

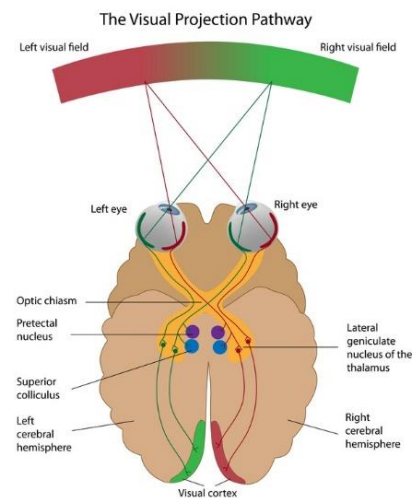
# CEREBRAL/CORTICAL VISUAL IMPAIRMENT (CVI)

Created By: Colleen Kickbush, Teacher of the Visually Impaired, January 2021

## DEFINING THE CONDITION

Cerebral or Cortical Visual Impairment (CVI) may be defined as reduced visual functioning caused by damage to the visual centers (occipital lobes) and/or to the visual pathways in the brain. CVI is a neurological disorder, which results in unique visual responses to people, educational materials, and to the environment. It is a visual

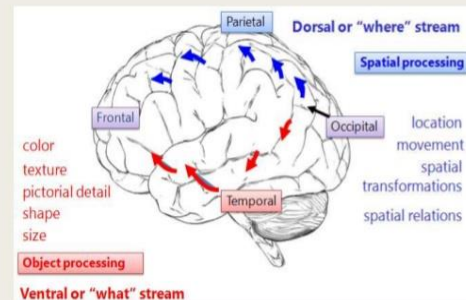
impairment because the brain cannot process or interpret images from the eyes accurately. The cells in the occipital lobe and/or visual pathway are damaged, but the eye itself is usually noted to be normal. CVI can, however, accompany other ocular conditions that are associated with the eyes or the optic nerve.



Cortical visual impairment (CVI) is a neurological disorder, which results in unique visual responses to people, educational materials, and to the environment. When students with these visual/behavioral characteristics are shown to have loss of acuity or judged by their performance to be visually impaired, they are considered to have CVI (Roman-Lantzy, 2011).

For children with CVI, the ability to process visual input may vary from day to day. It can also fluctuate depending on the child's level of visual fatigue. Placements of people and objects within the environment and the health of the child are also factors to consider with children who have CVI. Because CVI is neurologically based and the location and extent of injury varies, children require an

assessment to determine the most appropriate interventions (see Evaluation and Assessment). Vision can vary greatly from little or no visual functioning to near normal in some children with CVI. Although there are no treatments for CVI, visual responses can greatly increase through individualized interventions. New visual pathways can be developed, and existing cells that are healthy or damaged within the pathway may work double-time if visually stimulated.



Depending on the location and extent of damage to the visual centers or pathways, children with CVI may have difficulty determining where or what an object is, especially without using their other senses like hearing or touch.

# Evaluation of CVI

**Medical Diagnosis of CVI**—Medical professionals, such as neurologists, optometrists, ophthalmologists, or neuro-ophthalmologists can diagnose your child with CVI. According to the Perkins School for the Blind CVI Now webpage, “diagnosing CVI can be a complex process, and, at this point, there are no clinical tests to “see” CVI, not in brain scanning or in the tests in the ophthalmology office.” Your child's medical team may work toward a diagnosis using a combination of medical history, parent interview, observations, eye exam, and potentially the results of clinical tests, such as a magnetic resonance imaging (MRI) to view the extent of brain injury or visual evoked potential (VEP) to test visual acuity.

## **Educational Assessment: The CVI Range—**

Teachers of the Visually Impaired (TVI) use The CVI Range (Roman, 2018), which is an assessment protocol to direct intervention for children diagnosed with Cortical Visual Impairment (CVI). It is typically given as part of a Functional Vision Evaluation and includes the components of parent interview, review of medical records, observation, and direct assessment of the 10 unique visual/behavioral characteristics of CVI. The CVI Range is a scale with 0 representing little or no functional vision and 10 representing near normal use of vision. This scale is used to plot your child's visual behaviors into one of three phases along the continuum. The CVI Range is a reliable and valid instrument (Newcomb, 2010). Another tool that is used by Teachers of the Visually Impaired and Orientation & Mobility Specialists is the CVI Profile by Lueck, Chen, & Hartmann, 2020.

