Multi-input Access to AAC: Eye-Tracking + Switch Scanning for Individual with Severe Brainstem Stroke

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RERC on AAC

Purpose/Rationale

Focus has remained on single input access methods despite advances in access technologies (eye/head tracking, touch interfaces, specialty switches).

Opportunities exist to improve access for individuals with severe physical impairments that experience single input access challenges.

Challenges with single input access:

- Fatigue due to over-use
- Inefficiency
- Heavy reliance/focus on methods such as dwell that require vigilance and precise motor execution
- Some access methods require optimal set-up, positioning and environmental conditions to be relied on exclusively as an access method

Research Question: Is there a difference in performance (accuracy of letter selection/ errors) using a multi-input prototype (eye-tracking + switch scanning) and eye-tracking only?

Prototype- Eye-tracking + Switch scanning

Eye Tracker

Switch

Method

Participant
- 37 year-old with brainstem stroke
  - Limited upper extremity movement
  - Significant occulomotor issues with diplopia requiring intermittent spot patching on glasses
  - Challenges: switch scanning was fatiguing early in recovery, eye movement challenges impacted successful use of eye tracking early in recovery

Equipment
- Multi-input access prototype
  - Surface pro with Tobii PCEye mini and jellybean switch, onscreen keyboard interface
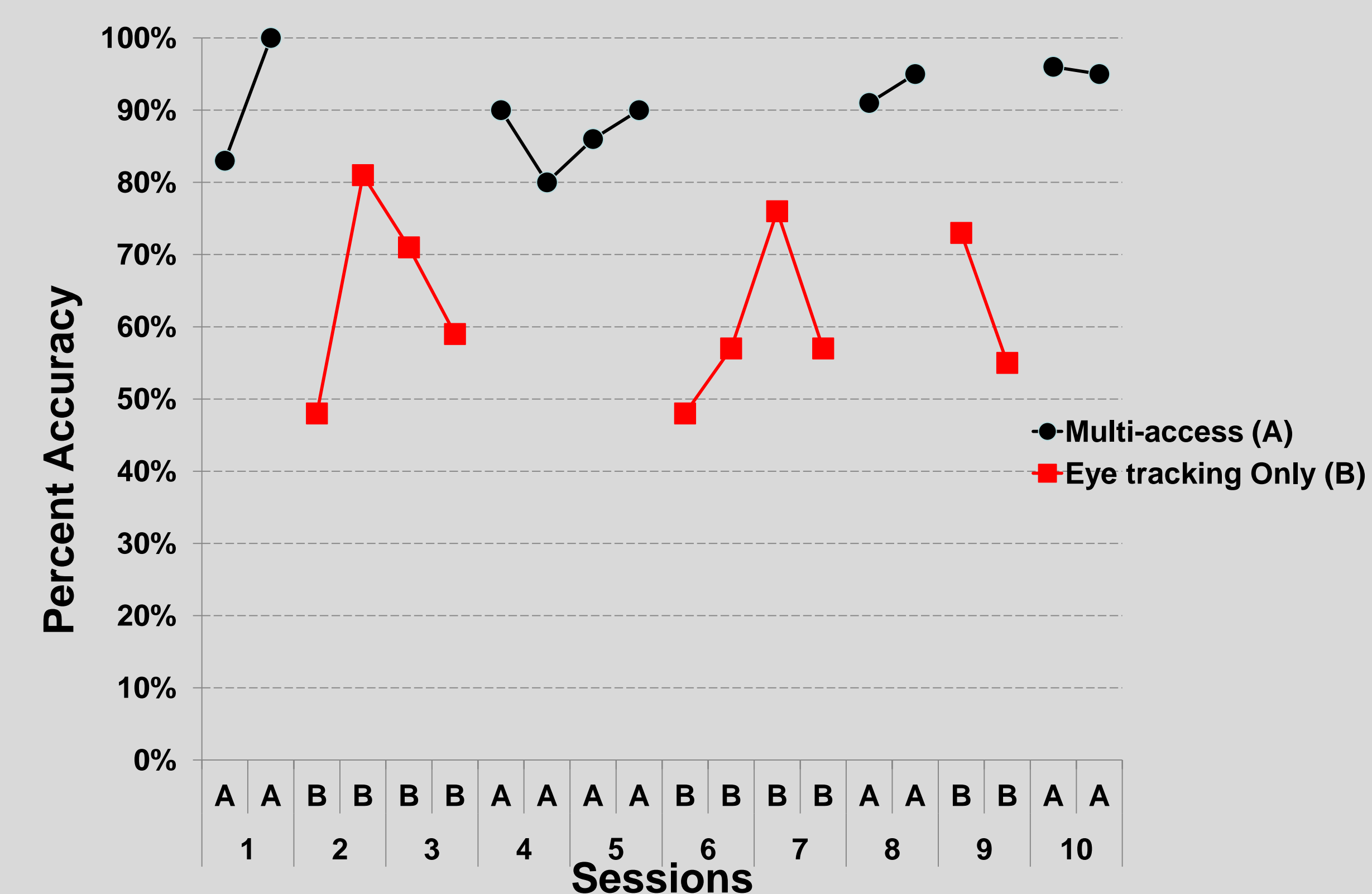- Tobii I12 with switch-selected letter access

