Enhance Spoken Communication in the Workplace

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Our Questions

Given the spoken-language communication requirements of the workplace, to what extent does current speech recognition technology, especially as available in mobile apps, enhance access by deaf and hard-of-hearing individuals?

Are speech recognition apps useful tools to enhance exchanges between deaf or hard-of-hearing persons and individuals who have typical hearing, whether it be a coworker or a boss?

Background

The workplace presents many challenges for individuals with hearing loss. Communication on the job involves written or spoken English about 80% of the time, whether with or without sign (Kelly et al., 2015). Job-related demands cause even more difficult communication situations for those who are deaf compared to those who are hard-of-hearing (Boutin & Wilson, 2009). To gain upward mobility, a wide array of flexible strategies is essential for communicating with people who have typical hearing (Foster & Walter, 1992).

Our Trials and Participants

To investigate the capabilities of newer Automatic Speech Recognition (ASR) applications/software as tools to support auditory access of spoken communication, we asked deaf and hard-of-hearing college students to use a variety of applications and software in everyday, job-related and social settings and to provide evaluative feedback on their experiences.

Participants were undergraduate and graduate students enrolled in one of these courses or activities:

- Freshman Seminar
- Organizational Communication and the Deaf Employee
- Individual speech-language instruction

Fall 2013

GROUP 1 = 15 students tested in quiet settings
- Office meetings with professors
- Computer Help Desk

GROUP 2 = 11 students tested in crowded group settings
- Classroom
- Career Fair

Fall 2015

GROUP 3 = 21 students tested in a variety of day-to-day settings
- 1:1 and group social conversations with friends & family

Participant Characteristics and Overview of Experiences

Students who relied on ASL:

- Found key word reception to be an "amazing" and "awesome" benefit of ASR.
- Ava performed "Better than Google. Helped me a lot."

Students who relied on Spoken English:

- Found issues with accuracy and latency, especially in noise.
- Even though many had highly intelligible speech, Ava/built-in ASR failed to recognize all deaf users' speech.

Overall:

- Ava performed slightly better than Siri for all iOS users.
- Perceived benefit of ASR apps is highly individual.
- Perceptions of ASR apps ranged all along a continuum of claims: "Not worth it to my family. We are very oral."
- "Had the best conversation with a hearing family member in past 5 years because we were able to talk in deeper context."

Study Results

A Closer Look at ASR App Ratings

App Ratings on a scale of 1–5 (1 = poor; 5 = outstanding)

<table>
<thead>
<tr>
<th>App</th>
<th>Rating Range</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
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</thead>
<tbody>
<tr>
<td>Siri (Notes app)</td>
<td>2.0-4.0; M = 3.0</td>
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<tr>
<td>Siri (Mail app)</td>
<td>2.0-3.8; M = 3.4</td>
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<tr>
<td>Siri (iPhones app)</td>
<td>1.8-3.0; M = 2.6</td>
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<tr>
<td>Ava (JEBA app)</td>
<td>2.0-3.8; M = 3.4</td>
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<tr>
<td>Dragon Dictation</td>
<td>3.0-5.0; M = 4.2</td>
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<tr>
<td>Dragon Transcribe</td>
<td>2.0-5.0; M = 3.0</td>
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<tr>
<td>Microsoft Speech Recognition</td>
<td>1.0-3.0; M = 2.6</td>
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<tr>
<td>Google Now (in Memopad app)</td>
<td>1.0-3.0; M = 2.6</td>
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<tr>
<td>Google Now (on Memopad app)</td>
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Future Directions

- Improve algorithms for increased accuracy and decreased latency, especially in noise and when experiencing poor internet connectivity.
- Investigate directional and Bluetooth microphones to improve performance in noise.
- Improve recognition of deaf talkers’ speech.
- Develop user training in the area of persuading hearing individuals to use ASR apps.
- Explore the possibility of using Ava/built-in ASR to support video transcription.

Additional App Resources


References