Introduction

- Continued practice (i.e., “overlearning”) can be beneficial to cognitive skill acquisition, even after performance has reached a certain criterion (Driskell et al., 1992) and repetition is likely important for long-term neural changes (Nudo & Fried, 1999). Treatment intensity has been shown to positively modulate outcomes and maintenance (Cherney et al., 2006).
- Repetition may be avoided during aphasia therapy to prevent boredom/loss of motivation, and speakers with aphasia may be reluctant to rely on therapists/family to assist with ‘drilling’ exercises. The development of an automated, computerized game to practice naming may be a solution to these issues, as the training aspect can be ‘hidden’ behind the gaming environment.

For naming accuracy practice, it is essential that such a game provides automated and fast feedback on the speech output, which is a challenge in itself (Wade et al., 2001).

The game also provides a rhythm during naming, which has been shown to improve fluency in speakers with aphasia and apraxia of speech (Boucher et al., 2001).

The purpose of the study was to assess the effectiveness of The Game for improving fluency in speakers with aphasia.

Methods

Participants

- 20 speakers with aphasia participated in this study. There were no significant differences in WAB-AQ score, AOS severity, age, or months post stroke between groups.

- The WAB-R, ABA-2 and a spontaneous speech sample (Cinderella story retelling) were collected before and after treatment.

- A naming test was created to assess naming accuracy and reaction time (RT) before and after treatment.

- Three versions of this test were created and were randomly assigned to participants as either Baseline, Pretest, or Posttest.

- Each version consisted of 40 words repeated in all three tests (20 ‘in-game’ items, 20 ‘not-in-game’ items) and 20 unique words.

- The primary outcome measures were 1) accuracy and RT on our naming task (through difference scores), 2) WAB-R AQ scores pre/post, and 3) correlations between time played and WAB difference score and baseline naming accuracy and RT.

Procedure

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Results

WAB AQ Pre vs. Post

- WAB AQ scores were significantly higher following treatment for all participants. (t(29) = 2.95, p = .008), and separately in the Home Group (t(10) = 3.22, p = .004), while this difference did not reach significance in the in lab Group (t(1) = 1.72, p = .13).

Naming Reaction Time Pre vs. Post

- Participants named pictures faster following treatment. Reaction time on relevant items was not significant (t(10) = 1.35, p = .196). In the Home Group, this measure approached significance (t(10) = 2.10, p = .092). There was no significant improvement for ‘in game’ items, not in ‘game’ items, or unique items in either group or overall.

Naming Accuracy Pre vs. Post

- Participants named pictures faster following treatment, but this increase was not significant (t(10) = 0.90, p = .229). There was no significant improvement for ‘in game’ items, ‘not in game’ items, or unique items in either group or overall.

Correlations with Time Played

- Including all participants, the correlation between time played and overall naming accuracy approached significance (r = .423, p = .071), and was significant for the ‘not in game’ items (r = .59, p = .007), suggesting generalization occurred.

- In the Home Group, the correlation between time played and accuracy for the ‘not in game’ items was significant (r = .749, p = .008).

- For the Lab Group, there was a significant correlation between time played and overall naming RT (r = .764, p = .027), in ‘game’ item RT (r = .711, p = .042), and accuracy for the ‘in game’ items (r = .793, p = .019), while the correlation between time played and ‘not in game’ item RT approached significance (r = .631, p = .093).

Conclusions and Future Directions

- We tested the effectiveness of a computerized game for independent use for treatment of fluency in speakers with aphasia.

- Preliminary results show improvement in WAB AQ.

- Naming accuracy and RT were not significantly affected, though participants were numerically faster and more accurate.

- In the Lab group, those who played the game more improved naming speed overall and for trained items, and accuracy for trained items.

- In the Home group, those who played the game more improved naming accuracy for the untrained items, suggesting generalization.

- In-progress and future analyses include assessing amount of repetition and variation during practice, naming speed during game play, narrative speech analyses (MLU, TTR), and naming errors (e.g., paraphasias, perseverations).

- Continued improvement of game mechanics/options is also underway.

References


The dataset contains the raw data of the experiment and the statistical analysis results. The data is used to support the conclusions and future directions of the study.