Supporting the CVI Visual Behaviors at Home

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CVI: Impacts all parts of development and learning

CVI visual behaviors:
- How they impact your child
- How to support those access needs

Learning begins with access: vision and compensatory skills

Compensatory skills support visual access and learning.
CVI Myths

- Cortical and cerebral visual impairment are separate things.
- Some children have mild CVI.
- Only 10 things can happen to the visual brain.
- All children with CVI need the same educational programming.
- All individuals with CVI all have clear evidence of a brain issue.
- There are no shared needs for children with CVI and children with ocular difficulties.
CVI Myths

- The rate and extent of visual improvement is predictable for a child with CVI.

- Braille is never appropriate for a child with CVI.

- Children will read by being exposed to adapted print.  
  [https://features.apmreports.org/sold-a-story/](https://features.apmreports.org/sold-a-story/)
Listening and Learning

- Perkins began to think about broader umbrella categories
- Identified 16 Visual Behaviors
- Identified new needs in assessment of CVI.
- Need to appreciate compensatory skills as a great support to visual understanding.
- Created the Perkins CVI Protocol
CVI Protocol Philosophy

• CVI is often one piece of a child’s complex diagnosis

• Need a broader background understanding of CVI before assessment and creating educational program plans.

• Assessment tools must look at more than vision since the goal is learning access.

• Research must support any aspects of assessment tools being used.

• Need visual access educational programming like their peers with ocular involvement.
CVI Protocol Philosophy: Collaboration

We must listen and learn from students and adults with CVI.

We need to collaborate for assessment and program planning.

- Engage the child in assessment
- Tap into the parent knowledge
- Seek educator and related service provider knowledge
- Seek medical information around coexisting diagnoses including ocular and neurological
- Share functional vision and compensatory skills information with the medical provider
CVI Protocol Philosophy

- Assessment must be ongoing not a moment in time.
- Behavior is communication.
- Each individual develops methods to “survive” CVI.
CVI Protocol Philosophy

• Must acknowledge that most children with CVI have co-existing ocular conditions

• Progress must be monitored with careful data taking

• Assessment should consider visual skills, compensatory skills, and strategies children have developed to just survive and understand their world.

• Assessment must look at the whole child including their motor, cognitive, behavior and social-emotional skills that influence learning.

• Children can fool us into thinking we are seeing visual recognition.

• Compensatory Skills enhance and support visual recognition abilities
Understanding “Survival Skills”

Use of unique ways they have learned to navigate and function with their perception of the world.

Every child develops ways to function based on

• Visual skills
• Compensatory skills
• Memory
• Prediction
• Shape coding and color coding
• Self talk or seeking narration
CVI Protocol: Major Concept

Looking does not mean understanding what is seen
Activity: Card Simulation
Collective Wisdom

What is currently understood? What tools are available? What are the researchers saying? What is missing?

- Gordon Dutton’s Visual Skills Inventory
- TeachCVI Screenings
- Christine Roman’s CVI Range
- PreVIAS
- Visual Assessment Skills Questionnaire (VAS)
- Nicola McDowell’s Austin Assessment
- Matt Tietjen’s 2D Image Assessment
- APH/Roman CVI Complexity Card Sequence

- Dr. Lotfi Merabet
- Dr. Corinna Bauer
- Dr. Barry Kran
- Dr. Gena Heidary
- Dr. Anne Fulton
- Dr. Arvind Chandra
- Dr. Gordon Dutton
- Prof. Elisa Fazzi

- Dr. Joseph Zihl
- Dr. Christopher Bennett
- Dr. Els Ortibus
- Dr. Melinda Chang
- Dr. Mark Borchert
- Dr. John Ravenscroft
- Dr. Sylvie Chokron
- Dr. James Jan
Co-Existing Ocular Conditions

- Refractive errors
- Strabismus
- Amblyopia
- Ocular motor challenges
- Optic nerve abnormalities
- Nystagmus
- Low contrast sensitivities
Visual Behaviors: Perkins CVI Protocol

Appearance of the Eyes
Movement of the Eyes
**Visual Attention**
**Visual Recognition**
Impact of Clutter and Crowding
Visual Fields
Impact of Color
Form Accessibility

Visual Guidance of the Upper Limbs
Visual Guidance of the Lower Limbs
Access to People
Impact of Light
Response Interval
Impact of Motion/Motion Perception
Sensory Integration/Impact on Vision
Visual Curiosity

Compensatory Skills
#1 Appearance of the Eyes

- This information is often validated by clinical optometry or ophthalmology
- Assessment of eye alignment and eye preference.
- Is there alternating eye use?
- Assessment of the ability to coordinate two eyes working together
Strabismus
Eye Muscles or Brain’s Ability to Team

- Any change in alignment of one or both eyes
- Sometimes alternating
- Difficulties of two eyes working together
- Child favors the straighter eye.
Ramifications for Strabismus

- Eye appearance
- Head tilting
- Body tilting
- Sideways sitting
- Closing one eye or squinting
- Difficulty coordinating the movement of the eyes
- Lack of binocular vision
- Amblyopia
- Missing information in the impacted visual fields
What to Do?

