NOTTINGHAM TRENT UNIVERSITY

Eye gaze, ASD and AAC

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Eye-tracking and facilitated communication

- Facilitated communication (FC) remains controversial
  - the commitment to it from advocates
  - very limited empirical support in the peer reviewed literature
- Physical support to hand, wrist, arm or shoulder, with backward pressure, while person points (usually to 'type')
- Peer reviewed studies based on message passing experiments
  - can the FC user communicate something not known by the facilitator?
  - 'authorship'
- Our aim
  - to observe
  - to describe
  - focusing on what the FC user is looking at

Eye-tracking study

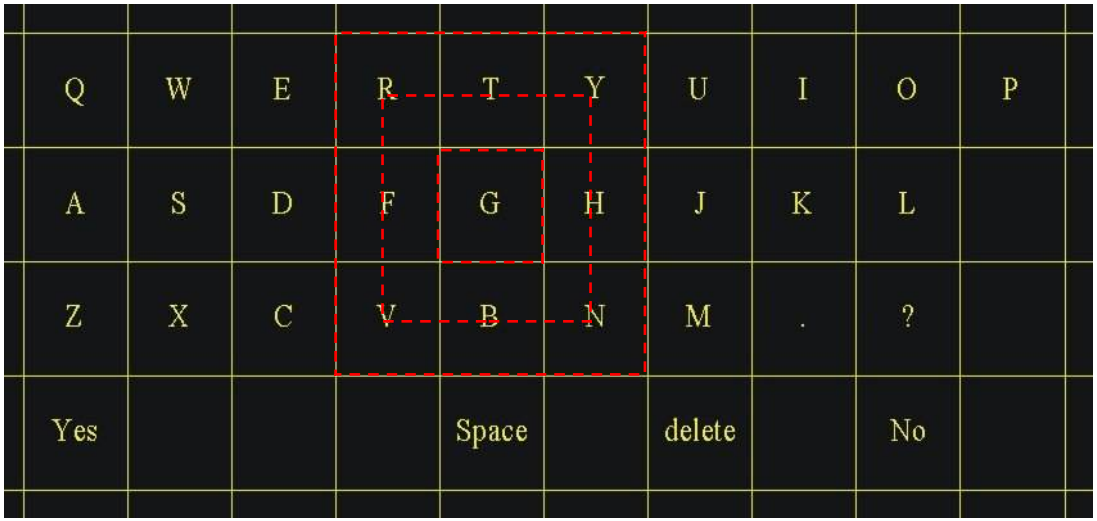
- Eight participants, all effectively non-verbal
- All participants present as having severe learning disabilities
- All participants had life-long input from speech and language therapists but had not developed independent communication beyond very basic abilities
- None of the participants have independent literacy skills
- Most participants were adults with an existing diagnosis of autism
- *All participants, with physical support, produce relatively well formed grammatical phrases and sentences*
- Authorship?

Data collection

- FC user ‘types’ by pointing to letters on QWERTY ‘keyboard’ displayed on computer monitor
- Typing is mostly free-form conversation with physical support to hand/wrist
- Eye-camera records fixations on screen, side-camera records pointing movements
- AV records from eye- and side-camera synchronised
- Pointing movements manually coded
  - Start of forward movement (‘forw’)
  - Moment finger touches screen (‘touch’)
  - minimum inter-rater reliability of .85 in 0.12 second window for each participant

Data processing

- LookZones (LZ) defined around each letter on screen
  - LZ1 - the letter's square
  - LZ2 - 1.5 x letter's square (allow for calibrational error)
  - LZ3 - 2 x letter's square (allow for more calibrational error)
- Fixations in LZ auto counted as a 'hit' or a 'miss' in relation to to-be-typed (t-b-t) letter
- 'Hit rate' calculated (percentage of letters looked at before being touched)
- Other fixation measures taken
- ALL usable data included



Are looking & pointing systematically related?

- No possibility of a control group, no normative data
- Development of 'Monte Carlo' (random) model: per participant
  - Two behaviour streams – looking (fixations) and pointing (the letters pointed to)
  - Builds frequency distributions of looking and pointing behaviours
  - Generates random versions of looking and pointing based on the actual distributions and replaces the observed data with these randomized data
  - random (expected) 'hit-rate' based on 100 x no. of letters observed per participant (e.g. 100 x 471 = c. 47,000 1 - 0 Bernoulli trials for participant A)
  - binomial distribution estimated, and compare the observed and expected hit-rates
- Model takes account of actual looking and typing behaviour, and of size of LZs
- **Clear evidence that looking and pointing are related**
  - **for 7 of the 8 participants observed hit-rates are significantly higher than expected hit-rates**

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- …set of slides with findings that are currently submitted for publication
- also videos that can’t be displayed on-line deleted from here
- please contact Andy Grayson if you are interested in any of these – andy.grayson@ntu.ac.uk

FC User authorship or facilitator influence?

- Looking and pointing related by more than chance factors
- But, could still be being caused by facilitator influence (facilitator guides finger, FC User follows finger with gaze)
- WHY?
  - making ballistic arm movements
  - towards meaningless shapes
  - in a room full of buzzing computers and monitors
  - in close proximity to others
  - for long periods of time
  - and they are ALWAYS looking at what they are doing
- Other measures…
- Fixations on relevant t-b-t letters versus fixations on non-relevant not t-b-t letters

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Implications

- At the very least, findings problematise facilitator influence account
- At best, convincing evidence of FC user authorship of complex texts – how else to explain
  - remorseless concentration on letters
  - longer fixation durations on t-b-t letters before forward movement
  - participant A's pattern of looking ahead
- FC is a way of enabling hidden communicative competence, probably by overcoming difficulties with movement and with the executive control of movement