In a national registry, called Babies Count, that collected data on 2,155 children with visual impairment in the U.S., from birth to age 3, CVI was the most prevalent diagnosis at 30% (Babies Count, 2020).

## RESOURCES

### 1) **The ALEX Program for Cerebral Visual Impairment**

<https://www.easterseals.com/ci/our-programs/alex-program/>

The ALEX Program brings together some of the nation's foremost experts in Cerebral Visual Impairment to provide access to experts closer to home (Illinois), increase awareness of CVI amongst professionals, and provide resources for those working alongside those impacted by CVI. Website Resources Include: About CVI, Events/Trainings, Resources

### 2) **Little Bear Sees** <https://www.littlebearssees.org>

Little Bear Sees is a foundation created by a parent of a child with CVI. The goal of the foundation is to provide families in need with the information, products, and tools to help their children with cortical visual impairment (CVI) learn to see.

Website Resources Include: CVI Newsletter, Apps/Books, Support Groups, Updates, About CVI

### 3) **CVI Now** <https://www.perkins.org/cvi-now>

The goal of CVI Now, created by Perkins School for the Blind, is to help you understand CVI, give you everyday parenting strategies, and connect you with other families so you can find the support you need.

Website Resources Include: Understanding CVI, Parenting, Facebook Group, Family Stories

### 4) **Family Connect: Cortical/Cerebral Visual Impairment in Children**

<https://familyconnect.org/after-the-diagnosis/browse-by-condition/cortical-visual-impairment/>

FamilyConnect is a service offered by the American Printing House for the Blind (APH) to give parents and other family members of children who are visually impaired—and professionals who work with them—a supportive place for sharing and finding resources on raising their children from birth to adulthood.

Website Resources Include: Parent Support Group, What is CVI?, Resources

### 5) **Strategy to See** <https://www.strategytosee.com>

Diane Sheline, Teacher of the Visually Impaired, created this website to provide strategies, suggestions and techniques to parents, caretakers, teachers and other action heroes, who hope to encourage more consistent and efficient use of vision in children with Cerebral/Cortical Visual Impairment.

Website Resources Include: Tips, Tricks, Modifications, and Strategies, Literacy, DIY Projects

# POSSIBLE EFFECTS ON VISUAL FUNCTION

## 10 Visual/Behavioral Characteristics of CVI

According to The CVI Range (Roman, 2018), there are 10 visual/behavioral characteristics that are associated with CVI. Some children with CVI will have all of the characteristics, while others may only demonstrate a few.

