Is repeating audio helpful in real-world environments?

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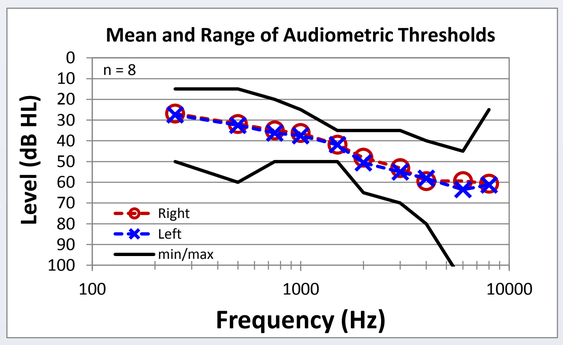
Introduction

In real-world environments, if a hearing-impaired person misses what is said, he will ask the speaker for repetition. If this happens often, it could be annoying and embarrassing for both parties. A potential solution to this problem is to provide the hearing-impaired listener with technology that allows him to repeat what was just said. This series of studies examined the efficacy of such a solution.

Methods



Participants

- 7 normal-hearing listeners
- 8 hearing-impaired listeners (right)

Devices

- iPods/iPhones were tethered to:
  - an EarPod microphone (normal-hearing listeners)
  - a hearing-aid microphone (hearing-impaired listeners) (below)

Task

- Participants wore the devices for 2-3 weeks
- Each time that participants repeated audio, they used one of 4 icons on the iPod to indicate whether:
  - repeating was helpful
  - repeating was not helpful because:
    - the signal was poor
    - the correct amount of audio was not recorded
    - they did not have time to repeat back the missed information
- Custom questionnaires were completed at the end of the study

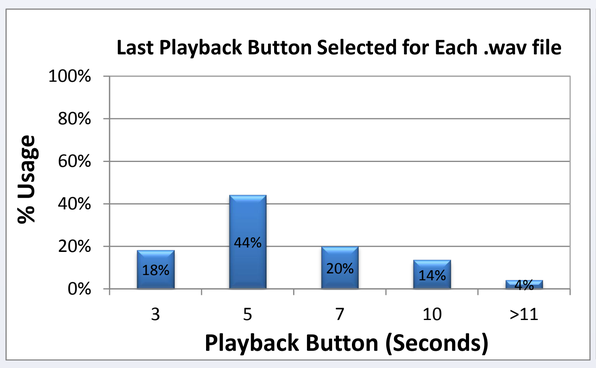
Other Variables

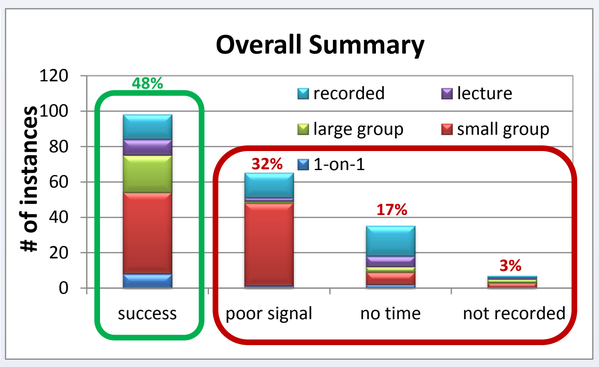
- Playback duration
  - 3, 5, 7 or 10 seconds (normal-hearing listeners)
  - 4, 7 or 10 seconds (hearing-impaired listeners) (study 1)
  - 1-20 seconds, adjustable in 1-second intervals (study 2)
- Method of initiating audio playback
  - iPod (normal-hearing listeners)
  - iPod or push button on an audio cable (hearing-impaired listeners)
- Immediate vs. delayed playback
  - Delayed playback (normal-hearing listeners)
  - Delayed and immediate playback (hearing-impaired listeners)

Results/Discussion

Normal Hearing

- 65 hours of wear time

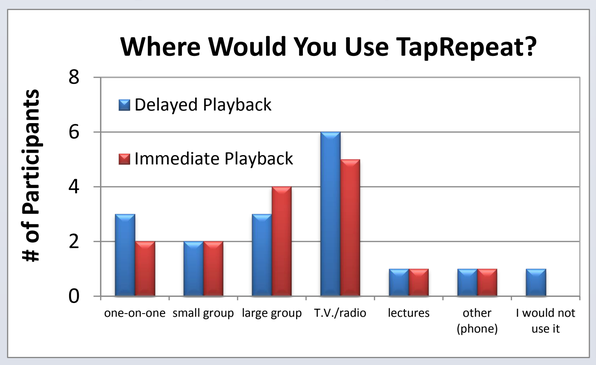


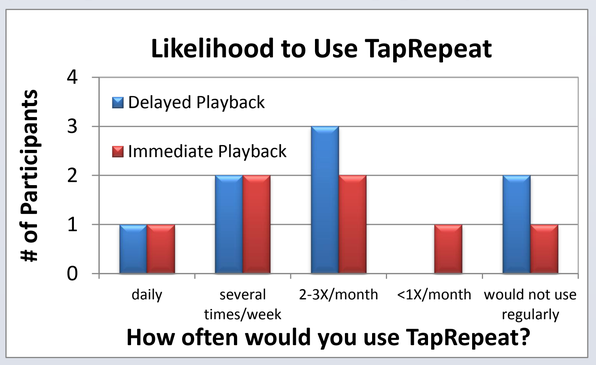


- Participants *liked* using this application in:
  - Group situations because there are more natural pauses in conversation and therefore more time for playback
  - Lectures because it was helpful when they "zoned out" or as a note-taking feature
- Participants *did not like* using this application in/with:
  - One-on-one conversations because it was awkward/inconvenient, and it was easier to ask for repetition
  - Recorded materials (e.g. T.V./movies/radio) because people could often use a remote to repeat what was said

Hearing Impaired

- Most participants used each version of the application (iPod and push-button interfaces) for 2-6 hours per day for 5-6 days
- Most participants did not log their responses correctly, and so their questionnaires were used to determine the usefulness of this feature
- Up to 20 seconds of recorded audio was required—this was much longer than was required for the younger, normal-hearing group





- Participants did not need the application in one-on-one conversations because the hearing aids provided enough benefit by themselves
- In other situations (e.g. T.V., movies and groups), sometimes repeating the audio helped and sometimes it did not
  - The application did not do anything to improve the quality of the signal, and therefore if the person did not catch what was said the first time, repeating the audio did not always help
  - Even if the missed audio was caught after it was repeated, some people did not like that they would then miss the next thing that was said
- 5 preferred immediate playback because it was faster and simpler
- 3 preferred delayed playback because they were able to stay engaged in the current conversation
- All 8 participants preferred the simplicity of using a single button to initiate playback (rather than having multiple time buttons)
- Participants liked having the option to change the playback time

Conclusion

Repeating audio is helpful to some people in some situations. For a hearing-impaired population, the greatest amount of benefit would likely be derived from a device that offered:

- A single button on the hearing aids that allowed the wearer to start and stop audio playback
- Immediate playback
- An adjustable playback duration of up to 20 seconds
  - This could be adjusted using a smart phone/remote
- A playback signal that is easier to understand than the original