CORTICAL VISUAL IMPAIRMENT (CVI)

What is it and how do I work with kids who have it?????

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What is CVI?

- Disability resulting from insult to brain or problems with organization of the brain that affects how one understands visual information
- Recognized as the primary cause of visual impairment in children in the first world
- Results in visual impairment that can range from mild to severe

CVI Characteristics

- Don’t use vision in “normal” ways:
- May not pay attention to things expected to have interest in, but fix attention on something unusual – light, moving blades of ceiling fan
- Difficulty perceiving objects under certain conditions so vision seems very changeable

It is like a kaleidoscope

I Can See It…… What is It????

I can see Waldo – but I can’t see Waldo

Causes of CVI

- Most common conditions associated with CVI
  - Complications of prematurity: asphyxia, hypoxia, brain bleeds, PVL (peri-ventricular leukomalacia)
  - Oxygen deficiency in the brain
  - Shaken Baby or other head injury
  - Shunt malformation in kids with hydrocephalus,
  - Infections and or viruses: meningitis, TORCH, CMV encephalitis,
  - Brain tumors, epilepsy, stroke
  - Structural anomalies of the brain

Myths and Misinformation

Roman-Lantzy 2014

- Vision is variable hour to hour
- Always use a black background
- Present objects and activities at midline
- Conduct therapy sessions in natural settings
- Children with CVI have Swiss cheese vision
Myths and Misinformation
Roman-Lantzy 2014

- Accommodations for ocular impairments and CVI are similar
- All TVIs have skills to address the unique needs on CVI
- Children with CVI do not need orientation and mobility
- For a child with significant neurological difficulties, vision is the least of their problems.

TRUTHS ABOUT CVI

- Visual functioning fluctuations are not random, but based on the environmental factors. Roman believes that students are responding differently to the changing environment.
- Treatment is education, not medical
- CVI may range from mild to severe - Interventions should be adjusted for severity
- Unlike ocular disorders, CVI can improve as neural pathways develop

10 Unique Behavioral Responses

1. Color
   - Strong color preference, especially for red or yellow
     a) May only look at items that are red
     b) May not look at items that have more than one color

Viewing Color Progresses

1-------------------------→---------------------------------------------------10
Views only
Views all colors,
single color
multicolors, patterns

2. Movement
   - Need for movement to elicit or sustain visual attention
     a) May only notice things that are moving or have reflective properties
     b) May seem to see better when they are moving

Need for Movement Progresses

1-------------------------→---------------------------------------------------10
Moving objects
Movement not required
for viewing

3. Latency
   - Visual latency: It may take a long time for the child to notice something

Latency Progresses

1-------------------------→---------------------------------------------------10
Prolonged time before look
Immediate visual response
4. Visual Fields
   a. Visual field preferences
      i. May be more responsive to things presented on one side
      ii. May not notice things in one or two fields

5. Complexity
   a. Difficulties with visual complexity
      i. May not look at patterned objects or busy backgrounds
      ii. May not be able to look when sound or competing visual stimuli are present

6. Light
   a. Light-gazing and non-purposeful gaze
      i. May stare at overhead lights, windows
      ii. Appear to “look through” people

7. Distance
   a. Difficulty with distance viewing
      i. Only notice things very close

8. Visual Reflexes
   a. Absent or atypical visual reflexes
1. Don’t blink when touched between eyes
2. Don’t blink when open hand moves toward face

9. Novelty
   - Difficulty with visual novelty
     a) May not be interested in new toys – only familiar ones
     b) Looks at things like familiar toys

Novelty
1--------------------------------->-------------------------------------10
Sees only familiar objects                                    Looks at wide
                                                           variety of novel things

10. Visually Guided Reach

9. Absence of visually guided reach
   a) Does not look and reach together
   b) Look, look away, reach
   c) Trouble accurately reaching

Visual Motor
1--------------------------------->-------------------------------------10
Separate look                                               Simultaneous look
& touch                                                      & touch

**Improvement in CVI**

- Characteristics may improve over time especially if receive systematic intervention
- Tend to resolve in this order:
  - light gazing, atypical blink reflex
  - color preference, latency, visual novelty, reflex to threat, need for movement
  - field preference, visually guided reach, visual complexity, distance viewing