- 1. Color Preference**—A child with CVI may favor looking at objects of a particular color. Although red and yellow are often favorites, the child may also prefer other bright colors, such as green or pink. **Adaptations:** Use objects of your child's favorite color during all daily routines, such as a yellow spoon for mealtime, a yellow ball for playtime, and a yellow blanket for bedtime.
- 2. Need for Movement**—Many children with CVI require movement of an object to initiate visual attention or maintain fixation. Some may even move their own head to create movement in their environment. **Adaptations:** If your child does not seem to see an object, try shaking it in place. Purposely choose toys that have movement, such as a slinky, pinwheel, or balloon.
- 3. Visual Latency**—Extended "wait time" may be necessary after presenting an object to a child with CVI. This will allow enough time to "look" or process where an object is located and determine what it is. **Adaptations:** After showing something to your child and telling them what the object is, give them at least 5 to 10 seconds (or more) to look, while you wait silently. If your child has additional disabilities, you may need to provide additional processing time for thinking and moving before looking can occur.
- 4. Atypical Visual Responses/Reflexes**—When an object approaches the eyes or touches the bridge of the nose, a child with CVI may have an absent or delayed protective blink response. **Adaptations:** Children with CVI may have a hard time protecting their eyes. Be sure to announce when objects will be moving toward the child to provide advance warning and reduce startling. Children with CVI may also benefit from wearing sunglasses outdoors to protect their eyes, especially if they prefer light-gazing.
- 5. Difficulty with Visual Complexity**—Children with CVI typically have an easier time processing visual stimuli when it is presented in the simplest manner. Visual complexity should often be considered in regards to the following: complexity of object (ex: a single-color object is simpler to look at than an object with 2-3 colors or a pattern), complexity of array (ex: it is easier to see one object that is standing alone than it is to see that same object among a group of objects), and complexity of sensory environment (ex: children with CVI often have difficulty using their vision when other senses, such as touch or hearing, are competing with vision). Children with CVI will often close their eyes, look away, or turn off visual attention when using another sense or to retain information. This can be misinterpreted as disinterest, but the child may be unable to look, while he/she is listening. **Adaptations:** Use a single-color object (i.e. yellow ball) instead of a multi-color or patterned object (i.e. rainbow striped ball). Present objects one at a time. Keep the environment free of other clutter and/or use a solid, high contrast background (i.e. black blanket/sheet/tri-fold poster board) to make it easier for your child with CVI to focus on one visual target. Know which senses your child is able to use together. For example, if your child cannot look and listen at the same time, sandwich a visual skill between speaking to provide sequential sensory information by saying the word, showing the item, and then repeating the word (i.e. say "diaper," hold up the diaper to look at, and provide wait time before saying "diaper" again). Make sure your child is positioned in the most supportive, comfortable way, so he/she can focus on vision instead of head/body control.

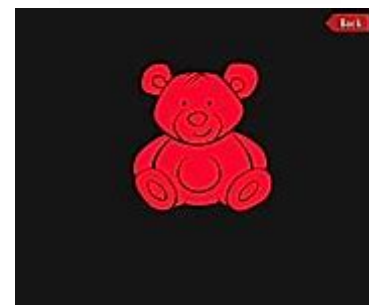
Children with CVI have the potential to improve their use of vision if they are evaluated and taught with the CVI Range techniques.  
([Perkinselearning.org/cvi/101](http://Perkinselearning.org/cvi/101))

6. **Light-Gazing/Non-purposeful Gazing**— Staring at sources of light, such as a window or ceiling lights, is common for children with CVI, especially those in the early phases. They may prefer looking at lighted or shiny/reflective objects, such as mylar balloons, pom poms, or mirrors. They may also appear to be looking through people or objects instead of focusing on them directly, which is considered non-purposeful gazing. **Adaptations:** Visual stimulation is important for building pathways in the brain, so it is great if your child is using his/her vision to know when lights are on or look out a sunny window. However, sometimes light-gazing keeps a child from seeing other objects and people in his/her environment. Be sure to turn off lights, close curtains, or face your child away from windows/lights if trying to get him/her to look at an object or face. Remembering to use some of the adaptations for reducing visual complexity, such as a high contrast background, can also be helpful.
7. **Difficulty with Visual Novelty**—The brain can process objects we have seen before more easily, especially after repeated exposure to the same object. For this reason, while at home or in familiar environments, when presented with familiar objects from daily routines, children with CVI typically demonstrate their best visual functioning. **Adaptations:** To maximize your child's use of vision, especially in unfamiliar environments like therapy clinics or doctors' offices, bring favorite toys from home.
8. **Visual Field Preferences**—Children with CVI tend to have a strong preference for looking at objects when presented in specific positions, using their peripheral or central visual field. **Adaptations:** Depending on the field preference, it can be easiest for your child to see objects shown at eye level or above and may be extremely difficult to see objects presented below eye level. For instance, your child may make eye contact if the person is positioned on the upper right in their preferred visual field. She/he may also look at toys or other objects held in that same position.
9. **Difficulty with Distance Viewing**—Distance viewing is often problematic for children, especially in early phases of CVI, which may be a result of increased complexity of the visual array, where objects farther away are lost against visual clutter. **Adaptations:** Present objects at near as often as possible, usually within 2 feet, or bring your child up closer to immovable objects. Be sure to verbally describe objects or actions at a distance, especially details like facial expressions, just in case he/she can't see them.
10. **Difficulty with Visually Guided Reach**—Children with CVI have a hard time looking at their toys or other objects, while they are reaching to touch them. **Adaptations:** Give your child longer to complete tasks that involve looking and reaching. Many repetitions with a reaching activity and placing his/her arm on the same surface as the object he/she is reaching for can help develop accuracy. He/she may also benefit from several adaptations for reducing the overall visual complexity.

