - ▶ 65 children Ages 9-10
 - ▶ At least +0.75 in **least** hyperopic eye
 - ▶ Result
 - ▶ Full correction improved 1 minute reading score 13%

Over Minus

- ▶ Over minus by 2D can cause ADHD symptoms!

Accommodative response and cortical activity during sustained attention
 Dmitri V. Poltavski^{1,2}, David Biberdorf³, Thomas V. Peto⁴
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ABSTRACT
 Greater accommodative lag and vergence deficits have been linked to attentional deficits similar to those observed in Attention Deficit Hyperactivity Disorder (ADHD). The purpose of the present study was to assess the effect of an accommodative vergence stress on a measure of sustained attention (Children's CPT) used by the diagnosis of ADHD. Twenty-seven normal non-ADHD adults completed the Children's CPT under two conditions: 2.00 D over- and under-correction. Under-correction (i.e., a 2.00 D over-correction) resulted in a 20% increase in the number of false starts (i.e., premature responses) and a 20% decrease in the number of correct responses. Under-correction also resulted in a 20% increase in the number of false starts (i.e., premature responses) and a 20% decrease in the number of correct responses. Under-correction also resulted in a 20% increase in the number of false starts (i.e., premature responses) and a 20% decrease in the number of correct responses. Under-correction also resulted in a 20% increase in the number of false starts (i.e., premature responses) and a 20% decrease in the number of correct responses.

Visual acuity alone is a very poor predictor of reading efficiency and symptomatology

Christa Ann Clin Exp Ophthalmol
 DOI: 10.1007/s00141-012-2135-0

MEDICAL OPHTHALMOLOGY

Association between reading speed, cycloplegic refractive error, and oculomotor function in reading disabled children versus controls

Patrick Quaid · Tiffred Simpson

Received: 23 May 2012 / Revised: 15 July 2012 / Accepted: 3 August 2012
 © Springer-Verlag 2012

Christa Ann Clin Exp Ophthalmol

Clinical test performed	Mean (SD) IEP (n=50)	Mean (SD) control (n=50)	Significance level
WPM below age normal	54.92 (32.87) wpm	8.62 (8.93) wpm	p<0.001
# of extra eye movements*	90.24 (62.52)	11.74 (12.14)	p<0.001
Questionnaire (0-40 score)	26.82 (13.91)	5.38 (5.58)	p<0.001
12BO / 3BI vergence facility	7.31 (3.37) cpm	14.48 (2.63) cpm	p<0.001
Spherical Rx (average Rx)	+1.37 (1.92) DS	-0.66 (1.62) DS	p<0.001
Astigmatic Rx	-0.82 (0.68) DC	-0.78 (0.59) DC	p=0.69
BAF (+/-2DS)	8.24 (3.38) cpm	12.81 (1.57) cpm	p<0.001
BAF (+/-2DS)	9.14 (3.44) cpm	13.52 (1.51) cpm	p<0.001
Amplitude of accommodation	10.44 (2.13) D	12.86 (1.31) D	p<0.05
Base out break (near)	15.88 (6.95) PD	25.58 (5.47) PD	p<0.001
Base out recovery (near)	12.56 (6.21) PD	21.05 (4.41) PD	p<0.001
Base in break (near)	9.21 (4.37) PD	13.28 (2.87) PD	p<0.001
Base in recovery (near)	7.02 (4.07) PD	11.21 (2.59) PD	p<0.001
Stereopsis (seconds of arc)	65.20 (41.36)	32.40 (12.04)	p<0.001
Near point of convergence	10.76 (4.03) cm	7.48 (2.77) cm	p<0.001

14 out of 15 measurements were different between the groups... BUT NO DIFFERENCE IN ACUITY (most saw 20/20 in BOTH groups!)

"Deficits in visual function are far more prevalent in school-aged children with [developmental dyslexia] than in [typically-developing] readers [...]"

