



Cortical Visual Impairment in Children: Presentation Intervention, and Prognosis in Educational Settings

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Abstract

Children with cortical visual impairment (CVI) exhibit distinct visual behaviors which are often misinterpreted. As the incidence of CVI is on the rise, this has subsequently caused an increased need for identification and intervention with these children from teaching and therapy service providers. Distinguishing children with CVI from children with other types of visual impairments in intervention designs and other educational planning is crucial to designing effective programs. To assist to this end, presentation “hallmarks” of CVI are outlined in this paper, as are recommended treatment strategies for optimizing visual performance.

Keywords

cortical visual impairment, visual disorders, vision problems

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The number of students with cortical visual impairment (CVI) attending public schools is increasing (Ferrell, 1986; Flodmark, Jan, & Wong, 1990; Jan & Wong, 1991; Morse, 1990; Whiting et al., 1985). Because children with CVI present with different strengths and weaknesses than children with other types of visual impairment, this necessitates a critical rethinking of the traditional interpretations of visual impairment (VI) as an “ocular” disorder involving only the eye. It also means that we, as service providers, will need to reformulate any preconceived stereotypes we may hold about “children with visual impairment” and how we should teach them. This fundamental distinction is especially crucial as research now indicates that interventions conducive to increasing performance with ocular impairments may be largely ineffectual or even detrimental when used for children having cortical visual impairments (Farrenkopf, McGregor, Nes, & Koenig, 1997; Groenvelde et al., 1990; Morse, 1990).

Definition and Etiology

Cortical visual impairment is unknown to many teachers and therapists. Standard explanations of CVI specifically consider where the disorder occurs, predominantly referring to a visual loss caused by some disturbance to the “posterior visual pathway” or “visual cortex” which encompasses difficulty in *processing and interpreting* incoming visual information. This may be simplified by thinking of CVI as inherently

“brain-based,” always involving the neural pathways and/or the brain itself. Visual information is relayed through the eye as it should be; however, the brain cannot always make sense of the information it receives (Baker-Nobles & Rutherford, 1995; Flodmark et al., 1990; Jan & Groenvelde, 1993; Morse, 1999).

Causes of CVI reflect this brain-based definition and are remarkably diverse. Hypoxic/ischemic and other “lack of oxygen to the brain” accidents are presently recorded as the leading cause of CVI and usually occur during or shortly after birth from complications of prematurity or other gestational/delivery difficulties. CVI can also result from later occurring events that result in decreased cortical oxygen and/or damage to brain tissue such as cardiac arrest/respiratory failure, increased intracranial pressure, head trauma, hydrocephaly, and/or shunt failure. Congenital brain malformations secondary to genetic syndromes and/or other birth defects are also implicated

in the incidence of CVI, as are CNS infections like meningitis, cytomegalovirus, encephalitis, and herpes simplex. Poisoning, certain drug exposures (e.g., Cisplatin), various sedating anticonvulsant drug therapies, carbon monoxide poisoning, intrauterine cocaine exposure, and accidental ingestion of other drugs or chemicals can also cause or exacerbate CVI. Finally, secondary complications such as seizures, metabolic diseases, hypoglycemia, and progressive genetic syndromes may cause or intensify cortical visual

Causes/Associations of CVI.

- *Lack of oxygen to the brain*
- *Intracranial pressure/hydrocephaly*
- *Brain malformations/head injury*
- *CNS infections (meningitis, CMV)*
- *Poisoning/drug exposure*
- *Prematurity/birth trauma*
- *Cerebral palsy*
- *Seizures/Epilepsy*

impairments (Flodmark et al., 1990; Good et al., 1994; Groenveld et al., 1990; Jan & Wong, 1991; Kivlin, 1993; Wong, 1991).

Incidence and Considerations

The incidence of CVI is less well established than its cause and, historically, under-identification has been the rule rather than the exception; however, according to Good et al. (1994), CVI “can now be considered one of the major causes of visual impairment” (p. 900). As children with CVI may present somewhat different characteristics across diagnostic etiologies across their lifespan, identifying a “set” profile that accurately describes all persons having CVI is particularly difficult. It may occur in pre-term/full-term infants, pre-school/school-aged children, and also adults. It may be congenital, acquired, temporary, permanent, and even occasionally progressive (Jan & Wong, 1991; Whiting et al., 1985). It classically occurs in tandem with central nervous system (CNS) disorders and so may be masked or difficult to isolate as a result of concomitant cognitive, motoric, language, and unrelated ocular deficits (Good et al., 1994; Morse, 1990). It has been called by many names: cortical blindness, cerebral blindness, double homonymous hemianopsia, occipital blindness, infantile cerebral blindness, visual agnosia, visual neglect, absolute scotomata, and functional blindness to include a few, largely misleading terms as children with CVI predominantly have some residual vision (Baker-Nobles & Rutherford, 1995; Farrenkopf et al., 1997; Flodmark et al., 1990; Morse, 1990).

