CVI, Complex Communication Needs and AAC: A Structure to Success

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Agenda:

1. What is CVI?
2. Vision and the Brain.
3. Characteristics of CVI
4. Philosophy/goal
5. Typical goals when not considering characteristics of CVI
6. Strategy: Partner Assisted Auditory Visual Scanning.
7. characteristics of CVI supported by video examples when available and how these typically interfere with our standard intervention strategies.
8. Questions

I. What is CVI?

- Used to describe a condition when a person is visually unresponsive but has a normal eye exam or an eye exam that can not explain the abnormal function
- The brain is unable to process the visual information sent to it from the eyes through the visual pathways

Cerebral Visual Impairment

Functional Vision disorder

A neurological disorder resulting in bilateral impairment of visual acuity caused by damage to the CNS, meaning visual acuity is reduced as a result of non-ocular disease.

The impairment is due to damage to the visual cortex and/or the posterior visual pathways
(Jan&Groenveld,1993)

Etiology:

- At least 60% of children with neonatal hypoxic-ischemic encephalopathy have cerebral visual impairment.
- PVL (periventricular leukomalacia) in preterm infants (lower visual field, visual guidance, extracting information from a visually loaded environment)
- Head injury
- Infections
- Metabolic disease
- Multiple births

Cortical/Cerebral Visual Impairment

- "….is now the commonest cause of visual impairment in children in developing countries, is increasing in prevalence due to improved perinatal care and survival of young children with profound neurological disease"

Matusuba, et.al. 2006, Dev. Med. Child Neurology

CVI

- Cortical Visual Impairment – bilateral damage to the visual pathways and/or the Occipital lobe. (Jan et al, 2000)
- Cerebral Visual Impairment/ Brain Damage related vision loss - damage to the cortex and also in other parts of the brain (Hyvarinen, 2004)

Visual disorder due to neurological damage

Table I. Description of professionals who treat visual imparments
with Terry R. Welch, 2005

Professional	Description	Role	Training
Ophthalmologist, MD	Physician who specializes in the medical and surgical care of eyes and visual system and in the prevention of eye disease and injury.	Eye exams, diagnosis and medical treatment of eye disorders and diseases, prescriptions for eyeglasses, surgery and management of eye problems caused by systemic illnesses.	4 years medical school: 1 year internship; 3 years residency. May also do fellowship to specialize in corneal, retinal, glaucoma, pediatrics, plastic surgery.
Optometrist, O.D.	Licensed nonmedical eye specialist. May work with an ophthalmologist.	Routine eye exams, diagnosis of vision problems and eye disease. Prescribes eyeglasses, contact lenses, and low vision aids. Treats eye diseases.	4 years optometry school. Residency to specialize in contact lenses, family practice, pediatrics, geriatrics, hospital-based, vision therapy.
Orientation and Mobility (O&M) Specialist/Instructor	Professionals who teach travel skills to adults and children who are visually impaired.	Techniques for using non-visual senses to orient to one's environmnet and to move safely from one place to another.	Specialty area in rehabilitation. Training at bachelor's or master's degree level. Supervised internship for certification.*
Low Vision Specialist	Optometrist or ophthalmologist with special training in low vision rehabilitation.	Comprehensive examination of individual's usable vision for functions of day-to-day life. Prescribes low vision devices, Recommends adaptations and aids for daily living activities.	Optometrist or ophthalmologist subspecialty. Study and clinical training in low vision.
Certified Low Vision Therapist (*e.g.*, OTs, RNs)	Education/rehabilitation professionals with specialty training in low vision.	Functional assessment of visual abilities. Instruction in optimal use of vision and visual aids in everyday tasks.	Specialized study and training beyond bachelor's or master's degree.*
Teacher of students with Visually Impairments (TVI)	Teacher who specializes in education of children with visual impairments.	Instruction in compensatory academic and related skills (*e.g.*, reading & writing Braille) and in assistive technology. Works in mainstream, residential and special school environments. Often itinerant.	Specialty area in education at bachelor's or master's degree level.
Vision Rehabilitation Therapist	Professional with specialty training in vision impairments.	Provides instruction for adults in compensatory skills and assistive technology. Emphasis on vocational and independent living skills. Works in center-based or itinerant settings.	Specialized study and training beyond bachelor's or master's degree level.*
Occupational Therapist (OT)	Licensed professional who specializes in improving function and independence of individuals (including those with visual impairments) in activities of daily living.	Assesses and treats impact of visual impairment on function. Positions to support efficient use of vision. Recommends and constructs equipment. Works to integrate sensory systems, visual-motor coordination skills and tactile skills.	Degree (bachelor, master and Ph.D.). Supervised practicuum. Licensure. OT assistant requires an associate's degree.

