### Effectiveness of an impairment-based individualized treatment program using an iPad-based software platform

Carrie Des Roches¹, Isabel Balachandran¹, Elsa Ascenso¹, Yorghos Tripodis², Swathi Kiran¹

¹ Department of Speech, Language, and Hearing Sciences, Boston University, ² Department of Biostatistics, School of Public Health, Boston University

#### Introduction

- Individuals with language and cognitive deficits following brain damage likely require long-term rehabilitation. Consequently, it is a huge practical problem to provide the continued communication therapy that these individuals require.
- Several studies have examined computerized rehabilitation with small numbers of aphasic participants, providing promising preliminary results for the use of technology in the rehabilitation (Doeborg et al., 2004, Fink et al., 2002, Palmer et al., 2012, Pedersen et al., 2001, Rambert and Marie, 2007).
- More recently, the advent of tablet devices, such as the iPad, has proved to be promising for rehabilitation (Holland, 2014, Hoover and Carené, 2014, Kiran et al., 2014, Kurland et al., 2014, Rambert and Messamer, 2014; Szabo and Dittelman, 2014).
- Kurland et al. noted there was often a need for the software to increase in task difficulty when their participants showed improvement, demonstrating the need of tailored therapy for individuals (Kurland et al., 2014).

#### Objectives

In the present project, a large scale preliminary clinical efficacy study was conducted to examine language and cognitive rehabilitation outcomes in patients who received continuous, personalized, and self-paced rehabilitation language and cognitive program using a structured iPad-based therapy program.

#### Research Questions

1. Can an iPad-based treatment program be provided in a standardized but individualized manner. If so, what does treatment dosage and treatment compliance look like?
2. What is the effect of the treatment on standardized measures and is it different between the control and experimental groups?
3. Are the individualized therapy tasks for language and cognitive therapy effective for improving overall language and cognitive performance?
4. Are there profiles of individual responsiveness to treatment?
5. What is the nature of between-task co-improvement across different therapy tasks across participants?

#### Participants

Fifty-one individuals with aphasia due to a stroke or traumatic brain injury were recruited to use an iPad-based software platform, Constant Therapy (www.constanttherapy.com), for a 10-week treatment program. Each participant was tested before and after therapy on: Revised Western Aphasia Battery, Boston Naming Test, Pyramids and Palm Trees, and Cognitive Linguistic Quick Test.

#### Data Analytics

Reports provided by the software, which include accuracy and latency by item, by task, and by week for each participant.

#### Results


#### Results (continued)

5. Latency co-improvement table of beneficial and significant slope values.

#### Conclusions

1. The experimental and control groups did not differ in terms of dosage, or in terms of percent of compliance out of the ideal time, but experimental participants completed overall more time than control participants.
2. Experimental participants showed more significant and positive changes in their standardized tests than control participants. This shows that more practice resulted in greater gains in standardized measures.
3. While both groups showed improvement, experimental participants showed more changes than control participants when examining just assisted or both types of sessions.
4. The changes in experimental participants were possibly driven by language and cognitive standardized measures scores, showing effects such as tasks where participants with lower R-WAB AQ score improve on simpler language tasks. While this may seem obvious, it is important to show that impairment-based therapy can show benefits.

#### Selected References


#### Acknowledgements and Disclosure

Funding for this project from Wallace Coulter Foundation for Translation Research. Disclosure: CB owns equity in Constant Therapy and serves as the Chair of the Scientific Advisory Board for Constant Therapy. CO, BI, and EA each own a portion of the stock equity that B2M owns.