

Making Eye Gaze Technology a Reality: The Road from Trials to Conversations

Judy Lariviere, M.Ed., OTR/L
Assistive Technology Specialist &
Occupational Therapist
Email: judy.lariviere@gmail.com





My Background

- First girl with Rett Syndrome (RTT) – 14 years ago – challenges with access – two switch step scanning
- Next girl, 10 years ago; worked with weekly and continued ever since with more girls
- Katie's Clinic for Rett Syndrome at Children's Hospital & Research Center, Oakland in December 2008



Eye Gaze Technology

- Builds on a girl's incredible use of her eyes; girls communicate so much through her eyes.
- Direct selection is a more efficient means for communicating – seeing dramatic progress
- Provides access to communication when other methods and tools have met with limited success at best
- Assumed a girl cannot communicate but really she has not had access or the opportunity
- "Presume competence" and figure out how to tap into a girl's potential.



Which Eye Gaze/Eye Tracking System to Trial?

- Size of the Trackbox of Eye Gaze/Eye Tracking System is important relative to the girl's positioning and natural movement patterns.
- Consider the amount of side to side movement or sitting position in chair (typically low tone in trunk)
- Conduct eye gaze trial with at least two different systems
- Extended trial with one shows best access



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Comparison of "Trackbox" Sizes

Device	Eye Gaze system	Height (up & down)	Width (side-to-side)	Depth (forward & back)	Distance from eyes
DynaVox EyeMax	Quick Glance	6	9.4	11	17 to 24
PRC ECOPoint	Tobii	10	15	8	20 to 28
Tobii C12/C15	CEye Module	12	16	8	18 to 26



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Goal of Trial with Eye Gaze System

- Exploring a new means of access to technology
- Remember this involves a lot of motor planning and takes time to learn
- Essentially two actions performing when using eye gaze
 - Looking at what want
 - Maintaining visual attention on it for selection (Dwell)



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Goal of Trial with Eye Gaze System

- It is not target practice!
- Aim for Success - increased motor demands, lower the cognitive and communication demands
- Allow for natural and spontaneous interaction; respond to selections appropriately
- Assist with navigation to page (Model)



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Judy's Eye Gaze Trial Page Sets

- Set up based on girl's natural use of horizontal eye movements in the middle of the page – looking left to right
- Navigation between pages is integrated into these middle buttons
- Typically girls have ease in looking up or down not both directions
- Tested and used across over 80 eye gaze trials with girls and teenagers with Rett Syndrome
- Able to identify girl's preferences very clearly through her pattern of selections while using these pages



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Judy's Eye Gaze Trial Page Sets

- Design and layout is copyrighted
- Page sets also support a girl's communication of her immediate wants and needs, use of greetings and commenting, and directing another's actions in activity-specific pages
- Page set for preschool and early elementary school age girls available for purchase and download soon through website
- Page set for late elementary and middle school age girls available for purchase and download at the end of August



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3 year old – Beginning of Trial

- Second eye gaze trial (first with Tobii C12 with CEye)
- Using my trial eye gaze page set
- See girl's response to request to "look up here" or pick this" button (does not select these upon command)
- Video shows selection of her favorite, Mickey Mouse Clubhouse, and use of what is available on screen to ask for Mickey Mouse video to be fixed so she could watch it



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Calibration During a Trial Session?

- Don't have the girl calibrate during an eye gaze trial unless accessing 20 or more buttons
- Use the sales representative's calibration
- If using my trial eye gaze page sets, never have the girls calibrate during a trial session
- Apraxia interferes with getting a good calibration
- Tires out a girl's eyes before she gets started
- Just need to position device and locate girl's eyes in the Track Status box and ready to go



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3 year old – 16 1/2 minutes into Trial

- Independently navigated to "Something's wrong" and then said "I'm tired"
- Had a short break
- Starting up again
- Repeatedly selecting the same button – "I'm tired" – this is a strategy girls use to get communication partner to respond to request
- Facial expressions match her selection of "I'm tired"
- Her selections are very intentional



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Collect Data

- Videotape the sessions
- Document how integrating eye gaze system into other modes of communication in order to interact
- Mean length of utterance (MLU) for younger girls
- ECOPoint has Language Activity Monitor (LAM) which labels button selected and time of selection
- EyeMax has usage counts for each button and keeps track of selections
- Tobii usage counts coming soon

