Orientation & Mobility
For the
Advanced Traveler with CVI

Speakers

Donovan Quinn

- Recent High School Graduate

Rebecca Hommer

- Connections Beyond Sight and Sound
- Teacher of Students with Visual Impairment
- Certified Orientation & Mobility Specialist
- Teacher of Students who are DeafBlind

Slide 3

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.

Slide 4

Image of a simple plus shaped intersection with a dark circle for the starting location and an orange circle for the destination. The street names are labeled Bout Ave and Rockville Pike

Slide 5

Image of a line drawn map with two plus shaped intersections and two T shaped intersections. The starting point is a half circle in red and the destination is a red square. The streets are labeled Willard Ave, Wisconsin Ave, and Western Ave. Whole Foods Market is labeled as the starting location.

Slide 6

Image of a line drawn map. It is similar to the map in slide 5 with Wisconsin Ave, and Western Ave being extended with greater detail. The starting location and destination are the same as in slide 5.

Slide 7

Image of a line drawn map. It is similar to the map in slide 6 but with additional landmarks and buildings added.

Slide 8

Image of a line drawn map. The map is similar to slide 5 but with additional details added to the north section of Wisconsin Ave.

Slide 9

This is a line drawn map of 3 city blocks. The streets and street names are highlighted in yellow. The image shows Dawson’s Market, the Library, the ice rink, gym, and additional unnamed buildings. The street names from left to right on the map are N Washington, Gibb St, and Maryland Ave.

Slide 10

This is a line drawn map similar to slide 9 with additional building names and streets added. Building names include Garage C, Wild Wings, Starbucks, CVS, Garage A, and Garage B. Additional street names are Beall Ave, and Middle Lane.

Slide 11

Characteristics of CVI Influencing the Use of Vision

Color, movement, latency, fields, light, distance, complexity (with the subdomains of sensory, array, object, faces), visually guided reach, blink reflexes

Slide 12

Image of the O&M Progress Chart. The area of Range 7-8 is highlighted.
Color: more colors and high-contrast areas may elicit visual attention
Need for Movement: Movement is not required for attention within 3-4 feet; may be necessary beyond.
Visual Latency: Latency is rarely present
Visual Field Preferences: Increasing use of right and left fields for near and distance activities. Difficulties with lower visual field function may persist.

Slide 13

Image of the O&M Progress Chart. The area of Range 7-8 is highlighted.
Difficulties with Visual Complexity: Competing auditory stimuli tolerated during periods of viewing. May travel familiar routes using naturally occurring, simple landmarks or cues.
Need for light: Light may help to anchor or establish orientation
Difficulty with distance viewing: 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.
Atypical visual reflexes: Blink response to visual threat is consistently present. May now anticipate approaching obstacles

Slide 14

Image of the O&M Progress Chart. The area of Range 7-8 is highlighted.
Difficulty with visual novelty: Selection of objects or environmental or route cues remembered after several sessions of familiarization. Demonstrates visual curiosity in novel settings.
Absence of visually guided reach: Look and reach occur in sequence, but not always together

Slide 15 Color

- Targets/Landmarks can be 3+ colors
- Targets/Landmarks should be highly saturated in color

Images of a Capital One Bank sign, Kroger sign, stop sign, and a Maryland Terp statue.

Slide 16 - Donovan

Color:

- When something is a bright color, it helps me easily see things in my environment.
- I am able to ignore other colors, so I can focus on what I am doing.
- If a vehicle is dark or has window tinting, it can affect my ability to determine which way they are turning.
- If there is discoloration in the headlights or turn signals, I have difficulty determining what lights are illuminated or flashing. The greater the discoloration, the more difficult it is for me to interpret.

Slide 17 Movement:

- Targets may need to have movement qualities to elicit visual regard beyond 10 feet
- The student may need to move within 10 feet to see a landmark that is stationary.

Images of a barber pole, blow up waving figure, revolving door, blowing flags

Slide 18 Donovan

Movement

- I need movement for objects beyond 6-7 feet.
- I can see a moving car at about 50 feet. I can identify the vehicle within 20 feet.
- If the display screen at a bus or Metro station moves quickly, it impacts my ability to visually interpret the information and know when the next bus is coming.
- Interference crossing: I have a hard time figuring out how to time the street crossing, especially with multiple vehicles moving around because, I can't figure out which vehicle to use when they all moving.
- When a vehicle is turning into my peripheral vision my glasses frame and visual field deficits make it hard to gauge distance and speed as they approach.

Slide 19 Visual Latency

- Students may miss familiar landmarks while completing familiar routes due to visual latency. There may not be enough time to visually interpret/process the landmark before they move by it.

- Visual latency in familiar and unfamiliar environments may make it difficult for students with CVI to correctly time street crossing using interference strategies.

Image of a green hourglass with sand running through it.

