IMPLEMENTING EYE GAZE 👁

Contents

INTRODUCTION TO EYE GAZE

What is eye gaze?

Eye gaze or eye control is one of many ways an individual can access a communication device and computer. Eye gaze is considered a **direct access method.** The individual looks at the screen to select the target. There are many different access methods including touch, switch and head pointing. An individual may use **multiple access methods**, using a different access method for different tasks or different access methods at different times of the day. Work with the individual's team including family, educators, Speech Pathologists, Occupational Therapists and Physiotherapists to find out what tasks might suit different access methods.

Eye Gaze devices have a computer, eye tracker and software that pick-up reflections from the user's eyes.

How eye tracking works: https://www.tobiidynavox.com/pages/what-is-eye-tracking

Why use eye gaze?

Eye gaze technologies can provide opportunities for individuals to communicate, play and access the computer. Many individuals with severe physical impairments may not have had the opportunity to explore, problem solve and show their knowledge. Eye gaze technologies can be used with individuals with cerebral palsy (Karlsson et al, 2017), Rett Syndrome (Townsend et al, 2016) and other physical and neurological disabilities such as spinal cord injury, multiple sclerosis, and motor neurone disease.

What does the research say?

The use of eye gaze technologies is relatively new and has recently started appearing in the research literature. There are several studies discussing the use of eye control technologies for individuals with severe physical impairments that also include cognitive and communication impairments (Karlsson, 2017; Borgestig, 2016). For children with complex impairments research has highlighted the need to measure performance over longer periods, several months to over a year to give opportunity to learn the new skills required for eye control (Borgestig, 2016). Research suggests that individualizing the technology and providing ongoing training and support to caregivers facilitates greater satisfaction and longer-term use of the technology (Karlsson, 2017; Townend, 2016).

MUST READ: Eye-Gaze control technologies for people with cerebral palsy. 2021 Clinical Guidelines
https://bit.ly/EGclinicalguidelines

Last updated February 2025

THE EYE GAZE LEARNING PATHWAY

Most individuals have never used eye gaze technology before or used their eyes to control objects; our eyes are naturally used for seeing (Borgestig, 2016). As with anything new we need to learn new skills through exposure, practice, and teaching. Using eye gaze technology requires the control of eye movements, ability to switch between using your eyes to see and using your eyes to select, and the cognitive demands of the task, for example communicating, playing games, operating the computer. For many individuals with complex physical disabilities, we can work through a range of skills to support their learning.

The **Tobii Dynavox Eye Gaze Pathway** offer us a framework for developing eye gaze skills. There are other frameworks available, this resource will use the six steps presented in this pathway to guide your implementation and assessment.

Step	Description
Screen Engagement	• Learning through fun! Movement of their eyes has a direct and immediate impact on what happens on the screen, "cause and effect".
Responding	• Learning that looking at different parts of the screen produces different responses.
Exploring	• Learning through exploring! Expanding cause and effect learning and creating understanding that changes happen on-screen depending on where we look.
Targeting	• Learning to focus gaze on a part of the screen to activate a target.
Choosing	• Learning to dwell (hold) gaze or press a switch to select targets on the screen
Full Control	• Learning to use eye gaze for different activities (communication, computer access, play)

Tobii Dynavox Eye Gaze Pathway Information and Resources: https://bit.ly/EyegazePathway
Each of the six steps contains practice activities, instructional videos, and communication tips to help get you on your way with eye gaze.

Link Assistive

ASSESSMENT

Assessment when using eye gaze technologies is **dynamic**. Until the user can try the technology it is hard to know what their skills are. You can start by observing how the individual uses their eyes and explore some choice making through eye pointing to objects or symbols. **Observation** is your most powerful assessment tool. Watch not only what is on the screen but what the individual's eyes are doing.

When we come to using eye gaze technologies there are a few key factors to consider (Stokes & Ruben, 2017):

1. **Find what is fun!** Motivation and engagement are key to finding out what our individual can do. Assess what the individual likes, is motivated by, try different games and activities, and observe their engagement and reactions. Personalise activities to include their interests, especially for adult users.
2. **Just the right challenge!** Grade and adjust tasks to provide just the right level of challenge so the individual is not bored but also does not disengage because it is too hard.
3. **Know why you are using the device!** Establish a clear purpose of using the device. Is it to see if eye control has potential to be an access method? Consider your long and short terms aims and expectations of the individual and the technology.
4. **Use the team!** Including the individual, caregivers, educators, and multidisciplinary team is essential in successfully assessing for and implementing eye gaze devices.
5. **Knowledge is power!** Training and support are critical in the success of using eye gaze technologies. Access the support resources available and train others in accessing support.
6. **Get detailed information!** Get to know the individual. Thoroughly assess and seek information on posture, vision, eye conditions, hearing, current communication.
7. **Positioning Positioning Positioning!** Consider where and when the individual needs to use the device and the mounting systems you will need. Remember the device needs to be positioned parallel to the user's face at 45-60cm. Ensure that the individual has good postural support and seating, get your OT and PT involved.

Tools to Guide Assessment

- AAC Needs Assessment by Tobii Dynavox https://bit.ly/tobiidynavoxresources
- Access Assessment Tool by Tobii Dynavox https://bit.ly/tobiidynavoxresources
- Eye Gaze Guidelines by AusACPDM https://bit.ly/EGclinicalguidelines
- ACETS Eye Gaze Technology Screening Checklist https://bit.ly/ACETSassessment
- Assessment and Set Up by Indigo https://bit.ly/engagingeyegaze
- Visual Assessment Scale https://bit.ly/visualassessmentscale

SENSORY ENVIRONMENT CONSIDERATIONS

Using eye gaze to interact with a communication device, tablet or PC requires use of cognitive, motor, visual and perceptual abilities. When someone is new to eye gaze, these demands are increased as they are learning a new skill.

Individuals with physical and / or neurological disabilities may have more difficulty than those without disabilities, with filtering incoming sensory information and focussing on relevant information, such as hearing a verbal instruction when there is a lot of background noise.

When practicing use of eye gaze, it is important to reduce or eliminate sensory input and environmental distractions that are not related to the task, to assist the user to focus on the information that will support their progress and performance. It may also be necessary to use repetition in teaching of key eye gaze skills. Individuals who have difficulty processing sensory information may require more repetition before the new skill is acquired, to give them as much opportunity to gain sensory feedback from their body about new movement patterns required for eye gaze.

