TIPS AND TECHNIQUES FOR EVALUATING THE NONVERBAL PATIENT

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WHICH PATIENT POPULATIONS ARE WE MOST LIKELY TO HAVE CHALLENGES WITH COMMUNICATION?
THE BOOKENDS!
NONVERBAL CHILDREN

- Toddlers
- Developmental Delay
- Neurological Damage
  - Acquired brain injury
  - Cerebral Palsy
  - Very low birth weight
Some nonverbal children become nonverbal adults!
- Acquired brain injury (TBI/CVA)
- Other neurological damage
- Dysarthria
VISUAL PROBLEMS ENCOUNTERED WITH NEUROLOGICAL DAMAGE

• Decreased visual acuity.
• Visual field losses – central, congruous and incongruous homonymous hemianopias, altitudinal defects.
• Eye movement dysfunctions – fixation, pursuit, saccade, nystagmus.
• Ocular muscle dysfunctions – strabismus, anisocoria, laophthalmos, ptosis.
• Binocular dysfunctions – exophoria, convergence insufficiency, vertical phorias, fusional instabilities
• Accommodative dysfunctions – amplitude, flexibility, sustainability
• Perceptual dysfunctions – contrast sensitivity, color vision, body image, left-right discrimination, spatial relationships, agnosias, “subjective visual disturbances”
• Visually-involved vestibular dysfunctions – vertigo, loss of balance
ADAPTATION THROUGH VISION
VISUOCOGNITION
VISUAL MEMORY
PATTERN RECOGNITION
SCANING
ATTENTION = ALERT AND ATTENDING
OCULOMOTOR CONTROL  VISUAL FIELDS  VISUAL ACUITY
VISION IMPAIRMENT IN CHILDREN

• Less than 1% of persons under the age of 18 have vision impairment

• Leading causes of legal blindness in children: congenital cataracts, optic atrophy, retinopathy of prematurity

• Blindness occurs mainly among children with very low birth weight (<1,000 grams)

Statistics on Vision Impairment:
Arlene R. Gordon Institute
Lighthouse International 2002
• The number of children with vision impairment is expected to rise with the increase in multiple births as well as the improved survival of low-birth-weight babies.

• One study found that 63% of very low birth weight children had reduced visual function.


Another study found that the rate of vision impairment for babies less than 1500 grams was 26% higher than for higher birth weight babies.

In this study, very low birth weight babies accounted for 17.5% of all severely impaired children.

The CDC found that from ½ to 2/3 of children with vision impairment also had one or more other developmental disabilities.

Crofts et al concluded “Although the contribution made by babies with very low birth weight to overall severe vision loss in the community is small, many of these children have additional impairments and probably place considerable demand on health and educational services and families”.


www.cdc.gov/ncbddd/dd/vision3.htm
• The vision problems that are encountered in children with neurological deficits are also found in very low birth weight children.

• One study identified impaired vision in this population that was not detected by a normal vision screening and the problems were related to impaired neurodevelopment.

• Since 80% of learning in the first 12 years is visual, children with vision impairment require low vision services throughout their schooling.
• Determining the child’s functional vision as early as possible provides valuable information to the teacher.
• Low vision devices can be beneficial at an early age and will change as the child’s school needs change.
CEREBRAL VISION IMPAIRMENT (CVI)

- Refers to any patient with a neurological insult and visual dysfunction with an otherwise normal ocular examination with normal pupillary function\(^1\)
- The term “cerebral vision impairment” (vs. cortical vision impairment) is now thought to be a more generalized and descriptive term\(^2\)

• The leading cause of CVI in children is hypoxic ischemic injury in the perinatal period.

• Other causes include meningitis/encephalitis, congenital central nervous system malfunction, hydrocephalus, trauma, cerebrovascular incidents, brain tumors and rarely metabolic disorders.

• **Cerebral vision impairment has become one of the leading causes of visual impairment in children in developed countries.**


• The pathophysiology of hypoxic ischemic injury in infants is different depending on whether the child is term or preterm.

• In the term infant, hypoxia and secondary ischemia results from neonatal asphyxia.

