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Cortical Visual Impairment (CVI)

Assessment, Implications, and Adaptations for Successful AAC Use

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What is CVI?

- Neurological disorder in which there is damage to the posterior visual pathways and/or occipital lobes of brain resulting in visual processing issues (Tallent, Tallent & Bush, 2012)
- May be used to describe condition when child/adult is visually unresponsive but has normal eye exam or an eye exam that cannot explain individual's significant lack of visual function (Roman-Lantzy, 2007)

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What causes CVI?

- Any neurological insult before, during, or after birth that damages visual processing centers
- Commonly have other neurological problems associated with brain damage (e.g. CP, cognitive impairment, seizure d/o, hypo/hyper sensitivity to sensory stim)
- Increased preemie survival means increased CVI dx

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CVI vs. Ocular Impairments

- Ocular impairments affect structure and function of eye and optic nerve
- CVI is a visual processing impairment affecting the brain
- Someone can have a “normal” eye exam but still have CVI
- Visual abilities in person with CVI are not static

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Physical Appearance

- Blank facial expression
- Lack of visual engagement/communication
- Smooth but purposeless eye movements
- Stabismus
- Nystagmus

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CVI Diagnostic Criteria

- Normal eye exam or an eye condition that cannot explain profound lack of functional vision
- Medical history including neurological problems
- Presence of unique visual and behavioral characteristics (Roman-Lantzy, 2007)

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10 Characteristics of CVI

- Color preference
- Need for movement
- Visual latency
- Visual field preference
- Difficulties with visual complexity
- Light gazing and nonpurposeful gaze
- Difficulty with distance viewing
- Atypical visual reflexes
- Difficulty with visual novelty
- Absence of visually guided reach

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The CVI Range

- Developed by Roman-Lantzy
- Assesses the presence of the 10 characteristics *and* the degree of impact of *each* characteristic
- CVI range assessment form and companion form (CVI resolution chart)
- Assess child on each characteristic in 2 ways
  - 0=no functional vision; 10=typical/near typical func
  - Rating 1-snapshot of functional vision
  - Rating 2-severity of each characteristic
- Ratings range from 1-10 and broken into 3 phases

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3 Phases

- **1: (scores 1, 2, or 3 on CVI Range)**
  - *Goal: Building visual behaviors (getting the child to look*)
- **2: (scores 4, 5, 6, or 7 on CVI range)**
  - *Goal: Integrating vision and function*
- **3: (scores 8, 9, or 10 on CVI range)**
  - *Goal: Resolving characteristics*

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10 Unique Visual and Behavioral Characteristics of CVI

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CVI Characteristic #1: **Color Preference**

- Strong attraction to visual targets of specific color
- Easier to focus on preferred color than non-preferred
- Typically prefer highly saturated colors
- Severity on spectrum
- **What are some ways you can identify a child's color preference?**

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Color Preference *Barriers*

- Difficult to focus on less preferred colors
- Surrounding items of preferred color draw attention away from task at hand
- Can’t always incorporate color preference into real-life situations
- Color preference can significantly limit learning and language

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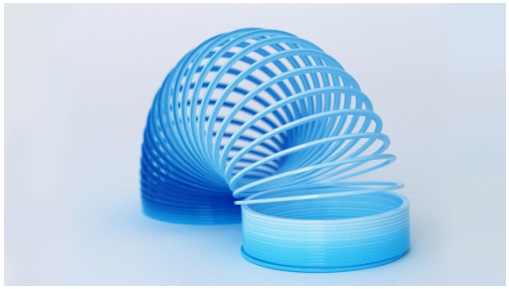
Color Preference *Treatment*

- Utensils/grooming items in preferred color
- Simple, brightly colored toys in preferred color



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Color Preference
AAC Adaptations

- Edit text, photos, and background color to draw attention to salient features of symbol, picture, letter
  - Don't use preferred color in background
- Use simple, brightly colored picture symbols
- Be aware of color preference when teaching objects
- Use color as an anchor for visual scanning

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CVI Characteristic #2: **Need for Movement**