Sensory environment factors that impact on successful engagement in the eye gaze pathway:
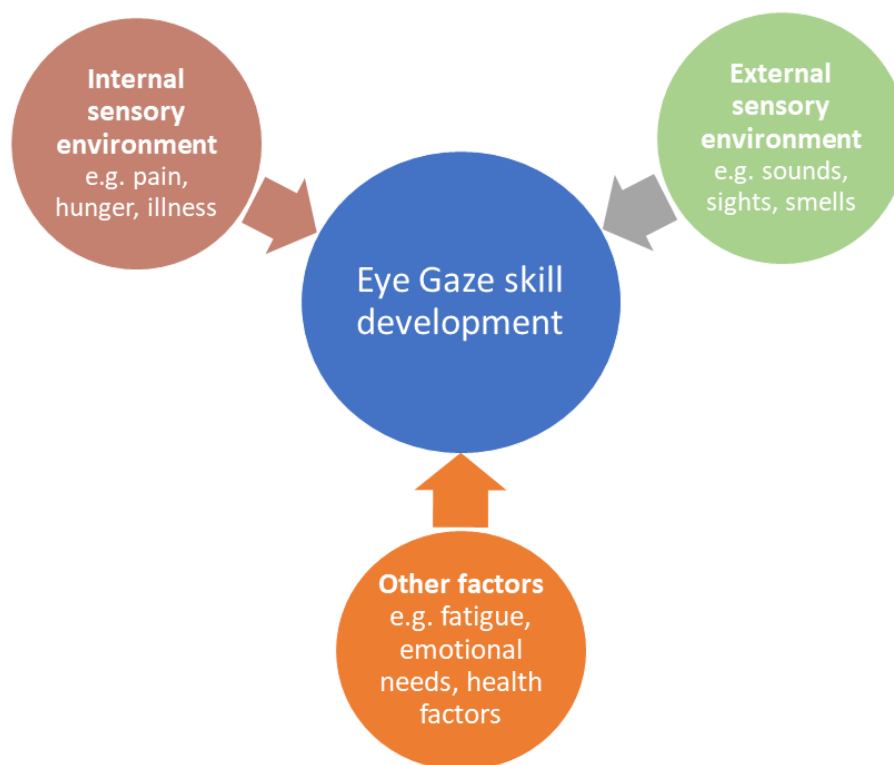
Assessment Resources

Link Assistive Sensory Environment Checklist (Appendix C)
Use this resource to assist you to create an optimal sensory environment to support the eye gaze user.

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POSTURE AND POSITIONING

A healthy body position while accessing an eye gaze device is essential. A well-supported posture helps the user to successfully focus on the screen, feel comfortable when using an eye gaze device, and use their oculomotor skills, Stability and support is required throughout a user's entire seated position, and especially at the following points:

- **Pelvis** – this is the foundation of a seated posture and affects the alignment of the rest of the body including the torso, neck, head, and upper limbs
- **Torso** – respiratory and digestive organs are within the torso; poor postures can lead to sub-optimal respiration and digestion, with negative effects on the person's ability to focus and feel comfortable
- **Neck** – the neck supports the head to be stable and / or to move smoothly through available range of motion
- **Head** – a well-supported head is essential in eye gaze use to allow for good oculomotor control, attention to the screen and endurance.
- **Feet** – the positioning of the lower limbs and feet using a stable base is supportive of the person's seated posture and helps to keep the person's pelvis from anterior tilt.

Individuals with multiple or complex physical disabilities may have fixed joint positions or anatomical differences that prevent them from achieving a symmetrical posture. It is important that the individual is well-supported within their unique posture with the appropriate seating and postural supports prior to using eye gaze e.g.:

- lateral supports
- a customised cushion
- a customised backrest
- a sufficiently supportive headrest with adequate lateral support as required

If you have concerns about a person's posture and positioning, especially if it is not possible to provide temporary postural supports during eye gaze use, it is recommended that the person is referred for a full seating and positioning review with an appropriate clinician.

Poorly supported postures when using eye gaze can lead to:

- Discomfort – if the user is uncomfortable or in pain, all aspects of their function will be impacted
- Fatigue
- Poor respiration
- Decreased eye gaze accuracy
- Decreased endurance for eye gaze use
- Decreased motivation for using eye gaze
- Decreased communicative opportunity – restricts line of sight to other people.

Other useful tips for supporting a person's posture and positioning for eye gaze use:

- **Use Tilt-in-Space function** – if this is available on the person's seating or wheelchair. This allows gravity to do some of the work of supporting the head and neck and decreases the effort in the neck muscles.
- **Match device to user, not user to device** – once the person is well-positioned and comfortable, use appropriate mounting to set up the eye gaze device according to the eye gaze positioning guidelines to match the user's posture.

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ASSESSING THE EYE GAZE PATHWAY

Screen Engagement

- Are they looking at the screen?
- Can I see their eyes in the track status?
- Are they repeatedly looking back to the screen?
- Do they smile or react to what is happening on the screen?

What to look for

- Look to Learn: Magic Mouse, Magic Squares, Fruit Punch, 1xVideo Wall
- Magic Eye FX: Level 1 (Follow me, colour trails)
- YouTube: favourite video and use gaze viewer to see where they gaze

Activities to try
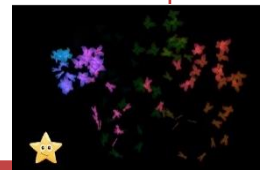
- Do not calibrate at this stage. Just position the device with the track status.
- Put something on the screen to help get them to look
- Remember to watch their eyes and face not just the screen
- Minimise distractions in the environment
- Find what's fun! Try different activities and be creative to see what grabs their visual attention. For example try putting a YouTube clip on the screen and observe.
- Be aware of sensory alertness. You may need noisy games, visually alerting games, the user may be overwhelmed.
- Reduce dwell time to 0/0.1 seconds if using TD Snap, Grid 3 or Communicator 5
- Most people move through this stage quickly, don't get stuck here!