Though not blind *per se*, children with CVI may *function* as blind due to their brain’s inability to recognize or analyze signals received by the eye and anterior visual pathway. Children with CVI also tend to have widely fluctuating vision and are often affected by

other coexisting disabilities. Cognitive impairments, cerebral palsy and/or other physical challenges, significant learning disabilities, and moderate to severe communication difficulties are all highly correlated with concomitant CVI. To complicate matters further, students with CVI are generally more difficult to diagnose than children with complete blindness and may experience delayed referral and/or treatment due to inaccurate perceptions about their residual vision and their capabilities for visual improvement (Groenveld et al., 1990).

A “New” Disability

CVI has been relatively unexplored as compared to more traditional ocular disorders. As a result, the visual difficulties of children with CVI are not well defined and the educational implications of these impairments are only marginally documented (Baker-Nobles & Rutherford, 1995; Jan & Wong, 1991). Children with CVI may be found in both general and special education classrooms and often present with primary labels of cognitive impairment, other health impairment, attention deficit disorder, or even autistic/behaviorally disordered. When the visual behaviors of these children are considered in conjunction with their educational diagnoses, they may inadvertently be excluded from visual rehabilitative services due to misconceptions regarding the cause of their *atypical* behaviors (e.g., when they turn away from presented stimuli, this may be interpreted as an attention or behavior problem rather than as a by-product of their attempts to reduce the number of items in their visual field or “visual crowding” issues). When referral for ophthalmologic testing and/or functional vision evaluation and services *does* occur, students with CVI may be judged “untestable” due to limited mobility and/or commu-

nication skills, further complicating the delivery of services.

With all these variables, the identification and understanding of cortical visual impairment may be difficult indeed for the vision professional, the classroom teacher, and other diagnostic and related services personnel. Though the diagnosis of CVI remains a medical decision by an ophthalmologist, this paper is intended to assist educational and therapy professionals who may encounter such children in identifying, referring, and working effectively with children having CVI.

Visual Loss in CVI: “Hallmark” Signs and Symptoms

Students with cortical visual impairment may have widely differing visual losses. Variations in degree of visual loss, fields of visual loss, and even fluctuation of visual performance are quite typical across children having CVI. This may be due to multiple reasons. Various severities and ranges of loss may be attributed to “brain shearing” and coup/contracoup injuries during traumatic onset (the twisting and bouncing of the brain in the skull that results in the disconnecting of pathways and then bruising to the cortical tissue). The site of lesion during epileptic seizures may also account for differences (the specific part of the brain where the electrical “short/overload” occurs). CVI related to brain damage from ischemic events/interruption of oxygen will also result

in different visual losses dependent upon the extent of oxygen deprivation, the exact area of the brain deprived or damaged, and even the age of the brain that was damaged.

Another explanation for the difficulty in isolating fields of visual loss/extent of vision deficit may be explained by the high co-occurrence of ocular (eye) impairments and cortical (brain-based) visual impairments. As reported by Whiting et al., (1985), up to 60% of children with CVI were also identified with concomitant ocular impairments. This notably complicates the differentiation of the two and makes identification and intervention inherently more complex, especially when considering an assessment/treatment

A Few Terms:

- **Visual acuity:** The eye’s ability to distinguish object details and shape.
- **Ocular visual impairment:** A visual problem caused by damage to the *eye*.
- **Cortical visual impairment:** A visual problem caused by damage to the visual areas in the occipital lobe of the *brain*.
- **Eccentric viewing strategies:** Assuming unusual head postures in order to “look out of the good part of the eye.”
- **Nystagmus:** Involuntary, rhythmic side-to-side or up-and-down eye movements.
- **Strabismus:** Misalignment of the eyes caused by imbalance of the eye muscles.
- **Exotropia:** Strabismus with the eye turned outward.