- Majority of individuals with CVI have tendency to be attracted to objects that have properties of movement

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Need for Movement: *Barriers*

- May not be able to visually focus on static picture symbols or 2D materials
- May require movement to gain/maintain attention on objects/pictures
- May move head, body, or hands in front of face to provide movement quality visually
- Distracted by reflective surface (e.g. lamination)
- Easily distracted by movement in environment

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Need for Movement*: Treatment*

- Shiny material behind toy targets
- Tap/slightly shake toy; move fingers near toy
- Use simple toys with shiny qualities
- Switch toys that make something move (e.g. fan with ribbon)
- Avoid tx rooms with windows/open spaces where ppl are walking

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Need for Movement*: AAC Adaptations*

- Speech Generating Device
  - Auto-Zoom feature
  - Cell highlighting
  - Cursor movement on screen
- Laser pointer or movement cue to draw attention to picture/object
- Shiny material behind visual target
- Tap/slightly shake visual target

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Characteristic #3: **Visual Latency**

- Delayed response from time target is presented to time target is visually regarded

- https://youtu.be/9Xj7gdqJy84?t=380

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Visual Latency: *Barriers*

- Misinterpretation of child's ability to locate a visual target
- Often results in increased cuing which can be distracting
- Misinterpretation of child's attention/ability to follow directions
- Latency time increases if child tired, hungry, etc.
- Real life situations are fast paced—not enough processing time

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Visual Latency: *Adaptations*

- Allow for increased wait time after making request
- Give less verbal prompting
- May use movement cues, light, or preferred color instead of verbal cues
- Decrease task demands, environmental complexity, and distractions
- Allow for visual warm up to decrease latency (e.g use familiar toy in preferred color first)
- Use consistent objects and routines for increased familiarity (decreases latency)

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Characteristic #4: **Visual Field Preferences**

- Tendency to ignore info presented in non-preferred areas of visual field
- May see patient repositioning (e.g. turn head, tilt core) to view objects from preferred field of view
- Poor Central Vision: Can't see 2D until about a 6 on CVI range

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Visual Field Preferences: *Barriers*

- Objects, symbols, SGD presented in non-preferred field results in decreased visual attention
- Difficult to view items at midline
- Traditionally, expect people to hold head at midline and visually attend to objects using central vision
- Positioning needs may make it challenging to present items in preferred field

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Visual Field Preferences: *Adaptations*

- Position objects, pictures, switches in preferred visual field
- Mount/position SGD in preferred field
- Place vocabulary in preferred visual quadrants
- Use slant board
- Be aware that atypical head movement/posture may be needed

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Characteristic #5: **Difficulty with Visual Complexity**

- Difficulty processing targets in complex environment
- Three dimensions of visual complexity
  - Complexity of object itself
  - Complexity of visual array (surrounding environment or background)
  - Complexity of sensory environment (movement, lights, sounds, touch)

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Difficulty with Visual Complexity: *Barriers*

- 2D materials often more complex to view and interpret
- Impacts ability to view and distinguish details of pics, symbols, words
- Impacts ability to analyze faces
- Decreased eye contact very common
- Environment is complex and difficult to control
- SGD often have complex symbols

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Difficulty with Visual Complexity: *Treatment Adaptations*

- Decrease clutter in environment
- Provide black background to allow objects/pictures to stand out
- Control environmental distractions
- Lower lights (CVI Den)
- Avoid presenting pic/toy in front of face/patterned shirt, etc.
- Use window reader to isolate parts of page when coloring/reading

***Photo credit: https://strategytosee.com/diy-projects/cvi-den/*

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Diff w/ vis complexity: *AAC Adaptations*

- Choose simple symbol sets
- Be aware of spacing of symbols on pages (e.g. hide every other cell)
- Pull off pictures and bring close to face
- Use high contrast simple pictures
- Invisiboard

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Characteristic #6: **Light Gazing, Non-Purposeful Gaze**

- Tendency to spend prolonged periods of time gazing at lights, out windows, or at lighted objects