JAMA Ophthalmology | Original Investigation

Frequency of Visual Deficits in Children With Developmental Dyslexia

Christa Ann Clin Exp Ophthalmol
 DOI: 10.1007/s00141-012-2135-0

JAMA Ophthalmology

Frequency of Visual Deficits in Children With Developmental Dyslexia (2018)

Assessing Binocularity:

- ▶ **Cover test**
- ▶ **Near Point of Convergence**
- ▶ **Stereopsis – Global/Local**
- ▶ Phoria
 - ▶ Von Graefe technique
 - ▶ Modified Thorington
- ▶ BI/BO Vergences
 - ▶ Step
 - ▶ Smooth

Diagnosing Binocular Vision Disorders


- ▶ Convergence Insufficiency
 - ▶ Prevalence 6-10% pediatric population
 - ▶ Associations: ASD, ADHD, Concussions, Lyme Disease, Alzheimer's, Parkinson's
- ▶ Convergence Excess
 - ▶ Prevalence: 0.8-7.1%
 - ▶ 5.4% EP'

Convergence Insufficiency - Signs

- ▶ **Receded NPC**
 - ▶ $\geq 6\text{cm}$
- ▶ **XP' > XP**
 - ▶ By 4Δ
- ▶ **Reduced positive fusional vergence (Base out)**
 - ▶ Fail Sheard
 - ▶ Blur/Break $\leq 15\Delta$
 - ▶ Prism Bar
- ▶ **CISS > 16**

Near Point of Convergence


- ▶ Accommodative target
- ▶ Fixate letter along the patient's midline; slowly move the stick towards the patient at eye level
 - ▶ Subjective
 - ▶ Objective
- ▶ Can repeat 3X to see if worsens
- ▶ Non-accommodative target (R/G)
 - ▶ Subtler cases
 - ▶ Normal – 1cm
 - ▶ Abnormal – very reduced



Sheard's

- ▶ Fusional reserve must be at least twice the demand for asymptomatic
 - ▶ $10XP'$, blur/break > 20
- ▶ Phoria can vary
 - ▶ Time of day, testing
- ▶ Sheard's does not look at recovery
 - ▶ 10 exo
 - ▶ BO $x/22/0$

CISS - Convergence Insufficiency Symptom Survey



The CISS is a 15-item survey used to assess the severity of convergence insufficiency. It includes questions about symptoms like eye strain, double vision, and difficulty reading. The survey is scored based on the frequency of responses to each item.

Convergence Insufficiency Treatment

- ▶ BI Prism
 - ▶ Sheard's's?
 - ▶ Vergence (Δ) = 2/3 demand (phoria) - 1/3 reserve (blur/break)
 - ▶ Ex: 16^Δ XP¹; NBO : x/24/16
 - ▶ $[2(16)-24]/3 = 2.67^{\Delta}$
 - ▶ Vision Therapy (CITT Study)

Convergence Insufficiency Treatment Trial (CITT)

- ▶ Most effective treatment for CI was office based therapy combined with home reinforcement activities (75% achieved improvement v. 43% home based)

NIH Public Access
Author Manuscript
Published in final edited form as:
A Randomized Clinical Trial of Treatments for Symptomatic Convergence Insufficiency in Children
Convergence Insufficiency Treatment Trial Investigator Group

NIH Public Access
Author Manuscript
Published in final edited form as:
Improvement in Academic Behaviors Following Successful Treatment of Convergence Insufficiency

Convergence Insufficiency Treatment Trial (CITT) ART

CLINICAL TRIAL
Effect of Vergence/Accommodative Therapy on Reading in Children with Convergence Insufficiency: A Randomized Clinical Trial

CONCLUSIONS: For children aged 9 to 14 years with symptomatic convergence insufficiency, office-based vergence/accommodative therapy was no more effective than office-based placebo therapy for improving reading performance on standardized reading tests after 16 weeks of treatment.

