Introduction to Vision and Motor Integration through Reflex Foundations

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Course Description

This 3-hour lecture/workshop focuses on the "how to" combine sensory and motor modalities in your VT practice to ultimately foster strong visual motor and visual perceptual functions.
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About Us

Vision Therapy  Sports Vision  Orthokeratology
Auditory Processing Therapy  Reflex Integration Therapy
We moved past 20/20 long ago

As of January 1, 2001 on the Gregorian calendar we entered into the 21st century which is also the first century of the 3rd millennium. The twentieth century is now history, and so should the idea of “20/20 vision”.

We, behavioral optometrists and vision therapists, have moved past the structures of the eye and are finding our successes when we look deeper into the brain. For us, it’s all about the neural connections and detailed brain maps that fire up inside our brains.

When we look into the eyes of our patients, we touch their souls.

What Can We Find When We Go Looking?

“Eyes don’t tell brains what to see; brains tell eyes what to look for.”

- Larry MacDonald

Making Connections

- Today we are going to learn more about Motor and Sensory so we can foster the neural connections that make detailed brain maps.
- Better brain maps lead to successful lives
What Are Brain Maps?

- Different brain regions have specific functions.
- Brain mapping uses neuroscience techniques to identify what different parts of the brain do.
- Spatial representations of different brain regions are called brain maps.
- As brains become neurologically more mature and advanced, brain maps become more detailed.

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**Vision**

“Vision is a dynamic interactive process of motor and sensory functions, mediated by the eyes for the purpose of simultaneous organization of posture, movement and spatial orientation, for manipulation of the environment and, to its highest degree, of perception and thought.”

- William V. Padula

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**Why should we use Neuro-Motor Development theories and principles to improve patient outcomes in vision therapy?**

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**Because...**

Vision guides motor & motor is refined by optimized vision
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Primitive Reflex Integration and Dr. Skeffington’s Model of Vision

![Diagram of Dr. Skeffington's Model of Vision]

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Neuro-Sensory Motor Maturity

The maturation of the nervous system that occurs when motor neurons link with sensory neurons repetitively to create detailed brain maps that result in higher levels of motor control and greater understanding of our world. - Andrich, P.

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Neuro-Sensory Motor Maturity

- Begins with reflexive movement and leads to highly refined, cortically controlled movement
- It is simple to complex development
- A transition from reactivity to connectivity and leads to productivity

- Andrich, P.
Motor Seeds of Vision

- Reflexive Motor
  - Primitive Reflexes
  - Our first movements
  - Primary motor patterns
  - Pathway to postural control
  - Psychological foundation to self-regulation, self-esteem, confidence, goal-setting and visualization

- Gross Motor
  - Transition to cortically controlled movements
  - Large muscle movements
  - Led by vision

- Fine Motor/ Dexterity
  - Purposeful small muscle movements
  - Super Fine Motor
  - Seeing
  - Hearing
  - Speaking
Vision's Sensory System Partners

- Auditory
- Tactile
- Olfactory
- Taste
- Proprioception
- Sense of knowing: perceiving & intuition

Making Sense of Sensations: The Development of Perceptions

Sensations and perceptions are complimentary to one another. Together they help us interpret our world.

- Sensation: awareness of touch, taste, sight, sound, smell, and movement
- Perception: a mental impression based on awareness, organization, and interpretation of sensory information.

Perception is developed through experience.
Perception does not always match reality.

The Thalamus

The thalamus is located in the middle of the brain above the brain stem and below the cerebral cortex.

The thalamus relays motor and sensory signals to the cerebral cortex. It is also involved in consciousness, sleep, and sensory interpretation.
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Sensory Pathways

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Making Neurological Connections

In vision therapy we use a wide array of whole brain techniques with vision paramount to nurture neurological sensory-motor connections.

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Making use of Hebb’s Rule

“Cells that fire together, wire together” – Donald Hebb
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How to use Hebb's Rule in VT

The trick is to get supportive sensory systems firing at the same time as Visual Motor and Visual Perceptual pathways fire, without overstimulating the patient!