Procedures
- AB design random assignment to multi-input prototype or Tobii I12
- Sentence task
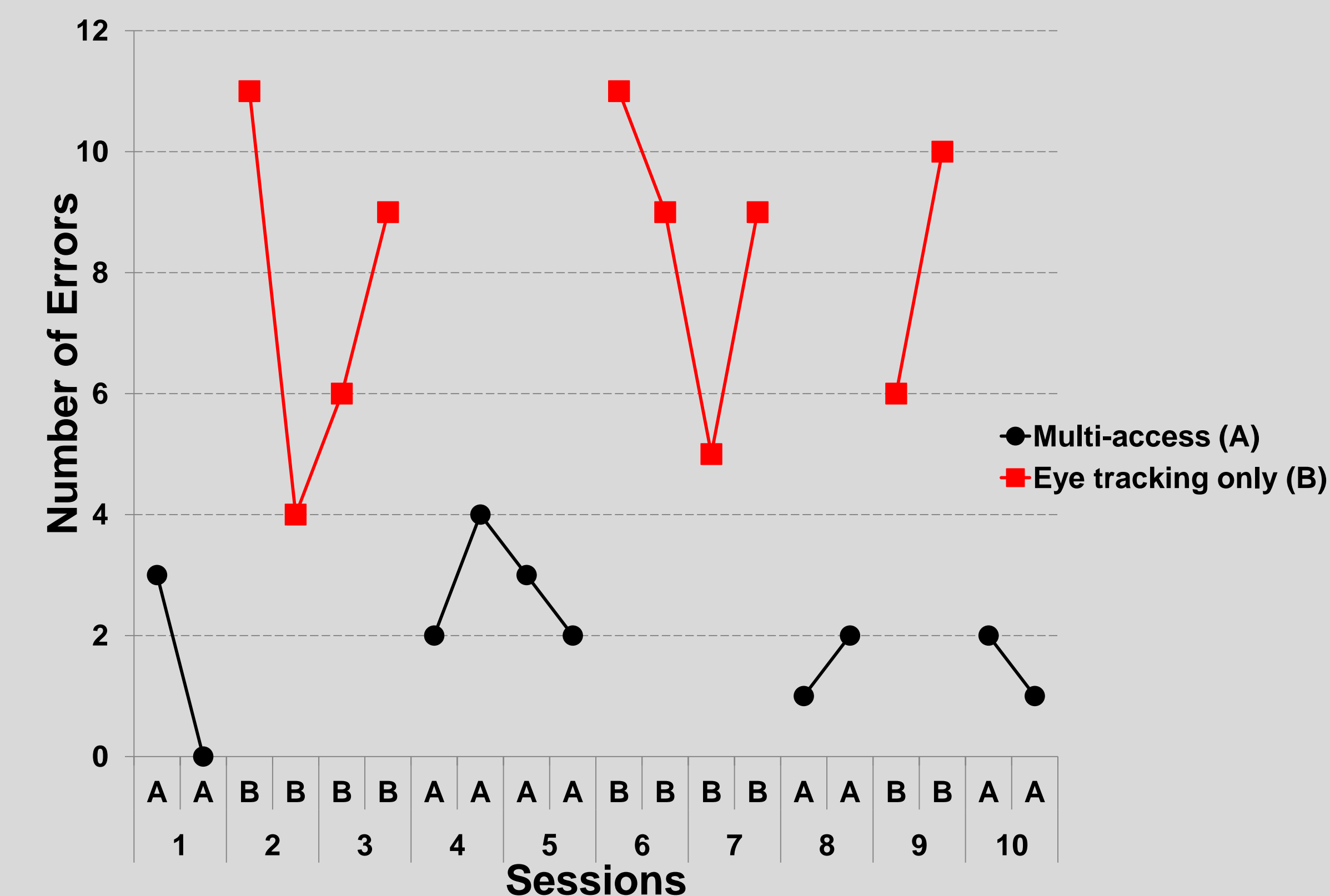
Data Collection
- First attempt accuracy
  - First attempt at target letter
- Errors
  - Number of errors (inaccurate letter selection, unable to select letter)

Results

First Attempt Accuracy

Errors Per Sentence

Discussion

- Eye tracking alone when assessed clinically, was not sufficiently accurate to support communication early in recovery which left her with switch scanning as her only viable access method
    Challenges: fatigue with high number of switch selections required during communication
- Multi-input prototype allowed her to reduce over-reliance on switch scanning and allowed her to leverage a more direct access method (eye-tracking) early in recovery
- Potential for tool to be used during the day when fatigue made switch scanning difficult
- Potential to bridge the gap between switch scanning and eye-tracking access (as eye motor control improved)
- Anecdotal reports from staff-excited about potential to use multi-input to encourage eye motor control through meaningful task (communication)

Acknowledgements