## CVI APPS

- 1) **Tap-N-See Now** (Little Bear Sees, Lite Free)
- 2) **My Talking Picture Board** (Little Bear Sees)
- 3) **Big Bang Pictures/Patterns** (Inclusive Technology)
- 4) **YouTube**—Search “CVI Friendly”
- 5) **Fluidity HD** (Entertainment, Free)
- 6) **Eda Play Toby** (Rana Pece Eda, Free)
- 7) **iLoveFireworks** (Fireworks Games, Lite Free)
- 8) **Cause & Effect Sensory Light Box** (Cognable)
- 9) **Art of Glow** (Natenai Ariyatrakool, Free)
- 10) **Peeping Musicians** (Inclusive Technology)

### Tap-N-See Now



# EARLY INTERVENTION ACTIVITIES

The following activities have been provided in a general format to be easily incorporated into various daily family routines. Prior to implementing these activities, be sure to individualize them by setting up the environment to maximize visual functioning and take into consideration the visual/behavioral characteristics of CVI that your child demonstrates.

## 1. Promoting Eye Contact and Social Interaction

Building a consistent, repetitive social greeting with your young child who has CVI can benefit all those involved. Each caregiver should develop a greeting that is unique to one of his/her physical characteristics (i.e. beard, glasses, long hair) and appeals to all of the child's senses, especially vision, hearing, and touch. For example, when Dad approaches the child he may say, "Hi James, it's Dada. Touch my beard." After speaking, Dad will stay silent while taking James' hand and helping him feel his beard. After James feels his beard, Dad may continue by saying, "Look at Dada," shining a flashlight onto his face, and providing more wait time for James to look. Wait time, which involves staying silent for 5, 10, or more seconds, while waiting for a child to look, listen, touch, think, move, or otherwise respond is crucial, especially for children with CVI who have difficulty processing more than one sense at a time (i.e. looking and listening at the same time). Dad and James may repeat this special greeting each time they see each other, which teaches the child with CVI to use all of his senses to learn (compensatory or sensory efficiency skills) and builds a strong bond between the two of them (social-emotional development).

## 2. Increasing Exploration: Looking, Listening, and Touching

Have you ever thought about how many objects are in your home? Do you think your child is able to see all of them? Even if he/she can see where they are, does he/she see well enough to know what all of them are or the details that distinguish them? One way of ensuring your child has access to all of the objects in the environment is to take time exploring familiar objects during daily routines. Address each sense separately, so your child can gather the most information possible. For instance, during diaper changes or dressing, allow your child to look at the diaper or sock. Consider the CVI characteristics that impact your child most and provide adaptations as needed. You may hold the object closer, show it against a high contrast, solid background, spotlight it with a flashlight or place it on a light box, and/or shake it to provide a movement cue. After providing extended time for looking at the object, you should involve the other senses, especially hearing and touch, by allowing your child to hold and feel the object or listen to a sound that it makes. These simple sensory experiences encourage exploration and can allow your child with CVI to further develop visual, tactual, and auditory skills. These interactions can also lay the foundation for using objects as a form of communication later in life.

