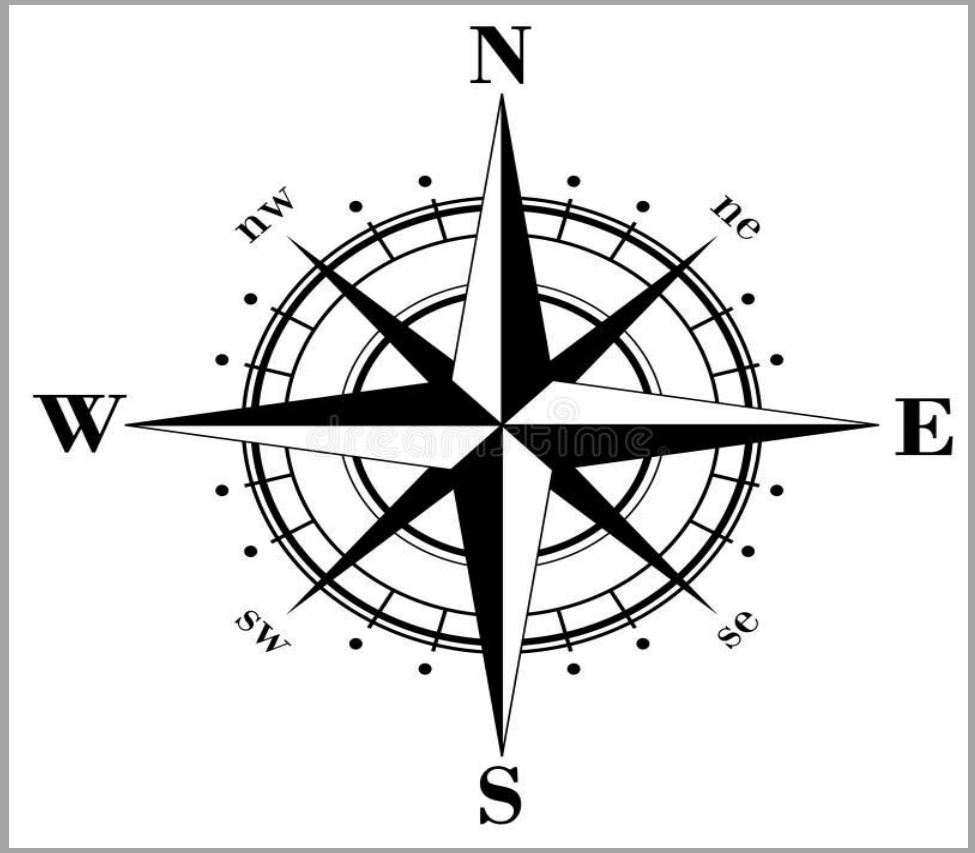
Orientation & Mobility

Problem Solving Strategies
For the Traveler with CVI



Donovan Quinn
Rebecca Hommer, EdD
March 13, 2026

Outcomes

- Gain an increased understanding of the visual implications of independent travel for individuals with CVI.
- Gain an in increased understanding of how to use CVI strategies to support independent travel for individuals with CVI.
- Meet a very cool young adult with CVI.

Building Strong Conceptual Foundations

Orientation & Mobility for individuals with CVI/NVI should not be contingent upon their attainment of independent mobility, a specific age, locomotor skills, cognitive abilities, or other forms of differentiated ability. When O&M is delayed until an individual achieves independent mobility, opportunities which help the student to learn basic orientation and problem-solving skills will be lost. *(Roman-Lantzy, 2018)*

Building strong O&M concepts for individuals who are not yet moving with independence will help the student to gain necessary pre-requisite skills. Having a solid foundation prior to “hitting the hallways and streets” will give the students the conceptual knowledge needed to begin formal O&M training.

Roman-Lantzy, C. (2018)
Cortical Visual Impairment: Advanced Principles.

Characteristics of CVI Influencing the Use of Vision

- Color
- Movement
- Latency
- Fields
- Light
- Distance
- Complexity
  - Sensory
  - Array
  - Object
  - Faces
- Visually Guided Reach
- Blink Reflexes

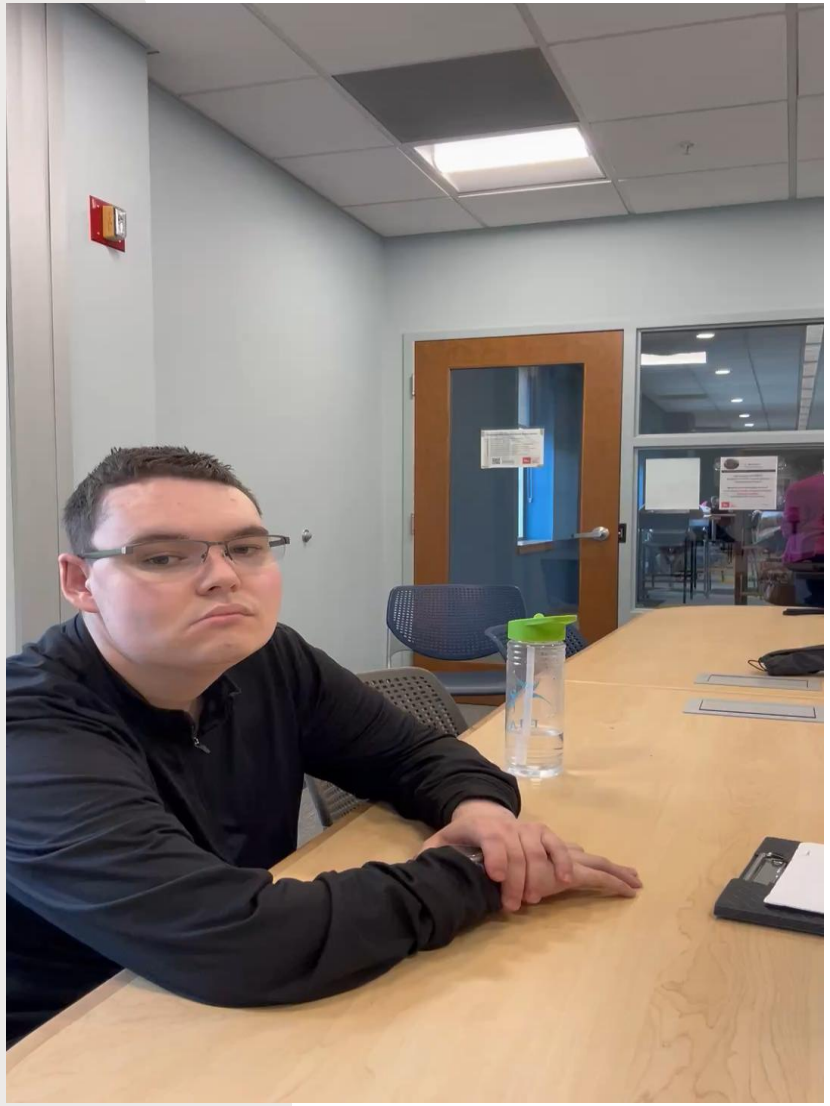
Roman-Lantzy, (2019)
Advanced Principles

Questions
Comments
Ideas



Donovan and I hope to make this an interactive presentation. We will happily answer questions, incorporate your comments, and integrate your ideas. However, please hold your thoughts until this slide appears at the end of each section.