- Allow head positioning and body positioning preferred by the child
- Use glasses consistently for strabismus and protection
- Encourage scanning for items in weaker visual field.
- Present activities in preferred visual field
- Learn to look in all fields of vision.
- Allow time to adjust to unfamiliar materials and activities
- Allow for fatigue
- Give visual breaks
- Surgery or patching to align the eyes
#2 Movement of the Eyes

- Assessment of ocular (eye-related) motor skills.
- Assessment of how the eyes move: horizontally, vertically, and diagonally.
- Assessment of the quality of shifting gaze
- Assessment of scanning
- Assessment of the ability to follow moving targets at different speeds.
Movement of the Eye

- Intermittent, Alternating Strabismus
- Nystagmus
- Inconsistent fixation
- Roving eyes
- Difficulty with smooth pursuit: following

A student can use head postures and head movements to compensate for these conditions.
Free examination.

1

Estimate material circumstances of the family

2

Give the ages of the people.

3

Surmise what the family had been doing before the arrival of the unexpected visitor.

4

Remember the clothes worn by the people.

5

Language, context and cognition

Yarbus 1967
What To Do?

- Time to view and explore
- Increase spacing
- Declutter materials
- Allow head tilting and positioning
- Narrate image
- Draw attention to elements of the object or picture
What do you need for understanding your visual world?

Visual Attention

- Look using central vision
- Sustain gaze
- Shift to elements
#3 Visual Attention

- Assessment of the ability to look, ability to look and sustain gaze long enough for recognition.

- Assesses limits in abilities to gather the whole visual scene, ability to maintain gaze in clutter and unadapted environments

- Assesses the ability to maintain gaze while ill or tired.
Visual Attention

- Our visual system allows:
  - The visual search for targets among competing others
  - Attention to this target while ignoring others
  - Matching the target to our visual library to support the speed and efficiency of recognition.

- When searching for an object, it’s not just about where to look, but also where *not* to look.
What do you need for understanding your visual world?

Visual Recognition

- Building a visual library: Have previous experience with the item or items that share features.
- Match item to one image in the brain.
- Match item to many images in the brain
- Understand what is seen
Activity

Using central vision
#4 Visual Recognition

- Difficulties in new environments and difficulty with visual recognition of new items.
- Assessment of visual recognition of materials and people: What is recognized purely visually.
- Assessment of recognition abilities for objects and classes of object categories (visual recognition of my cup vs. the ability to see and recognize any cup).
Visual Recognition

- What forms can the student recognize visually?
  - Under what circumstances/conditions?
  - Are abilities generalizable?

- How does distance impact vision? Is the child visually curious and demonstrating recognition?
Visual Recognition

- Does the student demonstrate visual “attack skills” around familiar features?

- What other senses does the student use to gain information and learn?

- Is visual recognition being masked by compensatory strategies?
#5 Impact of Clutter/Crowding

- Assessment of the number of objects tolerated in a display
- Assessment of the benefit of increasing spacing to improves visual attention and visual recognition.
- Includes whether predictable object presentation helps visual attention and visual recognition.
- Includes the impact of presentation clutter, material clutter and environmental clutter.
Impact of Clutter/Crowding

Ability to visually attend, to visually recognize, and/or navigate materials or learning environments with varying levels of presentation/clutter.

Considers the impact of increased spacing and predictable presentations.
What To Do?

- Increase spacing
- Clean backgrounds
- Predictable presentations
- Limiting the number of items in the display
- Single colored items
Spacing
#6 Visual Fields

- Includes clinical visual field testing results
- Assessment of full functional visual fields functioning: upper, lower, left and right.
- Assessment of central vs peripheral visual field use
- Assessment of the impact of clutter, crowding, noise on use of full visual fields
What To Do?

- Get a clinical evaluation of visual fields
- Present in best field
- Use compensatory support on the neglected visual field.
- Learn to systematically scan the whole environment or presentation.
#7 Impact of Color

- Assessment of how children react to different colors
- Assessment of the reaction to colored vs black and white 2D materials
- Assessment of how children use color as an overall strategy function to identify materials and to search for materials.
- Assessment of how multicolored materials disrupt visual recognition (simultanagnosia)
Color Reliance & Support

“What is the frog?”

“The tube is pink.”
Would the student have been successful?
“But its not the right color…”
What To Do?

