

DETERMINING THE EQUIVALENT HEARING LOSS OF COCHLEAR IMPLANTED CHILDREN IN COMPARISON TO CHILDREN WITH HEARING AIDS –

FIRST RESULTS OF THE INTRA-EUROPEAN HEARD PROJECT

Coninx, F. (2005). Konstruktion und Normierung des Adaptiven Auditiven Sprach-Test (AAST). 100 Jahre Phoniatrie in Deutschland. 22. Jahrestagung der Deutschen Gesellschaft für Phoniatrie und Pädaudiologie, 24. Kongress der Union der Europäischen Phoniater. Berlin, 16.-18.09.2005.

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Vermeulen, A; Coninx, F. (2012). Development of an auditory speech perception standard for hearing impaired children. ONICI. Antwerpen, November 2012

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CONTACT: SANDRA.NEKES@UNI-KOELN.DE

hEARd – Hearing evaluation of auditory rehabilitation devices

→ Analyze **auditory speech perception skills** in children with cochlear implants and children with hearing aids

→ **Compare** performances of these two **groups**, find level of hearing loss at which a **cochlear implant** offers better speech perception than **hearing aid**

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Data from the following Centers included in following analysis:

- CIC Wilhelm Hirte, Hannover
- Johannes-Vatter-Schule, Friedberg
- Radboud UMC, Nijmegen
- Institut für Audiopädagogik/ Praxis der Ohrwurm, Solingen
- Landesförderzentrum Hören und Sprache, Schleswig
- CSP, Gent
- AC, Eindhoven
- Köttgen Hörakustik, Köln
- Deutsche HörZentrum Hannover (DHZ) der HNO-Klinik der MHH, Hannover

Participants

- Children in Kindergarten and primary school,
- 3-12 years of age; mean 8 years (SD 2 years)
- Binaural HL acquired within 1st year of life
- Living in an auditory communication environment
- No diagnosed or suspected additional handicap that could influence their speech perception skills

No. of HA users grouped as to their unaided PTA (of 0.5, 1, 2, 4 kHz) and group of CI users

N= 177 ears

Group	PTA	N
I.	≤40 dB HL	26
II.	41 - 60 dB HL	54
III.	61 - 80 dB HL	22
IV.	>80 dB HL	10
CI	Cochlear Implant	65

Auditory speech perception skills tested unilaterally with the **Adaptive Auditory Speech Test AAST** (Coninx 2005) in Dutch or German language amongst other tests of the Battery for the evaluation of listening and language skills (**BELLS** software).

Subtests included

- **AAST in quiet** (SRT),
- **AAST in noise** (SNR)
- **AAST high frequency** test-set using words with larger proportion of “high frequency” phonemes (HF SRT)

Further information documented in a **questionnaire**

- speech audiogram (open set speech perception skills)
- unaided audiogram
- Personal information: age, type of school, information about additional handicap, spoken language environment, estimation on level of child's spoken language development of the child, etc.

FIRST ANALYSIS RESULTS

Results of the AAST subtests within the formed groups:

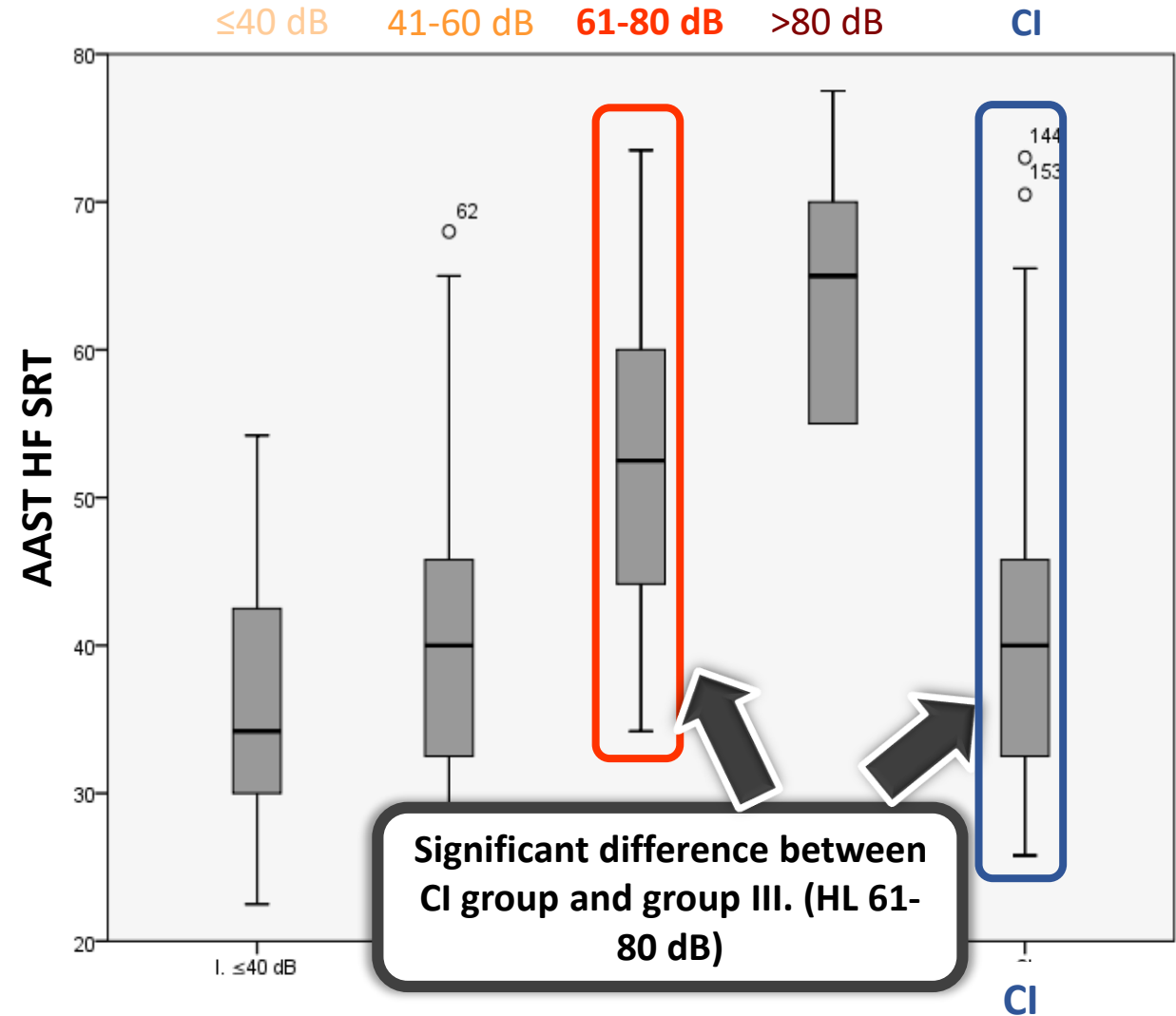
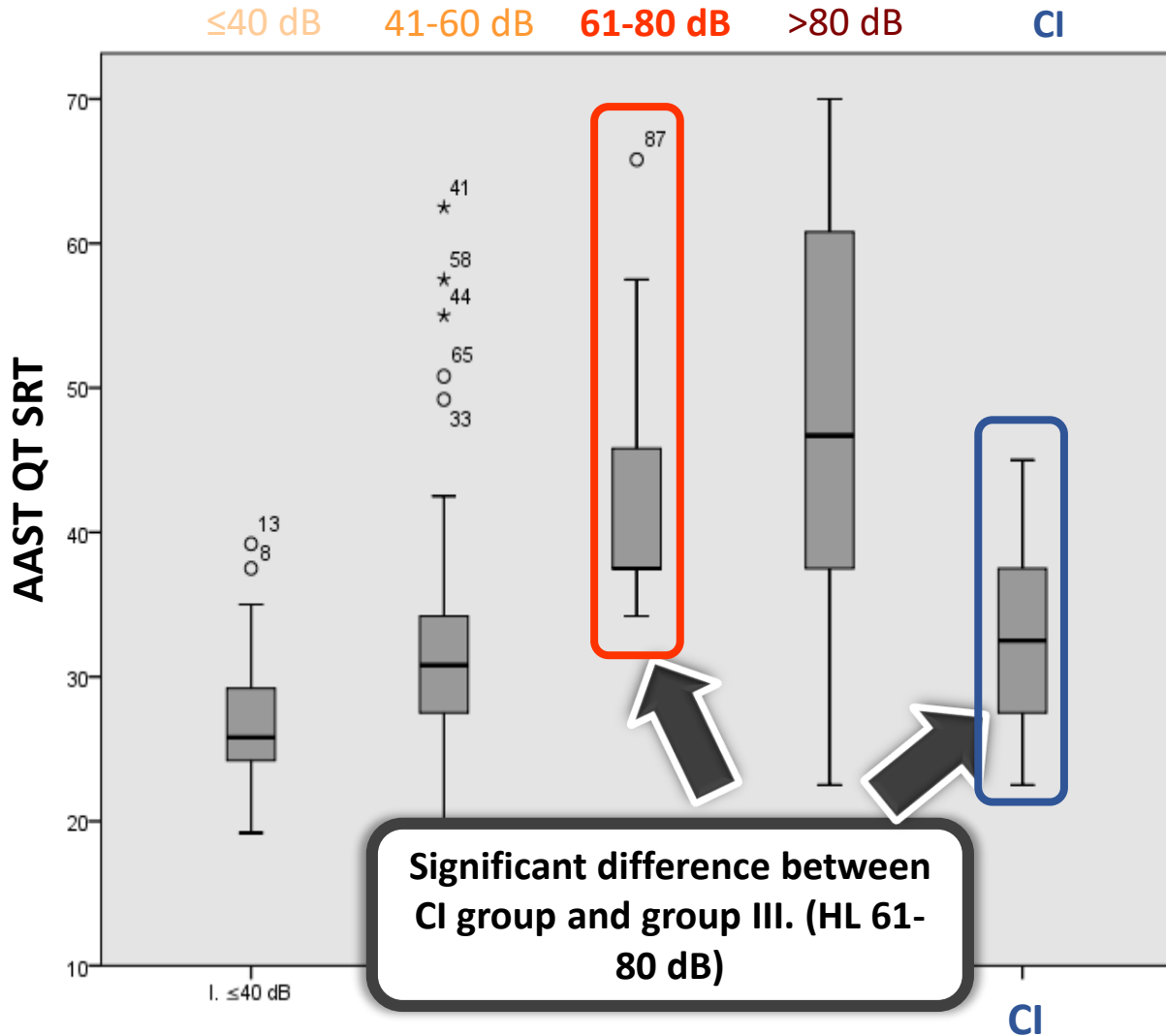
Kolmogorov Smirnov test and *Levene's test*