• The asphyxia (cardiorespiratory depression) leads to hypoxia and resulting hypercarbia.

• This results in loss of auto regulation of cerebral blood flow, leading to decreased perfusion in watershed areas of the cortex and subcortex.

• Decreased perfusion in these areas leads to cystic infarctions in the frontal and parieto-occipital regions, the latter potentially leading to CVI.

Edmond J, Foroozan R. Current Opinion in Ophthalmol 2006; 17: 509-512

• In the pre-term infant, the brain injury from hypoxia selectively injures the subcortex, mainly the periventricular deep white matter.
• In this area is the germinal matrix, a temporary structure that is viable at 8-28 weeks and subsequently involutes.
• This area has a rich supply of fragile capillaries that are prone to hemorrhage from hypoxia and ischemia secondary to fluctuations in blood flow and blood pressure around the time of delivery.
• The hemorrhage may damage the periventricular white matter, leading to periventricular leukomalacia (PVL), a permanent scarring and loss of tissue around the ventricles.

• The optic radiations and the corticospinal tracts travel in the periventricular white matter.

• PVL has a strong association with CVI and cerebral palsy.

• It has also been proposed that injury to the germinal matrix may impact cortical organization and projections, leading to the complex cognitive and attentional problems often encountered in many preterm infants.

VISUAL ACUITY IN CVI

• Visual acuity can range from no light perception to normal visual acuity.
• Visual acuity is simply the ability to recognize a particular sized symbol at a particular distance – resolution acuity.
• It is only one measure of visual function.
• Children with CVI may have normal visual acuity but have cognitive visual dysfunction.
The Visual Brain

- **Parietal Lobe**: Visuospatial map, visual attention
- **Frontal Lobe**: Eye movement planning
- **Middle Temporal Lobe**: Motion perception
- **Occipital Lobe**: Shape, contrast, color
- **Inferior Temporal Lobe**: Object perception
- **Midbrain**: Visual orientation and eye movements
- **Cerebellum**: Moderates eye movements
- **Brainstem**: Eye movements integrated with vestibular input
COGNITIVE VISUAL DYSFUNCTION

• A disorder of visual processing that leads to misinterpretation of the visual world with respect to either what objects are or where they are.
• A normal eye exam does not imply that the patient has a normal visual system because it does not exclude cognitive visual dysfunction.
• The more severe the neurological deficits, the more difficult it is to obtain visual acuities and other functional information about the child’s visual system.
Cognitive visual dysfunction arises from damage to the visual area of the brain, the peristriate cortex.

These areas of the brain process visual information arising from the primary striate cortex in the occipital lobe.

Two functional visual pathways are responsible for cognitive visual function – the dorsal stream and the ventral stream.
TYPES OF CEREBRAL VISUAL IMPAIRMENT

CVI can be considered in the context of which parts of the brain are considered dysfunctional and which are not:

- the visual pathways and occipital lobes
- the middle temporal lobes (perception of movement)
- the ventral stream and temporal lobes (recognition and orientation)
- the dorsal stream and parietal lobes (search and visual guidance of movement)

DAMAGE TO VISUAL PATHWAYS AND OCCIPITAL LOBES

• Visual acuity, color perception, contrast sensitivity and visual fields

• Occipital lobes are the most active parts of the brain, having the highest blood flow and having the greatest oxygen and glucose demand

• Prolonged period of reduced oxygen to the brain can affect occipital lobes the most

• Extent of functional loss is dependent upon when damage occurred and whether one or both sides are affected.
VISUAL PATHWAYS AND OCCIPITAL LOBES

• If damage to only one side, will usually have visual field loss on the opposite side with no loss of visual acuity, color or contrast
• Early onset bilateral damage – profound visual impairment
• High level blindsight- if the middle temporal lobes are not damaged, may have normal intellect and limb movement and retain visually guided movement with limited conscious movement

• Damage to the middle temporal lobes or the nerve fibers pathways that support them impairs **perception of movement**

• Akinetopsia – cannot perceive motion despite being able to see stationary objects
DAMAGE TO THE MIDDLE TEMPORAL LOBES