About Me

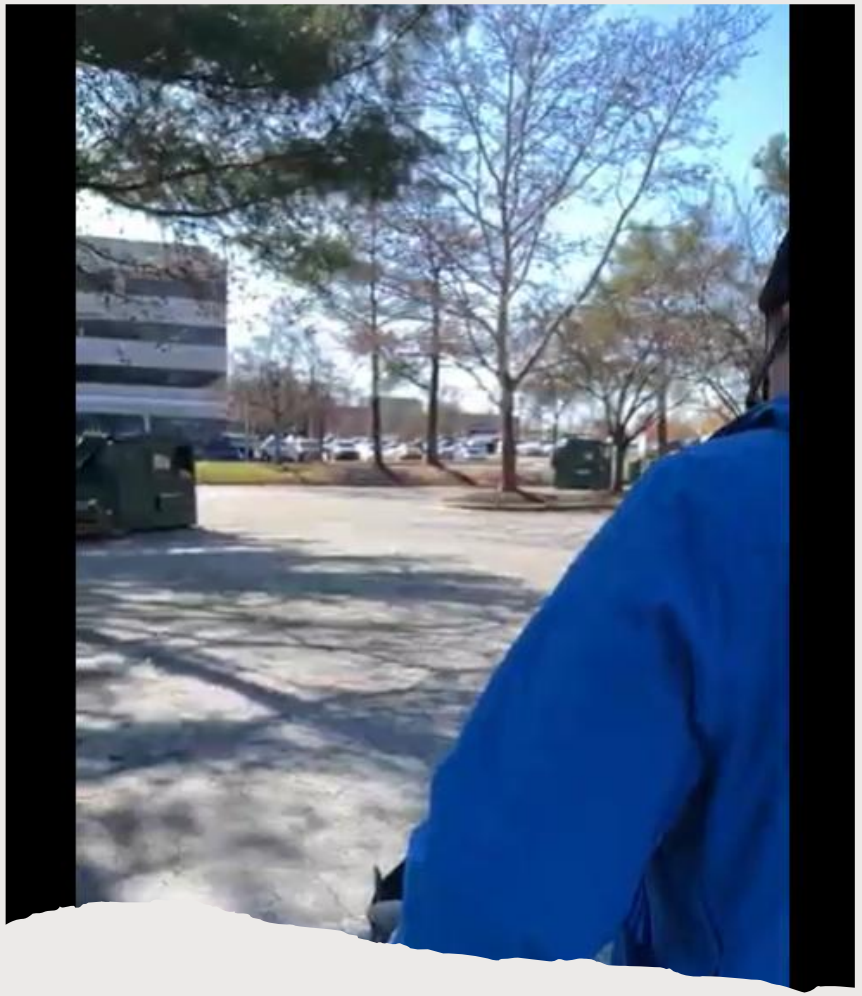




Questions
Comments
Ideas









Accessibility

Accessibility



Accessibility



Characteristics

- Complexity
- Novelty
- Distance Viewing
- Latency

Problems

- Lack of sidewalk
- Only path to sidewalk is entrance to parking lot.
- Extended time in parking lot
- Visually interpreting a new environment

Solutions

- Walk along the edge of the vehicle entrance
- Walk along the edge of the parking lot
- Requesting assistance with interpreting visual information
- If available, show a video of the space before asking him to travel.

Characteristics

- Complexity
- Novelty
- Distance Viewing
- Latency

Orientation Guidelines

Backgrounds to visual targets may have additional elements that are within view, but the additional elements may interfere with the student's recognition or identification of the target.

Mobility Guidelines

The individual may travel using landmarks or familiar environmental features during routes but may not visually process or interpret the information due to a delay in visual processing after eye to target fixation occurs. Especially in novel environments.

Cortical Visual Impairment
Advanced Principles
Christine Roman-Lantzy

Questions
Comments
Ideas



Accessibility







Characteristics

Is this vision related or an issue associated only with accessibility?

Problems

- Heavy door without automatic door mechanism
- On two occasions, he did not have his Rollator.
- Focusing all of his energy on the control of his physical movement takes away from his ability to effectively use his vision.

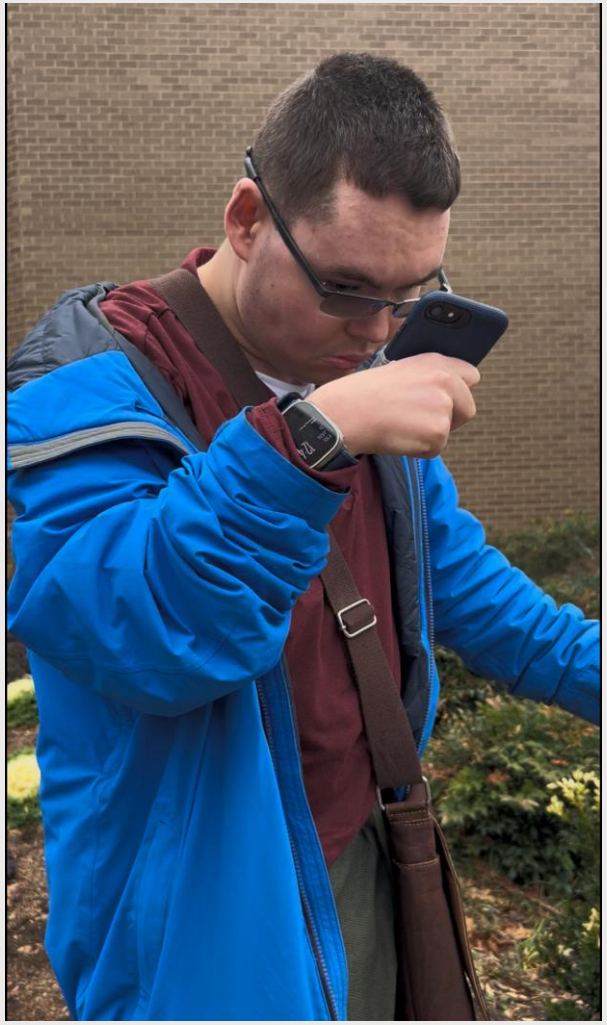
Solutions

- Request assistance to open or hold door.
- Ensure the ride share or Metro Access system will assist with his Rollator.
- When he is working to control physical movement, provide extra support with visual accommodations.