- Use colors that support visual attention
- Use separate colors to support visual recognition
- Use separate colors to group concepts: organize
- Use color as ”Where to reach” and ”Where to step”.
- Use real items in their appropriate color.
- Use separate colors to mark locations and belongings
Impact of Color
#8 Form Accessibility

- Assessment of the accessible learning form for visual attention and visual recognition
- Evaluates the understanding of 3D materials
- Evaluates the understanding of 2D
- If 2D, what is the most accessible form? (color or realistic forms)
Form Accessibility

- Evaluation of the visual accessibility of multicolored materials vs. solid colored materials.

- *Looking is not understanding*
What To Do?

Use the right learning form

- 3D
- 2D real photographs
- Colored 2D real drawings
- Avoid symbolic or black and white
Form Accessibility
Color the images that begin with a T sound.
Understand Limitations
<table>
<thead>
<tr>
<th>afraid</th>
<th>cold</th>
<th>frustrated</th>
<th>a lot</th>
<th>all done</th>
<th>corn flakes</th>
<th>on top of</th>
<th>Christmas Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>short sleeved shirt</td>
<td>snack foods</td>
<td>hair brush</td>
<td>communication binder</td>
<td>bar of soap</td>
<td>barber shop</td>
<td>teddy bear</td>
<td>laundry basket</td>
</tr>
<tr>
<td>rubber ball</td>
<td>living room</td>
<td>post office</td>
<td>hot chocolate</td>
<td>postage stamp</td>
<td>bumble bee</td>
<td>electric fan</td>
<td>electric drill</td>
</tr>
<tr>
<td>which one</td>
<td>watering can</td>
<td>you are</td>
<td>I'm ready</td>
<td>leave me alone</td>
<td>pick out</td>
<td>who</td>
<td>taxi cab</td>
</tr>
<tr>
<td>clothes dryer</td>
<td>change channel</td>
<td>milk carton</td>
<td>curious</td>
<td>computer mouse</td>
<td>I want</td>
<td>busy</td>
<td>bend over</td>
</tr>
<tr>
<td>I don't know</td>
<td>favourite</td>
<td>light</td>
<td>birthday cake</td>
<td>later</td>
<td>pickles</td>
<td>night</td>
<td>cloudy</td>
</tr>
<tr>
<td>Can I play?</td>
<td>scarf</td>
<td>shampoo</td>
<td>pills</td>
<td>fork</td>
<td>toes</td>
<td>umbrella</td>
<td>book</td>
</tr>
<tr>
<td>write this</td>
<td>breakfast</td>
<td>stickers</td>
<td>garage</td>
<td>desk</td>
<td>monkey</td>
<td>refrigerator</td>
<td>depressed</td>
</tr>
</tbody>
</table>
Perspectives Matter:
#9 Visual Guidance of Upper Limbs

- Assessment of visually guided reaching and its accuracy
- Assessment of visually guided placing of objects in relation to each other
- Assessment of looking while playing with or exploring objects.
Optic Ataxia

- Difficulty completing visually guided tasks. Disrupts the ability to judge distance, depth, and weight, which is needed for motor action.

- When reaching out to pick up an object, the hand’s in-flight adjust to the size of the object.

- Computing object distance is crucial for size constancy and grasp.
What To Do?

- Encourage tactile learning and using tactile methods.
- Use color for locations to grab and place
- Use color to highlight edges
- Increase spacing and reduce clutter
Example: Supporting Visual Guidance of Upper Limbs
Color
#10 Visual Guidance of Lower Limbs

- Assessment of the ability to step accurately onto surfaces
- Assesses the impact of color, depth and shadows for stepping accurately
- Assessment of the ability to place the foot accurately (such as into a shoe).
- Assessment of the overall navigation abilities and abilities to move through space.
What To Do?

- Encourage tactile learning.
- Use color for locations to step
- Use color to avoid problems with depth
- Use color to highlight edges
- Increase spacing and reduce clutter
#11 Access to People

- Assessment of facial regard
- Assessment of facial recognition, facial expression understanding, body language understanding and gestural understanding.
- Assessment of the compensatory strategies used to recognize people
Access to People

Consider that the child:

- Is using color to identify people.
- Is using context to recognize people.
- Is relying on voices or motion to recognize people.
- Is using clothing, glasses or beards to identify people.
What To Do?

- Introduce yourself
- Narrate who is present
- Describe a feature of yourself or others
- Use the child’s name before delivering a question or statement
- Do not try to have the child “guess” who you are.
- Do not use photographs of people
#12 Impact of Light

- Assessment of the distraction of light
- Assessment of need for light
- Assessment of any light sensitivities: Difficulty transitioning between environmental with changing light levels
- Assessment of the impact of backlighting.
- Assessment of reaction to certain types of light levels and light spectrums (dislike outdoor light yet seek light in toys and to indoor overhead lighting)
What To Do?