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How to use Hebb's Rule in VT

- Use tolerable amounts of sensory stimulation
- Look for JND's and symptoms of overstimulation
- Be ready to load and unload activities

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Symptoms of too much too fast

- Behavior: irritable, whiny, meltdowns, angry outbursts
- Difficulty maintaining posture
- Adverse facial expressions
- Skin changes (color-sweating)
- Changes in breathing
- Stuck down, or refuses to participate in activities and/or interact with others
- Avoids touching or being touched-moves away
- Gets overexcited, laughs excessively, silly
- Covers eyes or ears with hands, avoids eye contact
- Increased difficulty with attention
- Fidgeting and restlessness
- Difficulty sleeping
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**Primitive Reflexes**
- Automatic, repetitive movement patterns
- Initiated and controlled by the brainstem
- Emerge in utero - integrated within 1st year of life
- Important for survival and movement learning
- Inhibited by higher brain areas and then integrated within the nervous system
- Retained with atypical neurology, poorly developed motor systems
- Reappear with trauma, dementia, or brain injury

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**Postural Reflexes**
- Reflexes that help us to support our posture against gravity so that we can sit, stand, and move without falling over
- Mediated by midbrain
- Through childhood and into adulthood, we rely on these reflexes to maintain balance

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**Functions of Reflexes**
- Survival: Automatic subconscious responses to changes or stimuli within or outside our bodies
- Maintain homeostasis (heart rate, breathing rate, blood pressure, and digestion)
- Automatic actions such as swallowing, sneezing, coughing, and vomiting
- Serve as early motor experiences that are on course to become refined and complex
Importance of Testing Reflexes

- Patients who regress after completing vision therapy often have significantly retained reflexes.
- Parents report that it is common for their child to gain skills and then later lose skills, in other areas of life (school, sports, etc).
- We have found that children reach their vision therapy goals faster when their reflexes are integrated.
- Testing reflexes gives the optometrist a valuable road map to sequencing therapy exercises.

"My body decides for me. My body always makes the decision before I can make the decision."
- VT patient

The Neurophysiological Basis for Vision Development

- The level of neuro-sensory motor maturity is directly correlated to the proper timing of the emergence, inhibition and integration of our motor reflexes.
- When reflexes emerge or integrate out of sequence, normal maturation of the nervous system is disturbed.
- The degree of abnormal reflex activity influences how well or how poorly nerve fibers are organized, thus affecting muscle tone, coordination, sensory perception, cognition, psychology and vision development.
The Neurophysiological Basis for Vision Development

- Our nervous system (Jenga tower) is only as strong as its support pieces.
- These pieces being specific reflex patterns emerging and being put in place at the proper time in development.
- High-level motor and cognitive skills (top of Jenga tower) developed by a child later in life are reliant on earlier stages of development (the Jenga base).

Even though the child may have enough pieces in place for intellectual ability, the child may not reach their full potential due to missing foundation pieces.

When the pieces are not put in place at the right time and sequence, development will occur at the expense of altered automaticity.

Continuous, laborious and conscious effort will be needed to master even the simplest skills.

Stabilizing and Strengthening The Tower

- Using specific reflex integration movements will help you to facilitate the myelination and proper functioning of the nerves, thereby improving brain circuitry.
- Supporting maturation of the nervous system facilitates communication between neural networks stimulating the development of vision skills as well as other sensory and motor functions.
From Head To Toe

"The subject matter of body bilaterality cannot be ignored in most patients if efficient binocularity is going to be achieved. From a developmental standpoint, a child first learns to team the two halves of his body before he learns to team his two eyes together. The problem of strabismus is not strictly an ocular or eye muscle problem. Most strabismics are strabismics from head to toe."

