Tobii EyeGaze and Rett Syndrome

Hector Minto
UK Sales and Business Development Manager
About Tobii

- Founded in 2001
- Based in Danderyd, Stockholm
- 400+ employees
- 10% owned by Intel
- Global leader in eyetracking
What is eye tracking?

- We see what you’re seeing!
- We know what you’re thinking/processing!
- We can monitor your eye movements in real time
What is eye control?

- Your eyes become your mouse!
  ....regardless of head position
  ....without needing to lock down precisely
The multiple applications of eyetracking
F: Fovial area (1-2°)
Pf: Para-Fovial area (2-5°)
P: Peripheral area (6-220°)
What do we see?

- The human visual field = 220°
- The 1-2° area of foveal vision is about the size of a thumbnail at an arms length distance
- Only foveal vision is trackable
What do we see?

- The fovea is less than 1% of the retina but takes up over 99% of the visual cortex in the brain.
- Peripheral vision is mainly good at picking up movements and contrasts.
The Bright Pupil Effect

Caucasian

Asian

Bright Pupil Reflection (Glint)
The Dark Pupil Effect
Rett Syndrome and AT (UK)

- I had never worked with someone with Rett in 15 years
- Low exposure group of children to AT
- Persevering with switches and touch screens – little acknowledgement of apraxia
- Low expectations of the children with Rett – parents often think differently to the professionals
- SLT says - “How can an ambulant child require eyegaze?”
Tobii and Rett

- Other territories saw high numbers of Rett “girls”
  - Eg USA, Germany
- Rett Syndrome viewed globally as one of four clear eyegaze groups
  - Cerebral Palsy
  - ALS/MND
  - Locked In Syndrome
  - Rett Syndrome
- UK experiences very different to other funded markets. We have NO standard AAC funding in the UK
First experiences in the field
New Orleans – June 2012

- Guess what? Girls were the same
- AAC funded – but with many of the same barriers to success
- SLPs presenting with clear strategies for successful communication
- “Apraxia, Apraxia, Apraxia”
- “Don’t Test”
- “Show that you believe in the girls” – presumed competence
Recent research carried out using eye tracking, at the Rett Syndrome Centre, Children's Hospital at Montefiore in New York revealed the hidden, inner world of children who have RTT.

The research confirmed the observation of parents, teachers and therapists that girls understand more than their bodies allow them to show.

Aleksandra Djukic MD, PhD. Rett Syndrome Center, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, New York, 2012
The Study: What did we do?

- We carried out a small scale study
- **Aim:** To determine if girls and women with Rett Syndrome (RTT) can use their gaze intentionally, by observing their comparative performance in several cognitive tasks using eye tracking and eye gaze control technology.
- 90+ girls diagnosed with RTT according to DSM-IV criteria were studied. Eyegaze technology was used to record their eye gaze responses to verbal and visual stimulation.
The cohort was made up of 90+ girls and women who were assessed between Nov 2011 and Sep 2013
  - Tobii clinics held in schools, hospitals and family homes
  - Regional Rett UK family days
  - Rett Clinics in Cardiff
  - Rett Ireland
About

Professional Contributions

Professor Clarke has contributed substantially to the clinical genetics community in Britain and more widely over the past two decades. These contributions include:

- Chair of Clinical Genetics Society Working Party on Genetic Testing of Children (Report 1994); subsequently member of working groups on the same topic for the British and European Societies for Human Genetics (reporting in 2010 and 2011).
- Member, Secretary and Chair of the JDHRT Specialty Advisory Committee on Training in Clinical Genetics (1993-2000)
- Co-founder and Organiser of the UK Genetics Group (from 2000)
- Editorial Boards of the eLS (Wiley Encyclopedia of the Life Sciences) and a

Roles & memberships

Cardiff University

Institute of Cancer & Genetics

Clinical Professor

Medical Genetics

Clinical Professor
The Study: How old?

*Where age was known, range 2:3 to 42*
The Study: Stage of Rett?

*Stage of Rett syndrome where known*
Strategy for the Study

- In line with the Tobii Eyegaze Learning Curve
Learning Curve Hardware

- More options now available
- Laptop + PCEye
Learning Curve Hardware

- More options now available
- Windows Pro Tablet + PCEye = Eyemobile
Eye FX
Software demo

- Look to Learn
Guided Narrative

- Live Response
  - Their “likes”
  - Music videos
  - OUP Reading Tree

- No user perceived testing
- Gaining trust in the end user
 Availability of the Sono Suite & more content

- All Tobii content products are preinstalled on the C-Series
- All products are available for download as a trial
- Check www.PageSetCentral.com for files and amendments
Learn how to hotspot.....

- A scientific approach to our assessments
Results

- Data collated over multiple sessions in a period of almost two years showed a high rate of fixation on the named items.
- Of the 90+ children and adults assessed, only two did not present engagement with the computer screen; it is possible that they have previously undetected vision problems.
- Over 50% did well in all tasks (Learning Curve Stage 3), and many responded in ways that astounded parents and teachers.
Conclusion

- The rate of appropriate eye-tracked responses suggests that there is measurable and intentional gaze in girls with RTT that can be used as a path to explore their cognitive performance.
- The girls performed well to both direct instruction and to indirect commentary, but some individuals achieved better results through indirect commentary; this needs further exploration.
Perceptions changing

- Proving cognition changes attitudes of teachers and therapists
- Proving functional use is very rare in an initial assessment. We need to prove that there is a starting point
- New cost point of hardware makes this a more feasible purchase for families, schools and therapists.
Recommended approach

- Apraxia heightens on command, so:
  - No testing
  - Monitor vision during time alone
- Make sure AAC is consistently available and modelled
  - (I-series really allows this)
- Respond consistently and positively to screen choices
The Future?

- Eye gaze technology should be put to use as a means of accessing AAC for people with Rett Syndrome.
- Eye gaze technology can be used to determine language and cognitive abilities.
- Further studies will be needed to find out what kind of illustrations/level of symbolisation is required, including whether individuals with Rett Syndrome can develop traditional literacy - reading written words.
SLTs feel more confident

- Teachers and SLTs now have an argument to make for funding
- Eyetracking allows us to demonstrate cognition and allow a recommendation

The children looked at the junk.
Article published in the Royal College of Speech and Language Therapists Bulletin in January 2013.

A further article will be submitted based on this study.

Rett Syndrome and eye gaze technology should now be well and truly on the Speech and Language Therapy radar!
The final word

- With an appropriate device, a child quickly learns to express her own voice. This is the necessity that allows these children to develop to the best of their cognitive and medical ability.
- Timing of intervention is essential. It has been well known for more than thirty years that the impact of appropriate stimulation has different effects at different stages of life, the window of opportunity, and the window of vulnerability.

Dr Aleksandra Djukic, MD, Director
The final final word......

- http://tommy322.wix.com/listentomyeyes
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Thank you