**Importance of Early Intervention**

- Window of opportunity when brain is plastic is open for longer than previously thought
- By understanding students’ visual preferences, aversions, and difficulties, teachers can present visual stimuli and environments that are most likely to encourage students to use their vision
- Dr. Roman’s study found that in 3.7 years, 98% of children reached 7 or higher on the Range

**Use Naturally Occurring Routines**

- Vision work must happen as part of daily routines – not just “lightbox time”
- Environmental accommodations need not be to whole house, but some areas the child uses daily – diaper change, feeding, crib
- Materials used in daily routines should be matched to the child’s level of CVI – color, complexity, movement

Accommodations to Daily Activities

Materials/Strategies You Can Use With Children with CVI

- Toys with motion qualities
- Bright colors – florescents, reflective
- Present one stimulus at a time
- Tell child where to look and for what
- Let child hold the object they are to look at
- Use materials that are familiar and part of the daily routine

Environmental Adaptations

- Visual stimulation as opposed to visual noise
- Simplify the environment
- Contrasting, plain backgrounds
- Cut-outs to keep out extraneous material
- Books with one picture per page
- Spacing of words
- Use color to highlight
- Consistent presentation

Sample CVI Schedule

The CVI Range
Dr. Christine Roman-Lantzy

- Identified 3 levels of impact of CVI which are used to plan interventions
  - Phase I (ranges 0-3) Building visual behavior
  - Phase II (ranges 4-7) Integrating vision with function
  - Phase III (ranges 8-10) Resolution of remaining CVI characteristics

Phase 1
Goal: Building consistent visual behavior for children who barely use their vision

- Most children in Phase 1:
  - have a dominant color preference and can only see objects that have one color
  - show greatest interest in objects with movement qualities
  - ignore objects with highly patterned surfaces, or items presented on a patterned background
need significant wait-time to respond to a visual stimulus
need significant control of the environment - no competing sensory stimulation while looking

Carly video of phase I

Phase I

Activities should be designed to increase visual attention and build stable and sustained looking even with very small number of viewing targets

Instructional Strategies for Phase 1
Color

- Use single color objects
- Use objects that are the same shade as student's identified favorite
- Use color to highlight objects
- Use color to bring attention to body

Instructional Strategies for Phase 1 Color

- If no favorite color noted, pick RED. Start with set of objects: slinky, pinwheel of reflective material, windsock, Elmo doll, mobile made of silverware

Instructional Strategies for Phase 1
Movement

- Use objects that are shiny or reflective or produce gentle movement
- Suspend or move objects and present them in students preferred field

Instructional Strategies for Phase 1
Light

- Control and use light
- Use lightbox, flashlights to draw attention
- Avoid direct light that conflicts

Instructional Strategies for Phase 1
Complexity

- Present objects on simple background
- Simplify environment using: trifolds occluders, slant boards, visually quiet spaces
- Select objects that do not have sound components
- Wear solid clothing or an apron

Instructional Strategies for Phase 1
Latency and Distance

- Use Active Learning Spaces and materials to keep things at near and present long enough
- Provide up to 60 seconds wait time for latency
Instructional Strategies for Phase 1

- Use objects that are familiar or share characteristics with familiar
- Watch for signs of fatigue: hiccupping, yawning, gaze avoidance, eyes closed, grimace
- NO PICTURES
- Position child for optimal viewing
- Build lateral skills - try new color, similar shape

Preparing a child to see

- Motor and vision abilities can be affected by handling and positioning
  - Support sitting if upper trunk control is poor
  - Ground feet and hands
  - Give time to adjust to new posture before expecting him to see
  - Provide vestibular, proprioceptive or tactile activity to get child ready for activity

What does literacy look like in Phase I? - examples of literacy materials for phase I

Gel bag pages to be viewed on Lightbox

Characteristics of Phase II

- Most children in Phase II:
  - Can look at objects
  - Reach for objects
  - Attend to objects of more than one color
  - Notice objects up to 4-5 feet away
  - Maintain visual attention with low levels of background noise and normal lighting
  - Still require some control over the environment to look

Goal: Integrating vision to function

- Use vision to make something happen
- Combine vision with touching, swatting, reaching, grasping
- Maintain visual contact for longer and in more complex environments

