Development of Trivia Game: Targeting Speech Understanding in Background Noise
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Abstract
This study explored the development of Trivia Game, a computerized training game where speech clues are presented with increasing levels of background noise. Normal hearing listeners completed a three week regimen of game-playing followed by objective outcome measures. Results suggest that Trivia Game may improve lip-reading skills and speech understanding in background noise. The results of this study will be used to explore the effects of Trivia Game in hearing impaired listeners.

Rationale
Hearing aid dissatisfaction has plagued the audiologic profession for many years. Despite the advances in hearing aid technology in the past several decades (i.e., introduction of digital technology, decrease in hearing aid size), hearing aid satisfaction has not increased (Kochkin, 2000; 2005). Understanding speech in the presence of background noise was identified as a primary reason for hearing aid dissatisfaction. Computerized games were developed to improve auditory processing skills, i.e. LACE (Sweetow & Sables, 2006); however, little data are available for how these tools change auditory processing in noise.

This study explored the development of HeardIT Listening Exercises. Trivia Game, an at-home computerized training game in which speech clues are presented in the presence of increasing levels of background noise. The purpose of this study was to investigate the effects of Trivia Game for understanding speech in background noise in normal listeners. This study was planned as a proof-of-concept feasibility trial prior to examining the effects of Trivia Game in hearing impaired listeners.

METHODS
Subjects
- 23 subjects with normal hearing (passed Pure Tone Screening bilaterally)
- Normal Auditory Processing (SCAN; Keith, 2009)
- Experimental Groups:
  - 14 Control (untrained) Subjects
  - Gender: 7 men, 7 women
  - Mean age: 21.4 years
  - Age range: 18 – 28 years
  - 9 Trivia Game Subjects
  - Gender: 4 men, 5 women
  - Mean age: 22.2 years
  - Age range: 19 – 26 years

Training Schedule
- Participants played twelve sessions over a three week period
- Each session lasted approximately 20 minutes
- Game played independently at home
- Headphones (Sennheiser PC151) worn during play
- Game log tracked playing time, accuracy, and noise level

Outcome Measure
- Administered Pre- and Post-Treatment
- Two Modalities:
  1. QuickSIN Auditory Only
  2. QuickSIN Auditory+Visual
- Balanced modalities for order within treatment
- Presented at 70 db HL

RESULTS

| QuickSIN Difference Scores from Pre to Post-test for Auditory Only and Audiovisual Conditions |
|-----------------------------------------------|-----------------------------------------------|
| **SNR** | **Control** | **TriviaGame** |
| 0 | 12 | 10 |
| 5 | 8 | 6 |

**Is There Improvement At All Listening Levels?**

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<tr>
<th><strong>Auditory Only QuickSIN Scores Across SNRs:</strong></th>
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<tr>
<td><strong>Gain from Pre to Post-test</strong></td>
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<tr>
<td><strong>SNR</strong></td>
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**Audiovisual QuickSIN Scores Across SNRs:**

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<th><strong>Gain from Pre to Post-test</strong></th>
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DISCUSSION

(1) Significant differences in favor of the treatment group were observed with no difference for presentation condition (Auditory versus Audiovisual).
- **TriviaGame** provides auditory training to better understand speech in noisy situations.

(2) A significant group by condition interaction at SNR 0 dB showed that changes were greater in the audiovisual condition than the auditory only condition.
- **TriviaGame** significantly improved performance in more difficult listening situations when audiovisual information was provided.
- Consistent training using audiovisual information may have improved lip-reading/face-reading skills.

(3) It is possible that significant improvements were not seen at easier SNR conditions due to ceiling effects of subjects with normal hearing.

CONCLUSIONS

Based on the methods used in this study, playing Trivia Game significantly improved speech understanding performance in noise. Future research is needed to determine benefit for people with hearing impairment.

REFERENCES


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