CITT - ART

- ▶ Binocular/accommodative therapy does not improve reading
- ▶ Both treatment and placebo groups improved in reading but not to a significant degree.
 - ▶ 16 weeks
 - ▶ Exclusion
 - ▶ Uncorrected hyperopia

COMPLEXITY OF READING

CITT ART RESULTS

CITT - ART

Treatment Group	Placebo Group
▶ Brock String	▶ Ductions and versions
▶ 3 Dot Card	▶ Prism dissociated bi-ocular rock
▶ Eccentric Circles	▶ High Low Contrast VA
▶ Aperture Rule	▶ After Image
▶ Vectograms	▶ Visual Closure Skills
▶ Computer Orthoptics	▶ Visual Figure Ground
▶ Bulls Eye Rock	▶ Visual Spatial Skills
▶ Lens Sorting	▶ Visual Discrimination

We even have imaging data to support VT interventions now!

Post-therapy Functional Magnetic Resonance Imaging in Adults with Symptomatic Convergence Insufficiency.
Hinter SC¹, Demer TL¹, Litschke CS¹, Ruhl MF¹, Sosa AJ¹, Serrano NP¹, Frost J¹

Abstract
SIGNIFICANCE: Prior studies have demonstrated the effectiveness of vergence-accommodative therapy in the treatment of convergence insufficiency (CI). These results show the changes in brain activation following therapy through the use of functional magnetic resonance imaging (fMRI).
PURPOSE: The purpose of this study was to investigate changes in brain activation following office-based vergence-accommodative therapy versus placebo therapy for CI using the blood oxygenation level-dependent signal from fMRI.
METHODS: Adults (n = 7, aged 18 to 30 years) with symptomatic CI were randomized to 12 weeks of vergence-accommodative therapy (n = 4) or placebo therapy (n = 3). Vergence eye movements was performed during baseline and outcome fMRI scans.
RESULTS: Before therapy, activation (z score > 2.3) was observed in the occipital lobe and areas of the brain devoted to attention, with the largest areas of activation found in the occipital lobe. After vergence-accommodative therapy, activation in the occipital lobe decreased in spatial extent but increased in the level of activation in the posterior, inferior portion of the occipital lobe. A new area of activation appeared in the regions of the frontal gyrus, which was not seen after placebo therapy. A significant decrease in activation was also observed in areas of the brain devoted to attention after vergence-accommodative therapy and to a lesser extent after placebo therapy.
CONCLUSIONS: Observed activation pre-therapy consistent with top-down processing suggests that convergence requires conscious effort in symptomatic CI. Decreased activation in these areas after vergence-accommodative therapy was associated with improvements in clinical signs such as fusional vergence after vergence-accommodative therapy. The increase in blood oxygen level-dependent fMRI vergence-accommodative therapy suggests that disparity processing for both depth and vergence-accommodative therapy.

“The significant change in blood-oxygen level dependent response in the occipital areas following rehabilitative vision therapy... suggests that both depth and vergence may be enhanced..”

Pseudo-CI?

- ▶ Really an **accommodative** problem
- ▶ Present with signs of CI
 - ▶ Reduced NPC
 - ▶ Reduced PFV
 - ▶ XP'
- ▶ May also demonstrate: reduced amplitude of accommodation, high lag
- ▶ But, patients with CI can have accommodative problems

Pseudo-CI?

- ▶ Testing
 - ▶ NPC Accommodative and non-accommodative target
 - ▶ More reduced non-accommodative = CI
 - ▶ Both "bad" = PCI
 - ▶ Retest NPC with **low plus!!**
 - ▶ **If pseudo CI will improve**
- ▶ Treatment
 - ▶ Low plus glasses for near
 - ▶ VT

<p>True CI</p> <ul style="list-style-type: none"> ▶ XP' ▶ Reduced NPC ▶ Low PFV ▶ May have low amps ▶ Plus makes it worse <ul style="list-style-type: none"> ▶ NPC worsens 	<p>Pseudo CI</p> <ul style="list-style-type: none"> ▶ XP' ▶ Reduced NPC ▶ Low PFV ▶ May have low amps ▶ Plus makes it better! <ul style="list-style-type: none"> ▶ NPC improves ▶ TTN
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ORIGINAL PAPER
The Relationship between Convergence Insufficiency and ADHD*

Children with convergence insufficiency are three times as likely to be diagnosed with ADHD. Conversely, children with ADHD are also three times as likely to be diagnosed with convergence insufficiency than children in the general population.