• Functionally, unable to see fast moving objects - movement makes things seem to disappear
• Unable to see quickly changing facial expressions
• Cannot see fast moving movies/videos
• Fast moving stimuli while walking are not seen
DAMAGE TO THE MIDDLE TEMPORAL LOBES

• No formal standardized clinical test for disordered perception of movement

• Observed behavior – startled by fast moving animals, unable to move quickly, difficulties seeing facial expressions, avoids fast moving movies, videos, can only see slow traffic

• Counting fingers test

• Facial expression test
VENTRAL AND DORSAL STREAM

Dorsal or “where” stream
- Spatial processing
  - Location
  - Movement
  - Spatial transformations
  - Spatial relations

Ventral or “what” stream
- Object processing
  - Color
  - Texture
  - Pictorial detail
  - Shape
  - Size
DAMAGE TO THE TEMPORAL LOBES AND DISORDERS OF VENTRAL STREAM FUNCTION

• Visual recognition and orientation

• Temporal lobes provide the long-term visual memories of what we have seen before
  - Right temporal lobe stores the images of all the faces we have seen
  - Left temporal lobe stores the images of shapes and objects


DAMAGE TO THE TEMPORAL LOBES AND DISORDERS OF VENTRAL STREAM FUNCTION

- **Ventral Stream: Perceptual pathway**
- The visual pathway between the occipital lobes and the temporal lobes
- Recognition of shape, color, texture, people and orientation within the surroundings
- The “what” pathway
- Commonly associated with impaired visual acuities, visual field disorders and varying patterns of dorsal stream dysfunction
- If isolated, more common in acquired brain damage
DAMAGE TO THE TEMPORAL LOBES AND DISORDERS OF VENTRAL STREAM FUNCTION

• Right temporal lobe
  - Prosopagnosia: inability to recognize people
  - Topographic agnosia: tendency to get lost
• Left temporal lobe dysfunction
  - Shape and object agnosia

(Agnosia – inability to process sensory information)


DAMAGE TO THE POSTERIOR PARIETAL LOBES AND THE DORSAL STREAM PATHWAYS

• Visual guidance of movement, visual search and attention
• Dorsal Stream: Action pathway or “Where” pathway (where is it)
• Visual pathway between the occipital lobes and the posterior parietal lobes
• Subconsciously maps the environment to facilitate immediate visual guidance of movement, visual search and the facility to switch attention from one element of the scene to another
DAMAGE TO THE POSTERIOR PARIETAL LOBES AND THE DORSAL STREAM PATHWAYS

- Impaired visual search: difficulty handling complex visual scenes (crowding)
- Optic ataxia: inaccurate visual guidance of movement
- Apraxia of gaze: difficulty following and tracking a moving object


DORSAL STREAM DYSFUNCTION

• Impaired simultaneous perception – an inability to locate an object in a crowded visual field, such as food in the refrigerator, spouse in a crowd, difficulty reading, and difficulty seeing moving objects.

• Inaccurate movements of the arms and especially the legs compounded by visual field deficits and any other motor deficits.
VISUAL FIELDS IN CVI

• Visual fields may be abnormal in patients with CVI.
• Children that have experienced a CVA as a cause of the CVI may have a homonymous hemianopsia with or without hemiplegia.
• Bilateral inferior visual field deficits have been found in patients with PVL involving the parietal optic radiations.
• The optic radiations that sub serve the upper visual field course through the temporal lobe and are less likely to be damaged.
APHASIA

• A communication disorder, usually resulting from a stroke or TBI, which causes problems with a person's ability to process language.

• Aphasia can lead to difficulty speaking and understanding others.

Effective Communication Strategies for Severe Aphasia
Kim Wang, Speech Language Pathologist 2018 Handout
APHASIA

• People with aphasia have **difficulty with naming objects**, they cannot find the words that they want to use.

• Aphasia can also **affect reading and writing**.