Tips & tricks
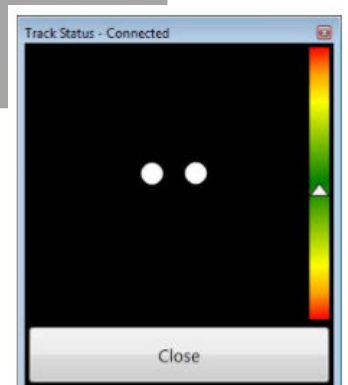
Assessment Resources

Link Assistive Eye Gaze Monitoring Form (Appendix A)

Link Assistive Games for the Eye Gaze Pathway: https://bit.ly/linkatgames

Tobii Dynavox Eye Gaze Pathway Screen Engagement: https://bit.ly/EyegazePathway

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ASSESSING THE EYE GAZE PATHWAY

Responding

What to look for

- Do they smile or react to what is happening on the screen?
- Do they react when different things happen on different parts of the screen?
- Do they show any preferences for items on the screen?
- Do they reactivate the screen again?
- Do they repeatedly intentionally activate the screen?

Activities to try

- Look to Learn: Parklife, Classroom
- Look to Learn Scenes and Sounds: all scenes
- Magic Eye FX: Level 2 (Flare Points)
- Snap Scene, Grid 3, Communicator 5: Create a personalised visual scene display
- Have a photo on the screen and use Gaze Viewer or the mouse to look at where the user is looking.

Tips & tricks

- It is not essential to calibrate at this stage. Just position the device with the track status.
- Remember to watch their eyes and face not just the screen
- Reduce distractions in the environment
- Be aware of sensory processing
- You could try a 1-point calibration using a familiar picture or photo
- Find what's fun! Try different activities and personalise activities by using photos of people and objects of interest.
- Reduce dwell time to 0/0.1 seconds in communication software
- Most people move through this stage quickly, don't get stuck here!
- Model non-electronic communication board as you play games

Assessment Resources

Link Assistive Eye Gaze Monitoring Form (Appendix A)

Link Assistive Games for the Eye Gaze Pathway: https://bit.ly/linkatgames

Tobii Dynavox Eye Gaze Pathway Responding: https://bit.ly/EyegazePathway

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ASSESSING THE EYE GAZE PATHWAY

Exploring

- Are they looking around all parts of the screen?
- Are they able to access corners of the screen?
- Do they show any preferences for items on the screen?
- Are they showing preferences in games and activities?
- Are they maintaing attention to games for increasing time?

What to look for

- Look to Learn: Bottles, Graffiti, Fart Clouds, Magic Squares (fill up the sceen), Scratch Cards, Reveal Squares
- Look to Learn Scenes and Sounds: DJ Star, Guitar, Xylophone
- Magic Eye FX: Level 4 (Music Maker, Graffitti)
- Snap Scene, Grid 3, Communicator 5: Create a personalised visual scene display

Activities to try

- It is not essential to calibrate at this stage. You might try a 1 or 2 point calibration with a motivating target.
- Remember to watch their eyes and face not just the screen
- Find what's fun! Try different activities and personalise activities by using photos of people and objects of interest.
- Reduce dwell time to 0/0.1 seconds in communication software
- Most people move through this stage quickly, don't get stuck here!
- Model non-electronic communication board as you play games

Tips & tricks

Assessment Resources

Link Assistive Eye Gaze Monitoring Form (Appendix A)

Link Assistive Aided Language Display (Appendix B)

Link Assistive Games for the Eye Gaze Pathway: https://bit.ly/linkatgames

Tobii Dynavox Eye Gaze Pathway Exploring: https://bit.ly/EyegazePathway

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ASSESSING THE EYE GAZE PATHWAY

Targeting

- Are they moving their eyes to targets on the screen?
- Are they reacting and responding to what is happening on the screen?
- Are they enjoying and showing preferences for games?
- Are they able to activate static targets or do they require moving targets?
- Are there differences between games? Why?

What to look for

- Look to Learn: Fruit Punch, Shoot, Custard Pies
- Look to Learn Scenes and Sounds: All skills games
- Magic Eye FX: Level 3 (Asteroids, Anticipation)
- Grid 3: Online Grids targeting games. Search "target"
- Communicator 5, TD Snap, Grid 3: start introducing some communication grids to explore

Activities to try

- At this stage start teaching calibration. Try a 2, 5 and 9 point simple calibration with a motivating target.
- Remember to watch their eyes and face not just the screen
- Find what's fun! Try different activities and personalise activities by using photos of people and objects of interest.
- Reduce dwell time to 0.1/0.2 seconds in communication software
- Use communication babbling to starting exploring and babbling
- Think creativel about communication. Perhaps using a one cell button to tell news or join in a game, like you might use a single message device.
- Don't forget to model symbols in a non-electronic way alongside the games.

Tips & tricks

Assessment Resources

Link Assistive Eye Gaze Monitoring Form (Appendix A)

Link Assistive Aided Language Display (Appendix B)

Link Assistive Games for the Eye Gaze Pathway https://bit.ly/linkatgames

Tobii Dynavox Eye Gaze Pathway Targeting: https://bit.ly/EyegazePathway

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ASSESSING THE EYE GAZE PATHWAY

Choosing

What to look for

- Are they able to hold their gaze (dwell) to select a target? for how long?
- Do they show preferences in choice making activities?
- Do they show some understanding that their eyes are making choices?
- Are they starting to explore and select vocabulary on communication software?

Activities to try

- Look to Learn: Monster Factory, Video Wall 2,4 and 6
- Look to Learn Scenes and Sounds: Happy Birds
- Magic Eye FX: Level 4 (Music Maker) Level 5 (Gaze Paint)
- Grid 3: Interactive Learning Games, customise communication grids
- Communicator 5: Emergent User, Matching and Memory Games
- TD Snap: customise communication grids

Tips & tricks

- At this stage start teaching calibration. Try a 5 and 9 point simple calibration with a motivating target.
- Remember to watch their eyes and face not just the screen
- Find what's fun! Try different activities and personalise activities.
- Start increasing the dwell time to 0.5 seconds or above seconds if using TD Snap, Grid 3 or Communicator 5. You are starting to look for intentional selections.
- Think about communication. Consider starting with simple choice making grids.
- This level can start simply with errorless choice making, working up to more icons on the screen, and intentional selections.