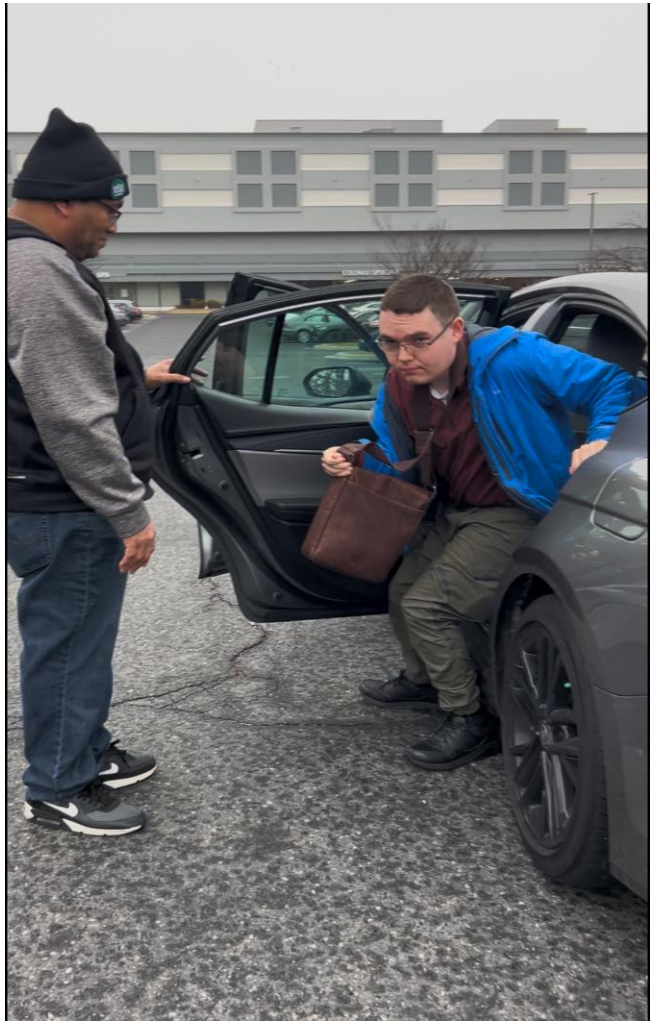
Questions
Comments
Ideas



Accessibility Uber







Characteristics

- Complexity
- Novelty
  - (Approaching car not the concept of ride share)
- Latency
- Movement

Problems

- He did not have his Rollator
- Issues getting the seat belt on.
- Stabilizing self when exiting car.
- Physical exertion minimizes his ability to use his vision effectively.

Solutions

- Use Metro Access in place of Uber.
- Solicit assistance for seatbelt.
- Secure balance before stepping away from the car.

Characteristics

- Complexity
- Novelty
- Latency
- Movement

Orientation Guidelines

The movement of the approaching car may help to elicit visual attention. However, the movement of many cars will create issues of complexity.

Mobility Guidelines

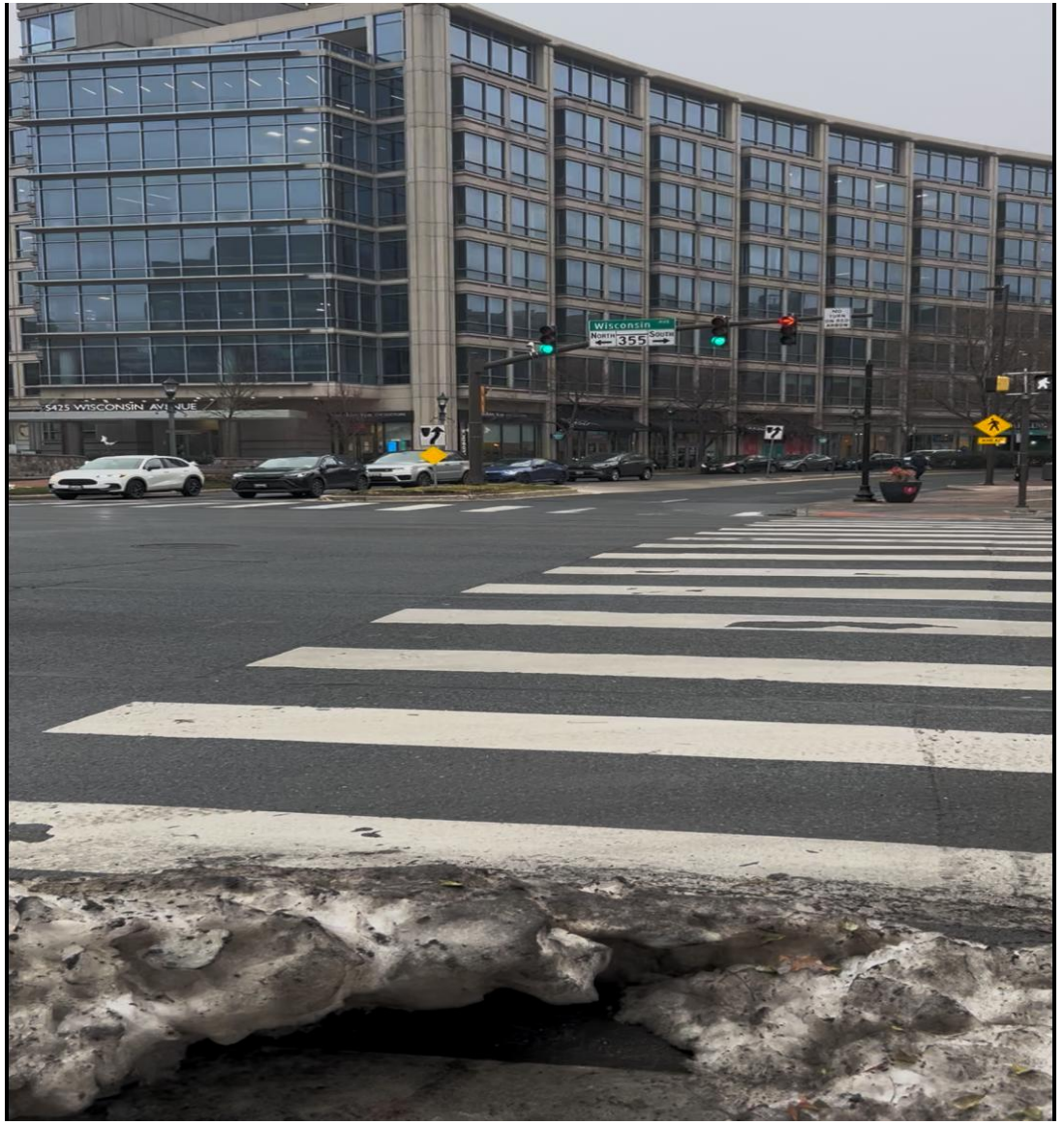
The individual with CVI may have difficulty with eye contact or looking at new faces. This may lead to difficulties with initiating interactions with the Uber driver and sustaining conversation.