• Most individuals have **completely preserved intellectual and cognitive capabilities** unrelated to speech and language.
TYPES OF APHASIA

• **Broca’s** - non fluent *(expressive)*
• **Wernicke’s** – fluent *(receptive)*
• Anomic
• Primary progressive
• Mixed non fluent
• Global
BROCA’S APHASIA (NON-FLUENT OR EXPRESSIVE APHASIA)

- Trouble speaking fluently but their comprehension can be relatively preserved.
- Difficulty producing grammatical sentences and their speech is limited mainly to short utterances of less than four words.
- Finding the right words is difficult.

https://www.aphasia.org/aphasia-resources/brocas-aphasia/
BROCA’S APHASIA (NON-FLUENT OR EXPRESSIVE APHASIA)

• May understand speech relatively well, particularly when the grammatical structure of the spoken language is simple.
• However, they may have harder times understanding sentences with more complex grammatical construct.
• May be able to read but be limited in writing.
EXAMPLES

• Difficulty forming complete sentences.
• Leaving out words like “is” or “the.”
• Saying something that doesn’t resemble a sentence.
• Trouble understanding sentences.
• Making mistakes in following directions like “left, right, under and after.”
• Using a word that’s close to what you intend, but not the exact word; for example, saying “car’ when you mean “truck.”


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WERNICKE’S APHASIA (RECEPTIVE APHASIA)

• **Inability to grasp the meaning of spoken words and sentences**, while the ease of producing connected speech is not very affected.

• Reading and writing are often severely impaired.

• Can produce many words and can often speak using grammatically correct sentences with normal rate and prosody.
WERNICKE’S APHASIA

• What they say doesn’t make a lot of sense or they pepper their sentences with non-existent or irrelevant words.
• They may fail to realize that they are using the wrong words or using a non-existent word and often they are not fully aware that what they say doesn’t make sense.
• They have profound language comprehension deficits, even for single words or simple sentences.

https://www.aphasia.org/aphasia-resources/wernickes-aphasia/
EXAMPLES

- Can say words with ease, but words do not come together to create coherent sentences.
- Comprehension is usually very impaired.
- Say many words that don’t make sense.
- Use the wrong words; for instance, calling a fork a “gleeble.”
- String together a series of meaningless words that sound like a sentence but don’t make sense.


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ANOMIC APHASIA

• One of the milder forms of aphasia.

• Applied to persons who are left with a persistent inability to supply the words for the very things they want to talk about, particularly the significant nouns and verbs.

• Their speech is fluent and grammatically correct, but it is full of vague words (such as ‘thing’) and circumlocutions (attempts to describe the word they are trying to find).
ANOMIC APHASIA

• The feeling is often that of having the word on the tip of one’s tongue, which results in their speech having lots of expressions of frustration.

• Understand speech well and can repeat words and sentences.

• In most cases they can read adequately.

• Difficulty finding words is as evident in writing as it is in speech.

https://www.aphasia.org/aphasia-resources/anomic-aphasia/?gclid=Cj0KCQjw6ar4BRDnARl8AI TGzIBj-wbRCn-rphb4n2dT aRhyz87ShDg2O_ePMqMcQlQIK2Z e6k8l9waAiD5EALw_wcB
EXAMPLES

• Can’t find words that they want to use
• May use a lot of filler words during conversation (e.g. “It’s that um, thing, that you use.”).
• Can usually understand speech and read.

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MIXED NON FLUENT APHASIA

• Applies to persons who have sparse and effortful speech, resembling severe Broca’s aphasia.
• Unlike individuals with Broca’s aphasia, mixed non-fluent aphasia patients remain limited in their comprehension of speech, similar to people with Wernicke’s aphasia.
• **Individuals with mixed non-fluent aphasia do not read or write beyond an elementary level.**

https://www.aphasia.org/aphasia-resources/mixed-non-fluent-aphasia/
GLOBAL APHASIA

• The most severe form of aphasia
• Patients can produce few recognizable words and understand little or no spoken language and cannot read
• Difficulty forming and understanding words and sentences
• Both Wernicke’s and Broca’s areas are affected.
• Expressive and receptive aphasia

https://www.aphasia.org/aphasia-resources/global-aphasia/
People with aphasia communicate differently (some may even use a device to speak), **but it does not affect their intelligence.**

Unless they are also hard of hearing, use a natural tone of voice with a normal volume and choose adult topics for discussion.
EXPRESSIVE APHASIA

• Ask yes or no questions.
• Ask one question at a time.
• Give fixed choices in questions e.g. “Do you want water or coffee?”
• Phrase Y/N questions from general to specific to help set the context
EXPRESSIVE APHASIA

• Ask them to gesture (e.g. thumbs up/down), point to things, draw, or write keywords/first letter.
• Give them sufficient time to respond, validate the person as needed (“I know that you know!”).
• Expand on what you think the person might be trying to say but don’t finish their words.