Assessment Resources

Link Assistive Eye Gaze Monitoring Form (Appendix A)

Link Assistive Games for the Eye Gaze Pathway: https://bit.ly/linkatgames

Tobii Dynavox Eye Gaze Pathway Choosing: https://bit.ly/EyegazePathway

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ASSESSING THE EYE GAZE PATHWAY

Full Control

- What do they want to do? This stage is about developing eye control to participate in every day activities - communication, recreation, computer access and environmental controls
- Goals are set for functional activities such as specific communication goals
- Goals might be to use computer controls to browse the internet, you tube and Facebook

What to look for

- Look to Learn: Control Games
- Look to Learn Scenes and Sounds: Skills Forest and Desert Race
- Magic Eye FX: Level 5 (Gaze Paint, Gaze Snake)
- Communication and computer access software such as Grid 3, Communicator 5 and TD Snap

Activities to try

- At this stage calibration is important. Encourage 5 or 9 point calibrations. The more calibration points the more accurate the eye tracker will be.
- At this stage the user is making intentional selections on the screen. Increase dwell time so that the user has time to look around and then dwells gaze for intentional selection. This is usually 1 second or higher.
- Find what's fun and relevant to the users particpation at home, school and int heir community.
- Keep multi-modal communication and multi-modal access sytems

Tips & tricks

Assessment Resources

Link Assistive Eye Gaze Monitoring Form (Appendix A)

Link Assistive Games for the Eye Gaze Pathway: https://bit.ly/linkatgames

Tobii Dynavox Eye Gaze Pathway Full Control: https://bit.ly/EyegazePathway

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SETTING GOALS

Establishing **clear**, **specific goals** allows you to monitor and track change over the short and long term. People using eye control technologies often require highly customised systems and have different learning pathways. Consider setting goals across the **four areas of communicative competence** (Light, 2014) if you are working towards using the eye gaze device for communication. For early users of eye gaze, you may focus more on the operational skills required for eye gaze. Your goals might include more than just using an eye gaze device, including using other access methods and non-electronic communication strategies. For example:

Linguistic	**Operational**	**Social**	**Strategic**
Amy will combine 3 words using multimodal communication strategies (eg speech, key word sign, symbols, eye gaze device)	Amy will dwell (hold) her gaze for 2 seconds to select a target on the screen	Amy will share pre-programmed news using her eye gaze device (1x1 grid) at school each day	Amy will gain attention of a familiar person present in the room by looking at their photo (2x2) grid on her eye gaze device and then looking at them

Goal Attainment Scaling (GAS) can be a useful tool for measuring outcomes as it accounts for the unique individual's needs (Karlsson, 2017). It can provide measurement of small change. GAS Goals measure progress across a 5-point scale for example:

-2 Much less than expected (current)	-1 Less than expected	0 Expected Outcome	+1 Greater than expected	+2 Much greater than expected
Charlene will glance at the screen to activate an item on the screen.	Charlene will dwell her gaze for 1 second to select a familiar item on the screen.	Charlene will dwell her gaze for 1.5 seconds to select a familiar item on the screen.	Charlene will dwell her gaze for 2 seconds to select a familiar item on the screen.	Charlene will dwell her gaze for 3 seconds to select a familiar item on the screen.

Goal Setting Resources

Eye Gaze Workbook by Indigo: https://bit.ly/engagingeyegaze
Dynamic AAC Goals Grid (DAGG-3) by Tobii Dynavox: https://bit.ly/DAGG3
Augmentative and Alternative Communication (AAC) Profile, by Tracy Kovach: commercially available

Outcome Measurement Tools

Goal Attainment Scaling: https://bit.ly/GASpracticalguide
GAS Goal Framework by Saltillo: https://bit.ly/saltilloGASgoals
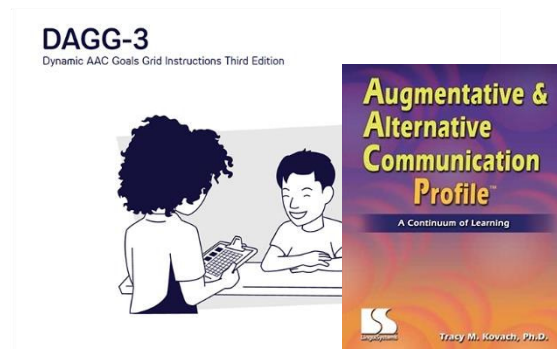
SETTING GOALS ALONG THE EYE GAZE PATHWAY

Consider the motor, cognitive and communication skills across the eye gaze pathway. REMEMBER! **Every person is individual**, set goals unique to them and their priorities for communication and learning across the four areas of communicative competence: linguistic, operational, social, and strategic. You will need to consider multi-modal communication strategies throughout the eye gaze learning pathway to ensure that robust language is still being modelled and a person has access to language whilst working on their eye control skills.

The following goals are **only examples** of what you might work on at each level.

Screen Engagement

At this level consider operational goals around increasing attention to the screen. This level may include goals around positioning and mounting of the device.

Example Goal	
Linguistic	Jade will show increased attention to a communication partner modelling communication page set on Grid 3.
Operational	Jade will look at the screen to make something happen independently 1-2 occasions using her Tobii Dynavox I13 eye control device and familiar games.
Social	Jade will use facial expressions and vocalisations to indicate she likes or dislikes the activity she is playing on her eye control device.
Strategic	Jade will look towards a familiar communication partner to gain attention and initiate an interaction.

Responding

At this level consider operational goals around accessing different parts of the screen.

Example Goal	
Linguistic	Jessica will visually attend to a communication partner modelling her Snap Core First page set and low-tech communication board when talking about activities.
Operational	Jessica will look at different parts of the screen (top, middle, and bottom) to make different things happen independently 1-2 occasions using her Tobii Dynavox I13 eye control device and familiar games.
Social	Jessica will participate in play with her siblings using her eye control device by exploring parts of the screen together (Jessica using her eyes, siblings the touch screen) and Jessica periodically looking at them to respond whilst playing.
Strategic	Jessica will use multi-modal communication strategies (e.g., facial expression, vocalisations, eye contact, eye pointing) to indicate when she has finished playing a game.

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Exploring

At this level consider operational goals around accessing all parts of the screen, showing preferences for games.

Example Goal	
Linguistic	Bas will use a 0.1 second dwell time to explore his communication page sets "babble".
Operational	Bas will demonstrate increasing visual exploration the screen, currently exploring bottom third of the screen.
Social	Bas will use a visual scene display of his family to engage in people games (eg peek a boo, tickles, ball) by activating their names using eye control.
Strategic	Bas will obtain a communication partners attention through multi-modal communication strategies (eg vocalisation, gesture, eye contact).

Targeting

At this level consider operational goals around accuracy, size of targets, speed in accessing targets, minimising fatigue.

Example Goal	
Linguistic	Brianna will activate a target to make an errorless choice given 2x2 grid of familiar vocabulary to participate in an activity
Operational	Brianna will activate a single target of familiar icons (5cmx5cm) in all four quadrants of the screen.
Social	Brianna will engage in shared reading by reading the text a book using her eye gaze device with a 2 cell grid with preprogramed text icon and a turn the page icon.
Strategic	Brianna will activate a single cell target to tell news at school

Choosing

At this level consider operational goals around time to dwell gaze, number of icons on the page.