1.8%-3.3% incidence of CI in general population...15.9% in ADHD population

5 out of the 9 DSM-IV symptoms could also be applied to eye teaming issues...it is not hard to imagine a diagnostic confusion

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University of San Diego, School of Medicine

Convergence Excess

- ▶ **EP' > EP**
 - ▶ Cover Test
 - ▶ Von-Graefe
- ▶ **Reduced negative fusional vergence (BI)**
- ▶ Other findings
 - ▶ Low positive relative accommodation (PRA)
 - ▶ High negative relative accommodation (NRA)

Convergence Excess

- ▶ Treatment
 - ▶ Low plus glasses for near
 - ▶ Vision therapy
 - ▶ Prism Glasses (BO)
 - ▶ **Saladin's 1:1 Rule for Esophoria**
 - ▶ **BO Δ = (phoria - BI recovery)/2**
 - ▶ Ex: 8^A EP'. NBI range x/4/2
 - ▶ (8-2)/2 = 3^A BO

Randot Stereopsis

- ▶ Do not allow the patient to turn or tilt the head
- ▶ Expected 40" for Wirt Circles
- ▶ All shapes (bifoveal)
- ▶ Retest with new prescription anytime Wirt stereopsis is reduced
 - ▶ Low hyperopia



Signs and Symptoms of an Oculomotor Dysfunction

- ▶ Loses place while reading or uses finger to keep place
- ▶ Skips lines
- ▶ Rereads words or lines
- ▶ Word omissions, substitutions and/or transpositions
- ▶ Poor reading fluency
- ▶ Math columns
- ▶ Problems with Scantron sheets



Gross Measurement of Saccades

- ▶ Chairside Saccades
 - ▶ 16 inches apart
 - ▶ Look at each target
 - ▶ Change timing
 - ▶ Horizontal
 - ▶ Head movement common < 8-9 years
- ▶ NSUCO Saccades
 - ▶ Standardized
 - ▶ Accuracy, Ability, Head, Body Movement
 - ▶ No instructions
 - ▶ Standing



NSUCO Scoring

PURSUIITS	ability	accuracy	head	body
level 1	no attempt	> 10 refixations	large	large
level 2	half rotation	4 to 10	moderate	moderate
level 3	1 rotation	3 or 4	constant, slight	constant, slight
level 4	2 rotations	1 or 2	intermittent	intermittent
level 5	both directions	none	none	none

SACCADES	ability	accuracy	head	body
level 1	no attempt	large misses	large	large
level 2	2 cycles	moderate	moderate	moderate
level 3	3 cycles	constant, slight	constant, slight	constant, slight
level 4	4 cycles	intermittent	intermittent	intermittent
level 5	5 cycles	none	none	none

Saccadic Tests

- | | |
|--|---|
| <p>DEM</p> <ul style="list-style-type: none"> ▶ 2 vertical & 1 horizontal substests <ul style="list-style-type: none"> ▶ Vertical for automaticity ▶ Time compared to as RATIO ▶ Errors (omissions, additions, transpositions) ▶ www.bernell.com | <p>King Devick (K-D)</p> <ul style="list-style-type: none"> ▶ 3 Horizontal Tests of increasing difficulty ▶ Normed times for each age ▶ Concussion ▶ www.kingdevicktest.com |
|--|---|

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

Test A/B Read as quickly as possible down each column.

DEM Test C Read as quickly as possible across each row.