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Qualitative Data Collection

Date – 8 buttons on page – Example of 16 ½ minutes into trial

Selection	To Communicate	Other modes of communication
I'm tired	I'm tired.	Looked to Mom
I'm tired	I'm tired.	Looked back to Mom; tired face
I'm tired	I'm really tired	Looked at another communication partner
I'm tired		
I need to rest my eyes	I'm tired and need to rest my eyes	Looked back at same communication partner

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Supporting Conversations

- Be open and flexible
- May need to follow through on a girl's agenda first
 - Example: Video of girl during eye gaze trial quickly and independently navigating from Potato Head page back to music page (moved through multiple pages on her own)
- When a girl is motivated or determined to do something else, she will get to what she wants to do/tell you
- Girls use repetitive selections of same message
 - Make a point or make sure you pay attention to what communicating
 - Request that you give more information or say something different

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What Eye Gaze Settings?

- On Tobii-based eye gaze trials, use red dial/clock rather than the shrinking dot up to 80 pixels in size
- Gives visual information about how long need to maintain eyes on location (i.e., dwell) before select a button
- Allows for communication partner's acknowledgement of a girl's motor approximations
- EyeMax use fill button feature with red
- Dwell always set to under one second – 880 milliseconds (ms); even as low as 400 ms



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Successful Calibration of Eye Gaze System

- Use keyboard-controlled calibration so the pacing of the calibration is based on girl's pace
- Available on ECOpoint, Tobii CEye and EyeMax
- Try using a favorite picture to help focus on calibration; this photo will vary depending upon a girl's age and interests
- EyeMax - try using different characters with eyes with green highlight
- Use a laser pointer to help "draw" eyes to locations



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Video of Step-through Calibration

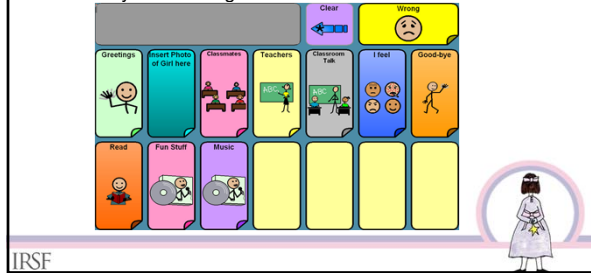
- Wait until see girl looking at the picture/stimulus
- Activate key on keyboard (typically "S")
- Try using "small" setting for picture; if not, try medium size setting
- Quiet environment
- Not asking questions



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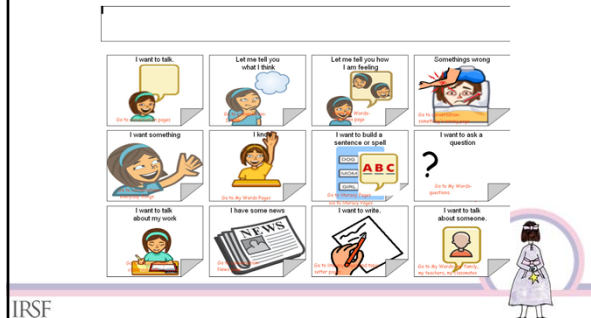
New device – now what?

- Build on what is working – use pages from trial and then expand from there – Main Page from Judy's Trial Eye Gaze Page Set



The Communication Book

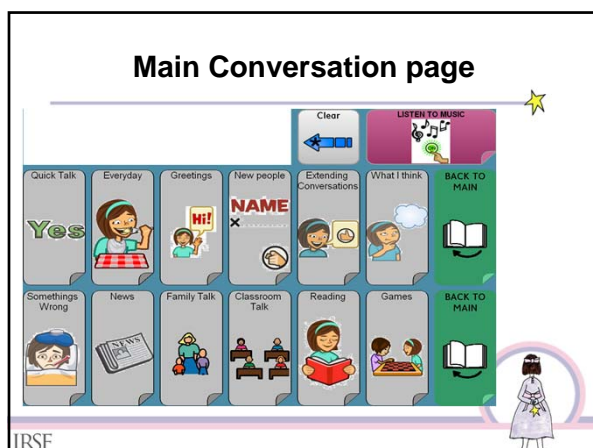
- Developed by Pati King-DeBaun



The Communication Book in Judy's Next Eye gaze page layout

- Starting page





Clinic Session

- This girl had used Tobii in Clinic and Natural History Study for a total of 3 times over a year and a half
- First time using new page layout with Pati's sample pages
- Just had something done with her ears
- Exploring pages; also communicating that "it was scary" and "did not like that"

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Clinic Session - Navigation

- Independently navigated to different page
- Navigation modeled to her only a couple of times during the clinic session
- Classroom Talk page but applying it to eye gaze
- Spontaneously responds to what her Mom and I say about her making eye gaze look easy. She says "This is easy" and "I know."

