THE IMPORTANCE OF VISION DEVELOPMENT IN NVLD

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What is NVLD?
ACRONYM DECODER
Nonverbal Learning Disability (NVLD)

- An emerging profile of a unique style for learning that specifically deflects away from vision as the dominant sensory processing ability.
- It has overlap with other known entities, such as high functioning autism, Aspergers, ADHD and sensory processing disorders BUT has hallmark differential characteristics that involve visual processing dysfunction.
- Yet, even though NVLD is gaining greater scientific and neuropsychology attention in the literature, there is virtually nothing in the optometric literature ...even though deficits are largely in visual spatial skills and executive function.
What is a Nonverbal Learning Disability?

Dr. Kimberly Williams
Clinical Psychologist
www.drkim4kids.org
Within Umbrella of Specific Learning Disability (SLD)

- "Specific learning disability" means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculations.
Specific Learning Disability (SLD)

- 1 or more of the CNS processes involved in:
  - Perceiving
  - Understanding
  - Using concepts through verbal (spoken or written) language or non-verbal means
SLD cannot be primary result of:

- Visual (acuity)
- Hearing
- Motor disabilities
- Cognitive impairment
- Emotional impairment
- Environmental, cultural or economic disadvantage
SLD have **deficits in**

- Attention
- Processing
- Memory
- Communication
- Reading
- Writing
- Spelling
- Calculation
- Coordination
- Social competence
- Emotional maturity

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Clinically SLD have problems

- Input
  - Auditory
  - Visual
  - Tactile
- Integration
- Output

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Within the Specific Learning Disability

- ADHD
- ASD
- AS
- SPD
- PDD NOS
- NVLD (Nonverbal Learning Disability)
Disorders often mentioned

- Dyslexia
- Dyscalculia
- Dysgraphia
- Auditory and visual processing disorders
- Nonverbal learning disabilities
Excellent Resource
Prevalence of NVLD

- Estimates, 5-10% of all SLD, but difficult to pinpoint due to inconstancy in agreement about the diagnosis
Early developmental signs

- Rourke states: “these children remain essentially sedentary, not exploring the world not through vision or locomotion, but rather through receiving verbal answers to questions posed about the immediate environment.”

- The disparity between precocious language development and delays in motor development is most notable in the early years
Early schooling

- Kindergarten problems begin to emerge in fine motor, struggling with scissors, crayons, pencil
- Often referrals go to OT for what looks like sensory integration disorder
- Demonstrate good phonological reading but may be referred for non-phonological reading difficulties
Early Elementary

- Math problems begin to emerge, try to overcome with verbal memory skills up to 3rd grade and occasionally beyond
- Social concerns begin to show
- Clinical signs of anxiety, depression, attention problems, obsessional preoccupations and self esteem problems
- Difficulty processing facial expressions and social signals, executive function difficulties and novel problem solving

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Early Elementary

- Demonstrate pragmatic language problems in social discourse
- Don’t use appropriate intonations
-Speak in flat monotone or sing song voice
- Facialy difficult to read their mood as they may seem wooden and constricted
- Therefore may be referred out to speech and language therapist
Even though they perform poorly in math and written expression, they often don’t get referred to educational specialists because they “perform well enough”
Later elementary and middle school

- The educational problems begin to become much more obvious
- Teachers become alarmed
- Parents start looking for help
- Educational specialists become involved
- Psycho educational evaluation is ordered
- IEP
- 504 plans

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High School

- Social issues become even greater concerns
- Advanced math and sciences become much more challenging
- Greater emphasis on executive function and written expression and advanced reading skills
- Emotional toll
- Reports say adult success is possible but with accommodations, modifications and interventions

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NVLD Diagnostic Criteria...Rourke

1. Target test (visuospatial drawing) at least 1 SD below the mean

2. No or very minimal tactile perception (finger dysgraphethesia)

3. Highest scores on two subtests of the Verbal Scale of the WISC-III: Vocabulary, Similarities, or Information

4. Two of the WISC-III nonverbal subtests or Block Design, Object Assembly, or Coding are among the lowest on the Performance Scale
NVLD Diagnostic Criteria...Rourke