Cortical Visual Impairment Advanced Principles
Christine Roman-Lantzy

Questions
Comments
Ideas



Analyzing and Crossing Intersections (familiar)



Characteristics

- Complexity
- Latency
- Novelty
  - Due to snow piles

Problems

- Snow blocking the crosswalk.
- COMS saying the incorrect street name. (Wisconsin Circle not Wilson Circle.)

Strength

- Because of his familiarity with this intersection, and his knowledge of snow, Donovan easily interpreted the new visual information (piles of snow blocking the crosswalk).

Characteristics

- Complexity
- Novelty
- Latency

Orientation Guidelines

- Use comparative language to connect two previously known concepts or objects.

Mobility Guidelines

- Use human guide techniques in novel environments combined with comparative language during travel to help the individual make associations and create new visual schemas.

Cortical Visual Impairment
Advanced Principles
Christine Roman-Lantzy

Questions
Comments
Ideas

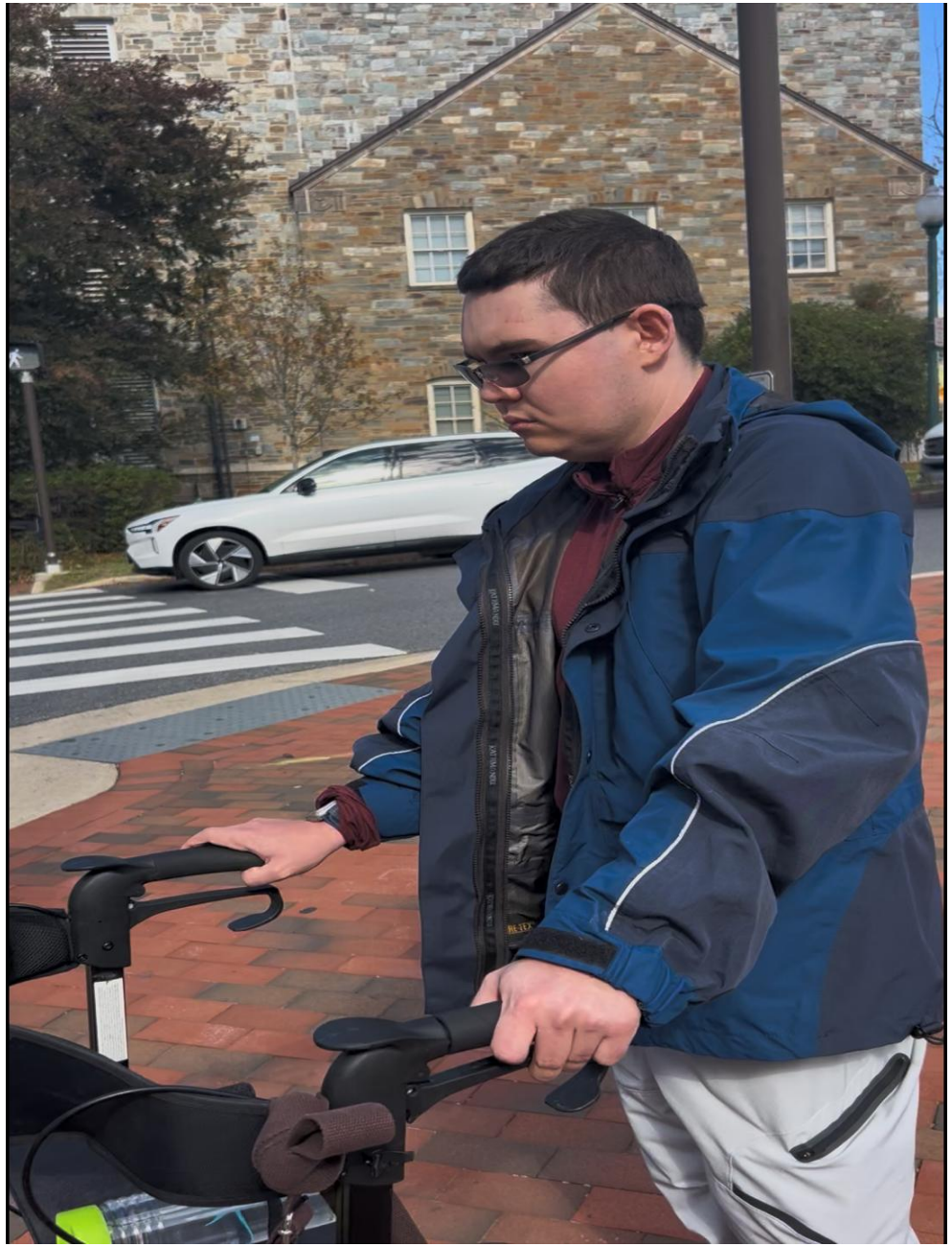


Analyzing and Crossing Intersections (novel)



