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Automatic Speech Recognition Systems as Tools to Enhance Spoken Communication in the Workplace

Linda Gottermier, AuD • Bonnie Bastian, MS • Carol L. De Filippo, PhD • Raja Kushalnagar, JD · LLM

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 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 usable 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?

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:

Fall 2013
• Group 1 = 15 students tested in quiet settings
• Office meetings with professors
• Computer Help Desk

Spring 2015
• 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

A CLOSER LOOK AT ASR APP RATINGS

<table>
<thead>
<tr>
<th>Group 3 DATA</th>
<th>Siri (in Notes app) M = 3.7</th>
<th>Google Now (in Memo app) M = 4.0</th>
<th>Ava (BETA app) M = 3.4</th>
<th>Ava (BETA app) M = 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of use</td>
<td>Rated 3.5-6.0 M = 4.6</td>
<td>Rated 2.5-3.0 M = 3.0</td>
<td>Rated 3.0-5.5 M = 4.2</td>
<td>Rated 2.5-3.0 M = 3.6</td>
</tr>
<tr>
<td>Latency or lag time</td>
<td>Rated 2.5-3.0 M = 3.6</td>
<td>Rated 2.5-3.0 M = 3.6</td>
<td>Rated 1.0-3.5 M = 2.6</td>
<td>Rated 1.0-3.5 M = 3.2</td>
</tr>
<tr>
<td>Accuracy of the text when deaf users spoke</td>
<td>Rated 3.0-3.5 M = 3.3</td>
<td>Rated 2.5-3.0 M = 2.5</td>
<td>Rated 3.5-4.0 M = 3.4</td>
<td>Rated 2.5-3.5 M = 3.0</td>
</tr>
</tbody>
</table>

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.

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