- *Photo credit: Cortical Visual Impairment: An Approach to Assessment and Intervention - Dr. Christine Lantzy*

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Light Gazing: *Barriers*

- Difficult to draw visual attention away from windows, overhead lights, etc.
- May require element of light to visually attend to target
- Objects or static pictures on paper may not be conducive to successful choice making
- May only attend to light up toys
- Light gazing may increase with novelty or increased complexity

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Light Gazing: *Adaptations*

- Use device with backlit screen
- Use flashlight (300 lumens or more) to spotlight pictures
- Place objects/pictures on light box
- Dim external lights in room
- Position child away from extraneous light sources
- Control complexity and novelty
- Use favorites to draw attention

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Characteristic #7: **Difficulty with Distance Viewing**

- May position visual targets within inches of face
- Great difficulty recognizing large or highly familiar targets beyond near space
- Can present like nearsightedness

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Difficulty with Distance Viewing: *Barriers*

- Visual targets positioned too far from communicator can't be interpreted
- Child may not visually attend to, experience, or learn from things outside of visual range (e.g. animals at zoo, places outside car window)
- Difficulty finding things at distance or navigating environment

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Difficulty with Distance Viewing: *Adaptations*

- Position objects, pictures, SGDs in preferred distance range
- Major consideration with access, particularly eye gaze and headpointing
- When item can't be moved closer, use other anchors (e.g. color, light, movement) to draw attention
- Colored tape/lights to line doorways/pathways/obstacles

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Characteristic #8: **Atypical Visual Reflexes**

- Atypical reflex responses that serve to protect eyes from harm
  - Blink to touch
  - Blink to visual threat
- Nothing to treat this, it just resolves as pt makes progress in phases of CVI

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Atypical Visual Responses: *Barriers*

- Less blinking can cause eye fatigue/dryness when viewing dynamic SGD, computer, iPad etc.
- Decreased blink to touch or threat may mean objects moving toward person aren't perceived quickly
  - Visual motor tasks difficult
  - May startle easily

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Atypical Visual Responses: *Adaptations*

- Additional visual “breaks” during tasks
- Increased narration or verbal cues to prepare for transition or before entering/leaving space surrounding person
- Be aware of backlighting on devices
  - May need to dim lighting on device during prolonged use

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Characteristic #9: **Difficulty with Visual Novelty**

- Anti-novel response to visual targets
- Familiar targets are visually regarded, while new visual targets are ignored.

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Difficulty with Visual Novelty: *Barriers*

- May be uninterested or unable to identify novel people or objects
- May be unable to recognize picture symbols or more abstract representations of familiar objects
- May look away from novel materials
  - Can look like not paying attention even though they are listening
- May demonstrate anxiety or visually "shut down" when approached by new people, in new environments, or in new routines

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Difficulty with Visual Novelty: *Adaptations*

- May prefer/respond better to digital pictures representation rather than picture symbols
- May benefit from familiar picture symbol set
- May require increased time to identify novel symbols and pictures
- May be necessary to pair photos with symbols/objects to teach salient features
- Use preferences to draw attention to novel materials (e.g. light, color etc.)
- Try to treat in same room each week

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Characteristic #10: **Visual Motor**

- May struggle to coordinate simultaneous visual gaze and physical reach
- May visually localize or fixate on target, turn away, and then reach in the direction of the target

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Visual Motor: *Barriers*

- May give impression that child is making non-purposeful choice
- Can result in misinterpretation of intention
- May lead to decreased accuracy when targeting pictures, symbols, or SGD for communication
- Coordinating look and touch more difficult with increased complexity

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Visual Motor: *Adaptations*

- Use keyguard to provide additional tactile cues for targeting when patient unable to look and touch at same time
- Space out choices to decrease change of miss-hits
- Trial access methods that decrease visual motor demands for reaching (e.g. auditory scanning with switches)

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Other Points to Remember

- CVI vision is not static
- Adaptations are used in the beginning to help draw visual attention with the intention of fading out accommodations (because visual processing center should regain connections which will improve functional vision)
- Better to incorporate visual strategies throughout day, across environments

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References and Resources

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