*In the U.S., it's the Academy for Certification of Vision Rehabilitation and Education Professionals.

Augmentative Communication News

II. Vision and the brain

Much of vision is due to the *processing* of visual information

Estimated that over 40% of brain is devoted to visual function (Dutton 2006)

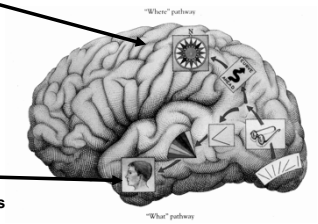
Two different pathways/ streams of vision

DORSAL STREAM

Spatial awareness, dealing with much visual information, control of visual guidance

VENTRAL STREAM

Visual recognition functions



Graphic from Vardit Kindler, OTR Israel

Dorsal stream dysfunction	**Ventral Stream dysfunction**
Motor - spatial Where is it?	Perceptual What is it?
•Difficulty seeing things that are pointed out in the distance.	•Impaired recognition of faces
•Difficulty seeing people/objects within a "visual clutter"	•Impaired recognition of the language components of facial expression.
• Impaired movement through three dimensional space (optic ataxia)	•Difficulty identifying shapes.
	•Difficulty naming colors.
	•Disorientation
	•Poor visual memory

Dorsal stream damage:

Visual **motor** disturbances such as:
- moving the eyes to direct visual attention to an object,
- fixating on an object of interest,
- shifting fixation and gaze to a new visual stimulus,
- and accomplishing fine motor tasks such as copying a drawing

Visual **spatial** disturbances such as:
- localization of objects,
- judgment of direction and distance of objects,
- orienting the body in relation to the physical world
  (the "Where is it?" aspect of vision)

posterior parietal (occipital) lobe lesions

http://www.childrenshospital.org/az/Site2100/mainpageS2100P0.html

Ventral Stream damage:

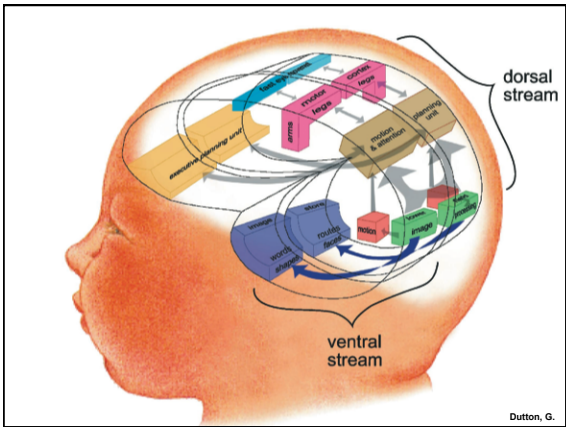
Visual **perceptual** disturbances such as:
- Difficulty with discrimination,
- Recognition (don't know familiar person until hear voice)
- and integration of visual images and objects
  (the "What is it?")

(inferior posterior temporal lobe lesions)

http://www.childrenshospital.org/az/Site2100/mainpageS2100P0.html

Most common missed diagnosis according to Dutton…

Lack of periventricular white matter (periventricular leukomalacia) can not only cause cerebral palsy *but it can cause visual problems in isolation*.



Prognosis

- Most patients with CVI will not regain normal vision. However improvement is usually seen over time. (Good, 2001)
- The prognosis is in correlation to the general neurological damage.

- The behavior of children with CVI is so characteristic that whoever is skilled in observing and detecting their visual behaviors, can save them from costly and invasive tests. The information that the parents provide is critical in the assessment process.

