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SPOKEN LANGUAGE PROCESSING LAB

Does Familiarity with a Talker's Voice Improve Intelligibility in Noise?

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Background

- Literature shows that familiarity with a talker's voice facilitates the listener's understanding, especially in complex listening tasks (e.g., listening in noise (Fleming et al, 2014; Newman & Evers, 2007)).

- However, most studies use synthetic noise (e.g., speech shaped noise) in the background.

- To better understand the role of talker familiarity in real-life, we need research that explores a familiar talker's speech intelligibility in the presence of ecologically valid background noise.

Aim

…determine whether or not familiarity with a talker's voice improves speech intelligibility when listening in real-life noisy environments.

Design

study design: mixed 2 X 2 yoked design based on the work of Newman and Evers (2007)

independent variables:
- talker type (familiar, novel) = between-subjects
- background noise (8-talker babble, cafeteria noise) = within-subjects

dependent variable: keyword accuracy (percentage correct)

Methods

participants: 32 adults, native speakers of American English with normal hearing. Half of the participants were familiar with the target talker because she taught their aural rehabilitation class (familiar talker condition; n = 16); the other half of the participants did not know the talker (novel talker condition; n = 16).
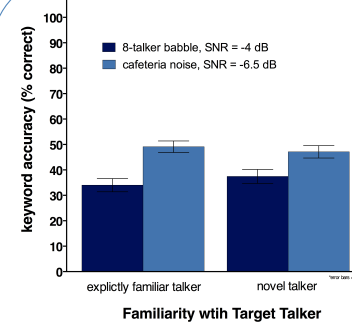
target sentences: An adult, female professor who taught COMD 5330 recorded 40 sentences, randomly selected from the Harvard Sentences (IEEE, 1969).

background noise. 8-talker babble consisted of 4 females and 4 males. The was cafeteria noise a real-life recording dubbed over 3 times. In an attempt to equate listeners' performance across the levels of background noise, noise was presented at an SNR of -4 dB for the 8-talker babble and -6.5 dB for the cafeteria noise.

Procedure

1. We tested listeners individually at a personal computer set-up in a double-walled sound booth and equipped them with circumaural headphones.

2. The researcher instructed listeners in the familiar condition that they would hear their professor speak sentences while noise played simultaneously in the background; listeners in the novel condition were told that they would hear a woman speak the target sentences.

3. The listener's job was to type the target sentences.

Results

Bar chart legend: 8-talker babble, SNR = -4 dB; cafeteria noise, SNR = -6.5 dB. Y-axis: keyword accuracy (% correct). X-axis: Familiarity with Target Talker (explictly familiar talker, novel talker). *error bars = SEM

- significant main effect of background noise; small effect size (partial $\eta^2 = 0.04$)

- no significant main effect of talker type or interaction

Discussion

These preliminary data suggest that short-term exposure to a target talker's voice did not yield benefits of familiarity. It is possible, that after collecting more data, a benefit will be found.

Alternatively it is important to note that our listeners were exposed to the target talker for a total of 12 hours of class time; had the listeners been exposed to the talker for longer—such as in studies exploiting familial relations (e.g., Barker & Newman, 2004; Souza, et al., 2013)—these data may have shown a benefit of familiarity.

Conclusions

- We are in the process of completing data collection to ensure that we have enough statistical power to draw sound conclusions about the role of talker familiarity.

- We hope our final data will provide new information that will help refine predictions of spoken language processing theory which often discount contributions of the talker altogether.

- Such knowledge is also important because it could ultimately help shape clinical intervention for people with communication disorders, such as hearing loss.

References

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