- Cassin & Solomon, 1997

design that will adequately address the individual characteristics and needs of each distinct problem. Fortunately, the “classical” signs of cortical visual impairment tend to be somewhat similar from child to child when the knowledgeable professional knows what to look for. The following section will address characteristics of this distinctive behavioral profile.

Physical Presentation (Eye Findings)

Children with CVI may have no notable eye disorders, though strabismus *may* be noted and could be an early sign of cortical visual impairment, especially if consistent exotropia is present (Good et al., 1984). In addition to possible strabismus, a slight motor

nystagmus may also be present in the form of an unsteady gaze or poorly coordinated/jerky eye movements (Baker-Nobles & Rutherford, 1995; Jan & Groenveld, 1993). This motor nystagmus is normally the direct result of impaired cortical control and should not be confused with the sensory nystagmus often seen in children with ocular visual impairments.

Sensory nystagmus, the obvious instability of eye fixation, is virtually nonexistent in children with cortical visual impairments *unless* CVI resides *concurrently* with another ocular impairment. Likewise, eye pressing, head shaking, and eccentric viewing strategies should NOT be noted in students with cortical visual impairment unless CVI is co-existing with ocular disabilities (Baker-Nobles & Rutherford, 1995; Jan & Groenveld, 1993).

<u><i>Visual Behaviors Explained</i></u>
<ul style="list-style-type: none"> • Visual latency: Delayed or slowed visual responses. • Visual attention/gaze behaviors: What is noticed and for how long. • Visual novelty: Looking at both new and familiar objects. • Visual curiosity: Exploring items visually and seeking stimulation. • Visual field restrictions: The loss of peripheral vision. • Depth perception: Using vision to judge distance to and from objects. • Figure-ground perception: Separating the background from the foreground to distinguish the borders or “shape.” • Visual crowding: Too many items in the visual field at one time.

**Behavioral Presentation
(Performance Findings)**

Children with cortical visual impairments in educational settings will show at least some behavioral consistencies. The overwhelming presence of visual latency, poor visual attention/limited visual attention span, and extremely shortened gaze behaviors is one of the most frequently reported hallmarks of children having CVI, often resulting in frequent misperceptions of these children as incapable, inattentive, or poorly motivated. To further compound the situation, a highly vari-

able visual performance is noted from day to day and even hour to hour, sometimes leading professionals and parents alike to suspect malingering (i.e., “faking”) on the part of the child (Good et al., 1994; Jan & Groenveld, 1993). Students with CVI have also been observed to create close viewing situations by bringing objects very near their face and eyes (Baker-Nobles & Rutherford, 1995), and up to one-third of children with CVI show a characteristic head turn when reaching for objects: they look away from what they are reaching for as they reach for it (Good, et al., 1994; Jan & Wong, 1991). This close viewing and head turn, used to reduce the number of items in the visual field (decrease visual crowding), to maintain visual attention, and to allow for selective peripheral viewing are often misinterpreted as

purposeful gaze aversion, task rejection, or as rebellious misbehavior, particularly after the child has been directly instructed to “look” at something specific by an authority figure (Baker-Nobles & Rutherford, 1995).

Other signature features of cortical visual impairment are visual field restriction and peripheral field loss. Poor depth perception and poor figure-ground perception are also characteristic. Increased spatial confusion further distinguishes this group, though color perception has been reported as intact. A preference for brightly colored objects (specifically red and yellow) has also been

reported (Anthony, 1994; Good et al., 1994; Groenveld et al., 1990; Jan & Groenveld, 1993; Morse, 1990).

The majority of children with CVI additionally show a coincident preoccupation and aversion to light. According to Jan &

Wong (1991), light gazing may be observed in roughly 60% of all children with CVI. The presence of mild, but persistent, photophobia in nearly one-third of children with CVI has also been reported (Jan & Groenveld, 1993; Jan, Groenveld, Anderson, 1993). Difficulty with visual novelty (a preference for looking at familiar items), alongside poor visual curiosity (limited visual notice) has also been observed. The final feature strongly correlated with CVI involves the associated neurological deficits that are typically concomitant with this condition. Though not all children with CVI have multiply involved systems, the vast majority *do* seem

predisposed to poor motor tone and decreased mobility. Global speech-language problems are additionally noted in both receptive and expressive areas, with depressed verbal communication being customary in these children.

