Part 1, CVI Series:
Introduction to CVI and the Roman Assessment

Date: September 14
Time: 1:30-3:30 PM
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Presented by
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Developed by
Texas School for the Blind & Visually Impaired
Outreach Program
CORTICAL VISUAL IMPAIRMENT

WHAT WE LEARNED AT THE CVI CONFERENCE

By Carolyn Mason and Chrissy Cowan

Modified by Jim Durkel (JimDurkel@tsbvi.edu)

And then modified more by Sara Kitchen (sarakitchen@tsbvi.edu) & Lynne McAlister (lynnemcalister@tsbvi.edu)

Definition and Incidence

• Definition of cortical visual impairment
• New field of research
• Fastest growing visual impairment
• Diagnosis

The Problem w/ Medical Diagnosis

• Eye report frequently doesn’t say “CVI”
• Best information may come from neurological
• Test like MRI is not necessarily useful in diagnosing CVI
• Look for “red flags”
Red Flags

- Asphyxia-damage depends on severity & duration. Some causes: placenta previa, prolapsed cord, delivery complications.

- Hypoxic Ischemic Encephalopathy-too little oxygen (hypoxia), too little blood flow (ischemia), irritation of the brain (encephalopathy). Results from asphyxia. Seizures common.

- Cerebral Vascular Accident-(stroke) blood capillaries in the brain rupture, damage depends on extent of bleed, more common in full term male infants, mostly affects left side of brain, seizures common.

- Intraventricular Hemorrhage-occurs in premature infants w/in 1st 48 hours. Severity grades I-IV.

- Periventricular Leukomalacia (PVL)-something, such as trauma, occurs and oxygen does not get to the distant areas of brain. These die and become filled w/ fluid (sometimes called cysts in the brain. Can cause CP, developmental delays.

- Infection-viral and bacterial (TORCH)=toxoplasmosis, rubella cytomegalovirus, herpes/HIV. Also meningitis.
Figure 1 Image of the brain including the functional subdivisions of the visual cortex, cerebellum, inferior temporal cortex (ITC), temporal lobe, lateral geniculate nucleus (LGN), frontal lobe, parietal lobe, and occipital lobe.
Current Trends in Neuroscience

- **Hardwired**: Outdated theories stated that the brain was static and could not be healed once injured.

- **Neuroplasticity**: Current beliefs include the brain’s ability to organize and reorganize itself.

- **Paula Bach Y Rita** discovered that sensory information could be received through different channels (in the early 1970s!):

Unique Characteristics of CVI

Color: strong reaction/preferential response to a particular color, typically red or yellow. Color receptors are diffused through brain & almost all children have some color vision. Need their favorite color as a visual anchor.

- Lily likes red better than yellow.

Movement: Stimulates the “aware” system, gets the visual system activated. Movement w/out sound is generally easier to visually process.

Movement plus reflective qualities provide an invasive, difficult to ignore effect on the visual system.

- Child may exhibit better than expected navigational skills.

Latency: delayed response to presentation of object. Can vary according to time of day, state of alertness, degree of stress, and neurological stability. Decrease in latency equals increase in visual behavior.

- How long does it take to look?

Visual Field Preferences: definition of visual field defect: a blind spot (scotoma) or blind area within the normal field of one or both eyes. In most cases the blind spots or areas are persistent, but in some instances they may be temporary and shifting, as in the scotomas of migraine headache. (http://www.britannica.com/EBchecked/topic/630842/visual-field-defect)

- It just appeared out of nowhere.

Mixed field preferences: May use one eye for a field preference, and the other for verification.

- Let me take a second look.
**Complexity:** most interfering of all characteristics.

- **Target/object**-some objects are too complex, and there is no place for child to anchor his vision and so vision shuts down: faces are very complex.

- **Array**-what’s behind the object can cause problems even with preferred objects. This is responsible for the misconception that vision is variable. Actually, vision is constant, but background interferes with vision functioning.

- **Sensory environment**-unable to process with more than one sense at a time; will defer to auditory over vision. Be careful where you place auditory stimuli. Limit talking while doing vision work.

**Abnormal Reaction to Light**-Photophobia/Light Gazing/Non-Purposeful Gaze-prominent in early stages.

**Distance Viewing**-As object gets farther away, complexity increases. Makes child appear nearsighted.

**Visual Reflexive Responses**-absent, intermittent, or delayed blink reflex. Blink to threat; blink when you touch the bridge of the nose.

