



# Cerebral Visual Impairment

Guidelines for health care professionals and educational professionals



“My home: stairs, people and windows”  
Drawing by S.H., a five years old girl with CVI.



Erasmus+

<http://www.teachcvi.net>

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**Cerebral Visual Impairment (CVI)** is considered as one of the principal causes of visual impairment in children, especially in developed countries. Yet **CVI** is still often misunderstood and misdiagnosed.

These guidelines, developed by the TeachCVI team, are designed as a tool to assist health care and educational professionals who are working with children at risk for **CVI**. For more information on the following topics, see <http://teachcvi.net/>.

We provide guidance on:

- What is Cerebral Visual Impairment?
- Risk factors
- Signs and symptoms
- Consequences
- Assessment
- Access to literacy
- Treatment / Intervention
- Teaching strategies



## Resources

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Freire, P., & Macedo, D. (1987). *Literacy: Reading the word and world*. South Hadley, MA: Bergin & Garvey.

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Lueck, A. H. (2010). *Cortical or Cerebral Visual Impairment in Children: A brief overview*. *Journal of Visual Impairment and Blindness*, 104(10), 585-592.

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## What is Cerebral Visual Impairment?

**Cerebral Visual Impairment (CVI)** is a term used to describe visual impairment due to injury to the visual pathways and centres of the brain.

**CVI** is not caused by a disorder of the eyes, but the visual system of the brain do not consistently understand or interpret what the eyes see. Thus, processing of visual information is impaired.

The degree of visual impairment depends on the severity and location of the neurological damage as well as time of onset. The range of possible outcomes is wide, both in terms of vision and associated impairments.

Visual outcomes can range from total blindness to mild disturbances in visual perception and frequently these



children can also present neurological disorders such as cerebral palsy, epilepsy and learning disability.

For clinical purposes, children with **CVI** can be grouped into three categories:

- Children with profound visual impairment due to **CVI**, many of whom have additional disabilities
- Children with **CVI** who have better functional visual abilities and some cognitive and motor challenges
- Children with **CVI** who have sufficient vision, that allows them to work at or near the expected academic level for their age group. Some can have additional motor disorders

**CVI** is not an indicator of the child's cognitive ability but it may have an adverse impact on the child's development.



State Diagnostic and  
Counselling Centre, Iceland



The Royal Blind, Scotland

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## TeachCVI team



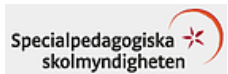
The National Institute for the Blind, Visually Impaired and Deafblind, Iceland



Child Vision, Ireland



Positive Eye Ltd., United Kingdom



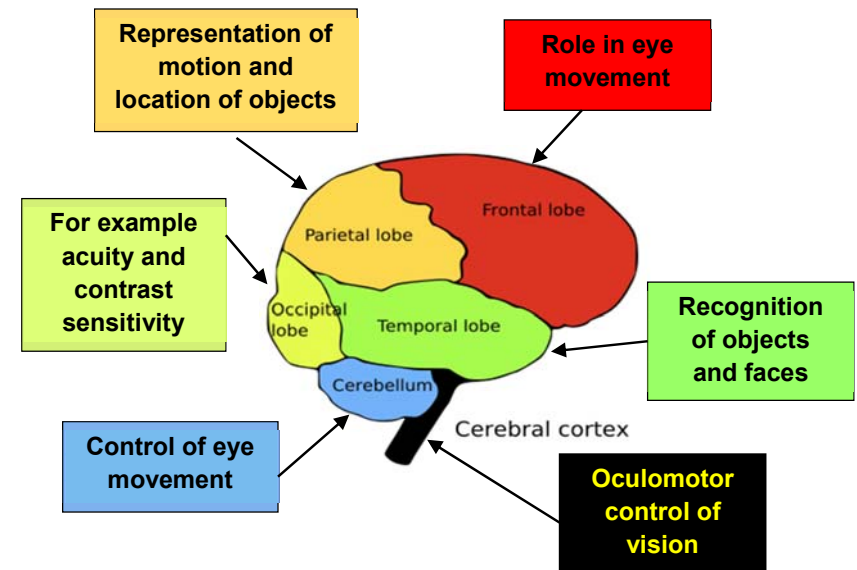
Agency for Special Needs Education and Schools, Sweden



Katholieke universiteit Leuven, Belgium

## Risk factors

Because vision involves so many areas of the brain, processing and interpreting visual information is a complex task. Therefore, injury to and malfunction in these areas is likely to impact adversely on the functioning of the visual system.