- Donald Getz, OD, FAAO, FCOVD

Identifying Neuro Sensory Motor Immaturity

- Developmental History Questionnaire
- COVD Lifestyle Questionnaire
- Retained Primitive Reflex Testing
- Assessment of Gross and Fine Motor Skills
- Assessment of Perceptual Skills

Identifying Neuro Sensory Motor Immaturity

- Gardner Test of Visual-Perceptual Skills
- Draw a Person
- Gardner Reversal Frequency Test
- Rapid Automated Naming
- Wold Sentence Copying Test
- The Bender-Gestalt II Test
- Test of Auditory Perceptual Skills
- Test Of Visual Perceptual Skills
- Developmental Test Of Visual Perception
- Wold Sentence Copy Test
- Motor Speed and Precision
- Screening of Residual Primitive Reflexes
- Beery Test
- Birch-Belmont Auditory/Visual Test
- Spatial Localization
- The Tansley Standard Visual Figures Test
- Motor-free Visual Perception Test
When using motor in VT…
Where do we start?

Think about what happened with the visual system at even the earliest stages of development. If supportive stages of development are missing or weak, begin your therapy there.

Integration of motor systems with sensory systems
- Set the stage for discovery
- Provide opportunities for the sensory systems to interconnect
- Refining growing perceptions
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In Utero
- Vestibular input
- Tactile input
- Reflexive movement patterns
- Auditory rhythms

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Incorporating Vestibular Input in VT
- Slow rotations
- Standing rotations
- BOSU® ball
- Therapy ball
- Vestibular swings
- Zip lines
- Airex balance pads
- Virtual reality headsets
- SVI balance module


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Incorporating Tactile Input in VT
- Deep Pressure
- Face and Body Tapping
- Hand and Foot massage
- Relaxation Chair
- Textures
- Tactile tracing
- Brushing
- Alcohol swab dots
- Weighted blankets
- Tactile draw a person
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**Incorporating Auditory/ Rhythm Input in VT**

**Commonly Used Tests in VT**
- Test of Auditory Processing Skills:
  - Auditory Memory
  - Auditory Discrimination
  - Phonological Segmentation
  - Birch Belmont Auditory Visual Integration
  - Auditory Processing Questionnaire

Refer to Otolaryngologists for:
- Otolaryngological Exam
  - Otoscopic exam & Tympanogram
  - Speech Audiometric Testing
  - Pure Tone Audiometry (hearing levels)
  - Middle Auditory Reflexes (movement of bones in middle ear)
  - Combined Auditory Reflex Auditory Processing Screening
  - Auditory Brainstem Response (ABR)

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**Incorporating Auditory/ Rhythm Input in VT**

- Metronome
- Trampoline
- Rhymes
- Open air music
- Classical
- Children’s folk songs
- Popular

- Auditory processing programs
- Dichotic word stimulation (left/right ears)
- Auditory central peripheral processing/ figure ground

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**Incorporating Reflex Movement Patterns in VT**

- In order to incorporate a reflex pattern into VT you need to know the movement pattern and how it affects vision skills.
- Once you know that you can create your own exercises and activities to help you achieve your vision goals.
- There is no one “magic exercise” that works with all patients. You have to understand the “why” and “how” in order to choose the right reflex.
Incorporating Reflex Movement Patterns in VT

**Vision Skill**

**Deficit Area**

**Reflex Movement Patterns**

- Accommodation
  - STNR, TLR, Landau, TLR
  - ATNR, Landau, TLR
  - Palmar Grip, FTA, STNR, PTA
  - Tonic Labyrinthine Reflex (TLR)
  - Spinal Galant (SG)
  - FTG (Foot Tendon Guard)
  - Reflex Movement Patterns

- Motor Control
  - STNR, TLR
  - TLR, TNR, SRR
  - Tonic Labyrinthine Reflex (TLR)
  - Palmar Reflex

- Integration of primitive reflexes
  - Palmar Grip, FTA, STNR, PTA
  - Tonic Labyrinthine Reflex (TLR)
  - JCN (Joint Closure Reflex)