**Visual Novelty**-strong response to familiar objects. Appear to ignore novel items.

**Visual Motor**-look and touch may happen as separate events.
Resolution of Characteristics

- Best chance for resolution is within first 3 years
- Characteristics will not resolve without structured intervention
  - Phase I: Building visual behavior
  - Phase II: Integrating vision with function
  - Phase III: Resolution of all CVI characteristics

Order of Resolution

- Early resolution: light gazing, and visual reflexive response of blink
- Mid-Resolution: color, latency, visual novelty, visual reflexive response of blink to threat, and movement
- Later Resolution: visual fields, visual motor, complexity, and distance vision
ASSESSMENT:

Assessment Framework

- Interview
- Observation
- Direct evaluation of student

Parent Interview/Teacher Interview

- Information on medical background
- Eye report
- What does child like to look at
- What are your concerns
- Child’s favorite color
- When is child most visually alert
- Does child look directly into faces
- Does child notice things that move more than things that are stable
- Does child seem to look “through” rather than at objects
Observation of Vision

- In living and learning environments
- Quiet and noisy times
- Near and distance
- Familiar and unfamiliar objects
- Cluttered and simple backgrounds
- Interest in objects of specific color (color preference)
- Movement
- Light gazing
- Preferential viewing

Direct Evaluation

- Evaluate range of visual functioning
- Evaluate presence and degree of individual CVI characteristics
- May need several sessions to test
INTERVENTION:

Possible Environmental Considerations at Level I

- Precaution about “Vision Stimulation”

- For the child who is in Phase I of building resolution, the child visually attends:
  - to familiar objects (usually one color)
  - when there are no sound distracters
  - when there are no visual distracters
  - when room light is low

Possible Environmental Considerations at Level II

- For the child who is in Phase II of building resolution, the child can attend:
  - to objects that share features of color or pattern with the “familiar” objects
  - when familiar or low intensity auditory inputs compete
  - on increased pattern/object beyond 3-4 feet
  - to different lighting situations (not overly attentive to lights)

Goal of Intervention:

“For Children with CVI, it is important to determine where they are on the continuum of possible impact of CVI, to identify in this way what they are able to look at or are interested in looking at, and to give them as many opportunities to look as possible by integrating motivating activities and materials into their daily lives. The goal is to facilitate looking.” (Page 114, Roman-Lantzy, Cortical Visual Impairment: An Approach to Assessment and Intervention.)
Case Study: Cassie

- 9 years old
- CVI secondary to anoxia from surgery during infancy
- Auditory processing disorder
- Deafblind label
- Developmental delays
- Speech Impaired
- Extremely social
- Uses object calendar

CVI Resolution Chart 101

- Review Range of Characteristics.
- Number the boxes for next activity

Interview

- See handouts:
  - CVI Interview questions for parents/caregivers (Cassie)
  - Appendix 4.A Answer Guide to CVI Parent Interview Questions
- Write notes on CVI Resolution Chart
Observation

- Watch Movie
- Make notes on CVI Resolution Chart in a new color

Direct Assessment

- Watch video of direct assessment.
- Record results on CVI Resolution Chart.

Refine Results

- Record results on “Essential Forms” (Rating II) on Number Line
- See Appendix 5.A CVI Scoring Guide for help with filling out Rating I.
- Record numbers and find CVI Range

Intervention

- Page 132: Tips for providing interventions by phase IN THE BOOK
- Page 138, table 6.1 Sample activities.
- Bulleted list for Cassie (see handout)
- Report as addendum to functional vision assessment
Resources:


American Printing House for the Blind (APH) CVI Website: http://www.aph.org/cvi/index.html

References


# CVI Resolution Chart

From *Cortical Visual Impairment: An Approach to Assessment and Intervention*, by Chirsitine Roman-Lantzy, copyright © 2007, AFB Press, New York. All rights reserved. This page may be reproduced for educational use only.

Date: ___________________________  
Student’s Name: ___________________  
Evaluator: ________________________

Use the following chart to help develop areas of needs for development of IEP goals and objectives.

<table>
<thead>
<tr>
<th>CVI Characteristics</th>
<th>Phase I: Building Visual Behavior Level I Environmental Considerations</th>
<th>Phase II: Integrating Vision with Function Level II Environmental Considerations</th>
<th>Phase III: Resolution of CVI Characteristics Level II Environmental Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color Preferences</td>
<td>Range 1-2 (0) (.25) Objects viewed are generally a single color</td>
<td>Range 3-4 (0.50) Has “favorite” color</td>
<td>Range 7-8 (0.75) Objects may have two to three favored colors</td>
</tr>
<tr>
<td>CVI Characteristics</td>
<td>Range 1-2 (0)</td>
<td>Range 3-4 (.25)</td>
<td>Range 5-6 (.50)</td>
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<tr>
<td>Need for movement</td>
<td>Objects viewed generally have movement or reflective properties</td>
<td>More consistent localization, brief fixations on movement and reflective materials</td>
<td>Movement continues to be an important factor to initiate visual attention</td>
</tr>
<tr>
<td>Visual latency</td>
<td>Prolonged periods of visual latency</td>
<td>Latency slightly decreases after periods of consistent viewing</td>
<td>Latency present only when student is tired, stressed or overstimulated</td>
</tr>
<tr>
<td>Phase I: Building Visual Behavior</td>
<td>Phase II: Integrating Vision with Function</td>
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<th>Range 7-8 (.75)</th>
<th>Range 9-10 (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual field preferences</td>
<td>Distinct field dependency</td>
<td>Shows visual field preferences</td>
<td>Field preferences decreasing with familiar inputs</td>
<td>May alternate use of right and left fields</td>
<td>Visual fields unrestricted</td>
</tr>
<tr>
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<tr>
<td>Difficulties with visual complexity</td>
<td>Range 1-2 (0) Responds only in strictly controlled environments Generally no regard of the human face</td>
<td>Range 3-4 (.25) Visually fixates when environment is controlled</td>
<td>Range 5-6 (.50) Student tolerates low levels of familiar background noise Regards familiar faces when voice does not compete</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Range 7-8 (.75) Competing auditory stimuli tolerated during periods of viewing; student may now maintain visual attention on musical toys Views simple books or symbols</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Range 9-10 (1) Only the most complex visual environments affect visual response Views books or other two-dimensional materials Typical visual/social responses</td>
<td></td>
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</tr>
</tbody>
</table>
### Phase I: Building Visual Behavior
#### Level I Environmental Considerations