## 3. Encouraging Movement

It can be difficult to motivate a child who is visually impaired to move, especially one with CVI who has difficulty with distance viewing. Incidental learning opportunities may be missed because he/she can't see what others in the environment are doing like going over to the toy box and taking out a favorite toy. There can also be an element of fear if he/she cannot see what objects or people are in the environment or where things are located. One activity that can promote movement is attaching objects to a secure surface, where they will remain in a consistent location for your child to find easily. For example, use a dangle bar, activity mat, or blanket with elastic ties sewn on to hold objects near your child. If you put the objects close enough to your child's hands, feet, or other body parts, he/she may move and come into contact with the object. Even if the movement begins as non-purposeful, he/she will consider the result of the movement as a reward. Using objects that provide the most multi-sensory reward, like shiny bells, pom poms, or rattles, will eventually



motivate your child to keep repeating the movement or action to get the desired result. For additional ideas on encouraging movement, please visit this webpage to learn more about the Active Learning Approach: <https://activelearningspace.org/equipment/make-your-own-equipment/overview-make-your-own-equipment>.

#### 4. Developing Visual Tracking and Head Control

If your child is working on development of visual skills, such as visual pursuit or tracking, this activity is ideal for you! Begin by setting up the environment by considering how your child is impacted by the visual/behavioral characteristics of CVI. Since tracking can be difficult, you want to make the environment around the object as “visually friendly” or simple as possible, so please refer to the adaptations under *Difficulty with Visual Complexity*, such as using one object at a time and presenting the object against a solid, high contrast (opposite color) background. You will also want to choose an object or toy that is easiest for your child to see, which may be one favorite, solid color and shiny or lighted. Example objects that may be easier for your child to follow with their eyes, include a shiny gold pom pom, red mylar balloon, or a yellow slinky against a black background. LED light cubes or lighted spinners can also be motivating if your child light gazes and does not have flashing lights as a trigger for seizures. Begin by allowing your child extra time to locate and lock gaze on the object, especially if he/she demonstrates visual latency. Shaking the object in place may help your child locate it more quickly if there is a need for movement. If your child has a strong visual field preference, start with the object in the preferred location for looking. Once your child is fixated on the object, move it slowly left, right, up, or down. If your child loses sight of the object, pause or return to the place he/she last saw it to regain fixation before continuing.

#### 5. Creating Body Awareness and Improving Communication

Even though your child with CVI may be showing progress with vision, you may have noticed he/she also uses other senses, such as hearing and touch, to learn or gather information. Body Buzz is a fun game that focuses on cognitive (concept) development, communication, sensory efficiency skills, and gross motor abilities (large muscle movements) in children with visual impairments, especially those with additional disabilities. Your child can improve his/her ability to detect and respond to touch or verbal cues with body movements or gestures, increase awareness of body parts, build anticipation of upcoming actions, and develop an understanding of cause and effect. You will play two rounds of this quick, non-visual game. While your child is lying on his/her back on the ground, touch one body part at a time with your hand, verbally label it (i.e. say “foot”), and provide a “body buzz” with a hand-held massager, tickles on the body part, or any other favorite touch. The most important aspect of this game is consistency! Play it as often as possible, incorporate it into daily routines like dressing or bath time, and always do the body parts in the same order. It is recommended that you begin with the foot on the same side each time (i.e. left foot) and move up that side of the body and down the other (i.e. left foot, left knee, left arm, left shoulder, right elbow, right hand, right leg, etc.). On the second round of the game, you will repeat the first round with one minor change. Tell your child that this time he/she has to move the body part before getting the “buzz” reward. After touching the body part and verbally labeling it like you did in the first round, you will give your child 5-7 seconds of wait time to move the body part before providing the “buzz” as a reward. At first, you may need to provide your child with extra verbal prompts or additional wait time. Most importantly, be sure to reward attempts at body movements with a buzz, even if it isn't just the body part you requested. And of course, have fun! For a video example of the Body Buzz game, visit the following webpage: [https://tech.aph.org/samvid/body\\_buzz.html](https://tech.aph.org/samvid/body_buzz.html).

**For additional information/resources contact:**  
Colleen Kickbush, TVI, [ckickbush@vision-forward.org](mailto:ckickbush@vision-forward.org)