Example Goal	
Linguistic	David will make a choice using a 4x2 grid to tell a communication partner what activity he wants to do.
Operational	David will dwell his gaze with increasing length of time to select items on the screen, currently 0.1 seconds' dwell.
Social	David will tell news using pre-programmed phrases on a 2x2 grid using eye control.

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Strategic	David will use multi-modal communication strategies (e.g., key word sign, vocalisations) to indicate he has something to say that isn't in his eye control device and for his partner to get his low-tech PODD communication book.
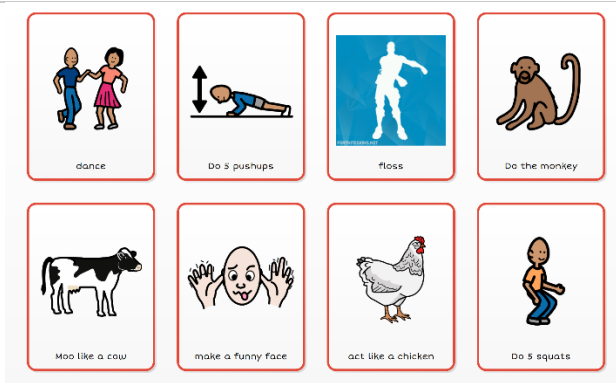
Full Control

At this level consider operational goals around increasing accuracy, speed, developing mouse control skills and developing navigation skills. Other goals should be focussed on participation outcomes.
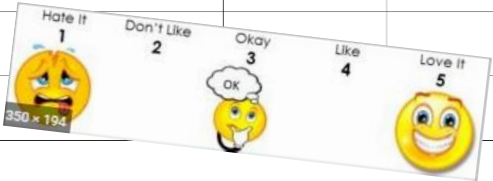
Example Goal	
Linguistic	Charlene will use her communication device to combine 2 words to communicate a message at home and school
Operational	Charlene will navigate to familiar vocabulary by activating 1-2 folder links independently
Social	Charlene will use her PODD Grid set for 4x communicative functions (eg request, give an opinion, as a question) at home and school.
Strategic	Charlene will indicate she needs access to her eye gaze device via looking at the device, using her "I need my device" icon in PODD book

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MONITORING AND TRACKING PROGRESS

There are many ways to track progress for our emergent users of eye gaze:

- Goal Attainment Scaling: tracking your goals
- Recording observations
- Taking photos and videos
- Collecting comments and feedback from caregivers or the person themselves
- Using rating scales
- Using tally sheets
- Charting progress along the eye gaze pathway

Software for monitoring progress

Gaze viewer: https://www.tobiidynavox.com/collections/apps-software/products/gaze-viewer

Look to Learn Heat maps

Magic Eye-Fx Pro *(purchase):* https://shop.sensoryguru.com/product/magic-eyefx-pro/

Insight *(purchase):* https://www.helpkidzlearn.com/shop/online-software/insight
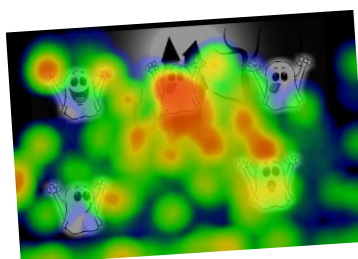
Resource

Link Assistive Eye Gaze Monitoring Form (Appendix A)

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TEACHING EYE GAZE SKILLS

Using an eye gaze device for communication, play and accessing the computer takes practice! To use eye control, an individual needs to learn to:

- Control their eye muscles and move them to look and target around the screen in different directions (horizontal, vertical, and diagonal)
- Understand and be familiar with the content on the screen, especially when using symbols for communication
- Visually be able to see items on the screen and keep visual focus
- Be positioned that they can maintain head position and visual attention.

We may need to support an individual with these things separately before combining all those demands. It is a balancing act of motor, visual and cognitive demands.
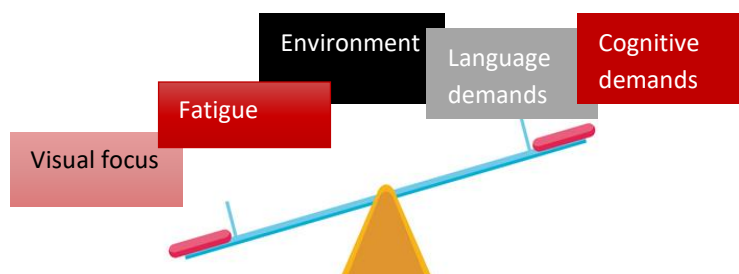
Support learning through scaffolding

Verbal Referencing
- *"You looked at the screen, you made the xylophone play"*
- *"You looked at more, you said more"*

Causal Language Instruction
- *"Look at the Xylophone to make music"*

Visual Prompts
- *Use a torch to provide a light cue of where the individual needs to look*
- *Plug in a mouse and use a mouse cursor to provide a visual cue of where to look or model what to do*
- *Wave your finger to provide a visual cue*

Modelling
- *Show the individual how to do it by you using your eyes, let them watch others*
- *Model with a mouse cursor or by touching the screen*

Use Multi Modal Communication
- *Reinforce and discuss using the individual's low-tech system*
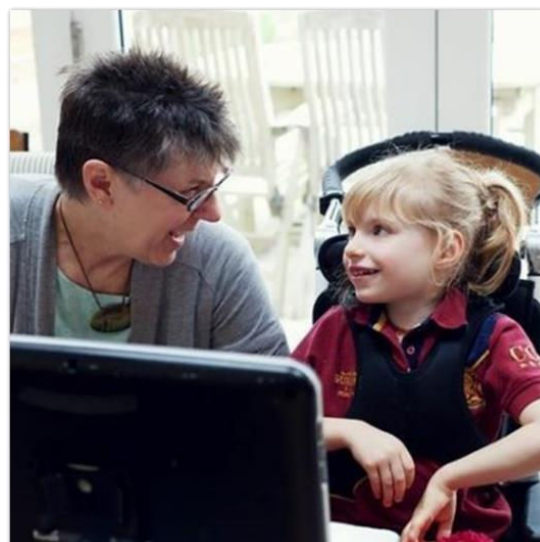
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Aided Language Display Appendix B