TEST C

3		7	5		9		8
2	5		7		4		6
1		4		7		6	3
7		9	3		9		2
4	5			2			1
5			3		7		4
7	4		6	5			2
9		2			3		6
6	3	2		9			1
7			4		6	5	2
5		3	7			4	
4			5		2		1
7	9	3			9		2
1			4		7		6
2		5		7		4	
3	7			9			8

KD Saccadic Test Demo

KD Saccadic Test 1

2	-----	5	-----	8	-----	0	-----	7
3	----	7	-----	9	-----	4	-----	6
5	-----	3	-----	1	-----	6	-----	4
7	-----	9	-----	7	-----	3	-----	5
1	----	5	-----	4	-----	9	-----	2
6	-----	5	-----	5	-----	7	-----	3
3	----	1	-----	8	-----	6	-----	4
5	-----	3	-----	7	-----	5	-----	2

KD Saccadic Test 2

		3		7		5		9		0
		2		5		7			4	
		1		4				7		6
		7				9			3	
		4		5				2		1
		5		3				7		4
		7		4				6		5
		9		0				2		3

KD Saccadic Test 3

5										0
4			4			1			8	
7			6			3			5	
3					5			4		2
1			2			6			9	
9				4				5		1
5			3			4			8	
4			1			6			3	
			3			5			2	
									7	

Research on Treatment of OMD

Clin. Psychol. (2014), 2014, August, 698-694, doi: 10.1177/0098298143292614

The effect of saccadic training on early reading fluency.

Leona DE¹, Mather CL², Messner LV³, Perea V⁴, Smith C⁵, Seating AJ⁶



¹ Author Information

Abstract
BACKGROUND: Eye movements are necessary for the physical act of reading and have been shown to relate to underlying cognitive and visuomotor processes during reading. The purpose of this study was to determine the effect of saccadic training using the King-Devick remediation software on reading fluency.
METHODS: In this prospective, single-blinded, randomized, crossover trial, a cohort of elementary students received standardized reading fluency testing pre- and posttreatment. Treatment consisted of in-school training 20 minutes per day, 3 days per week for 8 weeks.
RESULTS: The treatment group had significantly higher reading fluency scores after treatment ($P < .001$), and posttreatment scores were significantly higher than the control group ($P < .001$).
CONCLUSION: Saccadic training can significantly improve reading fluency. We hypothesize that this improvement in reading fluency is a result of rigorous practice of eye movements and shifting visuospatial attention, which are vital to the act of reading.
 © The Author(s) 2014.

KEYWORDS: eye movements; reading fluency; remediation; saccades

Treatment of Oculomotor Dysfunction

- ▶ Automaticity problem = referral to SLP
- ▶ Vision Therapy
 - ▶ Monocular saccades
 - ▶ Large to small
 - ▶ Equalize skills between eyes
 - ▶ Can incorporate accommodation/vergence

Accommodative Symptoms

- ▶ Blurry vision when reading
- ▶ Headaches when reading
- ▶ Eyestrain
- ▶ Red eyes when reading
- ▶ Tired when reading
- ▶ Avoids reading
- ▶ Near to Far or Far to Near Blur

Accommodative Anomalies


- ▶ Prevalence
 - ▶ Very variable 1-70%!!
 - ▶ Methods
- ▶ Common with other BV conditions
 - ▶ 74% in CITT Study
- ▶ Common with Medications
 - ▶ ADHD Stimulant Medications
 - ▶ SSRIs
- ▶ Common in systemic conditions
 - ▶ DS
 - ▶ CP

Assessing Accommodation

- ▶ Accommodative Amplitude: Push-up Method/Pull Away/Minus Lens
- ▶ Negative Relative Accommodation (NRA)
- ▶ Positive Relative Accommodation (PRA)
- ▶ Accommodative Facility (+/-2.00)
- ▶ Accommodative Response
 - ▶ Monocular Estimate Method (MEM)

Accommodative Facility


- ▶ +/-2.00 lenses
- ▶ 20/30 print at 40 cm with child saying 'clear' or calling out letters as lenses changed.
- ▶ Done binocularly and if problem, monocularly
- ▶ Binocular also uses vergence



