Department of Clinical Research

Development of a Danish test material for assessing speech-in-noise reception in school-age children

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Introduction

Children are often exposed to noise (e.g. in classrooms), which causes difficulties with speech understanding (e.g. Shield & Dockrell, 2003). For the audiological assessment of the speech-in-noise abilities of school-age children with normal or impaired hearing, an appropriate test material is needed. However, in Denmark there is none.

Aim

- To develop a test material for assessing speech-in-noise reception in school-age children that is characterized by small training effects, high test list equivalence and low measurement uncertainty

Methods

➢ Sentence material

- Based on the 600 (carefully designed) test sentences from the Danish DAT corpus (Nielsen, Dau & Neher, 2014)
- All sentences have a simple, fixed structure, i.e. they start with a name [Dagmar (D), Asta (A) or Tine (T)] and contain two short keywords, e.g. “Dagmar tænkte på en teske og en næse i går”
- D-, A- and T-sentences uttered by three different female talkers
- Selection of 220 sentences with ‘child-friendly’ keywords

➢ Generation of test lists

- Creation of 11 test lists containing 20 sentences each as per the procedure used for the DAT corpus (counterbalancing of easy- and hard-to-understand sentences)
- All sentences in a given list are uttered by the same talker and thus start with the same name (4 D-lists, 3 A-lists and 4 T-lists created)

➢ Participants

- 20 typically developing, normal-hearing native Danish children aged 6-12 yr (data from one child excluded due to unreliability)

➢ Procedure

- Speech reception threshold (SRT) measurements in stationary speech-shaped noise (60 dB SPL); Speech level varied according to the adaptive procedure of the Danish HINT (Nielsen & Dau, 2011); Starting level: 67 dB SPL
- Diotic stimulus presentation via Sennheiser HDA200 headphones
- Test-retest measurements after, on average, 10 days (range: 4-19 days)

Conclusions

✓ A set of 11 Danish test lists suitable for assessing speech-in-noise reception in 6-12 year olds was created.

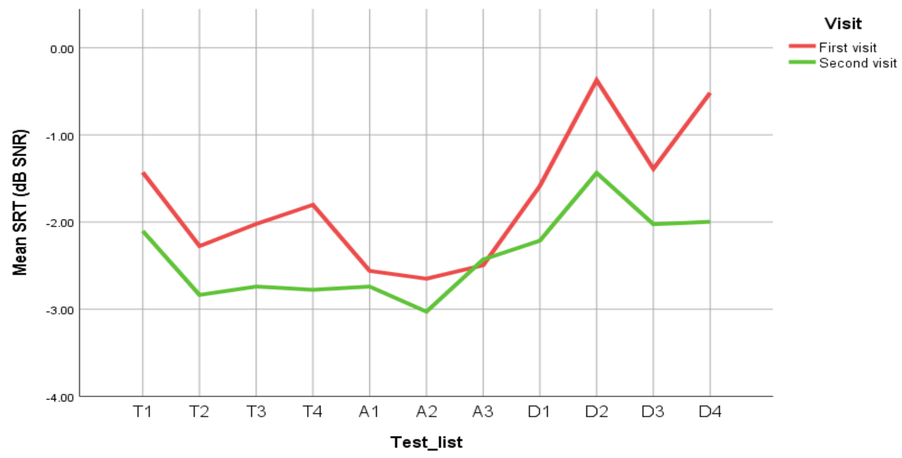
✓ The A- and T-lists produced an overall SRT of –2.4 dB SNR, an average test-retest improvement of 0.5 dB, and a within-subject standard deviation of 1.2 dB SNR. The D-lists produced an overall SRT of –1.4 dB SNR.

✓ In future studies, we recommend to use the D-lists for training purposes and the A- and T-lists for actual testing.

Results

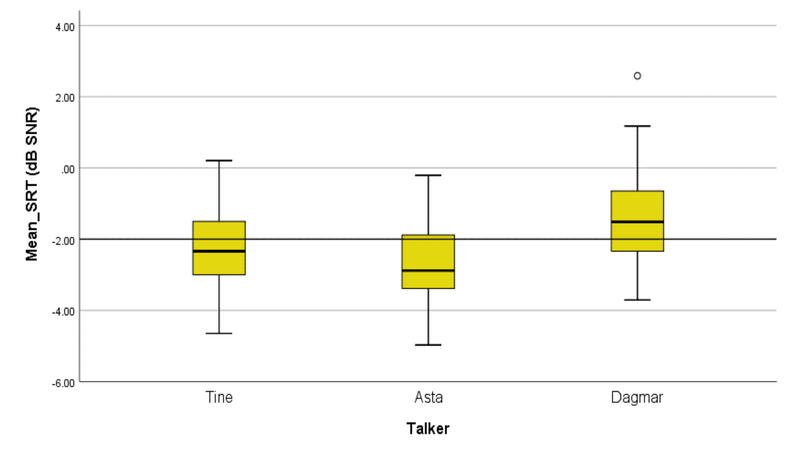
➢ Mean SRTs for each list and visit

- Two-way repeated-measures ANOVA: Significant effects of test list and visit (both $F > 12.0$, both $p < 0.05$)



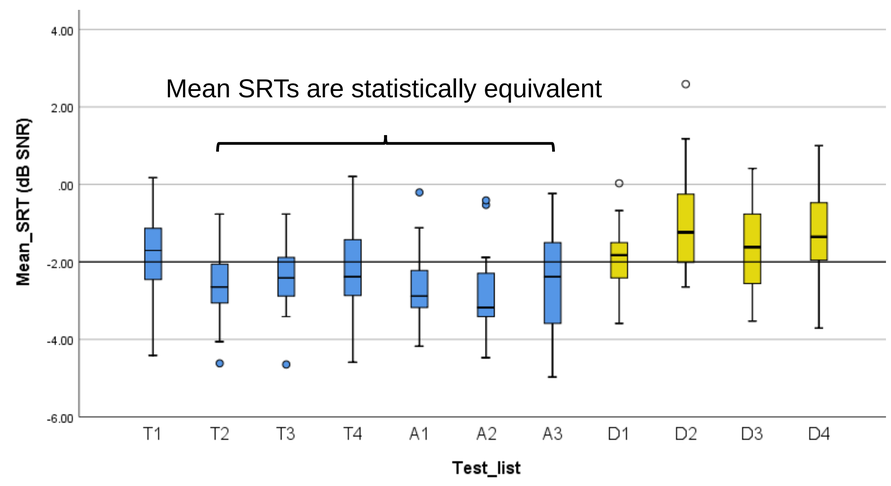
➢ Talker effect

- One-way ANOVA: $F = 19.2$, $p < 0.001$
- Post-hoc tests: D-lists produced higher mean SRT compared to A- and T-lists (both $p < 0.01$)



➢ Analysis of A- and T-lists

- Grand average SRT across all lists = –2.4 dB SNR
- Average test-retest improvement across lists = 0.5 dB
- Within-subject standard deviation across lists = 1.2 dB SNR
- Two-way ANOVA showed significant effect of test list ($p < 0.01$), post-hoc tests showed T1-list differs from T2, A1 and A2 (all $p < 0.05$)



Acknowledgments

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