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RECEPTIVE APHASIA

• Use short, simple sentences, a slow rate of speech, and an expressive voice.
• Use gestures to supplement your conversation and emphasize key words.
• Write down keywords or topics during conversation e.g. write “PAIN” when asking if patient is in pain
• Use pictures, drawings, print-outs to illustrate an idea, focus on presenting one at a time.
RECEPTIVE APHASIA

• Eliminate distraction e.g. noises, other people, or multiple pictures at a time.
• Observe their expression, posture, or gestures to determine their level of comprehension.
• Confirm understanding or summarize the conversation if it was a long one.
DYSARTHRIA

- A **motor speech disorder** in which the muscles that are used to produce speech are damaged, paralyzed, or weakened.
- Cannot control his or her tongue, larynx, vocal cords, and surrounding muscles, which makes it difficult for the person to form and pronounce words.
- Some medications, such as certain sedatives and seizure drugs, also can cause dysarthria.
- **Comprehension is NOT affected.**
CONDITIONS THAT CAN CAUSE DYSARTHRIA

• Amyotrophic lateral sclerosis (ALS, or Lou Gehrig's disease)
• Brain injury
• Brain tumor
• Cerebral palsy
• Guillain-Barre syndrome
• Head injury

• Huntington's disease
• Lyme disease
• Multiple sclerosis
• Muscular dystrophy
• Myasthenia gravis
• Parkinson's disease
• Stroke
• Wilson's disease
SPEECH LANGUAGE PATHOLOGIST

• Experts in communication.
• Work with people of all ages, from babies to adults.
• Treat many types of communication and swallowing problems including speech sounds, language, social communication, voice fluency and feeding and swallowing.

EXAMINING THE NONVERBAL PATIENT
VISUAL ACUITY
MEASURING VISUAL ACUITY

• Most important piece of data.
• What we need is FUNCTIONAL ACUITY
• Very difficult to estimate in patients with CVI
• In children, the visual acuity tends to improve as the child matures
  - In CVI, it is a true improvement, both with adults and children.
  - In the absence of CVI, the improvement is due to improvement in cognition leading to a more accurate prescription.
OKN DRUM
OKN DRUM

• Helpful in nonverbal adults and children
• Optokinetic nystagmus (OKN) is an eye movement that occurs in response to a rotation movement.
• The presence of optokinetic nystagmus means there is vision (20/200)
• This is very useful when the question is whether the child/adult has any functional vision.
• In an adult or child with TBI/CVI, the absence of an OKN response does NOT necessarily mean there is no vision.
• The presence of an OKN response is encouraging.
GRATING VISUAL ACUITY – PREFERENTIAL LOOKING

• Used to estimate visual acuity in very young children.
• Designed for “normal” children, not children with neurological deficits or children with vision impairment.
• However, it does gives us an idea as to level of functioning vision in both children and adults.
TELLER CARDS
GRATING ACUITY

• Teller cards – do have a conversion to Snellen acuity; controversy as to whether it is accurate, especially in children with vision impairment.

• Lea gratings – have a graph that shows what size grating the child should respond to at a certain age (birth to 18 months); can tell whether a child is visually responding normally for his/her age.

• Preferential looking or grating acuity testing does not work as well with the child with CVI.

