Alisha Waugh,
COMS, PT, Perkins-Roman CVI Range© Endorsed,
PRESIDENT FUNDAMENTALS First, INC.

Orientation & Mobility for Students with CVI
• 24 week gestation preemie
• diagnosed with CVI in the 1st year of life
• 10 years old
OCULAR VI VERSUS CVI

DIFFERENCES in Assessment & Approach

- Concepts
- Landmarks, Clues or Cues
- Use of Maps/ Physical Representations
- Cognitive Representation
- Social Skills

Photo: Josh Sullivan, 2003
# ASSESSMENT: CONCEPTS

## Ocular VI vs. Cortical Visual Impairment

- Ocular: much may be determined by tactual and auditory modes
- CVI: much may be determined by visual mode

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<th>concept</th>
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understanding of environmental concepts (i.e. chair, counter, window)

At what level of mastery? What level of generalization?

A. identification

B. recognition with an instruction (“Find the ...” or “Is it ... or ...?”)

C. discrimination

What attributes are being used to confirm the identity of something:

- fragile or solid information?
Ocular VI vs. Cortical Visual Impairment

- Landmark, clue/cue selection
  - Ocular:
    - What environmental information does the student use to reach the destination?
      - wall, surface, elevation changes, auditory information, braille signage (for braille users)
    - Unintentional contact?
  - CVI:
    - What environmental information does the student use to reach the destination?
      - visual landmarks, context of situation, print/pictorial signs (if meaningful)
    - Don’t assume absence of unintentional contact equates to safe travel
    - Tend to notice the same types of features? Things in the same visual field? Only highly familiar?

- The CVI Range ©
  - Rating II helps you choose appropriate landmarks and clues/cues

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Ocular VI vs. Cortical Visual Impairment

maps/ physical representations

- Ocular: Learning Media Assessment results to determine map medium
- CVI: The CVI Range ©¹ Rating I determines the Phase of CVI ©¹, which will determine instruction and teaching material considerations

Ocular VI vs. Cortical Visual Impairment

**Ocular cognitive representation:**
- describe indicators to change directions along a route?
- approximate accuracy in compass directions?
- understand temporal relationships (based on specific locations)?

**CVI cognitive representation:**
- aware of important features are in space?
- position landmark markers on a map in the correct place?
- understand temporal relationships (based on specific landmarks)?
Ocular VI vs. Cortical Visual Impairment

- Social skills:
  - CVI:
    - “who do you see?”
    - “How do you know?”
    - actual versus photos
    - Clarification requests?
  - Ocular:
    - “who do you hear?”
    - Clarification requests?
  - Use social skill assessment instruments (i.e. Social Competence Assessment \(^2\), Social Skills Assessment Tool for Children with Visual Impairments-SSAT-VI \(^3\))

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Ocular Visual impairment

- individual part-to-integrated whole teaching

- may address concepts spontaneously within the context of an actual O&M lesson

- increased focus on tactual, auditory, and olfactory attributes of concepts
Cortical Visual Impairment

- whole generalized visual attention (at near) to more detailed part analysis
- teach concepts that will be encountered during O&M lessons beforehand with materials and instruction conducive to the student’s Phase of CVI©
- increased focus on visually-accessible key attributes (salient features) of concepts
Ocular Visual Impairment

- increased use of less immediate perceptual senses to provide cues, clues, and landmark confirmation

- use magnified and/or high contrast visual targets to provide orientation information to increase clarity
  - visual awareness > perception > interpretation

- auditory information can aid in increasing orientation for those students with intact hearing
Cortical Visual Impairment

- encourage use of vision to access landmarks, clues/cues
- may provide additional clue/cue for confirmation by adding color, movement or light to a feature
- use landmarks, (often unrelated to size depending on acuity), that appeal to the student’s unresolved CVI Characteristics to gain visual attention for perception
  - visual attention > perception > interpretation
- extraneous auditory information can be disorienting
Ocular Visual Impairment

- tactile graphics, different textures, or tactile overlays to provide relevant information for tactual access to information
- high contrast to distinguish different areas for students with low vision
- audio to add information
- may include more extensive information to provide the most complete map:
  - in one map
  - in a series of overlay maps
  - in a separate key
CVI Phase 1