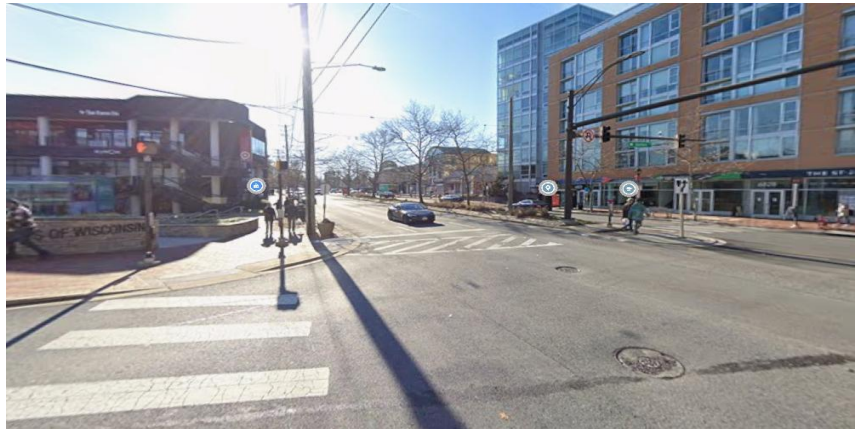
Analyzing and Crossing Intersections (novel)

Donovan stated he was analyzing his parallel street in place of his perpendicular street. The COMS didn’t notice the mistake in the moment and therefore didn’t redirect. Real life, in the moment, happenings of an O&M lesson.



Analyzing
and
Crossing Intersections
(novel)







Images of street he was analyzing

Analyzing and Crossing Intersections (novel)



Analyzing and Crossing Intersections (novel)



Pedestrian attempting to engage and offer assistance.

Analyzing and Crossing Intersections (novel)



Characteristics

- Complexity
- Novelty
- Latency
- Movement
- Distance Viewing

Problems

- It was cold and windy.
- He did not correctly identify the types of lanes from where he was standing.
- The T shaped intersection makes it more difficult to identify the traffic movement in his parallel street.

Solutions

- Spend time reviewing videos or Google Maps of this intersection.
- Use human guide on initial street crossing.
- Review maps and images inside to reduce complexity.

Characteristics

- Complexity
- Novelty
- Latency
- Movement

Orientation Guidelines

Consider the background of the visual target (in this case the Ped Head). When in a novel environment that is also complex choose targets that are presented in isolation (when available) and preview the target both in 2-D (images) and 3-D forms (real life).

Mobility Guidelines

The student needs to be provided with a preview of unfamiliar areas. This will help them gain an understanding of the environment and assist with identifying concerns with safety and accessibility.

Cortical Visual Impairment
Advanced Principles
Christine Roman-Lantzy

Questions
Comments
Ideas



Addressing Novelty

- The selected targets, landmarks, and environments should share traits of previously known targets/landmarks/environments.
- Use comparative language to link familiar and novel targets, concepts, and environments.
- Preview novel environments.
  - Google Maps, videos, photos, etc.
- When previewing a novel environment;
  - Control the sensory environment.
  - Monitor for Bio-behavioral complexity.
  - Connect to previously known information.
  - Monitor for visual and cognitive fatigue.
  - Provide physical support as needed.
    - The student should not have to focus on maintaining posture/balance/head control etc.