Phase II

- In this phase all activities should encourage use of vision to make something happen – objects presented should not respond unless student acts on them – press to activate fan or vibrating toy

Phase II

- Activities should combine vision and touch, choice making, self help, fine motor (wrapping Mylar around comb on black washcloth)

Logan – video phase II
Instructional Strategies for Phase 2

Using Color

- Use color or shiny to highlight targets for functional use
- Use objects of preferred color plus one or two colors
- Introduce more colors

Instructional Strategies Phase 2

Light and Movement for Attention

- Move objects slightly in right or left peripheral field
- Movement qualities in reflective objects can get attention
- Light gaze usually resolved but may still need lightbox to motivate attention

Instructional Strategies Phase 2

Complexity

- Can begin to use embedded symbols or simple 2-dimensional images
- Visually guided reach promoted by placing objects on black or plain background
- Keep near surfaces free of visual clutter
- Select objects with low volume sound components

Instructional Strategies for Phase II

- Latency decreasing - provide 15-30 seconds wait time for response
- Present new objects similar to familiar ones
- Use familiar objects for learning new things

Learning Environments Phase II

- Less restrictive - lights on, some sound
- Present on plain background - especially new or challenging task
- Position away from active areas in classroom - door, centers

What does literacy look like in Phase II?

- This is the stage where children can begin to process pictures!
- Use books with predictable, salient features. Cover one page until child can move from one to other
- Moving to 2-D - teach salient features and highlight them

Phase II Literacy - Over in the Meadow - adapted by Fran Holliway TVI

Beginning Phase II - No words - favored color 3-D animals on black background

Later Phase II - Matching object to picture - one picture on page, plain background, one word
Phase II grocery book by Ginger Schmidt TVI NEGA RESA

Student selects the real grocery item that matches the image-photograph presented on black background

Phase II book from SC

2 targets on plain black background- highlighted in glitter - focus on salient features and match to real objects

Phase II Book – Veto  Early Phase II- reflective materials, tactual feedback from 3-D components, no words

Later Phase II – Veto  Words and picture from original book added

Phase III

Goal: To facilitate resolution of CVI characteristics still active

- Students in Phase III
  - Have more normal fields
  - Visually guided reach emerging
  - Have difficulties with complexity in 2-dimensional materials
  - Can view at a distance between 10-15 feet

Phase III

- Have short viewing distance in unfamiliar indoor and outdoor areas,
- May still have problems in specific areas of visual fields (usually lower)
- Have difficulty with visually guided reach
- May have trouble with steps, drop-offs - O&M needed

Daniel – video phase III

Instructional Strategies

for Phase III

- Use bright colors to outline or highlight 2-D symbols
- Present materials in all visual fields except lower
- Provide wait time to provide for visual latency when tired or sick
- Use occluders or window cards to block out excess detail on page
- Highlight critical features of symbols or pictures

Instructional Strategies Phase III

- Highlight landmarks symbol on water fountain,
- Teach sorting skills
- Background details in 2 dimensional materials should be added slowly until student can recognize real pictures (boat on black background – add waves, clouds, person)
- Add complexity in environment – (recognize familiar object in room instead of on table)

Literacy in Phase III - Can process more complex pictures-
CVI Mentor Project

- 8 teachers in Georgia working toward CVI endorsement with Dr. Roman
- Districts committed to letting them do some work once a month for others needing help with CVI assessment and implementation
- School year 2016-17 hope to have referral system in place

Important Resources, Researchers

- Dr. Christine Roman-Lantzy

Cortical Visual Impairment: An approach to Assessment and Intervention - New book coming soon

- West Virginia CVI Mentor Training Materials http://wvde.state.wv.us/osp/vj/cvi/

Important Resources

- TSBVI CVI Web Exercise: http://tsbvi.edu/cvi-exercise
- Diane Sheline
- Important Resources
- South Dakota CVI resources
  - Phase II Interventions http://www.usd.edu/~media/files/medicine/center-for-disabilities/cvi-phase-ii.ashx?la=en
  - Phase III Interventions http://www.usd.edu/~media/files/medicine/center-for-disabilities/cvi-phase-iii.ashx?la=en
  - CVI Apps http://www.usd.edu/~media/files/medicine/center-for-disabilities/cvi-apps.ashx?la=en