(Jan & Groenveld, 1993)

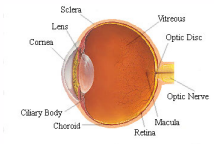
CVI should be considered when…

- **Normal or near normal eye exam that can not explain the child's behavior**
- **A history or presence of neurological problems**
- **The presence of behavioral responses to visual stimuli that are unique to CVI**

****Child may have additional ocular impairments**

Vision

Vision Resources | Vision Glossary | Vision Child Profile



Vision is the ability of the brain to process information received from the eyes.

The eye receives light and transforms it into electric signals that are sent along the optic nerve to the brain.

Vision problems are grouped into six categories:

- Acuity loss
- Field loss
- Oculomotor problems
- Reduced contrast sensitivity
- Reduced or absent color sensitivity
- Processing disorders or cortical visual impairment (CVI)

www.sparkle.usu.edu/ Topics/vision/

III. Characteristics of CVI
(Roman-Lantzy 2007)

OFTEN:

- Strong color preference, especially for red or yellow
- Need for movement to elicit or sustain attention (either viewer or object viewed needs to move)
- Visual latency (delayed response in looking)
- Visual field preference
- Difficulty with visual complexity or sensory complex/competing information

Characteristics of CVI
(Roman-Lantzy 2007) continued

- Light gazing and non-purposeful gaze
- Difficulty with distance viewing absent of atypical visual reflexes
- Difficulty with visual novelty
- Absence of visually guided reach (can't look at and reach/touch an object at the same time)
- *** vision is not static and can change over time

IV. Philosophy / goal

** usually different from a vision specialist's goals/objectives

- Primary goal is creating and expanding communication and language-learning opportunities
- primary goal is **not** increased use of vision BUT of course want to encourage vision

V. Typical (inappropriate) communication goals for children with CCN and characteristics of CVI

- **Student will identify requested object/photo/ symbol from a field of two**
- **Student will communicate a choice from a field of two objects/photos/symbols**
- Student will match picture symbol to object

Typical Progress Report Summary:

- **Student inconsistently looks at options**
- **Students eye gaze is too quick/fleeting to interpret**
- **Student is too distractible to attend to task**
- **Student demonstrates maladaptive behavior when presented with communication choices**
- **Student does not consistently identify symbols suggesting poor comprehension of vocabulary**

Why these outcomes?

- GOALS REQUIRE CHILD TO:
  - Visually attend/regard complete field
  - Visually track
  - Visually do a point-to-point shift
  - Visually confirm with joint attention to partner

When no success:

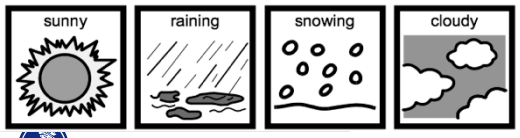
Wait for a SPONTANEOUS COMBUSTION OF SKILL

Additional thoughts

- Communication is not 'choice making'
- 'COMMUNICATION' means that we don't already know what the person wants to say
- Some children are most interested in the social process, not the message

Current Strategy #1:

Children are often asked direct questions with a right or wrong answer or given limited choices that don't go anywhere

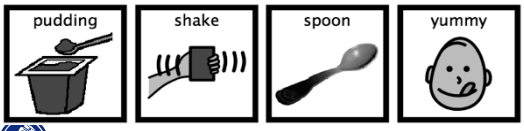


"What is the weather?"

From Linda Burkhart

Current Strategy #2:

Vocabulary flies in and out of thin air and then 'disappears' back into oblivion at the end of the activity.



From Linda Burkhart

Current Strategy #3

Children's options are limited to two or three objects as their performance is "inconsistent" or "hard to interpret".

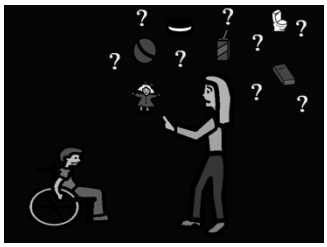
Offered choices may not be what child really wants!

Costello 08

We need to present vocabulary that remains constant (does not disappear) and is in a predictable location.

Current Strategy #4: "20 Questions"

We ask many questions based on what the partners *'thinks'* is important



VI. Strategy: Partner Assisted Auditory - Visual Scanning

- Remove need to visually shift gaze
- Eliminate the need for communication success to be based on symbol knowledge
- Supports expansion of language beyond nouns/objects
- Reduces random presentation of symbols consciously processed as new, each time.

