
Texas School for the Blind & Visually Impaired Outreach Program



www.tsbvi.edu

512-454-8631

Superintendent William Daugherty

Outreach Director Cyral Miller

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

Date: September 14
Time: 1:30-3:30 PM
Location: TETN Network Broadcast #35065

Presented by

Sara Kitchen, VI Consultant, TSBVI Outreach
(<mailto:sarakitchen@tsbvi.edu>)

Lynne McAlister, Lead Teacher, TSBVI
<mailto:lynnemcalister@tsbvi.edu>

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.

The Brain from Top to Bottom:

<http://thebrain.mcgill.ca/>

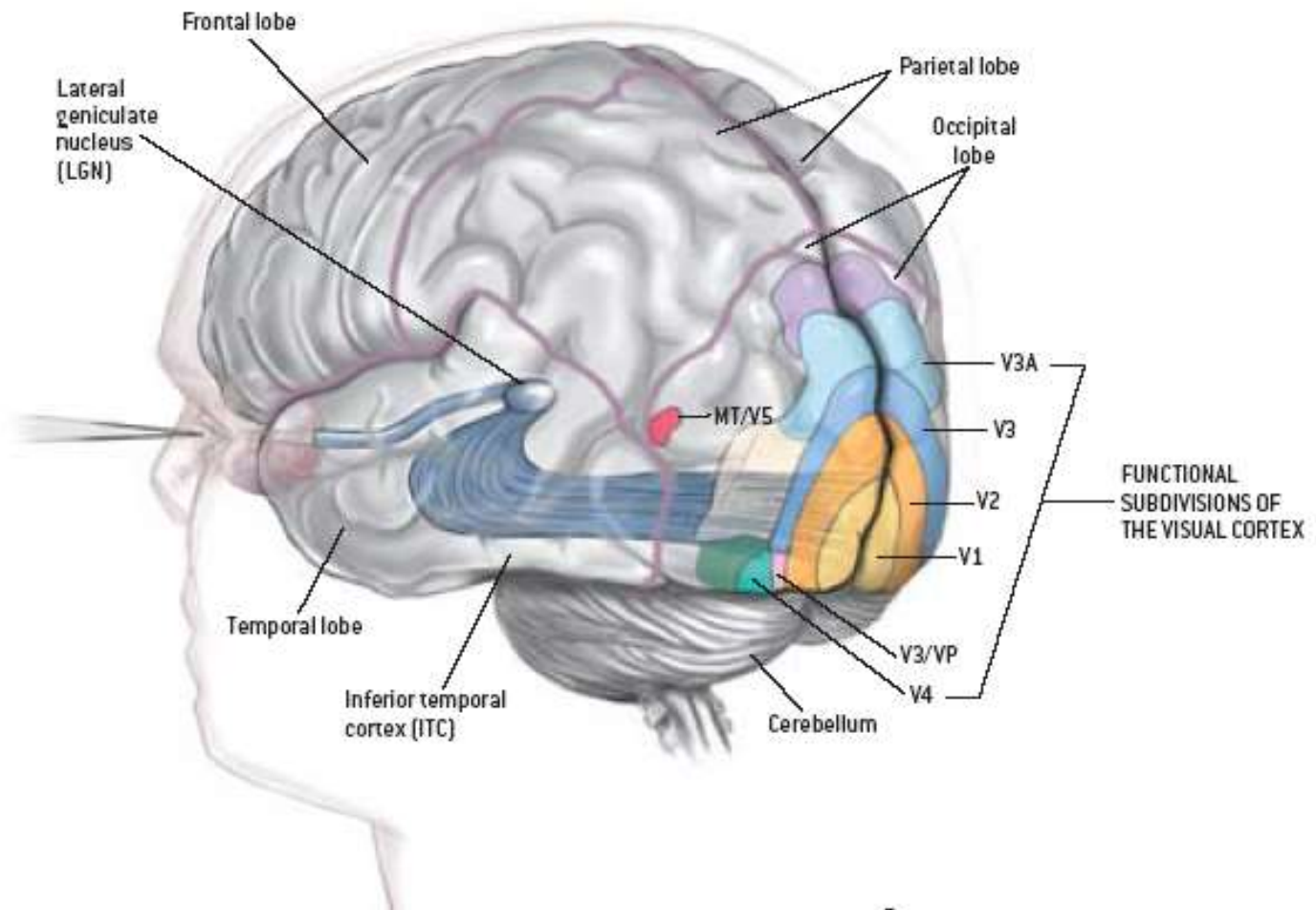


Figure 1 Image of the brain including the functional subdivisions of the visual cortex, cerebellum, inferior temporal cortex (ITC), temporal lobe, lateral geniculate nucleus (LGN), frontal lobe, parietal lobe, and occipital lobe.

