AT 204: WHY IS THE STUDENT HAVING DIFFICULTY WITH EYE GAZE?

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Access to Independence

Introductions

- Who am I?
- Goals for today
  - Put in chat box

What we will be covering:

Your student is using Eye Gaze to control a speech generating device, but is struggling.

- What is Eye Gaze technology and how does it work?
- What are common barriers to successful use?
- What can be done to optimize Eye Gaze use?
- When are other access methods more appropriate?

Eye Gaze

- **What is it?**
  - Eye gaze is sometimes considered a Direct access method, as the client looks directly at a target to select it
  - Eye gaze may also be considered a Hybrid access method, as eye movements are translated into movement of a cursor or highlight, similar to a mouse

Eye Gaze

- **How does it work?**
- Eye tracking is used to determine where a person is looking at a computer or speech generating device screen
- 'Illuminators' send out an infrared (IR) light which is reflected by the eyes
- A camera measures the reflections and then determines where on the screen the client is looking
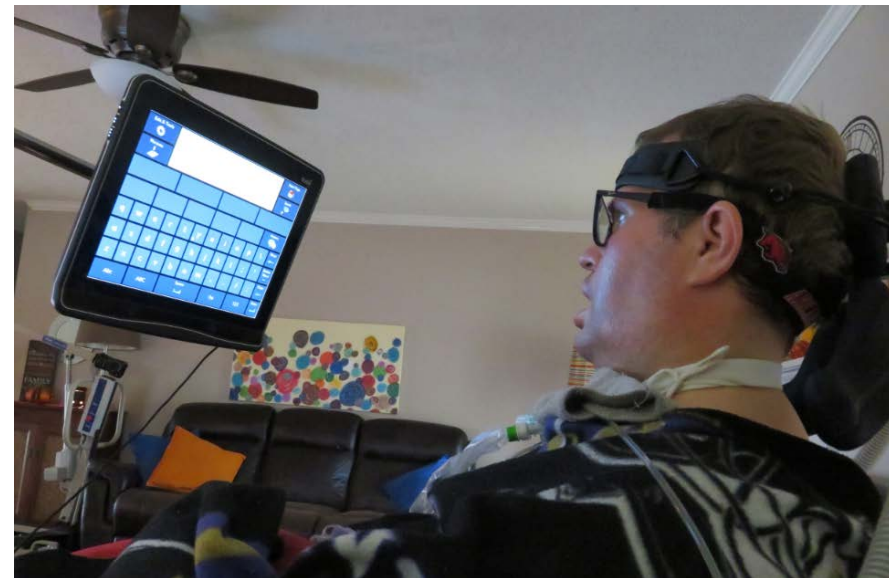
Eye Gaze

- **Product Options**
  - Tobii Dynavox
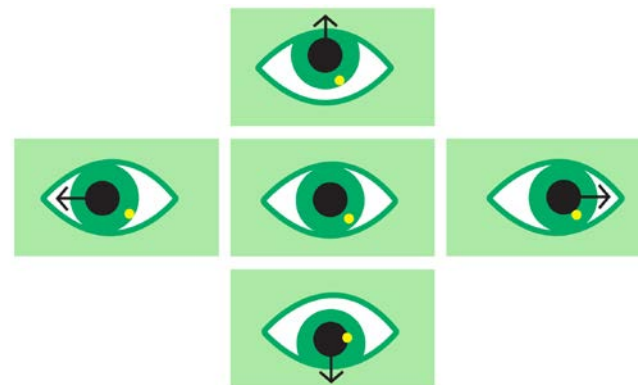 - Prentke Romich NuEye Tracking System

Tobii Dynavox

- I-12+
- I-15+
- Other options for computer and tablet control via Eye Gaze

Tobii Dynavox

- Uses a 3D model of the eye which allows the client to move their head while using eye tracking
- Dark pupil tracking
  - Illuminators are placed further away from the camera (to the side), less light reflection on the pupils
- Bright pupil tracking
  - Illuminators are placed closer to the camera
- Tobii device dynamically shifts between Dark and Bright tracking, as needed

Eye Gaze Video

Prentke Romich

- Accent series with NuEye Tracking System

Eye Gaze

- **How does the client make a selection?**
- Activation
  - Dwell
  - Blink
  - Switch

Activation

- Dwell
  - Sustain gaze on a specific icon for a programmed amount of time
  - Must distinguish from time spent tracking

Activation

- Blink
  - Intentional blink (longer than normal eye blink) acts as switch activation
  - Client may lose sustained gaze on desired location

Activation

- Switch
- Can be difficult to sustain Eye Gaze while activating switch
  - Dissociation