## Teaching strategies

The brain damage leading to **CVI** can occur:

- Before the child is born
- During or immediately after birth
- Later during the child's life

Most common risk factors for **CVI** are:

- Prematurity, especially birth before 34 weeks gestational age
- Periventricular white matter disease
- Lack of blood supply or oxygen to the brain
- Developmental brain defects
- Low blood sugar at birth
- Hydrocephalus
- Infections of the central nervous system (e.g. meningitis and encephalitis)
- Head injury

Sometimes there is no obvious cause.

A structured programme of support can make a huge difference in outcomes for children with **CVI** (see teaching material on <http://www.teachcvi.net/>).

The following strategies can be used:

- Use multisensory stimulation of vision, hearing, touching and olfaction
- Allow lots of time and intermittent breaks for the child to see and respond to stimuli. A great deal of energy is needed to process information visually and the child might tire easily
- Try to keep visual information as simple, constant and predictable as possible
- Use toys and activities that motivate the child
- Try to interpret the child's subtle response cues: for instance changes in breathing patterns, shifts of gaze or head and body position



## Treatment / Interventions

The principal aim of all early intervention measures for children with **CVI** is to minimise the impact of disability on the child's development, facilitate independent daily living skills, minimise social disadvantage and increase the quality of life.

The following approaches are aimed at minimising the consequences of CVI:

- Ensuring that environmental conditions and all communication materials used are accessible and matched to the developing needs of the child
- Developing efficient strategies to maximize visual capacities
- Encouraging functional compensation of other senses like tactile, auditory, etc.