• They will look away from the gratings – too “cluttered”.
• Other targets are used to elicit a “fix and follow” response in very young children and children/adults with suspected CVI.
• Bright, shiny targets (pom poms, mylar balloons) can be used with children.
• Lighted toys in a dark room are good fixation targets for children and adults.
• Avoid flashing lights in TBI adults 2/2 seizure risk.
• Have to find a toy that doesn’t make noise!
• We use anything that will attract a child’s attention.
• Familiar toys are very helpful, and parents are asked to bring them.
• CVI children are attracted to toys that are shiny and move.
• Children are attracted to faces.
• The “hiding Heidi” face is a great tool to get an idea as to what size object a child can see at what distance.
• Start at 1-2 feet and see if the child will follow the large Heidi face.
• I made copies of the smaller Heidi face and minimized it to get a better idea as to the near functional vision.
• To test distance functional visual acuity, move further away until the child no longer follows the target.
LEA SYMBOLS

- High contrast simple figures that most children can identify or be taught to identify.
- Work well with adults with aphasia
- Can be used to measure distance and near visual acuity.
LEA SYMBOLS

• Usually will do forced choice (apple vs. circle)
• Can also do matching
• For adults with aphasia, symbols are easier than numbers and numbers are easier than letters.
• Is an excellent way to measure resolution acuity
• NOT measuring functional acuity if using the cards because crowding is not an issue.
NONVERBAL ADULTS

- If they are unable to name numbers, try Lea symbols
- If they cannot name the symbols, they may be able to match.
- If they cannot match them, use forced choice circle vs. apple
- May need to be at 5 feet rather than 10 feet
NONVERBAL ADULTS

- Low Vision Distance Acuity Chart (Bernell)
- Great for patients with dorsal stream dysfunction since only has 4 numbers per page so can easily isolate
- If a patient has expressive aphasia, they can use their fingers to show how many numbers
NEAR VISUAL ACUITY IN CHILDREN

• Near visual acuity is more important than distance acuity in children since their world is close.
• Even if it cannot be measured exactly, we need to know what size near material will need to be for our nonverbal patients.
LEA SYMBOLS AT NEAR
A cat says to a cat, “Me-ow, me-ow, me-ow.”
ASSESSING NEAR ACUITY BY FUNCTION

• Watching how a child plays gives very good information.
• How close does the child hold material?
• At what distance does the child spot objects?
• How close does the child get to the television?
NEAR VISUAL ACUITY IN ADULTS

• Accommodation is often affected in ABI so measuring near acuity is important to assess even in pre-presbyopic adults
• All of the cognitive tests require reading/near tasks.
• The smallest Lea symbols can be utilized to determine the size text that is necessary.
NEAR CARDS
ALPHABET FLASH CARDS
SINGLE LETTER ACUITY VS. TEXT ACUITY

• Single letter acuity is what is usually measured but it is not a good indicator of an individual’s ability to read text.

• Both central scotomas (blind spots) and constricted visual fields can adversely affect ability to read text, especially for long periods of time.

• Scanning, tracking, smooth pursuits, ability to accommodate and crowding all affect reading as well.

• PATIENTS WITH EXPRESSIVE APHASIA CANNOT READ TEXT ALOUD BUT CAN READ.
My bird sings.
Helen has a pet hen.
Dogs make good friends.
Jack can make a good cake.
CROWDING

• Crowding is more of a factor in the patient with a neurological component (dorsal stream dysfunction).

• Crowding can be addressed by measuring near acuity in a crowded environment compared to a non crowded environment.

• Crowding ratio – the acuity when presenting a single optotype, divided by the acuity presenting several optotypes (linear).
• A crowding ratio $\geq 2$ is the standard for abnormal crowding.
• One study found the crowding ratio has fairly good sensitivity (67%) and specificity (79-86%) to distinguish children at risk for CVI.

CROWDED VS. NON-CROWDED ACUITY
DETERMINING BEST CORRECTED VISUAL ACUITY - REFRACTION

• Necessary to know best corrected because services are based upon best-corrected visual acuity.

• We want to know if glasses or contact lenses will improve the visual acuity.