An example

- Cassidy
- Using Eye Gaze, but having difficulty sustaining visual gaze
  - Dwell was also slowing her down, as she had to wait for each selection to be 'activated'
- Tried a head switch for activation
  - She was able to activate this while sustaining visual gaze
  - Increased communication speed

Common Barriers to Successful Use

- **Positioning**
  - Client
  - Device
- **Vision**
  - Acuity
  - Tracking
  - Sustained gaze
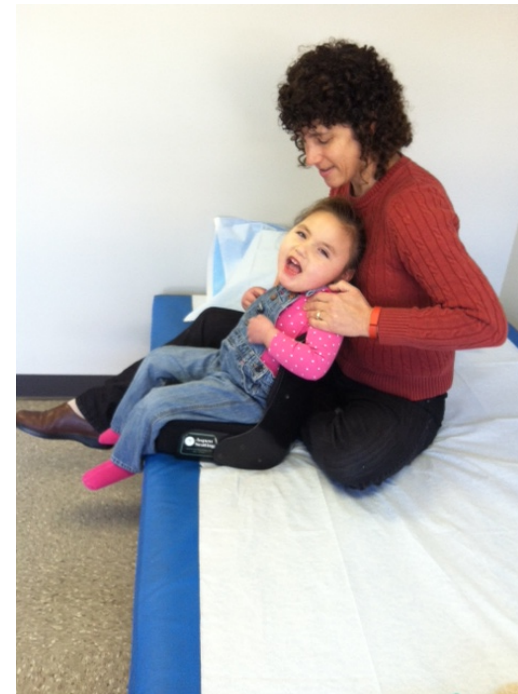 - Eye movements
  - Glasses

Positioning

- The client must be well positioned to use Eye Gaze optimally
- Optimal position of pelvis and trunk lead to optimal head position
- The device must be positioned relative to the client

Positioning

- If the pelvis is in a posterior pelvic tilt, the trunk and neck will be flexed
- This impacts head control and position

Positioning

- Jesse
- Linear seating system
- i2i head support
- Neck hyperextended
- Using Eye Gaze
  - Not well…

Positioning

- Jesse
- Neck hyperextension
- Upward gaze

Positioning

- Jesse
- Corrected head position
  - Head support needed to be moved forward
- Improved gaze
  - Successful use!

Positioning

- Jesse
  - A comparison:

Positioning

- Jessica
  - Successfully using Eye Gaze
  - However, she is positioned in a significant posterior pelvic tilt and having back pain
  - She explained, using her communication device, that she had to slide down in her wheelchair to use the Eye Gaze!!!
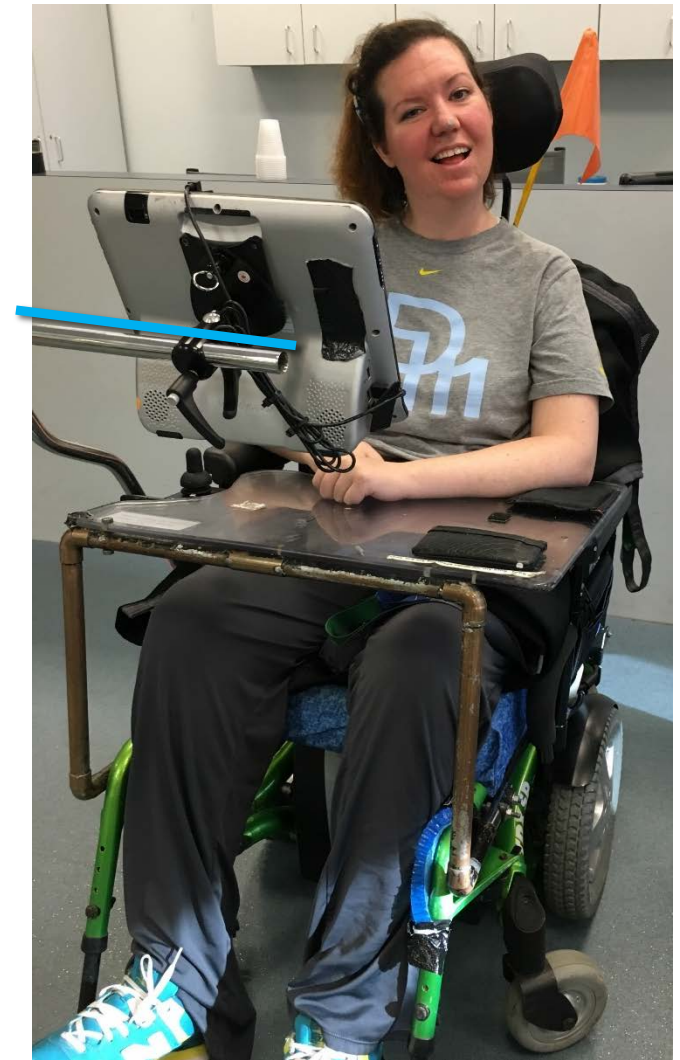
Positioning