Introducing a Novel Intersection

Questions
Comments
Ideas



Public Transportation

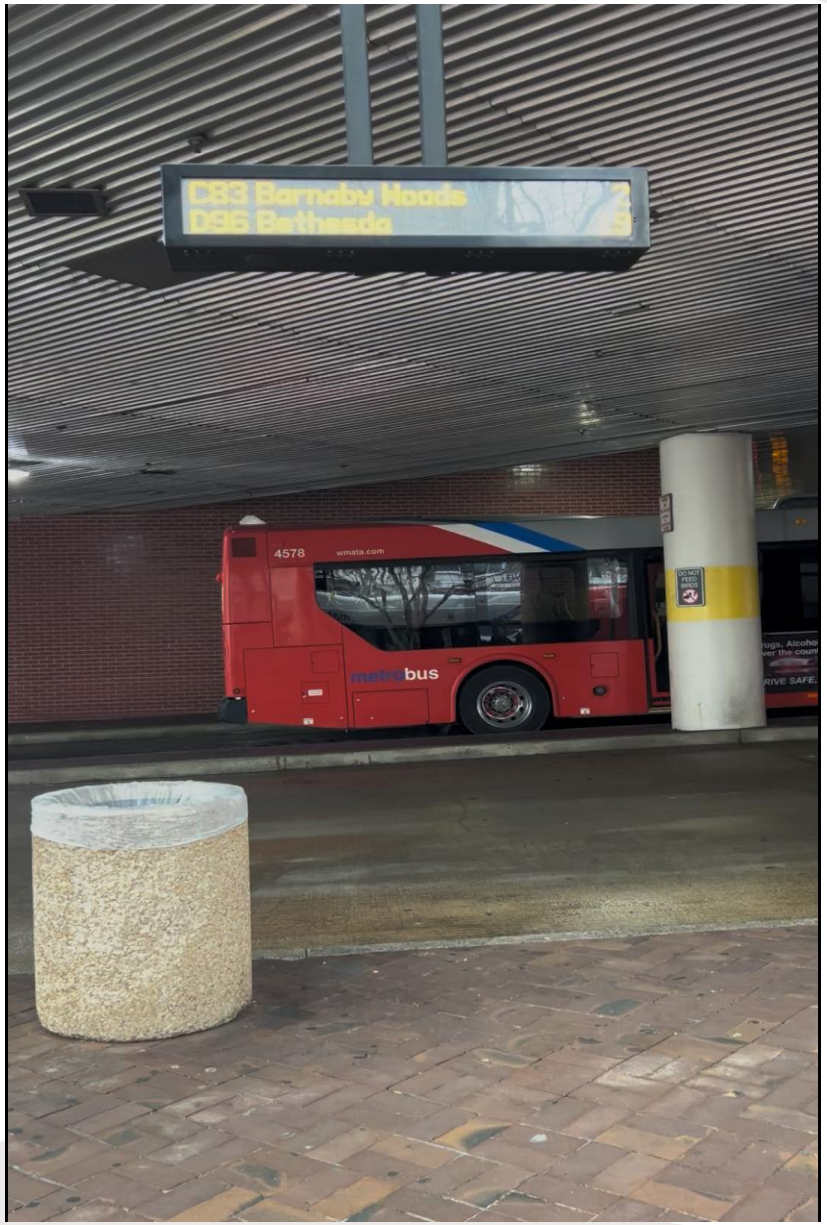




Public Transportation

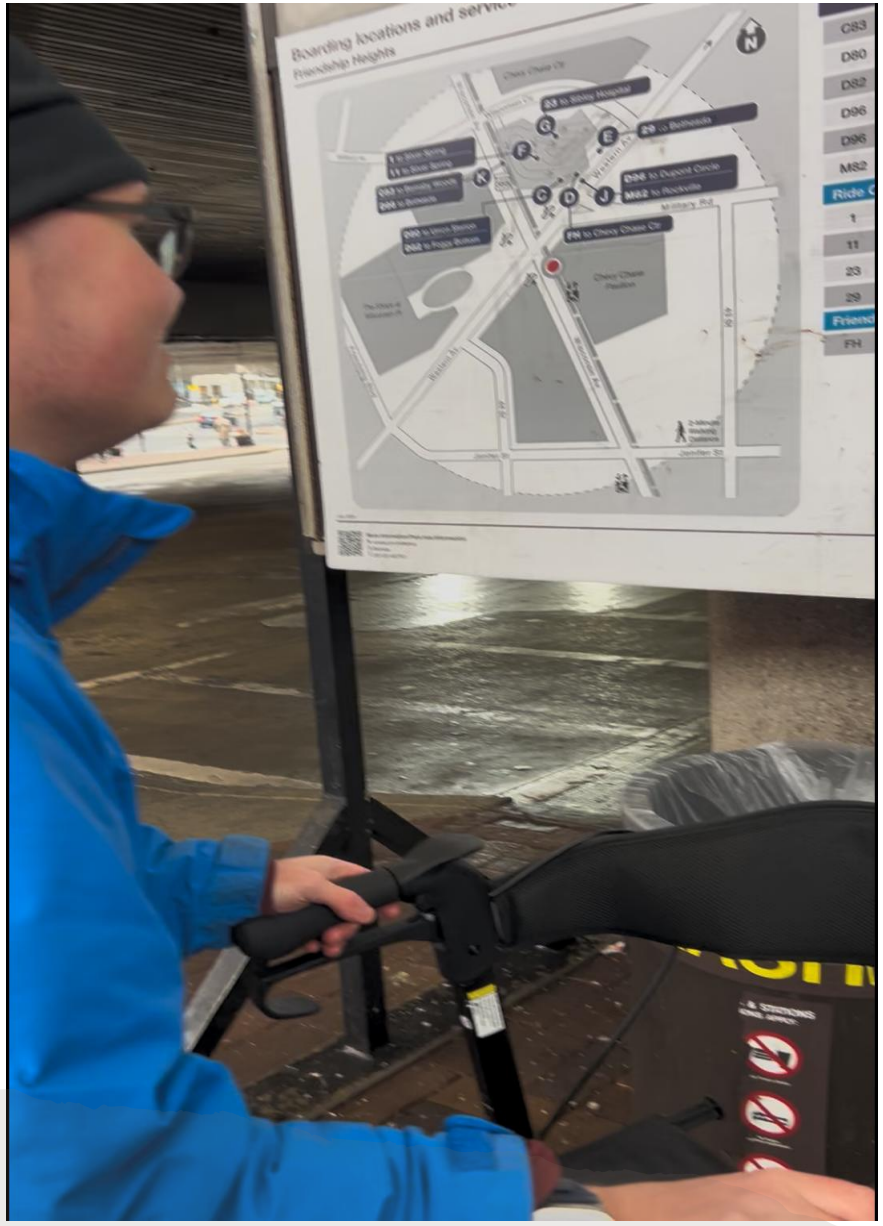
Signage



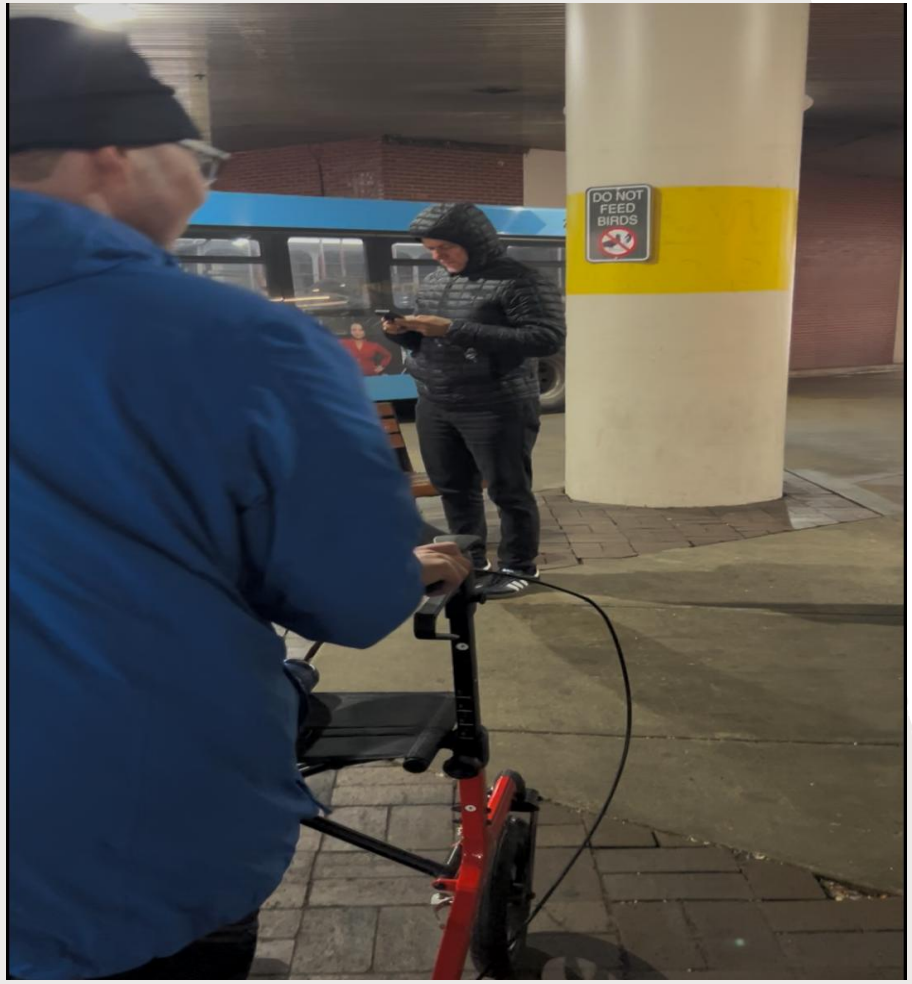


Public Transportation





Public Transportation





Public Transportation

Soliciting Assistance



Public Transportation



Public Transportation



Public Transportation

Accessibility to Metro





Characteristics

- Complexity
- Novelty
- Latency
- Light

Problems

- Dark bus station
- Complex signage
- Obstacles (bike)
- Obstacle (bus in crosswalk)
- Inaccurate and/or confusing information
- Uneven sidewalk

Solutions

- Lighted signage
- Preview environment (in person, pics, videos)
- Call Metro to solicit assistance on bus location/bay

Characteristics

- Complexity
- Novelty
- Latency
- Light

Orientation Guidelines

Present photographs, videos, and text used to describe or show landmarks/routes on a backlit surface (phone, tablet, computer, etc.). Include access to illuminated signage and digital displays as available.