5. Wide Range Achievement Test-Revised (WRAT-R) standard score for Reading is at least 8 points higher than Arithmetic

6. Tactile Performance Test, right, left and both hand times become progressively worse compared to norms

7. Normal to superior grip strength vs mildly to moderate impaired Grooved Pegboard

8. WISC –III VIQ exceeds PIQ by at least 10 points
NVLD Diagnosis... Rourke

- Seven to eight “positive diagnosis” NVLD
- Five or six criteria probable NVLD
- Three to four criteria questionable NVLD
- One or two criteria suggest low probability NVLD
Dr. Takesuyeye – History and Controversy

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History and Controversy of NVLD
History

1940: Josef Gertsmann
1967: "NLD" first named
1975: Johnson & Myklebust
1985: Byron Rourke
1991: Pennington
1995: White Matter Model
2006: Davis & Broitman
History

1940: Josef Gerstmann

Defined, labeled “Gerstmann Syndrome”

Finger Agnosia, agraphia, acalcula, directionality

“The localizing value of the syndrome is significantly emphasized by the fact that the syndrome of finger agnosia is represented in the brain unilaterally and that it is associated with a correspondingly located lesion in the dominant side of the brain, that is the left hemisphere in right-handed persons”
History

1967: Johnson and Myklebust

Book: Learning Disabilities: educational Principles and Practices

“Social Perception”

- Gestures, nonverbal motor learning, body image, spatial orientation, directionality
- Difficulty interpreting emotional perception and social settings
- Distractible, preserved, disinhibited

Well defined patterns in abilities and deficits, compares NVLD type patients to other learning disorders and developmental problems
History

Myklebust: fist termed “nonverbal learning disabilities” (1975)

Changed definition to difficulty negotiating nonverbal aspects of environment while verbal intelligence is average or above average

Hypothesized disturbance in right hemisphere
History

1985: Byron Rourke

Book: Neuropsychology of Learning Disabilities: Essentials of Subtype Analysis

Book: Syndrome of Nonverbal Learning Disabilities: Neurodevelopmental Manifestations

Most commonly used diagnostic criteria:

Based on neuropsychological profiling

Tools outdated now

Definition not updated since Rourke

Developed “white matter model” 1995
White Matter Model

Damage to white matter decreases communication within the brain

Poor tactile perception, visual perception, complex psychomotor skills, adaptation to novel circumstances

Tactile and visual attention, exploratory behavior

Tactile and visual memory, concept formation, problem solving, hypothesis testing

Interpretation of content and function of language
Present: Many researchers contribute to studies from many professional fields

Difficult to define from each field

Even more difficult to interpret as a whole

More later

Disagreement on definition, causing disagreement on research methods and criteria
NVLD Now

Focused on defining subtypes of NVLD

Sermud-Clickeman 2001

Diagnosis criteria may be partial

Forrest 2004

2 subtypes

Grodzinsky 2003

3 subtypes

Davis/Broitman 2011

4 subtypes
Controversy
Many have found matching profiles with Asperger’s or high functioning autism

Similarities with ADHD
Mathematics? Art? Handwriting?

Academic, but not social

Mood disorders (Rourke, Young, Leenars 1986)

New definition is flexible and may or may not have several components
Variation by Profession

Occupational Therapists
  - Sensory integration issue

Speech and Language
  - Semantic/Pragmatic issue

Psychiatry
  - Social skills

Leads to incomplete and inconsistent diagnosis and treatment
  (fragmented body of research)
Two Models

Medical Model

White matter hypothesis based

Validates neurological deficits associated with NVLD (Ris and Nortz 2008)

Clinical Model

Based on signs and symptoms, more easily observed and identified in practice

Defined by observable diagnostic features in children with learning disabilities
NVLD vs ADHD

