After severe traumatic brain injury (TBI), some literate individuals who require augmentative and alternative communication (AAC) to support communication, use onscreen keyboards to generate text (Beukelman & Mirenda, 2013; Britton & Baarslag-Benson, 2007; Fager, 2014; McNaughton, 2007; Brady, Anderson, Hahn, & Obermeier, 2014; Hux, Fager, & Kapa, 2006). A range of layouts are available in specialized communication software. However, limited objective information is available on the visual-cognitive processing demands of AAC interface use different keyboard layouts to guide clinical decision-making for keyboard selection. Individuals who have had a TBI often experience changes in their visual and cognitive capabilities which can affect their ability to use different keyboard layouts (Fager, Doyle, & Hux, 2007). Eye tracking analysis can provide insight into the visual-cognitive processing requirements of AAC interface layouts and content (Thiessen, Beukelman, Ullman, Longenecker, 2014; Wilkinson & Light, 2014; Light & McNaughton, 2014; Brady, Anderson, Hahn, Obermeier, & Kapa, 2014; Gillespie-Smith & Fletcher-Watson, 2014).

**Research Question:**
Is there a difference in the visual-cognitive processing demands between an QWERTY and ABC (alphabet) onscreen keyboard for individuals who have a TBI and for typical individuals?

**Method**

**Participants**
- 10 individuals with TBI; Ranchos Los Amigos Level 8-10 (Hagan, 1997)
- 10 typical (neurologically intact) individuals

**Hardware/Software**
- Tobii X2-60 eye tracker
- Tobii Studio analysis software
- Keyboard layouts-Tobii/Dynavox Compass

**Procedures**
- Calibrated using Tobii X2-60
- Controlled cursor with standard mouse
- Typed sentences using mouse with ABC or QWERTY (10 sentences for each onscreen keyboard layout randomized per participant)
- Data collected regarding keyboard type preference, and prior experiences using onscreen keyboards.

**Analysis**
- Keyboard = area of interest (AOI)
- Eye gaze metrics:
  - Fixation Count (number of fixations within an AOI)
  - Total Fixation Duration (the sum of the duration for all fixations within an AOI)
  - Means/standard deviations, t-test=within group, paired t-tests=between group between keyboard type

**Results**

- **Total Fixation Duration**
  - Typical
    - QWERTY: 12.83 (SD = 2.29)
    - ABC: 17.02 (SD = 3.80)
  - TBI
    - QWERTY: 14.81 (SD = 3.59)
    - ABC: 21.01 (SD = 6.09)

- **Fixation Count**
  - Typical
    - QWERTY: 66 (SD = 16)
    - ABC: 115 (SD = 26)
  - TBI
    - QWERTY: 112 (SD = 28)
    - ABC: 179 (SD = 53)

  *no significant difference between participant groups

  *significant differences for keyboard type for both groups at p <0.05

**Discussion**

- QWERTY keyboard use resulted in shorter total fixation durations and fewer fixation counts than ABC keyboard
- Performance matched perceptions and preferences for QWERTY over ABC layout
- Prior experiences using different technology interfaces may provide guide layout selection
- TBI participants- more variability in performance across participants compared to typical participants

**Acknowledgements**
Project supported by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR)- Grant # 99RE5017, RERC on AAC