Video and material review

- Not elegant
- Part of a diagnostic session in which I focus on quickly assessing as many variables as possible
- In most instances, these videos represent the FIRST time child is introduced to this concept or an expanded feature of this concept.
- Otherwise, goals have been as previously described.

When watching each video… when you get concerned with the amount of time or the labor required, think about what the alternative is!

1. Strong Color Preference

- Unclear how or why attraction to a particular color evolves
- Possibly learned through repeated and consistent exposure
- 55% red; 34% yellow; 11 green, pink, blue (Pediatric View Study Lantzy and Roman 2002-2007)
- Roman discusses preferred color as 'visual anchor' for drawing attention

2. Difficulty with Visual Complexity

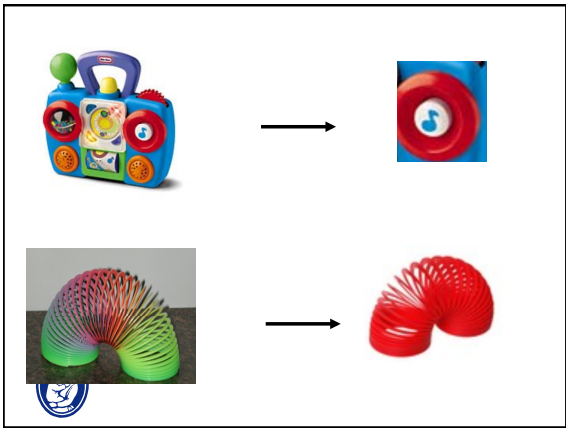
- **Complexity of visual field**
- **Complexity of visual symbols/patterns**
- **Complexity of visual plus auditory**

Complexity

- **Visual complexity compounds visual difficulties**
- **Complexity is one of the hardest characteristics to resolve**