- actual object cue that signifies something in that location that student may match
- simple, single-colored if possible
- present against a plain background (i.e. invisiboard) before encounter in environment
**APPRAOCH: USE OF MAPS/PHYSICAL REPRESENTATIONS**

**CVI Phase II and III**

- one visual map/representation that has highly-saturated color only on important aspects
- design map/representation based on CVI Phase visual accessibility guidelines
- limit information provided on map/representation to reduce visual complexity
- consider pairing actual feature image with icon on map
Ocular Visual Impairment

cognitive representation of a space may develop through:

- distance-time relationships
- tactual exploration strategies, such as perimeter, gridline, and reference-point with calling attention to location of textures, auditory feedback, quantity, temperature, etc. of features)
Ocular Visual Impairment

- spatial orientation often achieved by comparing the flow of perceptual information (tactual, auditory, etc.) with memory of landmarks in order of encounter along a route

- often an egocentric frame of reference, although an allocentric frame of reference can be taught
Cortical Visual Impairment

- development of a solid cognitive representation of space requires:
  - calling visual attention to landmarks to create a cognitive representation of space
  - regular review of these landmarks to engrain them into visual memory
  - review the visual attributes of chosen landmarks through materials conducive to student’s Phase of CVI
  - provide language support to help interpret landmarks/visual displays (i.e. describe location, shape, size, quantity, etc. of key visual features)
Cortical Visual Impairment

- tactual exploration, like trailing a wall, may interfere with the student being able to visually regard landmarks simultaneously

- time-distance relationships may not be perceived
  - use of a timer may help develop sense of time

- predicting sequence of expected landmarks along routes (egocentric perspective) can be difficult due to the visual-spatial working memory
  - activities to work on order of landmarks encountered
Ocular Visual Impairment

- Social skills development does not occur incidentally.
- May be more apparent when a child with ocular visual impairment is not aware of others.
- Others may more readily accommodate for this.
Cortical Visual Impairment

- social skills development does not occur incidentally
- others may assume recognition has occurred with eye-to-face fixation
  - recognition may be based on fragile, or changing, visual information
    - teach salient features of people
Cortical Visual Impairment

- others may assume that not participating in an activity that student is present for means disinterest
  - processing speed, or latency, makes it difficult to follow along with multiple step activities even if interest exists
    - pre-teach activities with materials accessible for Phase of CVI©
- others may assume lack of peer acknowledgement means they are not interested in interacting with them
  - CVI characteristics create barriers to peer recognition
    - teach peers to accommodate for these
UNRESOLVED CVI CHARACTERISTICS

The CVI Range ©

- color preference
- attraction to movement
- visual latency
- visual field preferences
- difficulty with complexity
- light gazing/ attraction to light
- distance viewing difficulty
- novelty difficulty
- difficulty with visually-guided movement
- atypical visual reflex responses

Visual Accessibility Guidelines

Phase I: building visual responses

- 3-d materials
- simple (single-colored, no pattern, plain background)
- only present 1 item at once
- no visual imagery generated in mind’s eye, even for familiar routine objects
Visual accessibility guidelines

- Phase II: integrating vision with function
  - no 2-d unless presented on backlighting
  - with 2-d, use photos of actual object vs. abstract illustrations
  - can use multiple-colored items, limit patterns
  - limit number of items
  - visual imagery in mind’s eye may be generated for routine objects/landmarks
  - visual imagery recall may need to be cued with tangible prompt
  - no visual imagery in mind’s eye for less familiar objects/landmarks
Visual accessibility guidelines

Phase III: resolution of Characteristics

- 2-d with highlighting to notice important features
- Abstract illustrations, but check to make sure it is accurately interpreted
- Extremely familiar visual imagery of objects/landmarks/ experiences may be generated/recalled in mind’s eye without actual visual information present
- Difficulty generating and recalling less familiar visual imagery without verbal or visual prompt to cue context/category
MODIFYING THE ENVIRONMENT OR TASK

Visual Accessibility Guidelines

*The What’s the Complexity Framework*
- created by Matt Tietjen
- 7 week online course through Perkins eLearning
UNRESOLVED CVI CHARACTERISTIC