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- I need up to about 20-30 seconds when I have visual fatigue, anxiety, or I am overly stressed.
- I need about 10-15 seconds of visual latency when a car is approaching.
- I need about 5-10 seconds to visually detect a person when they are approaching.
- I may need approximately to 45-50 seconds to identify a fast-moving vehicle.
- I may need approximately 20-25 seconds during the day and around 35 seconds at night to detect vehicles and people due to low levels of light.
- I need approximately 5-10 seconds to identify a change in the ped-head or traffic light.

Slide 21 Complexity

- Backgrounds to landmarks or targets may add complexity to the array and may interfere with the student's ability to interpret a familiar landmark.
- Rush hour traffic will have a different level of complexity. A greater number of cars, additional traffic/people sounds, additional pedestrian movement, etc.
- Visually interpreting a familiar face in a novel environment may be difficult for students.

Abstract image of a city.

Slide 22 Donovan

- Object: If there is a lot of text or signage on a building or vehicle, it can be challenging to visually interpret the information, especially if the text is small or moving.
- Array: Multiple levels of signs can be tricky. Too much signage around the destination I am looking for can make it hard to locate.
- Environment: If there is a lot of noise or abnormalities in the environment that make it busy, it can become very distracting and hard for me to focus. Construction sites/signage, emergency vehicles, honking cars, people yelling, a lot of fast-moving cars, an unexpected touch, confined spaces, or glitches in

technology, etc., are all examples of experiences that make it hard for me to interpret visual information.

Slide 23 Visual fields

- When choosing landmarks/targets, be sure to consider the student's visual fields.

Image of a couple walking on a brick sidewalk with the lower field blacked out. A footbridge in the woods with the lower right field blacked out, an image of a sunset with the central field missing, and an image of a city with greater amounts of central field loss.

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- I do have lower field issue when using my peripheral vision. This makes it hard to locate and manage obstructions in my travel path.
- My right visual field has a greater deficit than my left visual field.
- My central visual field is not obstructed, but my glasses frame and nose pad can get in the way of my central vision which can reduce my ability to use binocular vision.
- I have to look over my glasses to get a good view in my superior vision.

Slide 25 Light

Light may be:

- Used to elicit visual attention to a target.
- Used to help maintain or regain orientation.
- Used to help maintain a direct line of travel.

Images of a lighted exit sign, a pedestrian crossing signal, a train station at night, and a lighted sign in the shape of a tooth.

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- When it is bright outside and the sun is shining in my face, it impacts my ability to see the map/phone, signage, and print maps.
- The backlight on my phone is helpful but not required. When my phone is on night mode I need to use more of my "visual battery".
- If the backlighting needs to be reduced due to software constraints or low battery, I am required to work harder to use my vision to interpret information.

Slide 27 Distance Viewing

- Will be impacted by the level of complexity in the environment
- Consider ocular comorbidity
- Consider proximity and complexity when working with the student to identify landmarks/targets
    - Good day vs bad day
    - High complexity vs low complexity
    - Novelty vs familiar

Images of two students using a monocular

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- The use of a monocular is helpful.
- I can see details like overhead signage at the grocery store, but I have trouble when there is a lot of signs for pricing, discounts, etc.
- Reading ingredients is hard because of the size of the print and the text is spaced too closely together.
- Reading medication bottles/labels is very hard.
- When the font size is large enough on a building name or number I can see it within 10 feet. But when the font size is smaller, I need to be within 2-3 feet.

Slide 29 Visual Reflexes

- Does the traveler respond to a threat?
    - No response
    - Exaggerated response
- Does the traveler blink but not react?
- Does the traveler blink and respond but the response is latent?

Images of children blinking, with eyes wide open, and a man in a wheelchair with his arms in front of him as a car approaches him in a parking lot.

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- My visual reflexes can be affected by factors such as having to look down at my device (visual accommodation), and then back up again.
- I have a delayed response to people moving quickly toward me. I may not respond to them for up to 5-10 seconds.
- If there are objects coming quickly toward me, I may not respond immediately.

Slide 31 Novelty

- Novel environments, targets, landmarks require greater visual processing.
    - Increases latent responses
    - Increases visual fatigue
- Novel information is more difficult to visually interpret.

Image of a women holding her fingers to her temples and making a grimacing face.

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- I need extra support in a new environment because I have a hard time understanding what I see especially when there is a lot of movement, and the signage is too small.
- When traveling a new route, I have a hard time understanding the flow of the traffic, the signage, the details of the intersection (especially large ones), where the median is located amongst the cars and traffic lanes, and when there is a pedestrian cross signal located on a median.
- New people around me make travel difficult because I cannot accurately identify their facial expressions, movements, and body language.

Slide 33 Visually Guided Reach

- Does the traveler consistently maintain their eyes on the target?
    - Novel environments
    - Complex environments
    - Visual or physical fatigue
- Look - Look Away - Look Again

Images of a man pushing the cross-walk button, a person reaching for a cup, and two people giving a high five.

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- No issues with using my eyes and hands together.
- In a complex environment it is hard to look and reach at the same time, so I look, look away, and look back to the target.
- Using my right hand and eyes together is much more difficult than when I use my left hand and eyes together.

Slide 35 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.

Slide 36 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.
- 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.