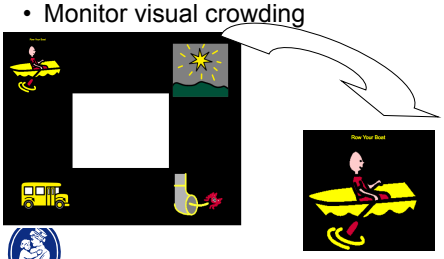
Complexity of Visual Field

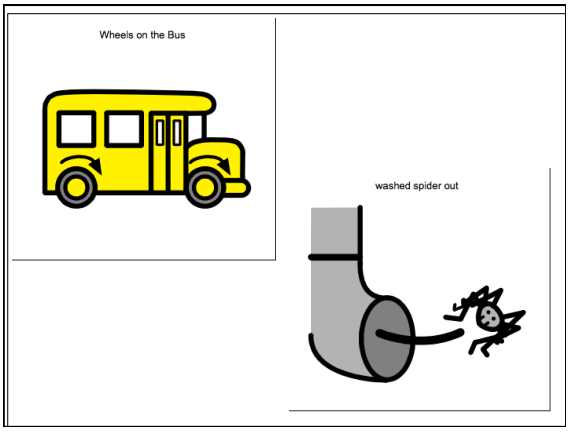
Reduce Visual Complexity

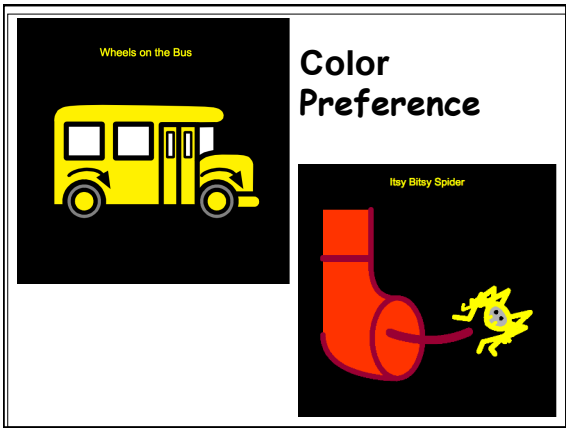


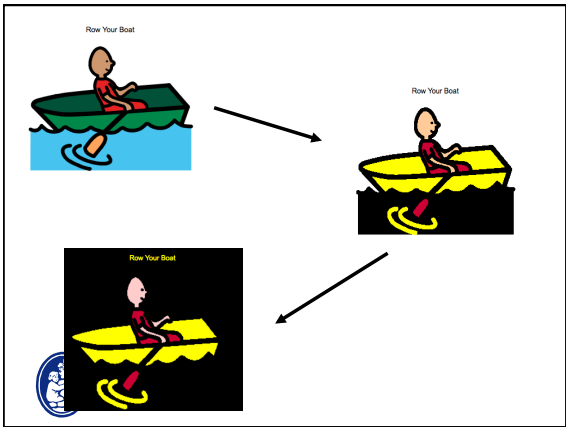
Complexity of visual array

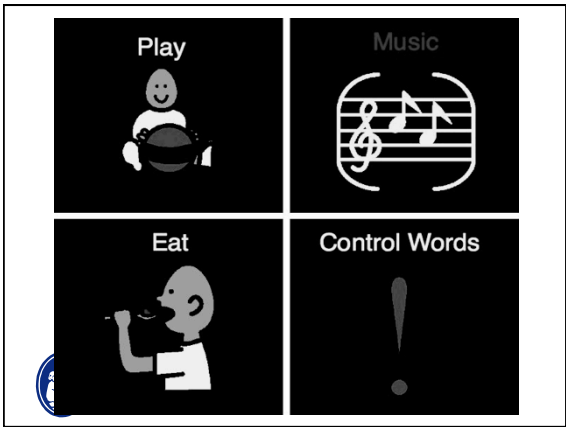
- Monitor visual crowding

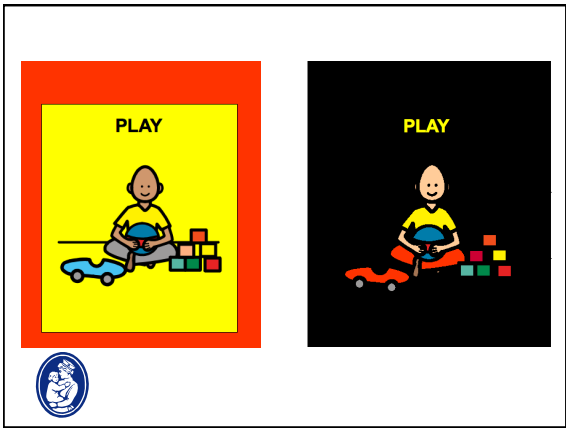


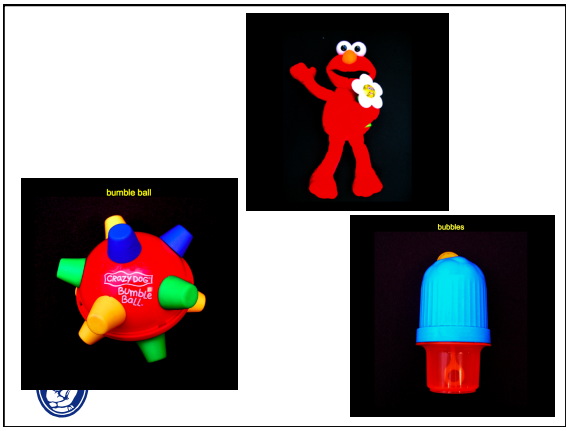



Wheels on the Bus
Color Preference
Itsy Bitsy Spider


Row Your Boat
Row Your Boat
Row Your Boat


Play
Music
Eat
Control Words


PLAY
PLAY


bumble ball
bubbles

Complexity of sensory environment

- For some, visual attention can occur ONLY when there is not competing sensory input.
  - may need to wait for child to stop visually regarding before giving verbal praise.
  - Minimize other movements, sound, etc. in room.
  - For many children 'vision will always lose' with competing sensory input.

Difficulty with Coordinating Looking and Listening

- **Some children drop their heads, avert gaze, close eyes or roll eyes up to block vision when listening intently**

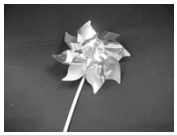
Some children use vision better when moving, rocking, swinging, moving head, etc.