Methods for Intervention

Effective interventions for children having CVI can differ substantially from techniques used with ocular impairments. As CVI tends to coincide with global develop-

mental delays, treatments that incorporate neural based stimulation methods and natural developmental sequences are preferable. ***Capitalizing on natural inclinations such as our inherent predisposition to notice faces, movement, high contrast, and bright colors are highly recommended. This aids in maximizing visual attention and residual vision.*** Specific to this, the following suggestions are proposed:

<i>Some Signs and Symptoms of CVI:</i>
<ul style="list-style-type: none">• Visual latency and poor visual attention/shortened gaze behaviors.• Highly variable visual performance.• Head turn when reaching for objects and close viewing behaviors.• Difficulty with visual novelty and poor visual curiosity.• Visual field restrictions and peripheral field loss.• Poor depth/figure-ground perception and poor shape discrimination.• Light gaze fixation/photophobia (a preoccupation/aversion to light).• Preference for brightly colored objects, often yellow and red.• Associated neurological deficits resulting in cognitive, motor, and communication difficulties.

• *Use movement.* Children with CVI can often locate moving stimuli with greater speed and accuracy, as well as maintain attention to moving stimuli for a longer period of time. Include movement in all interventions until locating, tracking, and maintaining visual attention is improved (Anthony, 1994).

• *Use high contrast (black print on white paper, yellow picture on black background, etc.).* Visual attention to high contrast gratings using black and

white stripes are excellent first options, followed soon after by checkerboards and bulls-eyes. High contrast colors such as red and yellow should be presented against various backgrounds to determine what the child sees best (Baker-Nobles & Rutherford, 1995).

• *Use boundaries and borders.* The simple inclusion of high-contrast borders or wide-width boundaries may provide signals to the child about where to look (e.g.,

place a thick black line between objects or draw strong boxes around text you want the child to focus on). This encourages attention and improves gaze behaviors. Borders may be created in various colors using easily discriminated tactile materials to provide ancillary tactual cues for the student (Anthony, 1994).

- *Use simultaneous touch and vision.* If the student is presently using touch cues to assist in identification, pair these cues with meaningful visual training to map visual images to established tactile perceptions (Baker-Nobles & Rutherford, 1995).
- *Use selective colors.* Note the child's color preferences and dislikes. As mentioned previously, red and yellow tend to be very effective first choices. Tailor-make interventions for each child using preferred colors whenever possible until visual attention to other colors can be established (Anthony, 1994).
- *Simplify the visual environment.* Avoid extraneous stimulation, stimulus competition, and indiscriminate visual bombardment by controlling the type, intensity and duration of sensory information presented. Present one item at a time until the child is able to tolerate and discern between 2, 3, and 4 objects progressively and can selectively attend to and/or visually discriminate between items. Items should be rather large and brightly colored initially, fading to more normalized stimuli as the child progresses (Groenveld et al., 1990; Jan & Wong, 1991; Morse, 1990).
- *Fill the visual field.* This may be done through use of close viewing, picture enlargement, or even magnification. Bring in objects from the peripheral field of vision and progress to more central fields (Anthony, 1994).
- *Ensure appropriate lighting.* The child with CVI may require decreased brightness and/or glare due to light sensitivities. Use various lighting types (e.g., incandescent, fluorescent, halogen, ultraviolet) in conjunction with supplementary modifications such as visors, tinted lenses, etc. (Groenveld et al., 1990).
- *Use technology.* Electronic media is easily manipulated to adjust size, color, contrast, and brightness for those higher functioning students who have little difficulty with representational tasks or transfer of functional skills. Auditory signals can also be adjusted to ensure appropriate signal-to-noise ratios and clear auditory cues (Baker-Nobles & Rutherford, 1995).
- *Select stimulus materials carefully.* The use of common, familiar, high frequency objects may assist students in forming accurate and representative mental constructs about these objects and their properties, particularly as students with CVI attend better to the familiar (Groenveld et al., 1990). Real objects are further recommended to ensure that children with associated neurological deficits do not encounter unnecessary obstacles in the transfer and generalization of learned skills to functional settings (Anthony, 1994).
- *Allow adequate time for responding and processing.* Students with CVI will need additional time to make sense of incoming visual information and to recognize patterns in what they see. When CVI is present along with neurological deficits, time delays in processing information often occur and the teacher will need to allow additional time for the child to answer before providing any further stimulation. Expect delays of 10-60 seconds at the minimum (Anthony, 1994; Morse, 1990).