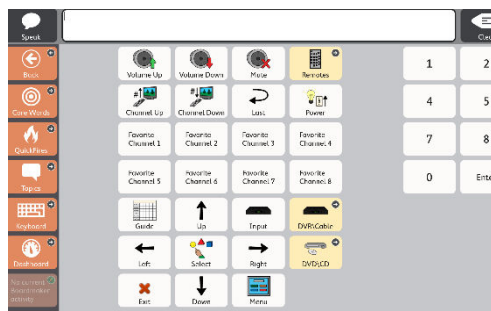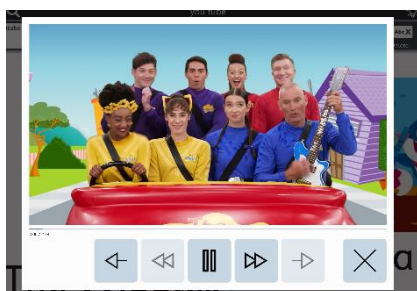# IMPLEMENTING THE EYE GAZE PATHWAY

Find What's Fun!

When teaching eye gaze skills and communication we need to find what is meaningful, of interest and enjoyable for the person. Like with any skill the more practice, the easier it gets! Be aware of our users getting bored, you may find that they disengage or do not demonstrate improvement in skills. We need **repetition but with variety**.

Be creative!

Find activities of interest to them that match their skill level. Users also disengage when something is too easy or too hard. Be aware of moving on through the pathway.

Here are some of our ideas!

- Develop pages for starting music or a YouTube Clip
- Program environmental controls, for some users turning their TV or lights on and off might be fun and meaningful
- Create target games using their favourite cartoon characters
- Use websites their peers use such as Starfall to engage in literacy
- Program IR remote control toys that can be operated with eye gaze

More resources and software

Link Assistive Games for the Eye Gaze Pathway: https://bit.ly/linkatgames

11 Fun ways to use eye gaze: bit.ly/elevenfunwaystouseeyegaze

Eye Games: https://www.tobiidynavox.com/collections/games

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SUPPORTING COMMUNICATION WHILE LEARNING EYE GAZE

Just because you are trialling eye gaze does not mean you cannot also use other multi modal communication strategies! This is particularly important for emergent eye gaze users that we because we do not want to wait for their eye gaze skills to build before we give them access to robust communication.

Consider communicative **autonomy vs independence**. For many emergent eye gaze users, they can often communicate more using low tech partner assisted strategies while they are developing their motor skills in operating eye gaze devices.

Think about how we can **balance the motor and cognitive demands** of the tasks we are asking our emergent users to do. Think about how you might need to do more simplified, powerful, social communication page sets when users are first learning to control their eyes, then balance giving more robust language in a low-tech way. Continue your focus on modelling, we need lots of modelling before we can expect expressive use!

Extra Reading: The Juggling Act (Linda Burkhart) https://bit.ly/jugglingactburkhart

Key things to keep in mind when trialling eye gaze

- Keep modelling robust vocabulary
- Use multimodal communication strategies
- Communication happens at all stages of the eye gaze pathway
- Give time for babbling and exploring communication page sets without expectation
- Keep it social, meaningful, and fun
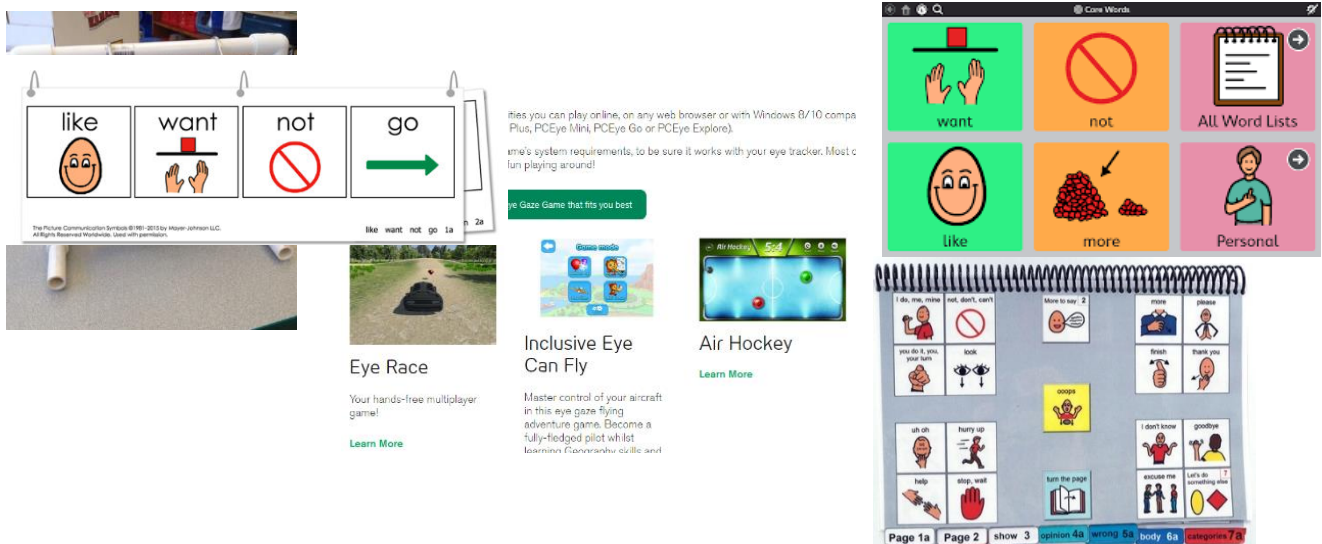
Video
We Speak PODD Modelling PODD while using Eye Gaze: https://www.youtube.com/watch?v=M-XdhP9P03Y

PRACTICALITIES: USING THE DEVICE

Positioning

STEP 1: Set up the mount

Build the mount that is with the device. This could be a table mount, floorstand or wheelchair mount.

Clamp On   **TS-XL**   **Floorstand**   **Wheelchair**


Videos to help are here: https://bit.ly/mountsupport

STEP 2: Put the device on the mount

Position about 45-60cm away from the user with the screen parallel to their face.

STEP 3: Turn on the device

Bring up the positioning guide on the software or eye tracker you are using. The eyes should be in the middle and the distance markers in the middle. It will look different in different software.

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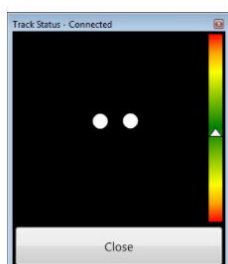
CALIBRATION

Calibration is used to help the eye tracker be more accurate for an individual's eyes. **You do not need to calibrate until the targeting stage** of the pathway.