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The Communication Book

- www.creativecommunicating.com
- Communication Book CD – boards in BoardMaker Plus
- Import into Communicator for Tobii C12 with CEye Module and/or Page Editing Software on DynaVox EyeMax
- Until June 30, 2011 - \$200; after, price returns to \$250
- Price increase expected in Fall 2011
- Integrating in my eye gaze page layout

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What a girl needs access to...

- Phrases for social interaction that are quick
- Activity-specific pages for play and active participation at school/home/community; situational
- "About Me" pages to talk about family, favorites, etc.
- Scrapbook on device for sharing experiences and photos of these; memories
- Core words and vocabulary for creating novel messages
- Alphabet
- Consistent way to navigate and motor plan
- Modeling and multiple opportunities to use for success
- Different routes to get to things

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ECOPoint



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Chat - Repairs

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Chat Activity Row

YES	NO	LET ME	YOU DO IT	REPAIRS	THROW UP	THUMB DOWN	CATEGORY	GO BACK
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Repair Activity Row

Ends?	Understand?	Repeat that	Mistake	Hold on	Too fast	Isn't easy	Not ECO 2	Can't find	MORE
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4 year old girl

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- Has Tobii
- Uses core words and vocabulary in 7 x 5 SonoLexis
- Using Pati King DeBaun pages for quick phrases
- Customized alphabet
- Play-based activity pages



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Main Page

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Clear

CATA		CONVER-SATION		PLAY	SCHOOL	GO TO SONO-LEXIS
ABC					LISTEN TO MUSIC	

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Alphabet Page

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Emotions Page

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13 year old teen

- Stayed over the weekend and gave her a Kris Allen CD from American Idol
- "Hot News" that shared on Monday at school was about our weekend together
- Natural and "real communication" with SLP as did not know what she was going to say

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“Hot News” Page

• Shared about getting Kris Allen CD

“I remember” Page

• Independently navigated to her “I remember” page with links to other pages; selected “Christmas page”

“Holiday” Page

• Immediately selected message to share that used CD Clock Radio she received at Christmas to play Kris Allen CD

Supporting Conversations

- Asking questions with only one answer doesn't work; even asking directed questions doesn't always work – why? Apraxia....especially with technology!
- Follow the girl's lead and respond to her selections; don't know what to expect – (examples: 13 year old teen; girl during clinic session)
- Amazing and incredible interactions (i.e., "moments of brilliance") happen when you least expect it
- Initiated spontaneous comments to add to conversation or comment on what is happening
- Sometimes we, as communication partners, take longer to put the pieces together about what a girl is trying to communicate

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Optical Head Pointing

- While working on pursuing eye gaze trials (try at least two different eye gaze systems) and securing funding, also explore optical head pointing with your daughter
- Girls who have started with optical head pointing are transferring these skills directly over to using eye gaze technology
- Check with AT/AAC Specialist if they have an optical head pointer (Tracker or TrackerPro)

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Optical Head Pointer Options

- Madentec's TrackerPro
- <http://www.ablenetinc.com/>
- (AT > Madentec)
- Loan of TrackerPro
- Origin Instruments HeadMouse Extreme
- <http://www.orin.com/>
- How to purchase – one week evaluation
- Camera Mouse 2011



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How teach use of Optical Head Mouse

- SoftTouch's Teaching Access Ability CD – teach mouse movements
- Teach girls in Clinic in under 30 minutes, including 3 year olds
- Quick at learning head movements
- Placement of reflective dot between eyebrows



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Camera Mouse 2011

- Free download from <http://cameramouse2011.com/>
- Works with webcam camera
- Use Tobii Communicator CD (free) with the built-in dwell feature
- Works with Judy's eye gaze page sets for Tobii Communicator



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Eye Gaze Device for Communication

- It is an integral part of communication
- Not replacement for existing modes which will always be quicker
- Empowers girls and young women with Rett Syndrome to express what is truly on their minds



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Website for Presentation

<http://irsfconf2011.jlariviere.com>



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