Mobility Guidelines

The student may have visual access to lighted signage at a greater distance.

Cortical Visual Impairment
Advanced Principles
Christine Roman-Lantzy

Questions
Comments
Ideas



Air Travel



Air Travel Accessibility



Air Travel




Important Announcement
If you cannot hear through your headsets, please remove them.


Select your language
English
Deutsch
Français
Español
Optional features
Accessibility
Including display, captions and text-to-speech settings
Parental controls
Only show suitable content

Exploration in a Novel Environment







Characteristics

- Complexity
- Novelty
- Latency
- Light
- Distance

Problems

- Walking Distance
- Large crowds
- Visual fatigue
- Complexity (all)
- Reading the flight info on arrival/departure board
- Using inflight screens

Solutions

- Self-Advocacy
- Use of a wheelchair
- Using phone on app to gain flight info
- Digital ID
- Adjustable scanning equipment

Characteristics

- Complexity
- Novelty
- Latency
- Light
- Distance

Problems

- Dark areas of the zoo
- Print size on exhibits, displays and menus
- Low resolution videos displays
- Auditory output of video displays
- Crowds
- Complexity (all)

Solutions

- Solicit assistance and ask for a list of accessible accommodations
- Call ahead for times with smaller crowd size
- Flashlight
- Preview map and images on website to become familiar with the environment

New Travel Experience

Thoughts

I was pleasantly surprised that some parts of my travel were visually accessible. Such as the TSA station, walkways with ramps and smooth ground surface. However, I found many aspects of travel and exploration difficult and in need of improvement. That includes dining menus that were impossible to read with small print and cluttered backgrounds, and museum exhibits with small print and low lighting.

However, I believe the trip was a success and would do it again. The available accessibility features gave me confidence in my ability to be successful.

Questions
Comments
Ideas



Neurological Vision

- A student's visual system is not only dependent on the integrity of their ocular system (eyes and eye structures) but also on the integrity of the brain's pathways and structures that are involved in visual detection, interpretation, attention, and recognition.
- A CVI student's ability to discriminate subtle changes in a visual target was higher when they focused attention on one attribute or feature.
    - Visual attention and interpretation were less effective when they attempted to divide their attention among several attributes or features.
    - When a student demonstrates visual attention different areas of the brain that are involved in the processing of relevant visual information are engaged. This is a cyclical process that supports creating new visual pathways leading to greater visual attention and interpretation.

Neurological Vision

- Students with CVI often have extremely short attention spans. These students are commonly characterized as seeing very little and have visual skills that vary from minute to minute or activity to activity.
- Students who are attempting to use their vision in unfamiliar environments, are presented with complex visual information, are positioned in poor lighting conditions, are struggling to regulate their biobehavioral state will demonstrate a dramatically altered ability to visually attend and interpret information.
- Visual variability may appear as on-again, off-again vision and intermittent visual attention. This variability in visual function may give others the impression that the child is deliberately not using his or her vision.

The Role of the COMS/NOMS

- The role of the O&M Specialist is to work on providing students with the skills required to locate, orient to, and integrate accessible visual targets.
- For the student with CVI, we begin that process in a controlled environment and increase the complexity of the environment as they begin to create new neural pathways.
  - Familiar indoor
  - Unfamiliar indoor
  - Familiar outdoor
  - Unfamiliar outdoor
- Each new “step up” in complexity should hold some type of similarity to known environments.

O&M Progress Chart	Phase I: Building visual behavior, primarily dorsal stream visual function Level I environmental considerations	Phase II: Integrating vision with function, dorsal and beginning ventral stream visual function Level II environmental considerations	Phase III: Refinement of CVI characteristics primarily refinement of ventral stream visual function Level III environmental considerations		
CVI Characteristics	**Range 1-2 (0)**	**Range 3-4 (.25)**	**Range 5-6 (.50)**	**Range 7-8 (.75)**	**Range 9-10 (1)**
Color preference	Single-color environmental features may be attended to in near space	Strong single-color preference persists	Objects or environmental features that have two or three colors may now be attended to within 4-6 feet	More colors and high-contrast areas may elicit visual attention	Safe travel is not dependent on color cues
Need for movement	-Targets viewed have movement and/or reflective properties -May be attentive to ceiling fans	Movement in the environment may distract from primary target	Movement may be needed to establish attention on target/destination	Movement is not required for attention within 3-4 feet; may be necessary beyond	Movement is not necessary for near or distant visual attention
Visual latency	Prolonged periods of visual latency	Latency slightly decreases after periods of consistent viewing	Latency is present only when student is tired, stressed, or overstimulated	Latency is rarely present	Latency is no longer present
Visual field preferences	Distinct field preference; may use one eye for peripheral vision, the other eye for central vision	May be able to use both right and left peripheral fields but will continue to show strong preferences for original peripheral field	Visual field preferences persist	-Increasing use of right and left fields for near and distance activities -Difficulties with lower visual field function may persist	Visual fields are unrestricted