Calibration requires an individual to visually track on the screen. During the calibration, the eye tracker measures how your eyes reflect light. The calibration is done by following a point, video or other graphic element that moves across the screen.

STEP 1: Position the eye tracker

STEP 2: Start the calibration in the software you are using
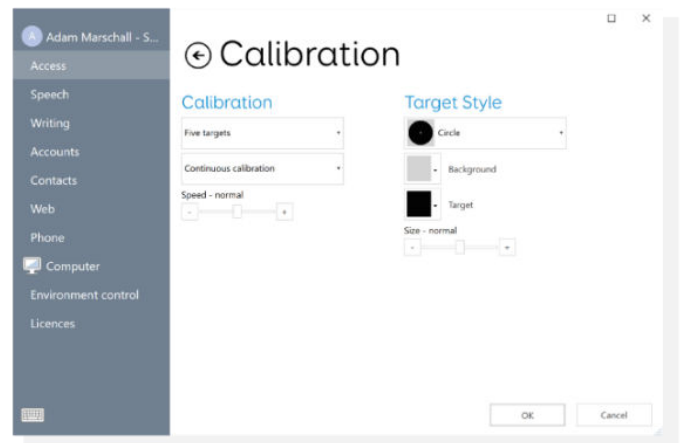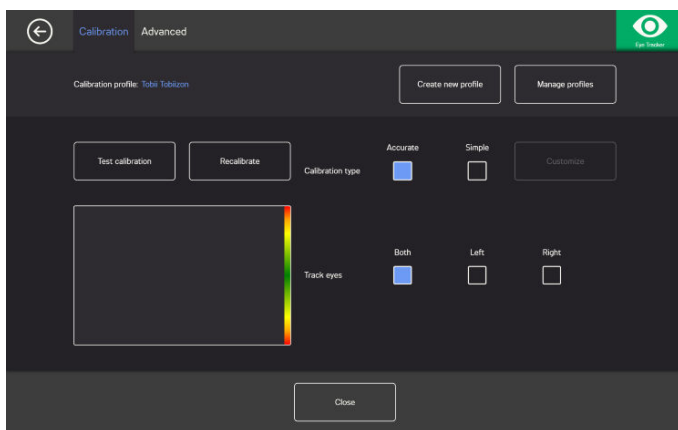
Tips for improving calibration

- Check the environment. Is there overhead light, glare through windows, distractions that might be affecting calibration?
- Look at the user's eyes. Do they have droopy eye lids? Are they looking away? Are they squinting? Are their eyes moving symmetrically? Consider their eye conditions and any vision difficulties.
- If eyes are not moving symmetrically try tracking one eye
- Increase the size of the targets in the calibration software
- Slow the speed of the target movement
- Improve one point or perform a step through calibration
- Provide a visual cue by wiggling your finer where the user needs to look
- Change the icon to be a motivating or familiar icon
- Change the number of points in the calibration e.g., start with a 1- or 2-point calibration
- Choose an icon (video) with some movement to attract visual attention
- Practice more targeting and exploring games and then try calibration again

Further Information

https://www.tobiidynavox.com/pages/what-is-eye-tracking

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FURTHER RESOURCES

Hardware Resources

Tobii Dynavox I-13 and I-16
Support and Training: https://www.tobiidynavox.com/pages/product-support-i-series
Tobii Dynavox Eye Mobile 5
Support and Training: https://www.tobiidynavox.com/pages/pceye-product-support
Tobii Dynavox Pilot
Support and Training: https://www.tobiidynavox.com/pages/td-pilot-product-support

Computer Control Software Resources

Computer Control https://www.tobiidynavox.com/pages/product-support-software
Simplified Computer Control https://www.tobiidynavox.com/support-training/faq-from-salesforce/how-can-i-use-computer-control-like-gaze-point/
Communicator 5 https://www.tobiidynavox.com/pages/product-support-software
Grid 3 https://thinksmartbox.com/smart-support/learning-resources/

Communication and Recreation Software Options

Look to Learn https://thinksmartbox.com/product/look-to-learn/
TD Snap https://www.tobiidynavox.com/pages/product-support-software
Snap Scene https://www.tobiidynavox.com/pages/product-support-software
Communicator 5 https://www.tobiidynavox.com/pages/product-support-software
Grid 3 https://thinksmartbox.com/smart-support/learning-resources/
Magic Eye Fx https://www.sensoryguru.com/magic-eye-fx-downloads/
Look Lab https://thinksmartbox.com/look-lab/
Look to Read https://thinksmartbox.com/look-to-read/
EYE Train & Learn https://www.linkassistive.com/product/eye-train-learn-1/
Eye Can Fly https://www.linkassistive.com/product/eye-can-fly/
Sensory Eye FX 2 https://www.linkassistive.com/product/sensory-eye-fx-2/
Kinka Eye Gaze Games https://www.linkassistive.com/product/kinka-eye-gaze-games/
EyeFeel https://www.linkassistive.com/product/eyefeel/

Implementation Resources

Engaging in Eye Gaze (Indigo)

Introductory videos, assessment and implementation frameworks, handouts and workbooks specific to school age children: https://bit.ly/engagingeyegaze

Look to Learn Workbook

Workbook for recording progress in Look to Learn software: https://bit.ly/look2learnworkbook

Inclusive Technologies

Workbook for the Inclusive Technologies Software: https://bit.ly/ITworkbook

Link Assistive Trial Diary

Supports to set goals and gather data during device trials: https://www.linkassistive.com/tobii-dynavox-resources/

Link Assistive Games for Eye Gaze Pathway

A list of games and software ideas at each level: https://bit.ly/linkatgames

Eye Gaze Pathway

Suggestions of games at each level: https://bit.ly/EyegazePathway

Eye Gaze Guidelines

Developed by The Eyes on Communication Research Group led by Dr Petra Karlsson has completed a series of projects related to eye-gaze control technology. More recently, The Eyes on Communication Research Group have developed consensus based clinical guidelines for the implementation of this technology with people with cerebral palsy. The guidelines were based on a published Delphi study: https://bit.ly/EGclinicalguidelines

Tobii Dynavox Accessible Games

Colelction of third-party beginner to advanced games that can be played via eye control. https://www.tobiidynavox.com/collections/games

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Stokes TS, Roden P. (2017). Establishing the key components of an eye gaze assessment for a child with a severe neurodisability using nominal group technique. Edorium J Disabil Rehabil:62–68.

