ABSTRACT

Background: In noisy environments, the ability to attend to a talker while simultaneously ignoring background speech and noise is essential. Compared to adults, children have more difficulty extracting target speech from interfering noise, and demonstrate greater variability in performance on speech-in-noise tasks (SNRT). It is known about auditory factors accounting for this variability. This study tested the following novel hypotheses: semantic content of target speech interacts with speech intelligibility for children; measures of cognitive assessment predict performance on speech-in-noise tasks, and cognitive variability is inversely correlated with informational masking.

Method: Four groups of normal hearing (NH) listeners were tested: Elementary school (7-10yrs), Middle school (11-14yrs), High school (15-17yrs), and Post-secondary (18+yrs). Listeners were presented with test stimuli (talking and noisy voices) in which they were asked to count words and identify words mismatching a visual prompt. Performance was measured as correct responses, reaction time, and an error index of response variability.

Results: All normal participants (NH), recruited from the local Madison, WI area.

Results: DCCS Percent.

Auditory MEASURES

Interferer: MSIN

Elementary school: 7 (10 yrs) Middle school: 11 (14yrs)

Data collection: Group Noise condition Speech condition Total

7-10 yrs: 4 males 3 males, 2 females 9 / 24

11-14 yrs: 1 male, 2 females 1 male, 4 females 8 / 24

15-17 yrs: 2 females 1 female 3 / 24

18-22 yrs: 4 females, 2 males 9 / 24

Total 13 / 48 14 / 48 27 / 96

Results: AUDITORY MEASURES

Interferer: Speech

Elementary school: 7 (10 yrs) Middle school: 11 (14yrs)

Data collection: Group Noise condition Speech condition Total

7-10 yrs: 4 males 3 males, 2 females 9 / 24

11-14 yrs: 1 male, 2 females 1 male, 4 females 8 / 24

15-17 yrs: 2 females 1 female 3 / 24

18-22 yrs: 4 females, 2 males 9 / 24

Total 13 / 48 14 / 48 27 / 96

Auditory

Previous studies have used either single-word or closed-set stimuli to investigate the ability of children to hear target speech in the presence of background noise. The current study was designed to investigate open-set corpus of sentences that vary in semantic content, being either coherent or anomalous. We found that semantic content factors are critical to the ability to hear in noisy environments. Consistent with adult data, semantically coherent sentences are more accurately reported, indicating semantic content influences intelligibility of target speech. Performance on these tests improves with age, suggesting a testable tool for tracking the developmental trajectory of source segregation in NH listeners. The findings may be used to guide individualized intervention for children with hearing impairment and who use assistive listening devices.

Cognitive MEASURES

CONCLUSIONS & FUTURE DIRECTIONS

All groups identify semantically coherent sentences more accurately than anomalous sentences at all SNRs, with both MSIN and Speech interferers, in both the quiet and listening conditions.

• The ability to hear speech in noise improves with an increase in age, particularly in the most challenging conditions (i.e., negative SNRs and/or with sources spatially separated). Results indicate similar mean scores (adjusted for age) for each of the cognitive measures in all groups. Preliminary results show variable performance within each measure. With additional participants (N=96) we expect that these results will improve, for each of the cognitive measures, will help predict the ability to use spatial cues for source segregation in complex listening environments (i.e., SRM). Further research should be done to identify specific cognitive mechanisms that best predict performance when listening in speech in noise.

In order to more thoroughly investigate the relationship between cognitive mechanisms and source segregation, we will add measures that assess multimodal inputs (e.g., IQ, Kaulman Brief Intelligence Test), expressive vocabulary (Experiential Vocabulary Test), and a non-linguistic measure of working memory (Weschler Intelligence Scale). References

REFERENCES

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