- Jessica
  - We raised the mount so that Jessica could sit upright AND use her Eye Gaze
  - Improved posture, reduced pain and pressure risk
  - Successful communication
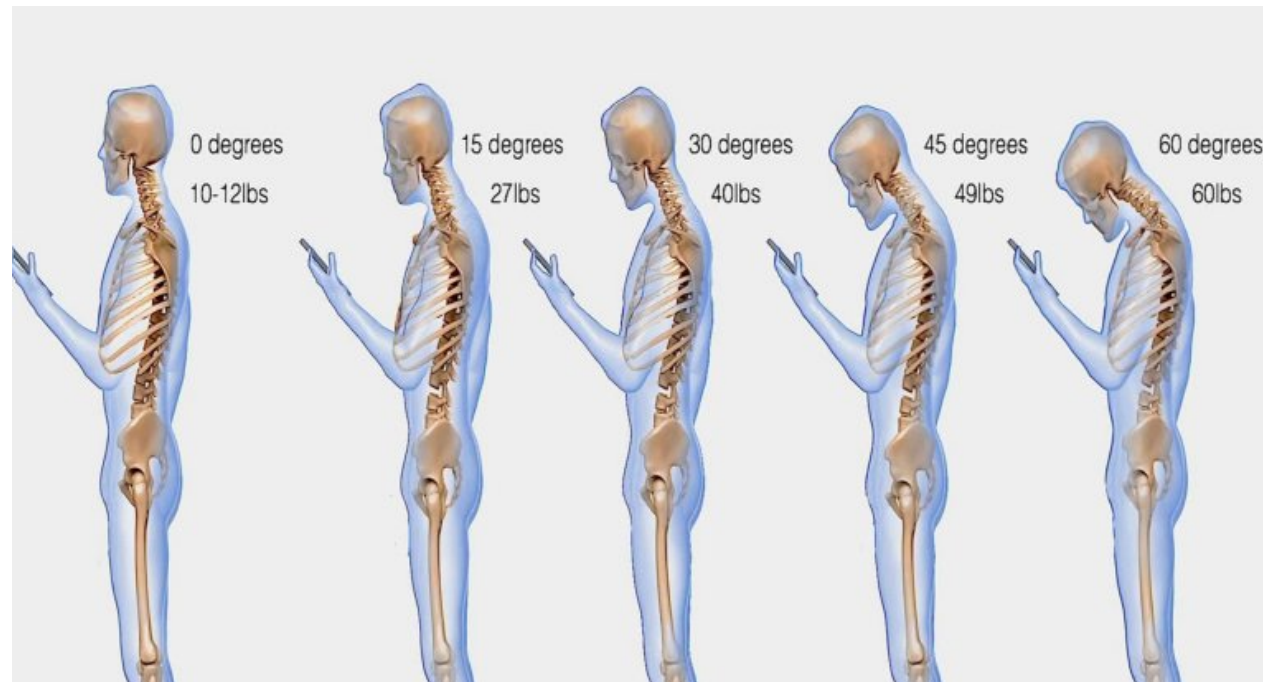
Positioning

- Jessica
  - A comparison:

Device Placement

- Eye Gaze devices are typically mounted higher than when other access methods are used
- This allows for a more direct line of sight
- More robust mount required with adequate height adjustment

Device Placement

- If the device is mounted too low, keeping the head tipped forward increases the weight that the neck must hold
    - Every inch of forward head posture can increase the weight of the head on the spine by an additional 10 pounds (Kapandji, Physiology of Joints, Vol. 3)
    - This makes the head "feel" heavier and is harder to sustain this position

Device Placement

- Challenge:
- When the device is in a good position for Eye Gaze, the client's vision is blocked for other activities
  - Seeing the front of the classroom
  - Visual field for power mobility

Device Placement

- Solution:
- The client's mobility base may have to be positioned at an angle to allow them to see the front of the classroom
- The device can be mounted as low as possible, still allowing for access

Device Placement

- What about Power Wheelchair use?
  - The client may need to drive with the device removed
  - This will require a caregiver to take this on and off
  - Another option: power mount
    - Product options very limited at this time (Motion Concepts)
    - *Video

Vision

- Acuity
- Tracking
- Sustained gaze / focus
- Glasses
- CVI / low vision
- Nystagmus

Vision

- Acuity
  - Can the client see and discriminate between multiple icons?

Vision

- Tracking
  - Can the client visually track across multiple icons on the display?