- Avoid light sources that overwhelm visual skills
- Use backlighting as needed
- Be aware of reflected light on surfaces or floors
- Use shades
- Used tinted glasses or billed hats
- Use positioning to avoid light
#13 Response Interval

- Assessment of the degree of delay in visual awareness
- Assessment of the degree of delay in attention
- Assessment of the degree of delay in visual recognition.
- Assessment of the degree of delay in response to visual information
- Assessment and documentation of the causes, timing and signs of visual fatigue
What To Do?

- Wait for visual attention
- Wait for visual recognition
- Support fatigue with the use of other senses
- Allow breaks
- Consider behavior as communication
#14 Impact of Motion

- Assessment of the need for motion to gain visual attention
- Assessment of the distraction of environmental motion
- Assessment of the ability to follow fast moving items
- Assessment of any impaired perception of motion (difficulties judging speed, distance or direction of motion)
- Assessment of the use of blindsight (ability to avoid objects while moving without awareness of the obstacle).
Impact of Motion

Impact on Navigation: Voices of Adults with CVI

● “Movement is hard so just getting around is something to think about it. For me to be processing these things means that I can be slowed down in all my other processes while I navigate, which can be quite dangerous.”

● “I can’t see cars moving. I see them first here (motions on elbow) and then they’ll be here next time I see them (motions on middle of her arm) so it’s hard for me to make decisions about where they are. Sometimes when I think they’re one place, then suddenly they’re at the next place and it’s very scary for me.”
What To Do?

- Use slight, predictable motion to gain attention
- Block distracting motion
- Avoid random motion
- Rely on other senses when motion is uncontrollable
- Be aware of difficulties with speed, direction or distance of motion
- Alert the child to your approach.
#15 Sensory Integration and Impact on Vision

- Assessment of the impact of competing sensory input on vision use both for multisensory environments and when attempting to multitask.
- Assessment of the difficulties listening while looking.
- Assessment of the difficulties holding their body in space while using vision.
- Assessment of the difficulties with feeling tactile information such as vibration, in materials and when being touched or moved.
- Assessment of the difficulties using vision when the child’s alert state and health and impact on vision use.
“So in a sense, I have taught my brain to be more conscious of my surroundings, even when my vision is limited by clutter, but there is a flip side to doing this. When I am doing this, I can't do anything else, like talk or listen to music, as any distractions takes my focus away from responding to what I am seeing.”

- Nicola McDowell -

CVIScotland.org
What To Do?

- Support multisensory learning with one sense challenged at a time
- Extend learning time for exploration using all senses.
- Use supportive seating
- Alert the child to approaching touch or movement.
#16 Visual Curiosity

- Assessment of the ability to look, ability to look and sustain gaze of the wider environment and in the whole scene at any distance.
- Assessment of the ability to visually recognize items in the wider environment and in the whole scene at any all visual field
- Determines accessible distance for incidental learning
Incidental Access

- Individuals who are sighted learn an enormous amount by simply observing the world around them.

- Individuals with CVI (and others who are visually impaired) need to be directly taught these same skills.

- Multisensory learning and hands-on experience is beneficial.
What To Do?

- Narrate distance events and learning
- Explore the whole scene
- Use the Wagon Wheel method to explore all visual fields
- Provide near exploration using vision and compensatory skills.
- Directly teach missed incidental learning.
Compensatory Skills

Supports visual understanding

Other Senses:
- Hearing
- Tactile
- Smell
- Taste

“Survival Skills”
- Prediction and memory
- Context
- Color coding
The use of strategies, techniques, and adapted materials that students with visual impairments need to access the general education and common core curriculum.

Compensatory skills are necessary and valuable but should not be confused for visual recognition.
Assessment Should Consider the Correct

- Presentation methods
- Access to people
- Materials
- Learning environment
- Support staff
- Need for direct teaching of missed concepts
CVI Core Concepts

Changes in visual attention are seen with improved access

- Environment
- Presentation Methods
- Materials

Change in visual recognition is seen with improved

- Visual attention
- *ongoing assessment*
- *systematic instruction with data taking.*
Programming Needs

Programming needs at home or school:

- Require an initial assessment of the 16 CVI visual behaviors
- Consider both visual attention and visual recognition
- Consider how the child uses compensatory skills
- Consider all aspects of the child: motor, memory etc.
- The results form the basis of educational programming to learn.
Life is Busy

Focus on what you can:

- Set up environment and positioning
- Provide materials of the correct form
- Provide compensatory support
Perkins CVI Center

- CVI Now at https://www.perkins.org/cvi-now/
- CVI Now Facebook at https://www.facebook.com/groups/CVINow
- CVI Evaluation at https://www.perkins.org/independent-evaluations/cvi/