- *Use multiple (but consistent) approaches.* As pointed out by Morse (1999), many children with cortical visual impairment will show a different compilation of deficits and behaviors. Though each child with CVI may retain characteristics similar to other children with CVI, the specific combination of deficits they may exhibit will likely exclude any single, inflexible approach (Jan & Wong, 1991).
- *Use physical prompts.* Full or partial physical assist may be needed during early training efforts. Physical prompts such as touching the child's elbow to cue them or even using hand-over-hand "do it together" formats can be quite successful in assisting children having CVI to acquire functional skills (Farrenkopf et al., 1997).
- *Separate complex or multidisciplinary treatment goals* when needed. If visual training is the purpose of a particular session, minimize competing demands on the child's system. For example, if postural support is needed, make sure it is given during visual training periods. This will ensure that children will not spend all their energies on maintaining upright sitting rather than on targeted visual tasks. Maximize visual efforts by minimizing other requirements during interventions until such time as the child is able to handle therapeutic co-treatment without distress or accelerated fatigue. Ensure that the student is comfortable with lighting, temperature, sitting

Why Do Children With CVI Turn Their Head When Reaching?

The presence of a head turn when reaching for objects has commonly been attributed to efforts in maintaining focus on stationary objects (so they will not divert their visual attention from the stimulus to their moving hand as it enters their visual field), simultaneously decreasing visual crowding. It may also be used to help a child see what is presented through use of their more efficient peripheral vision.

position, and even hunger levels prior to beginning treatment sessions (Groenveld et al., 1990; Morse, 1990).

- *Pair verbal and tactile cueing with associated language concepts.* Actively develop the language needed to describe both objects and concepts as a primary part of intervention (Groenveld, et al., 1990). In addition, use verbal information to describe what the student is seeing and feeling. Respond contingently using varied intonation cues (Anthony, 1994).

- *Schedule frequent opportunities and lessons specifically for using vision.* Intervention with infants and preschool populations should be intense, with scheduled stimulation of 5 days per week, 2 times per day, up to 12 minutes daily for one year recommended (Powell, 1996). Adjust schedules for older children to consider factors such as severity of need, tolerance for intervention, prior visual training and progress accordingly.

• *Consider the child's physiological and psychological state.* Treatment times should be planned around optimum alert levels whenever possible. Observe the child across multiple settings and time periods during daily routines to determine their most favorable intervention times. Take problem periods into account when scheduling difficult tasks. Remember that some children may frustrate and/or fatigue after a matter of minutes. Providing predictable routines and structure during lessons may help alleviate this tendency, as

may changing tasks frequently (Anthony, 1994; Groenveld et al., 1990; Jan, & Leader, 1990).

- *Start each session at a level the child can perform.* Success is crucial to motivation and perseverance. *When failure occurs, look carefully at the chain of preceding events.* Look for behavioral antecedents and error patterns to assist in determining reasons for breakdown.
- *Encourage active learning and use intrinsically motivating/rewarding stimuli.* Recognize the cues that your students are giving you regarding their readiness and respect what the child is telling you (either verbally or nonverbally). Select stimuli that are interesting to the child and allow the child to show preferences among teacher chosen materials. Encourage the child to be an active agent in his/her sessions by building in these choice-making activities. Use naturally occurring reinforcers whenever possible. Remember that decision-making is a

learned skill requiring opportunity, guided experience, and supportive feedback for refinement (Anthony, 1994; Morse, 1990).

Some Useful Interventions for CVI:

- Use movement.
- Use high contrast (colors, boundaries, borders).
- Use simultaneous touch and vision
- Simplify the visual environment.
- Fill the visual field.
- Ensure appropriate lighting.
- Use technology.
- Select stimulus materials carefully.
- Allow adequate time for responding/processing.
- Use multiple and consistent approaches.
- Use physical prompts.
- Separate complex treatment goals.
- Pair verbal/tactile cueing with language.
- Make opportunities for training visual skills.
- Consider physiological/psychological state.
- Start sessions at levels the child can achieve.
- When failure occurs, look at preceding events.
- Encourage active learning.
- Use intrinsically motivating/rewarding stimuli.
- Remember behaviors may be communication.
- Keep team members informed and involved.
- Consider less inclusion.
- Remember that CVI is seldom “cured.”