- Handwriting
  - Palmar Reflex
  - STNR

- Visual Perception
  - ATNR, TNR, Landau, TLR

- Visual Attention
  - SG, ATNR, STNR, FTG

- Handwriting
  - Palmar Reflex

- Visual Field
  - ATNR, TNR, Landau, TLR, OHRR

- Auditory Perception
  - ATNR, TNR, Landau, TLR


**Central Peripheral Processing**

- Binocular Fusion
  - ATNR, Landau, STNR

- Eye Control
  - ATNR, TLR

- Vestibular
  - FTG, TNR, TLR, MR, ATNR, STNR, Landau
  - Tonic Labyrinthine Reflex (TLR)

- Oculo-Head Righting Reactions (OHRR)
  - OHRR, LHRR

- Oculo-Head Righting Reactions (OHRR)
  - OHRR, LHRR


- All reflexes affect each vision skill in some way

- In reality it is not this clear cut

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**Symmetrical Tonic Neck Reflex (STNR)**

- Segmental Rolling

- Amphibian Reflex

- Oculo-Head Righting Reflex (OHRR) & Labyrinthine Head Righting Reflex (TLR)

- Palmar Reflex

- Moro Reflex

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**Birth & Infancy**

- Deep pressure
- Breathing
- Integration of primitive reflexes
- Oculomotor development

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**Secret Ingredients**
Incorporating Breathing in VT

- Breathing during traditional VT exercises and activities
- Hum breathing
- Hiss breathing
- Superbrain Yoga®
- Breathing with timers
- Breathing & awareness of body

Toddler Years

- Postural control
- Rapid development of language
- Gross motor skills
- Fine motor development

Incorporating Postural Control in VT

- Tilting seated games
- Standing tilts
- Using yoked prism
- Virtual reality
- Using therapeutic seat cushions
- Using T stools
- Using therapy balls
- Using mirrors and sticks
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Incorporating Language in VT

- Microphone
- Karaoke
- Projected videos with lyrics
- Description games
- Use of picture cards
- Word repetition (i.e., Language)
- Rhymes and folk songs

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Incorporating Gross Motor in VT

- Gross motor skills
  - Bilateral walking
  - Zoom ball
  - Army crawl
  - Creeping
  - Stair climbing
  - Infinity walk
  - Walking rail
  - Skipping

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Incorporating Fine Motor in VT

- Finger isolation games
- Lacing
- Pin punching
- Rice sorting
- Micro-brock string
- Bracelet making
- Fidget toys
  - Lego building
  - Rubik’s cube
  - Musical instruments
  - Mirror box
  - VT Scrap book
  - Black light/highlighter
  - Art
Preschool Years

- Refining Postural Control
- Further development of Gross motor skills
- Further development of Fine motor development
- Further development of Perceptual skill
- Imaginary Play
- Social skills

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Incorporating Imaginary Play in VT

- Theme toys
- Shadow play
- Playdough
- Face playdough
- Video stories

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Incorporating Perceptual Skills in VT

- Visualization
- Rubik's Cube
- Estimating distances
- Estimating time
- Rotating symbols
- Chess
- Khet
Incorporating Social Skills in VT
- How do you see it games
- Congratulating others
- Video analysis of social situations
- Creating plays - role playing
- Group summer camps

School Years
- Sport skills
- Reading
- Writing
- Math
- Science
- Higher Level Perceptual Development

Incorporating Sport Skills in VT
- Using patient's favorite sport equipment in VT
- Strobes
- Using strategy & official play diagrams and charts
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Incorporating Reading Skills in VT
- Learn to read games
- Read with style recordings
- Microphone reading

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Incorporating Writing Skills in VT
- Speed thoughts writing activity
- Dry erase paper writing mat
- Handwriting Without Tears® Wooden pieces
- Writing camp
- OEP writing activities

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Incorporating Math Skills in VT
- Math saccade sticks
- Math dots
- Math stars
- Cuisenaire rods
- Math hart charts
- Math machine labarge
Incorporating Science in VT

- Simple science experiments
- Creating “My Discoveries” books
- Science theme targets

Through our vision ... we give vision

Thank You

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Realize
Real eyes
Real Lives

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