“You can’t pay attention if you can’t understand” - Scott Bezsylko (Child mind)

Similarities

- Poor social skills
- Academic difficulties
- Inattention
- Over-focusing on specific tasks
- Excessive talking
- Speaking without thinking first

NVLD

- Difficulty with balance, sometimes seated
- Talks with hypervigilance to details as opposed to the big picture
- Avoidance of novel situations
- Often comorbid with depression and anxiety

ADHD

- Fidgets and squirms
- Distracted and impulsive
- Seeks out novelty with enthusiasm
- Often comorbid with opposition or defiance
NVLD vs Autism

NVLD

Normal speech development

Misinterpretation of social cues and body language

Poor appreciation of incongruities and adapting to novel situations

Strong speech abilities

Asperger’s Syndrome

Delayed speech development

Indifference to feelings of others

Inflexible adherence to nonfunctional routines

Repetitive speech patterns
Research

No controlled studies

Cause is debatable

Most accepted is “white matter theory”

Thought to be neurological, not emotional or deliberate

Symptoms of left side motor deficits, social deficits, psychopathology (Forrest 2004, Semrud and Glass 2008)

Issues

Multiple subtypes and multiple presentations of NVLD and AS

Core characteristics not easily distinguished from typical function on neuropsychological testing

Lack of uniform inclusion criteria
Advocacy

Books

14 books on parents and teachers since 2000

2 major websites for information and support

Research

1981-1990: 15 publications

2001-2010: 85 publications

Publications

Websites
Diagnosis

Can be concurrent with several other learning disorders (significant overlap)

- ADD
- PDD
- Language disorders
- Asperger Syndrome

Easily confused or misdiagnosed

- Often overlooked because of high verbal ability

Proper treatment

- Comprehensive treatment
- Address all areas of difficulty

Intraprofessional communication

- Accurately communicate syndrome
Classroom Management

Treatment is currently largely empirical

Influenced by controversy

Interferes with finding proper help

Diagnosis and Statistical Manual (DSM V)

Not currently recognized in DSM V

No solid body of research to support diagnosis

IDEA: RTI

Eligible as SLD but RTI program does not address math well

Section 504

Classroom modifications
Summary

- NVLD
- Poor Coordination
- Non-verbal
- Learning Disorder
- Math Difficulties
- Likes Routine
- Math Difficulties
- Spatial Difficulties
- NVLD
- Auditory Memory
- Spatial Difficulties
- Poor Handwriting
- Good Vocabulary
- Poor Handwriting
- NVLD
- Likes Routine
NVLD strengths:
- Early speech and language development
- Remarkable rote memory
- Strong auditory retention to detail
- Good early reading skills
- Excellent spelling skills

*Cofounder of Nonverbal Learning Disorders Association*
NVLD deficits:

- Poor motor abilities including poor coordination, severe balance problems and difficulties with graphomotor skills
- Poor visual-spatial/organizational with deficits in visual recall, imagery, spatial perceptions and executive function
NVLD deficits in executive function results in difficulties in:

- Decision making
- Planning
- Initiative
- Assigning priority
- Sequencing
- Motor control
- Emotional regulation
- Problem solving
- Correcting
- Problems with spatial relations
NVLD social deficits include difficulty:

- Comprehending nonverbal communication
- Adjusting to transitions and novel situations
- Poor social judgment and social interaction
The NVLD Project...bringing awareness

What is NVLD?

COLUMBIA UNIVERSITY AND THE NVLD PROJECT PRESENTS:

What is NVLD?

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Dr. Bartolini - Diagnostic Testing
Diagnostic Testing

Eye Movement Testing
- Slow pursuits with cognitive load
- King Devick Test
- Visagraph

Eye Hand Coordination
- Wold Sentence Copy Test
- Visual Motor Integration (Beery)

Gross Motor Evaluation
- Bilateral Integration
- Visual Vestibular Integration
- Primitive Reflex Testing

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16 year old male diagnosed with NLD

Wold Sentence Copy

Four men and a jolly boy came out of the black and pink house quickly to see the bright violet sun, but the sun was hidden behind a cloud.

