Clear speech for older hearing-impaired listeners: Effect of rate

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-Background-

Clear Speech

- Style of speaking adopted naturally by many talkers in difficult communication situations (e.g. Byrne & Dillon, 1986).
- Nearly always a reduced rate (e.g. by many talkers in difficult communication situations).

Purpose

Listener variability

Overall Results

• On average, clear/slow provided the largest intelligibility advantage (10 points, relative to conv/normal).
• Conv/normal also provided some advantage (8 points).
• No significant advantage from clear/normal on average.

All main effects were significant (p < 0.001) in 3-way ANOVA (rate, talker, listener).

Listener variability

• Benefit of clear/slow speech was the most robust.
• Nearly all talker/listener combinations (except T1/L10 and T5/L7).
• No significant advantage from clear/normal on average.

Does the benefit of clear/slow speech vary with talker for these listeners?

Participants

T3: 11 talker/listener combinations (5 talkers, 2 modes, 2 rates).

All main effects were significant (p < 0.001) in 3-way ANOVA (rate, talker, listener).

Overall Results

For older listeners with moderate, sloping hearing loss in quiet conditions:

 listener variability

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• Nearly all talker/listener combinations (except T1/L10 and T5/L7).
• No significant advantage from clear/normal on average.

Does the benefit of clear/slow speech vary with talker for these listeners?

Participants

T1, T4, and T5: no conv/slow intelligibility benefit...

No significant advantage from clear/normal on average.

All main effects were significant (p < 0.001) in 3-way ANOVA (rate, talker, listener).

Overall Results

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Overall Results

For older listeners with moderate, sloping hearing loss in quiet conditions:

-Role of Speaking Rate-

-Results-

Speech Materials

Drawn from speech collected in previous work on clear/normal speech.

Test conditions

• Hearing corrected individually based on listener’s audiogram, using the National Acoustic Laboratory (NAL-R) procedure (Davis & Dillon, 1994).

Sentence presented:

- Monaurally, via headphones (without hearing aids)
- In speech-embedded noise at (approximately) SNR-50

Talker Interactions

Effect of condition varied across talker (Talker x Rate x Mode interaction, p < 0.001).

Reduction of rate did not guarantee intelligibility benefit

- Slow rate provided benefit in both modes for only 2 of 4 talkers.
- Clear/slow: best condition for only 2 of 4 talkers.

Future work

- Improved intelligibility of clear/slow speech (especially T3, T5) for other listener populations and environments.
- Analyze acoustical properties of T3 (and other talkers) and compare to listener populations and environments.
- Improved digital hearing aids (amplification + “clarification”)
- Improved techniques for predicting intelligibility
- Intervention strategies (e.g. Schum, 1997) / Aural Rehab techniques
- Public officials and systems, front end to speech recognition...

-References-