- *Understand that behavior and movement are often communication.* In the absence of a more sophisticated system, children with multiple disabilities will express themselves in “non-traditional” and sometimes undesirable manners. Analyze behavioral chains to comprehend what students are telling you. Respond to the *content* rather than *method* of delivery (e.g., knocking materials from a table as a signal of rejection, closing their eyes and bowing their head as an indication/communication of fatigue).
- *Ensure that all team members are informed and involved.* All service personnel must understand how CVI affects intervention so that treatments can be maximally effective. Team approaches will also encourage carry-over to additional functional settings (Jan & Wong, 1991; Morse, 1999).

- *Consider less inclusion.* Though full inclusion is undoubtedly beneficial for some students, the least restrictive environment *must* be the one in which the child can gain the highest level of educational and social benefit. As children with CVI may present with visual crowding problems, fluctuating alertness, concomitant neurological deficits/health impairments, and have difficulty transferring skills to new environments, fewer people involved in intervention may facilitate more successful results for the student. This is particularly true when speaking of children with multiple sensory impairments (Groenvelde et al., 1990; Jan & Wong, 1991).
- *Finally, remember that CVI is seldom “cured.”* Though children with cortical visual impairment typically improve, even children who appear to have gained “normal” vision may still show intermittent difficulties. Classroom descriptions such as “inattentive” and “distractable” may be indicators that CVI continues to challenge the child. Likewise, those working with children having more severe disabilities in conjunction with CVI should remember that progress is made in small steps. Some results are best measured qualitatively rather than quantitatively (Morse, 1999).

The prognosis for “recovery” from cortical visual impairments is mixed. While nearly all studies agree that some degree of visual improvement may be expected in the majority of children (Jan & Wong, 1991), age of onset, degree of severity, and site of lesion continue to dictate probable recovery. It is presently believed that children with more diffuse and global damage have the poorest

prognosis for recovery (Wong, 1991). In addition, secondary conditions such as seizures, respiratory stability, *and appropriate intervention* are significant variables affecting the level and duration of student recovery.

Though recovery from CVI is most dramatic in the first 12 months of life, improvement continues in a gradual nature for several subsequent years for up to 2-5 years post onset, perhaps even persevering into adolescence (Flodmark et al., 1990; Jan & Wong, 1991;

Kivlin, 1993). Most authors agree that children receiving meaningful and consistent intervention who show little improvement in the first 1½ to 2 years after acquiring CVI are less likely to show recovery (Groenvelde et al., 1990). At this time, CVI resulting from birth asphyxia, postnatal hypoxia, and seizure disorders report the poorest prognosis for object vision (Chen, Weinberg, Catalano, Somin, & Wagle, 1992).

Where to go for more information.....

- <http://www.aph.org/cvi/index.html>: The American Printing House for the Blind (APH) website contains articles, videos, case studies, and numerous educational and advocacy supports relating to effective services for children having CVI.
- <http://www.dblink.org/lib/topics/cvi-bib.htm>: This link will lead you to DB-Link, a clearinghouse of information on deaf-blindness and related issues. Several articles and resources for CVI can be accessed here. Intervention activities are included.
- <http://blindness.growingstrong.org/eyes/cvi.html>: This site contains links to CVI and resources for help.

Prognosis

Implications and Conclusions

Cortical visual impairment is the “leading cause of bilateral visual impairment in children in Western countries,” (Good, Jan, Burden, Skoczenski, & Candy, 2001, p. 56.). Children with CVI present as a distinct subgroup of children having visual deficits who, though often showing co-existing ocular impairments, also show markedly different visual behaviors which can be recognized with careful training. These differences call for separate and individualized intervention approaches to facilitate improvement. As children with CVI virtually always have some form of neurological deficit in addition to their visual difficulties, a team approach for intervention is crucially needed.

Research has substantiated that children with CVI are not malingering, do not have inherent behavior problems, and are not inherently poorly motivated: their ability to use their vision really DOES fluctuate across time and situations. The literature has further made clear that the unusual attending and gaze behaviors seen in these children are used for a reason, predominantly as attempts to self-compensate for visual difficulties. Most importantly, research has incontrovertibly established that *some* level of improvement can nearly always be attained in the visual capabilities of children with cortical visual impairment. In light of these findings, it becomes critically urgent that service professionals recognize the relevant symptomology of CVI and provide appropriate and timely interventions for these students.

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