Calling out letters	Binocular	Monocular
6 year old	1.5-5.5 cpm	3.8 cpm
7 year old	1-6 cpm	4.5-8.5 cpm
8-12 years old	2.5-7.5 cpm	4.5-9.5 cpm
Saying "now" when clear		
13-30 years old	3-13 cpm	6-16 cpm


Accommodative Response

- ▶ MEM (Monocular Estimate Method) retinoscopy
- ▶ Distance Rx
- ▶ Child reads off age-appropriate card on retinoscope
- ▶ Scope each eye when reading
 - ▶ Do not occlude an eye
- ▶ Expected +0.50 (+0.25 to +0.75)
- ▶ High in DS, CP



Amplitude of Accommodation - normal values

- ▶ Hofstetter's norms
 - ▶ Average amplitude 18.5-1/3 age
 - ▶ Minimum amplitude 15-1/4 age
- ▶ But: Swedish study
 - ▶ Overestimated by 2D!
 - ▶ (15-1/4 age) - 2



Sterner B. et al. The amplitude of accommodation in 6-10 year old children – not as good as expected! Ophthal Physiol Opt 2004. (24); 246-51



Diagnosing & Treating Accommodative Dysfunction

- ▶ Accommodative Insufficiency – difficulty stimulating accommodation
 - ▶ Low amps
 - ▶ High MEM/FCC
 - ▶ NRA>PRA
 - ▶ Treatment
 - ▶ Low plus at near
- ▶ Accommodative Infacility – difficulty changing accommodative response
 - ▶ Fails accommodative facility monocularly
 - ▶ May have difficulty with NRA/PRA (low)
 - ▶ Treatment
 - ▶ Low plus at near?
 - ▶ Vision Therapy

Kennedy had made a promise. But could America keep it? By 1961 some rockets had flown a few hundred miles up into space. But the moon was almost a quarter of a million miles away! A trip to the moon and back would take eight days. By 1961 only one American had ever been up in space – and for only fifteen minutes!

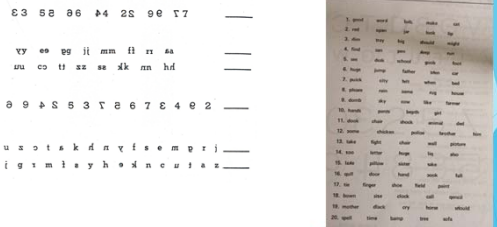
Visual Processing Problems - Evaluation

- ▶ Visual Spatial Skills
 - ▶ Tests for letter reversals
 - ▶ Jordan/Gardner
- ▶ Visual Analysis Skills
 - ▶ Test of Visual Perceptual Skills (TVPS)
- ▶ Integration of Vision
 - ▶ Eye Hand (Visuomotor)
 - ▶ Beery VMI
- ▶ Optometrist
- ▶ Psychologist

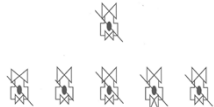





Visual Spatial Skills


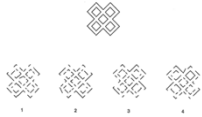
- ▶ Jordan/Gardner
 - ▶ Identify reversed letters alone or in words









TVPS

- ▶ Visual Discrimination – identify the same object
 - 
- ▶ Visual Spatial Relations – identify the different form
 - 
- ▶ Form Constancy – find same form rotated, different size
 - 

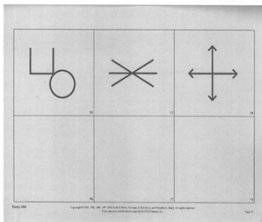
TVPS

- ▶ **Visual Figure Ground** – find form hidden among others (main idea from insignificant details)

- ▶ **Visual Closure** – which form will make the complete form


TVPS - Memory

- ▶ **Visual Memory**

 - 1 
 - 2 
 - 3 
 - 4 
- ▶ **Visual Sequential Memory**



Visual Motor Integration



Other resources:



THANK YOU!!



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