Four men and a jolly boy came out of the black and pink house quickly to see the bright violet sun, but the sun was hidden behind a cloud.

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Left/Right Awareness
- Piaget Left/Right Awareness Test
- Observations during gross motor screening

Visual-Spatial Awareness
- TVPS
- Piaget Inventory Test
- Clock Drawing
- Rey-Osterrieth Complex Figure Test*

Non-Verbal Skills
- WISC III-Block Design, Object Assembly, Coding*
- WRAT-Comparison of reading level and math* level
- Alphabet Tactile Feedback*

*Performed by Neuropsychologist
Piaget Inventory Test

We turn the bottle this way.

What does the water look like?

A  B  C  D

Now we turn the bottle this way.

What does the water look like?

A  B  C  D

We put the balls into the tube this way.

We turn the tube like this.

How do the balls come out?

A  B  C  D

We turn the tube like this.

How do the balls come out?

A  B  C  D

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6.9 female diagnosed with NLD
Clock Drawing

1st Attempt

2nd Attempt

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6.8 female without NLD
Clock Drawing
8 year old female diagnosed with NLD
Rey-O Figure*

*Jennifer Maurer PsyD https://brainspotential.com
WISC III Block Design Test*

*Performed by Neuropsychologist

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Vision Therapy Activities

- Gross Motor Activities
- Oculomotor Activities-Hart Chart, Optics Trainer
- Laterality/Directionality
- Geoboard Flips/Transformations
- Parquetry Block Series
- Spatial Visualization
Spatial Visualization

#1 - Example

Visualizing from different points of view

## Floor Plan

```
  1
  2
  2 1
```

Left  Front  Back  Right

#2 - Build the plan, then draw what it would look like from the following points of view:

```
  1
  3
  2 1
```

Floor Plan  Left  Front  Back  Right

#3 - Build the plan, then draw what it would look like from the following points of view:

```
  2 4 1
  3
  1
```

Floor Plan  Left  Front  Back  Right

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Optics Trainer
Oculomotor Activity

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Optics Trainer
Visual Spatial Activity
SELECT THE OBJECT THAT IS ROTATED RIGHT
Activities for Non-Verbal Learning Disorder

Presented by:

Angela Schleichert ● Connie Glanzer ● Alyson Olmstead ● Monica King
Hillier Space Board

Spatial Awareness ● Motor Planning ● Space Estimation

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Space-Time Exploration

Spatial Judgment and Executive Function

Spatial • Gross Motor • Emotions • Space/Time

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Space-Time Exploration

Spatial Judgment and Executive Function

Exploration • Change

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Dots to Writing

Fixation Lines

Simple Shapes

Fixation ● Spatial ● Gross Motor ● Eye Hand ● Visual Motor Integration

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Dots to Writing

Large Dot Grids

5 Dots

9 Dots

25 Dots

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Dots to Writing

Letters or Numbers

Fixation ● Spatial ● Fine Motor ● Eye Hand ● Visual Motor Integration

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Vision!
Vision!
Today is therapy.
Today is therapy.
Spatial Orientation Games

Perfection

Tricky Fingers

Fine Motor ● Spatial
Figure Ground

Dexterity ● Problem Solving
Develops Patience and Tolerance
Sensory Input ● Spatial

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Spatial Orientation Games

**Perfection**

**Set Junior**

Spatial Reasoning ● Critical Thinking ● Visual Perception

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Spatial Orientation Games

IQ Twist

Rock Me Archimedes

Manipulation ● Spatial
Fine Motor ● Visual Planning

Critical Thinking ● Fine Motor
Balance ● Visual Perception Decision
Making ● Strategy

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Spatial Orientation Games

Spatial Orientation Tic Tac Toe

Directionality ● Reversals ● Spatial Planning ● Spatial Orientation

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Thank you!