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!):

http://www.pbs.org/kcet/wiredscience/video/286mixed_feelings.html

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:

Roman-Lantzy, C. (2007) *Cortical Visual Impairment: An Approach to Assessment and Intervention* American Foundation for the Blind Press (www.afb.org/store)

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

References

Giaschi, D., Jan, J. E., Bjornson, B., Young, S. A., Tata M., Lyons C. J., et al. (2003). Conscious visual abilities in a patient with early bilateral occipital damage. *Developmental Medicine and Child Neurology*, 45, 772-781.

Good, W. V., Jan, J. E., Burden, S. K., Skoczinski, A., & Candy, R. (2001). Recent advances in cortical visual impairment. *Developmental Medicine and Child Neurology*, 43, 50-60.

Hoyt, C. (2003). Visual function in the brain-damaged child. *Eye*, 17, 369-384.

Lanners, J., Piccioni, A., Fea, F., & Goergen, E. (1999). Early intervention for children with cerebral visual impairment: Preliminary results. *Journal of Intellectual Disability Research*, 43(1), 1-12.

Maitre, S., & Haerich, P. (2005). Visual attention to movement and color in children with cortical visual impairment. *Journal of Visual Impairment & Blindness*, July, 2005.

Milner, A. (1997). Vision without knowledge. *Philosophical Transactions: Biological Sciences*, 352 (1358).

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.

	Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)
Color Preferences	Objects viewed are generally a single color	Has "favorite" color	Objects may have two to three favored colors	More colors, familiar patterns regarded	No color or pattern preferences

	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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)
Need for movement	Objects viewed generally have movement or reflective properties	More Consistent localization, brief fixations on movement and reflective materials	Movement continues to be an important factor to initiate visual attention	Movement not required for attention at near	Typical responses to moving targets
Visual latency	Prolonged Periods of visual latency	Latency slightly decreases after periods of consistent viewing	Latency present only when student is tired, stressed or overstimulated	Latency rarely present	Latency resolved (continued)

	Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)	
Visual field preferences	Distinct field dependency	Shows visual field preferences	Field preferences decreasing with familiar inputs	May alternate use of right and left fields	Visual fields unrestricted	

Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)
Difficulties with visual complexity	<p>Responds only in strictly controlled environments</p> <p>Generally no regard of the human face</p>	Visually fixates when environment is controlled	<p>Student tolerates low levels of familiar background noise</p> <p>Regards familiar faces when voice does not compete</p>	<p>Competing auditory stimuli tolerated during periods of viewing; student may now maintain visual attention on musical toys</p> <p>Views simple books or symbols</p> <p>Smiles at re/regards familiar and new faces</p>	<p>Only the most complex visual environments affect visual response</p> <p>Views books or other two-dimensional materials</p> <p>Typical visual/social responses</p>

	Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)	
Light-gazing and nonpurposeful gase	May localize briefly, but no prolonged fixations on objects or faces Overly attentive to lights or perhaps ceiling fans	Less attracted to lights; can be redirected to other targets	Light is no longer a distracter			

	Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)
Difficulty with distance viewing	Visually attends in near space only	Occasional visual attention to familiar, moving, or large targets at 2 to 3 feet	Visual attention extends beyond near space, up to 4 to 6 feet	Visual attention extends to 10 feet with targets that produce movement	Visual attention extends beyond 20 feet Demonstrates memory of visual events

	Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)
Atypical visual reflexes	No blink in response to touch and/or visual threat	Blinks in response to touch, but response may be latent	Blink response to touch consistently present Visual threat response intermittently present	Visual threat response consistently present (both reflexes near 90 present resolved)	Visual reflexes always present; resolved

	Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)	
Difficulty with visual novelty	Only favorite or known objects elicit visual attention	May tolerate novel objects if the novel objects share characteristics of familiar objects	Use of “known” objects to initiate looking sequence	Selection of objects less restricted, one to two sessions of “warm up” time required	Selection of objects not restricted	

	Phase I: Bulding 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	Range 1-2 (0)	Range 3-4 (.25)	Range 5-6 (.50)	Range 7-8 (.75)	Range 9-10 (1)
Absence of visually guided reach	Look and touch occur as separate functions Look and touch occur with large and/or moving objects	Look and touch occur with smaller objects that are familiar, lighted, or reflective Look and touch are still separate	Visually guided reach used with familiar objects or “favorite” color	Look and touch occur in rapid sequence, but not always together	Look and touch occur together consistently

Key:

Draw an X through 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

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.

Texas School for the Blind & Visually Impaired

Outreach Program

www.tsbvi.edu



QuickTime™ and a
decompressor
are needed to see this picture.

Figure 2 Office of Special Education Logo

"This project is supported by the U.S. Department of Education, Office of Special Education Programs (OSEP). Opinions expressed herein are those of the authors and do not necessarily represent the position of the U.S. Department of Education."