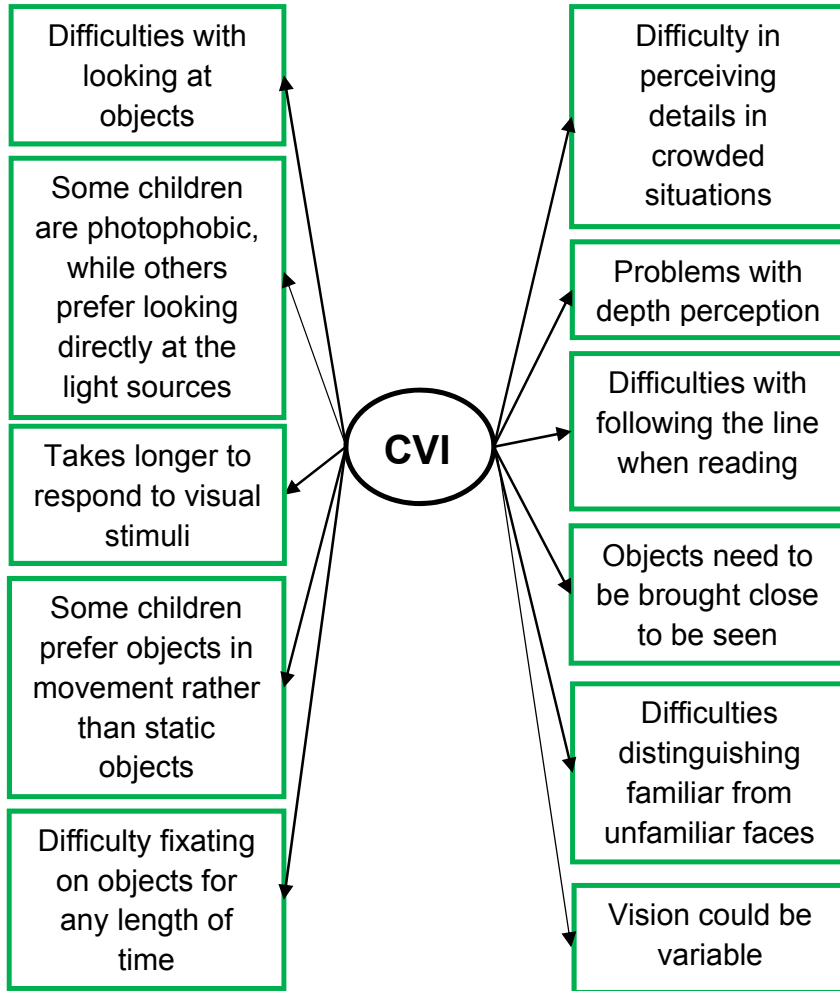
## Signs and symptoms

Signs of **CVI** are variable and no single sign is characteristic of the condition.

Common characteristics of visual function demonstrated by children with **CVI** may include what is presented in the diagram.

Young children with **CVI** can appear blind during the first months, but their vision tends to improve. Children with **CVI** may also have problems with the basic visual functions such as visual acuity, contrast sensitivity and visual field.





<b>Developing Literacy</b>	Awareness that words are made of different sounds, decodes words, writes simple sentences, etc.	6 – 7
<b>Early Independent Literacy</b>	Shifts from “learn to read” to “read to learn”, reads independently for a longer time, writes own ideas and observations, etc.	8 – 9
<b>Independent Literacy</b>	Reads confidently and independently in multiple modes of text, written work is organized, coherent and easily understood, etc.	10 – 11
<b>Expanding Literacy</b>	Reading for acquisition of knowledge, analyses and thinks critically about ideas presented in text, writes for a variety of reasons and in diverse modes, etc.	11+

*\* Age ranges indicate when one would expect children without disabilities to be engaged in the activities and behaviours listed and are provided for general reference only.*





Many lack opportunities to engage naturally in incidental learning. Professionals from different fields share the responsibility to support children with **CVI** to gain access to literacy and give them an opportunity to achieve their maximum potential.

The TeachCVI project supports the concept of literacy as a continuum starting at birth.

Stage	Description	Age*
<b>Building a Foundation for Literacy Development</b>	E.g. chews on books, enjoys rhymes, attends to pictures, understands that an object can be a symbol for an activity, etc.	0 – 2
<b>Early Emergent Literacy</b>	Pretends reading, listens to stories, recites and fills in phrases in a story, scribbles, draws, etc.	2 – 4
<b>Emergent Literacy</b>	Understands that text and pictures convey meaning, begins to recognize familiar environmental print and their name, may write some letters, etc.	4 – 5

## Consequences

**CVI** can for instance have an impact on:

- Near vision tasks
- Access to literacy
- Communication and social interaction
- Daily living and learning skills
- Orientation and mobility

**CVI** can also lead to:

- Visual fatigue
- Anxiety

## Assessment

**CVI** should be considered as the cause for visual impairment when the visual behaviour is not fully explained by the ophthalmological examination. The eye movements are frequently abnormal (nystagmus



or strabismus) and visual functioning is variable. Clinicians frequently have to rely on observations and the child's health history to diagnose **CVI**.

The assessment is best made by a multidisciplinary team following an ophthalmological evaluation, comprising a visual function and a functional vision assessment, a neurological examination and a (neuro) psychological evaluation. Frequently an MRI scan of the brain is part of the diagnostic process as well.

Early diagnosis of **CVI** is crucial, as early intervention may improve the outcome. In order to facilitate early diagnosis, **CVI** screening lists have been developed.

On our website, you can find these screening lists and an overview of the regional multidisciplinary teams you can refer to for **CVI** assessment.

## Access to literacy

Literacy is not only about the ability to read and write. It is an act of liberation and empowerment, of taking a role as an active citizen in society. Literacy is “reading the word and the world” (Freire & Macedo, 1987).

The Convention on the Rights of the Child states:

*“The child shall have the right to freedom of expression; this right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any other media of the child's choice.”* (United Nations Convention on the Rights of the Child, Article 13).

Children with **CVI** have specific and diverse needs when it comes to literacy exposure and experiences.