Color Preference

Phase I:
- use landmarks that are student’s known visually regarded color

Phase II:
- mark landmarks in routes and activities with student’s preferred color

Phase III:
- use color to highlight chosen landmarks in a photo preview
Attraction To Movement

- landmark selection
  - use naturally moving landmarks
  - adhere shiny, light-reflecting material

- Phase I:
  - may need movement activity before using vision

- Phase II:
  - may need movement of landmark to notice if at distance greater than 3-4 feet away

- Phase III:
  - may need movement of landmark to notice if greater than 10 feet away
UNRESOLVED CVI CHARACTERISTIC

Visual Latency

Phase I:
- may not achieve eye-to-landmark fixation

Phase II:
- may achieve eye-to-landmark fixation, but not achieve interpretation of landmark

Phase III:
- need more time and verbal mediation to interpret novel landmarks in a less complex setting
- more time to process familiar landmarks in a complex setting.
Visual Field Preferences

- **Phase I:**
  - only use landmarks for orientation purposes during route travel that are located within student’s preferred field(s)

- **Phase II:**
  - can begin to use landmarks that are highly motivating and familiar in less preferred field

- **Phase III:**
  - less familiar landmarks, select those that share characteristics to already known landmarks
  - location of less familiar landmarks during route travel should be within the student's preferred visual fields
Visual Field Preferences continued…

Other considerations:

- Long cane techniques to detect drop offs and obstacles in less-regarded fields.
- Upper protective technique for decreased regard in upper field.
Difficulty with Complexity

Phase I:
- use single color 3-d non-patterned landmarks
- no clutter around landmark
- teach route during periods of quiet and absence of pedestrian traffic

Phase II:
- use 3-d landmarks with minimal pattern
- minimal clutter around landmark
- teach route during periods of quiet and low pedestrian traffic

Phase III:
- can use 2-d landmarks with some pattern
- if highly familiar setting, background clutter may have less impact
- sensory complexity continues to interfere with visual regard of landmarks and comfort level in navigating environments
UNRESOLVED CVI CHARACTERISTIC

Light Gazing/ Attraction to Light

Phase I:
- may need to shine flashlight or light source on adapted landmark for student to visually regard in dimmed environment if possible

Phase II:
- may benefit from choosing light-emitting landmarks (windows, message boards, etc.) or adding a light feature to landmarks for student to notice

Phase III:
- may choose light-emitting landmarks for visual attention from a distance
Distance-Viewing Difficulty

Phase I:
- Student needs to be within a couple feet of landmark to visually regard

Phase II:
- Student needs to be within 5 feet to regard landmark

Phase III:
- Student may regard landmark from a distance of approximately 10 feet
Novelty difficulty

- Phase I:
  - must allow multiple presentations/exposure to landmark to achieve visual regard at a later time.

- Phase II:
  - novel landmarks may go unnoticed in familiar environments

- Phase III:
  - novel landmarks may be noticed in familiar environments, but likely only if it shares something meaningful with a well-known concept. To recall novel landmarks for later use, familiarization/concept development will need to be done.
Difficulty with Visually-Guided Movement

Phase I:
- no simultaneous moving and looking. Visually regarding environment is a challenge in itself.

Phase II:
- have student stop to visually regard familiar landmarks. Movement will interfere with regarding.

Phase III:
- student may regard landmarks while moving if highly familiar.
- encourage mobility driven by visual recognition of more distant landmarks
Atypical Visual Reflex Responses

Phase I:
- no reflex response, inconsistent or delayed response

Phase II:
- inconsistent reflex response

Phase III:
- intact reflexes, but may be delayed if ill, tired, post-seizures, etc.

Consideration: Be aware of potentially dangerous environments and teach protective techniques
“The brain is more than an assemblage of autonomous modules, each crucial for a specific mental function. Every one of these functionally specialized areas must interact with dozens or hundreds of others, their total integration creating something like a vastly complicated orchestra with thousands of instruments, an orchestra that conducts itself, with an ever-changing score and repertoire.”

~Oliver Sacks
Alisha Waugh, COMS, PT, Perkins-roman CVI Endorsed

Fundamentals First, Inc.

www.fundamentalsfirst@hotmail.com