• Often must rely on objective measures – retinoscopy and autorefraction.
RETINOSCOPY
HANDHELD AUTOREFRACTOR

• Very helpful in children since they do move around a lot – can often get one quick reading that is a good starting place.
• Great for wheelchair patients.
• Very accurate if wet refraction
• Expensive second opinion!
REFRACTION

• Not usually an option in nonverbal children
• Can perform a refraction on an adult with aphasia
• Thumbs up/thumbs down, yes/no
• A trial frame refraction may be easier for the patient to understand
• Can use larger increments
COLOR VISION

• Important to know if a child has a color vision defect since some of learning is “color coded”.
• Use Lea puzzle in very young children – at least can rule out congenital color defects.
• For adults, can trace the numbers in the color plates
• Can also use flash cards.
COLOR TESTING
VISUAL FIELDS

- Visual fields may be abnormal in children/adults with neurological damage.
- Brain injury occurring postnatally or late in gestation results in adult patterns of visual field loss.
- Insults during the first two trimesters may be modified by plasticity of the immature visual system and result in less severe visual field loss.
- Adults with ABI are likely to have visual field loss, usually homonymous hemianopia.
- Children that have experienced a CVA as a cause of the CVI may also have a homonymous hemianopia.
HOMONYMOUS HEMIANOPIA

Normal

Hemianopsia
CONFRONTATION VISUAL FIELDS TEST

• Best if 2 people are involved when testing a child—one keeps the child’s attention with a “flash” toy and the other brings a lighted object from behind.
• When the child looks, that is a good indicator of the visual field.
• Adults usually respond well with using a hand to indicate when they see the target
• Can perform tangent screen testing on adults as well
CONTRAST SENSITIVITY

• How much is an individual’s visual acuity affected by low light levels or when the contrast is poor (yellow marker on a white board, faded copies).

• Not as much of an issue with children since even children with vision impairment may still have quite good contrast sensitivity.

• Nonverbal older adults may have contrast sensitivity issues 2/2 other things like cataracts, glaucoma.

• **Color and contrast are usually not affected in CVI**.
CONTRAST SENSITIVITY TESTS
OCULOMOTOR DYSFUNCTIONS

• Strabismus (eye turns) 2° nerve palsies, mechanical restrictions.
• Saccadic dysmetria (inaccurate saccadic amplitude; over or undershooting a visual target).
• Saccadic pursuit (maintaining fixation on a moving target).
• Unstable fixation (unable to maintain fixation on a stationary target).
• These abnormalities may manifest as blurring of vision, double vision or sensation of movement in the environment (My eyes don’t work together).
OCULOMOTOR DYSFUNCTION

• Oculomotor dysfunctions are common in children with neurological problems such as CVI or cerebral palsy.

• **The oculomotor functions (pursuits, saccades and fixation) are extremely important in reading.**

• Children with good visual acuity but poor oculomotor skills will be poor readers.
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<th>Cranial Nerve Name</th>
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<tbody>
<tr>
<td>I - Olfactory</td>
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<td>II - Optic</td>
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<td>III - Oculomotor</td>
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<td>IV - Trochlear</td>
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<td>VI - Abducens</td>
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<td>VII - Facial</td>
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<td>VIII- Vestibulocochlear</td>
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<td>X - Vagus</td>
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<td>XI - Spinal Accessory</td>
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<td>XII - Hypoglossal</td>
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MANAGEMENT OF OCULAR MOTILITY DYSFUNCTION

- Vision therapy techniques can be utilized.
- Compensatory techniques can be utilized.
- Children may read more easily by keeping the head still and moving the reading material from side to side (eliminates the need for accurate saccades and pursuits).
- Use of low vision devices may help.
DISORDERS OF ACCOMMODATION

• Accommodation is the ability of the eyes to focus at near.

• Brain damage may lead to incomplete accommodation, persistent hyperopia (farsightedness) and blurring of near images.

• Dyskinetic cerebral palsy can lead to impaired or absent motor accommodation.

• Reading glasses or bifocals may be necessary.
RESOURCES

- Cortical Vision Impairment: An Approach to Assessment and Intervention
- Christine Roman- Lantzy
RESOURCES

- What and How Does This Child See?
- Lea Hyvarinen and Namita Jacob
RESOURCES

• Vision and the Brain: Understanding Cerebral Visual Impairment in Children
• Amannda Hall Lueck and Gordon N. Dutton
THANK YOU!

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