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APPENDIX A: EYE GAZE MONITORING AND ASSESSMENT FORM

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Name:　　　　　　　　*Date:*　　　　　　*Person Completing:*

	Not yet developed	Developing within some activities	Achieved on multiple activities	Activities demonstrated in	Comments and Progress
Screen Engagement *"I can have fun when I look at the screen"*					
Responding *"I get different responses when I look at certain parts of the screen"*					
Exploring *"I can make changes happen when I look at different parts of the screen"*					
Targeting *"I can gaze at a particular part of the screen to make something specific happen"*					
Choosing *"I can dwell my gaze to select specific on-screen content"*					
Full Control *"I can use gaze to independently communicate and control the computer"*					

Device Used

- ☐ Tobii Dynavox I13
- ☐ Tobii Dynavox I16
- ☐ Tobii Dynavox Pilot
- ☐ Tobii Dynavox Eye Mobile 5
- ☐ Other _____

Settings needed

- ☐ Calibration settings

_____

- ☐ Dwell time: _____

Environmental Considerations

- ☐ Lights on
- ☐ Lights off
- ☐ Minimal distractions
- ☐ Quiet environment
- ☐ High contrast games and activities

Vision Information

- ☐ Eye conditions _____
- ☐ Glasses
- ☐ Droopy eyes/ long eye lashes
- ☐ Asymmetrical eye movement
- ☐ Eye tremor
- ☐ Other _____

Sketch positioning required

Prompts and Cues

- ☐ Wait time
- ☐ Verbal referencing (write what you say)
  _____
- ☐ Visual Cues (circle)

  mouse   touch screen   other

- ☐ Communication modelling if yes, what system _____
- ☐ Support and encouragement
- ☐ Time to play independently
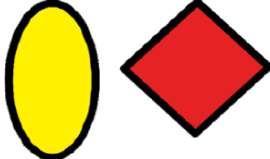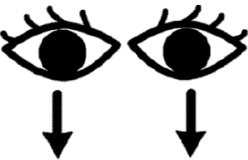
Mount

- ☐ TS-XL table stand
- ☐ Clamp on mount
- ☐ TS-Go table stand
- ☐ Floorstand: _____
- ☐ Wheelchair Mount: _____
- ☐ Other _____

Notes: *Include specific activities person is working on, enjoys, other considerations such as general health, observations of fatigue, eye movement*

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APPENDIX B: AIDED LANGUAGE DISPLAY: EYE GAZE ACTIVITIES

I (do it)	again / more	like it	need a break
you (do it)	stop	don't like it	something different
help	look	this is too easy	this is hard
computer	game	Look to Learn	great

APPENDIX C: SENSORY ENVIRONMENT CHECKLIST

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Sensory Component	Considerations for eye gaze use	Yes	No
VISUAL	**Is the lighting in the room supportive of eye gaze use?** • Consider turning off bright overhead lights, particularly if they are fluorescent lights • Ensure there is no glare from sunlight directly in the user's face, or directly on the device screen or eye tracker. Make use of window coverings or position the user and the device away from direct glare		
	Is the room free of visual clutter and visual distractions? • If there are people or objects in the user's line of sight that they are likely to be distracted by, move these away • Consider turning off screens other than the eye gaze device (e.g., television, tablets, mobile devices)		
	Is the information that you want the user to focus on, as salient as possible? It is important to make the eye gaze device and what is occurring on the screen, the object of the user's visual focus. • Increase sensory salience using bright colours and contrast between on-screen objects • Consider size, shape, and speed of objects on the screen to suit the user's ability to attend visually • Utilise visual items or colours based on the user's interests and preferences to increase the likelihood that the user will orient to and attend to the screen.		
AUDITORY	**Is background noise reduced as much as possible?** General background noise such as conversation, television, music, or household sounds can be distracting and overwhelming, especially when someone is attempting a new motor or cognitive skill. • Turn off any devices such as TVs and music • Close doors or windows to reduce ambient background noise where possible • Identify and eliminate any sources of loud, unexpected, repetitive, or potentially startling noises • Consider reducing the number of people in the room • Reserve conversations, questions or comments not directly related to what the user needs to do, to after the session is concluded.		
	Have you planned the verbal instructions and prompts you will provide, to ensure that verbal auditory information is as easy for the user to process as possible? • Ensure that verbal instructions and direction are simple and short • Provide ample time for the user to process the verbal instruction you have provided • Avoid having multiple people providing verbal instructions or comments at once • Supplement verbal instructions with non-verbal cues and prompts as much as possible		

TACTILE	**Does the user require tactile input before or during eye gaze use to support their attention and engagement?** Eye gaze is an access method that does not inherently provide tactile feedback to the body; however, some users will benefit from tactile input to support their ability to remain alert and engaged, particularly if they seek to touch, hold, or mouth objects frequently at other times. • In preparation for eye gaze use, consider providing the user with opportunities to change their body position e.g., spending time out of their wheelchair, or with their body in a different position or location? • Would the user benefit from a tactile object or surface to touch or hold whilst using eye gaze; does the user usually seek or benefit from tactile input such as different textures?	
	Are you providing sufficient tactile feedback to support body awareness? Tactile feedback supports body awareness which is essential for coordination. • Does the user have sufficient contact with the supportive structures of their seating to give them tactile feedback as to where their body is in space i.e., contact with armrests, leg rests, backrest. This kind of generalised tactile support can assist the user to coordinate their body, including their head and eyes for eye gaze use, as it provides a sense of overall body awareness	
PROPRIOCEPTIVE / VESTIBULAR	**Have you ensured that the user's posture and positioning is well supported?** The proprioceptive sense provides information from the muscles, joints, and ligaments regarding the position of individual body parts in relation to the rest of the body and assists in performing tasks requiring coordination. Supportive seating, which may include armrests, lateral supports, a supportive seat base and backrest, provides the user with a comprehensive sense of their body. For eye gaze use, support for the neck and head is particularly important for coordinated eye movement.	
	Is the user's head well-supported in an upright position? Vestibular receptors are in the inner ear and provide information about orientation in space. The vestibular and visual senses are closely connected, and adequate support for the head is essential for smooth, coordinated eye movement. Adequate support for an upright posture is essential for coordinated eye control and eye gaze use. *Refer to the 'Posture and Positioning' section of this workbook for more information on establishing a well-supported posture.*	