Vision

- Can the client sustain visual gaze to a specific icon to make a selection?
  - If using dwell
- Or, can the client sustain visual gaze while simultaneously activating a separate switch?

Vision

- Glasses
- Most Eye Gaze systems work well with glasses
- If the client has a strong prescription, there will be distortion in the lens, except in the very center
  - This can prevent accurate use
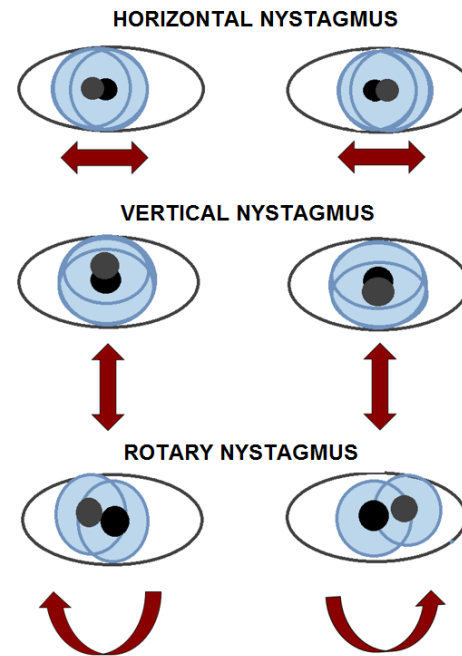 - May be thinner options available

Vision

- Cortical Visual Impairment (CVI)
  - Client may need to hold head at an angle to optimize vision
  - Head positions may vary
  - Sustained gaze difficult

Vision

- Nystagmus
  - Can interfere with Eye Gaze recognition

HORIZONTAL NYSTAGMUS

VERTICAL NYSTAGMUS

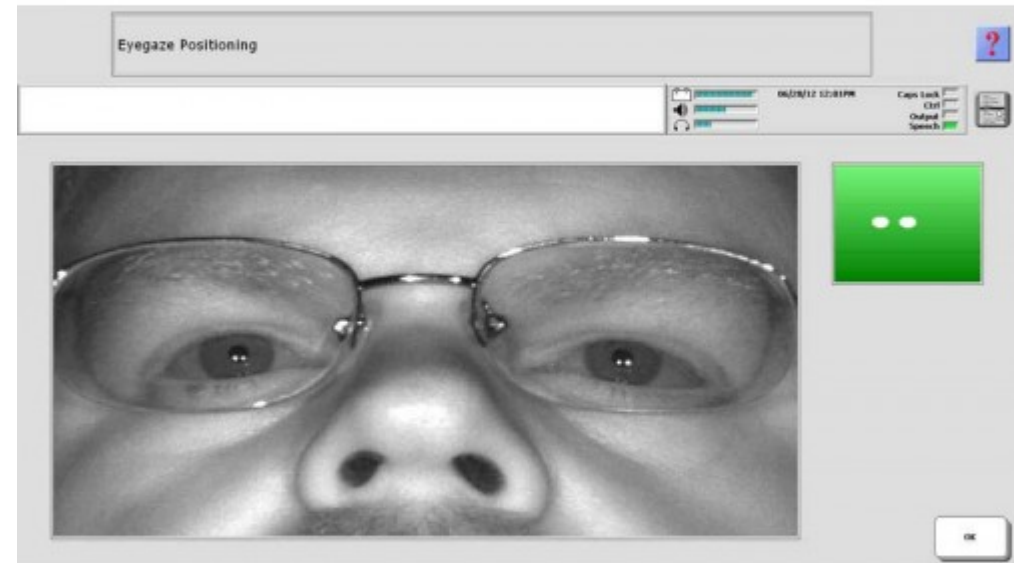ROTARY NYSTAGMUS

Vision

- Haley
  - Trying Eye Gaze
  - Glasses
    - Distortion, except for center of lens
  - CVI
    - Difficult to sustain gaze
  - Poor head control
    - Hard to keep head up and eyes toward display

What can be done to optimize Eye Gaze use?

- Optimize client position
  - Particularly head position
- Optimize device position
- Optimize vision
- Calibration
- Other programming

When are other access methods more appropriate?

- Despite our best efforts, some clients cannot successfully use Eye Gaze
- If the client cannot access the device, despite efforts to optimize use
- If the client can access the device, but inefficiently
  - Too much time, too much effort, reduce accuracy
- If the client's vocabulary is limited by Eye Gaze use

- Switch access may be indicated
  - Auditory scanning

Questions?

Thanks!

Upcoming Webinars:

- 8/14/18
- AT 205: How do I determine where the student can access a switch?

- 9/18/18
- AT 206: How do I determine what type of switch the student can use?

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