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<th>Range 7-8</th>
<th>Range 9-10 (1)</th>
</tr>
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<tr>
<td>Light-gazing and nonpurposeful gaze</td>
<td>May localize briefly, but no prolonged fixations on objects or faces</td>
<td>Less attracted to lights; can be redirected to other targets</td>
<td>Light is no longer a distracter</td>
<td></td>
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<tr>
<td>Overly attentive to lights or perhaps ceiling fans</td>
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</tbody>
</table>

### Phase II: Integrating Vision with Function
#### Level II Environmental Considerations

### Phase III: Resolution of CVI Characteristics
#### Level II Environmental Considerations
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<th>Range 9-10 (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty with distance viewing</td>
<td>Visually attends in near space only</td>
<td>Occasional visual attention to familiar, moving, or large targets at 2 to 3 feet</td>
<td>Visual attention extends beyond near space, up to 4 to 6 feet</td>
<td>Visual attention extends to 10 feet with targets that produce movement</td>
<td>Visual attention extends beyond 20 feet Demonstrates memory of visual events</td>
</tr>
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<tr>
<td>Atypical visual reflexes</td>
<td>Range 1-2 (0)</td>
<td>Range 3-4 (.25)</td>
<td>Range 5-6 (.50)</td>
<td>Range 7-8 (.75)</td>
<td>Range 9-10 (1)</td>
</tr>
<tr>
<td>No blink in response to touch and/or visual threat</td>
<td>Blinks in response to touch, but response may be latent</td>
<td>Blink response to touch consistently present</td>
<td>Visual threat response intermittently present</td>
<td>Visual threat response consistently present (both reflexes near 90 present resolved)</td>
<td>Visual reflexes always present; resolved</td>
</tr>
<tr>
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<tr>
<td>Difficulty with visual novelty</td>
<td>Range 1-2 (0)</td>
<td>Range 3-4 (.25)</td>
<td>Range 5-6 (.50)</td>
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<tr>
<td></td>
<td>Only favorite or known objects elicit visual attention</td>
<td>May tolerate novel objects if the novel objects share characteristics of familiar objects</td>
<td>Use of “known” objects to initiate looking sequence</td>
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<td></td>
<td>Selection of objects less restricted, one to two sessions of “warm up” time required</td>
<td>Selection of objects not restricted</td>
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<tr>
<td>Range 1-2 (0)</td>
<td>Look and touch occur as separate functions</td>
<td>Look and touch occur with smaller objects that are familiar, lighted, or reflective</td>
<td>Visually guided reach used with familiar objects or “favorite” color</td>
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<tr>
<td>Range 3-4 (.25)</td>
<td>Look and touch occur with large and/or moving objects</td>
<td>Look and touch are still separate</td>
<td>Look and touch occur in rapid sequence, but not always together</td>
<td></td>
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</tr>
<tr>
<td>Range 5-6 (.50)</td>
<td>Visually guided reach used with familiar objects or “favorite” color</td>
<td>Look and touch occur together consistently</td>
<td>Look and touch occur together consistently</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range 7-8 (.75)</td>
<td></td>
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**Phase I: Building Visual Behavior**

**Level I Environmental Considerations**

**Phase II: Integrating Vision with Function**

**Level II Environmental Considerations**

**Phase III: Resolution of CVI Characteristics**

**Level II Environmental Considerations**

**CVI Characteristics**

- Absence of visually guided reach
  - Range 1-2 (0)
  - Range 3-4 (.25)
  - Range 5-6 (.50)
  - Range 7-8 (.75)
  - Range 9-10 (1)
Key:

Draw an X though boxes that represent resolved visual behaviors

Use highlighter to outline boxes describing current visual functioning

Draw an O in boxes describing visual skills that may never resolve because of coexisting ocular conditions

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Figure 2 Office of Special Education Logo

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