O&M Progress Chart	Phase I: Building visual behavior, primarily dorsal stream visual function Level I environmental considerations		Phase II: Integrating vision with function, dorsal and beginning ventral stream visual function Level II environmental considerations	Phase III: Refinement of CVI characteristics primarily refinement of ventral stream visual function Level III environmental considerations	
CVI Characteristics	**Range 1-2 (0)**	**Range 3-4 (.25)**	**Range 5-6 (.50)**	**Range 7-8 (.75)**	**Range 9-10 (1)**
Difficulties with visual complexity	-Visually attends only in strictly controlled environments *those without sensory distractions -Engages in rote, assisted travel	Visually attends to or fixates on simple targets at near (within 3 feet), with environment controlled for sensory distractors	-May be able to tolerate low levels of familiar background noise while maintaining visual attention on familiar targets -Engages in rote or route travel with adapted visual cues	-Competing auditory stimuli tolerated during periods of viewing -May travel familiar routes using naturally occurring, simple landmarks or cues	-Only the most complex visual environments affect independent travel -Environmental or traffic signs may now be useful for independent travel
Need for light	-Is overly attentive to lights -Room light may have to be reduced	-Is less attracted to lights: can be redirected to other targets	-Environmental light is no longer a source of distraction -Backlit tablets may be useful for pre-teaching environmental landmarks	-Light may help anchor or establish orientation	-Responses to light are commensurate with those of non-visually impaired peers
Difficulty with distance viewing	Visually attends in near space only	Occasionally attends visually to familiar, moving, or large targets in simple or familiar settings, up to 3 to 4 feet	-Visual attention ex-tends beyond near space, up to 4 to 6 feet -Complexity in the environment may reduce this distance	-Visual attention extends to 10 feet with targets that produce movement or are in a familiar or noncomplex area -Color cues, movement, and target may be factors in visual attention	-Visual attention extends beyond 20 feet -Demonstrates memory of routes, cues, or landmarks and may now be able to travel independently
Atypical visual reflexes	No blink in response to touch and/or visual threat	Blinks in response to touch but response may be latent	-Blink response to touch consistently present -Blink to visual threat is intermittently present	-Blink response to visual threat is consistently present -May now anticipate approaching obstacles	Visual reflexes always present at expected or age-appropriate levels

O&M Progress Chart	Phase I: Building visual behavior, primarily dorsal stream visual function Level I environmental considerations		Phase II: Integrating vision with function, dorsal and beginning ventral stream visual function Level II environmental considerations		Phase III: Refinement of CVI characteristics primarily refinement of ventral stream visual function Level III environmental considerations
CVI Characteristics	**Range 1-2 (0)**	**Range 3-4 (.25)**	**Range 5-6 (.50)**	**Range 7-8 (.75)**	**Range 9-10 (1)**
Difficulty with visual novelty	Responds only to familiar objects	May visually attend to objects or environmental features if they share characteristics with familiar objects	Visually attends to landmarks or cues that are highlighted with familiar color or pattern	-Selection of objects or environmental or route cues remembered after several sessions of familiarization -Demonstrates visual curiosity in novel settings	Selection of objects, environments not restricted or specially adapted
Absence of visually guided reach	Look, reach, and touch occur as separate functions	Occasional visually guided reach, possibly with a single, preferred object	Visually guided reach used with familiar objects, backlit materials, simple configurations, and "favorite" or vibrant color.	Look and reach occur in sequence, but not always together	Look and reach occur as a single action

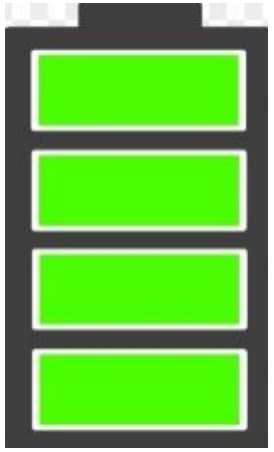
Draw an ***X*** through boxes that represent resolved individual visual behaviors
Use a highlighter to outline boxes describing current visual functioning
Draw an ***O*** in boxes describing visual skills that may never become typical because of coexisting ocular conditions

Cortical Visual Impairment: An Approach to Assessment and Intervention © 2018 C. Roman-Lantzy

Questions
Comments
Ideas



The Visual Battery



A student will have a full visual battery when they are well rested, feeling well, and emotionally calm. A full visual battery is key for the student's ability to be educationally available.

What drains a student's visual battery?

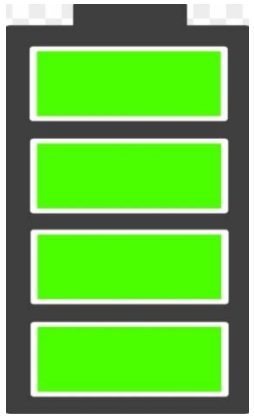
- Prolonged visual attention
- Cognitive processing of difficult concepts
- Searching for visual targets against a complex background
- Backlit surfaces
- Searching for targets in a busy or complex environment.
- Providing visual attention to new objects
- Visual interpretation in busy environments
- Visual interpretation of faces
- Visual attention in dim lighting
- Visual attention in very bright lighting
- Medication
- Seizures
- Physical fatigue
- Emotional fatigue
- Stress
- Visual interpretation of new objects.



How to recharge a student's visual battery

- Breaking from activity prior to crossing the threshold of complete visual fatigue
- Closing eye for a few seconds or minutes
- Using auditory or haptic sense as the primary source of gaining information

- Having a snack
- Getting a drink of water
- Taking a walk or movement break
- Shift visual gaze away from the target



Visual Battery

What Drains My Visual Battery

- Things that are too small
- Things that are complex
- Using my vision for extended periods of time
- Repetitive actions such as copying and pasting on the computer

What Fills My Visual Battery

- Appropriate font size
- Taking breaks
- Using auditory information in place of, or in conjunction with, my vision.

Donovan Quinn

Questions
Comments
Ideas



References

- Bennett, C. R., Bauer, C. M., Bailin E. S., & Merabet, L. B. (2020). Neuroplasticity in cerebral visual impairment (CVI): Assessing functional vision and the neurophysiological correlates of dorsal stream dysfunction. *Neuroscience & Biobehavioral Reviews,* 108, 171-181.
- Bathelt, J., de Haan, M., & Dale, N. J. (2019). Adaptive behaviour and quality of life in school-age children with congenital visual disorders and different levels of visual impairment. *Research in Developmental Disabilities, 85* 154-162.
- Chokron, S., & Dutton, G. N. (2023). From vision to cognition: potential contributions of cerebral visual impairment to neurodevelopmental disorders. *Journal of Neural Transmission*, *130*(3), 409–424. https://doi.org/10.1007/s00702-022-02572-8
- Cohen-Maitre, S. A. (2002). *Visual attention in children with cortical visual impairment*. ProQuest Dissertations & Theses.
- Farah, M. (2005). *The cognitive neuroscience of vision (p. 60). Blackwell*
- Philip, S. S. & Dutton, G. N. (2014). Identifying and characterizing cerebral visual impairment in children: a review: *Clinical and Experimental Optometry, 97(3), 196-208.*
- Roman-Lantzy, C. (2018). *Cortical Visual Impairment An Approach to Assessment and Intervention*. AFB Press, New York, NY.
- Roman-Lantzy, C. (2019). *Cortical Visual Impairment Advanced Principles*. AFB Press, New York, NY.