Use Movement, Light and 'organized sound'

Pay attention to where a child will attend to objects and pictures at any given time and make appropriate adjustments

3. Need for Movement

- Majority of children with CVI are attracted to objects with property of movement
- Many only see object when it is in movement OR when they themselves are in movement (swaying head, move in chair, look out window of car)



- Preference for objects with reflective properties (shiny/glittery).
- Perceived in the brain as movement.
  (Roman,2007)

Some children see better when they are moving – rocking, swinging, riding in a vehicle

Shake Picture Symbol in Peripheral Visual Field - Then, Move Toward Central Field

Communication Intervention

- Slight movement of objects or symbols being presented
- Closely observe head and eye movement and impact on visual attention and participation.

4. Visual latency

- Delayed response in looking from time target is presented to when item is visually regarded. (seen in children with minimal amounts of consistent vision)
- Other impact of latency include fatigue, over stimulation or minimal practice time

Intervention for communication

- Allow plenty of time (varies by person)
- May not always require visual attention to communicate
- Minimize competing sensory input as 'vision will always lose'

5. Visual Field Preference

- Present in almost all students who have CVI (Jan and Groenveld 1993)
- Many may have peripheral field preference (peripheral vision regulates:
  - seeing in low light,
  - perception of moving targets and
  - ability to perceive forms in space

Visual Field Preference (cont'd)

- Many show a mixed field preference by eye (may notice position of object with one eye, then turn head to exam object with other eye)
  - It is rare that central vision is preferred for children with CVI

Visual Field Differences

- children show a variety of differences in visual fields
- May change - improve and worsen
- May be like "Swiss Cheese"

- Do not scan the environment.
- Rely on peripheral vision due to visual field loss.

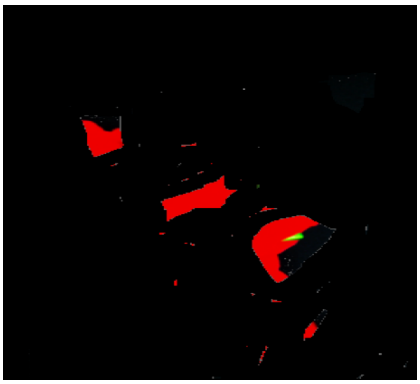
Central Scotoma

Swiss cheese effect

(Moore, 1995)

Kindler, V. 2008

Bigger is not always better!



"When a child with CVI needs to control his head, use his vision, and perform fine motor tasks, the effort can be compared to a neurologically intact adult learning to knit while walking a tightrope."

– http://www.tsbvi.edu/outreach/seehear/fall98/cortical.htm

Intervention

- Note where a child will attend to objects and pictures at any given time and make appropriate adjustments
- Recognize that 'looking' is not always done in a standard manner. Encouraging child to have head and eyes forward may actually sabotage the child's success.
- Communication supports must be versatile enough to continue, even when vision cannot be successfully engaged and suit the dynamic nature of useable vision.

Considerations:

- Use light to highlight objects/symbol.
- Minimize other competing light in the environment
- computer may be used to attract visual attention
- Don't demand eye contact.

6. Light gazing and non-purposeful gaze

- May gaze (and be attracted to) light from window or light from overhead light
- May be used as a strategy to avoid overly confusing/overwhelming visual array.
- Some students can not look and listen simultaneously, thus will look away from target toward a blank wall or light when listening

7. Difficulty with Distance Viewing

- Related to complexity of the environment.
- The more complex, the more difficult it is to identify an item
- Student may see something at a great distance IF there is minimal visual compexity/crowding.

Possible intervention consideration:

Bring pictures close for attention, bring back for focus

8. Difficulty with visual novelty

- Child may attend to familiar patterns only
- New items may be ignored OR child may respond with great agitation/fear to novel items

- **Build a repertoire for communication by using functional objects and symbols that are *meaningful* to the child.**
- **Provide repeated and consistent/predictable opportunities to learn new visual information by pairing a visual with the activity. Make it part of the routine and ideally pair it with something that is already familiar.**

9. Absence of visually guided reach

- Looking and reaching appear as two separate events (may look, then look away, then touch)
- Often is misinterpreted
  - "look before you touch"
  - "you have to look at what you are touching"
  - "she didn't mean that because she wasn't even looking"

Remember:

We CO-construct communication with typical early language learners, why wouldn't the child with complex needs require the same thing?

Take Home:

- **Children with CVI require consistent and predictable opportunities to experience and manipulate language.**
- **Language exposure and success should be built upon - but not dependent on - engaging vision.**