→ not normally distributed, heterogeneous variances

→ *Kruskal Wallis test* to test for differences between the groups for each AAST subtest

→ differences DO exist in between the groups for each subtest

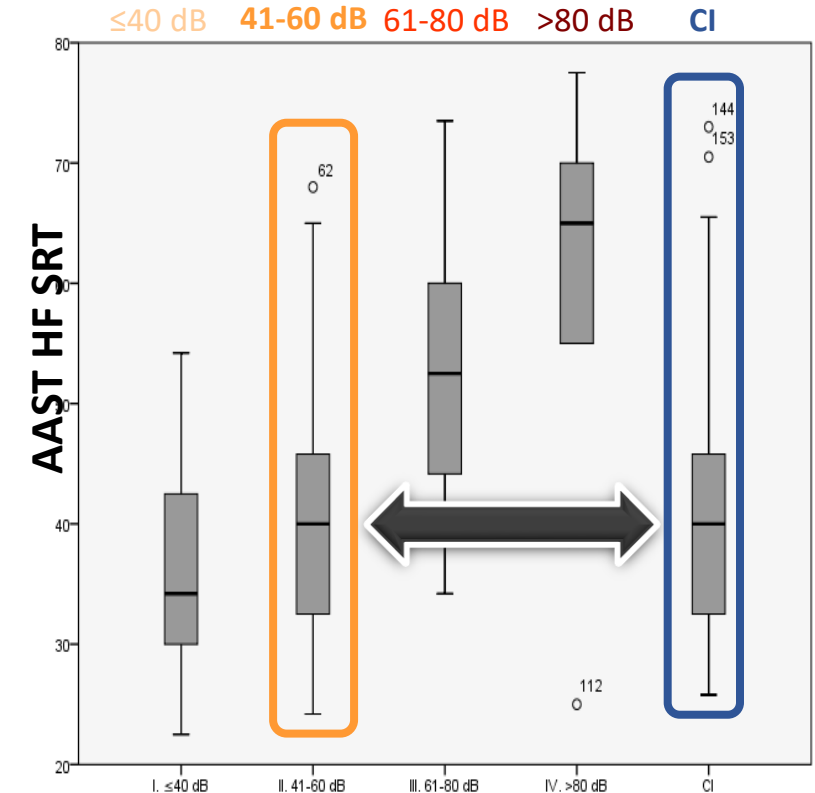
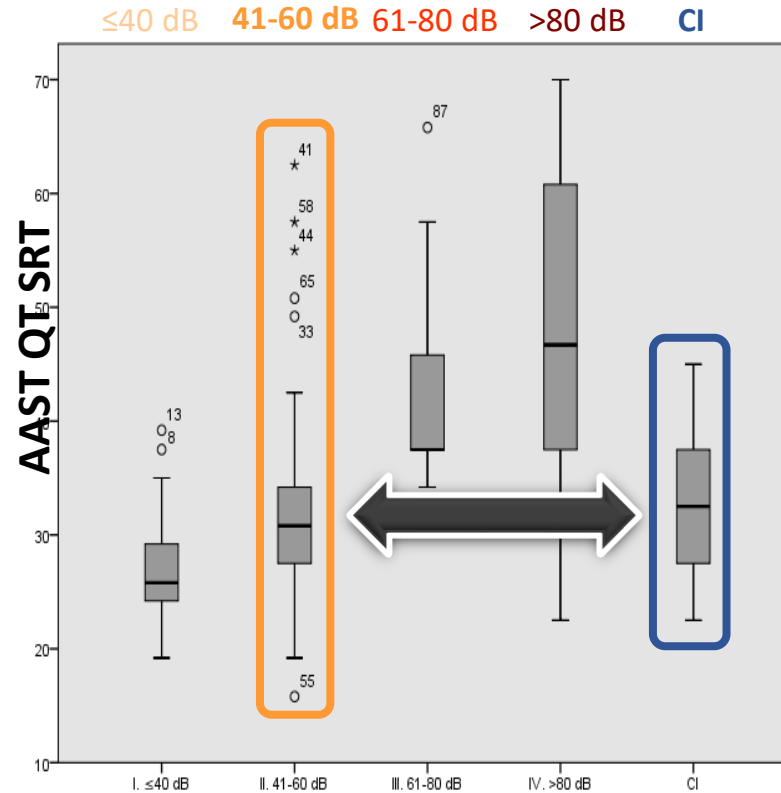
AAST in quiet & High Frequency



AAST in quiet & High Frequency

CONCLUSION

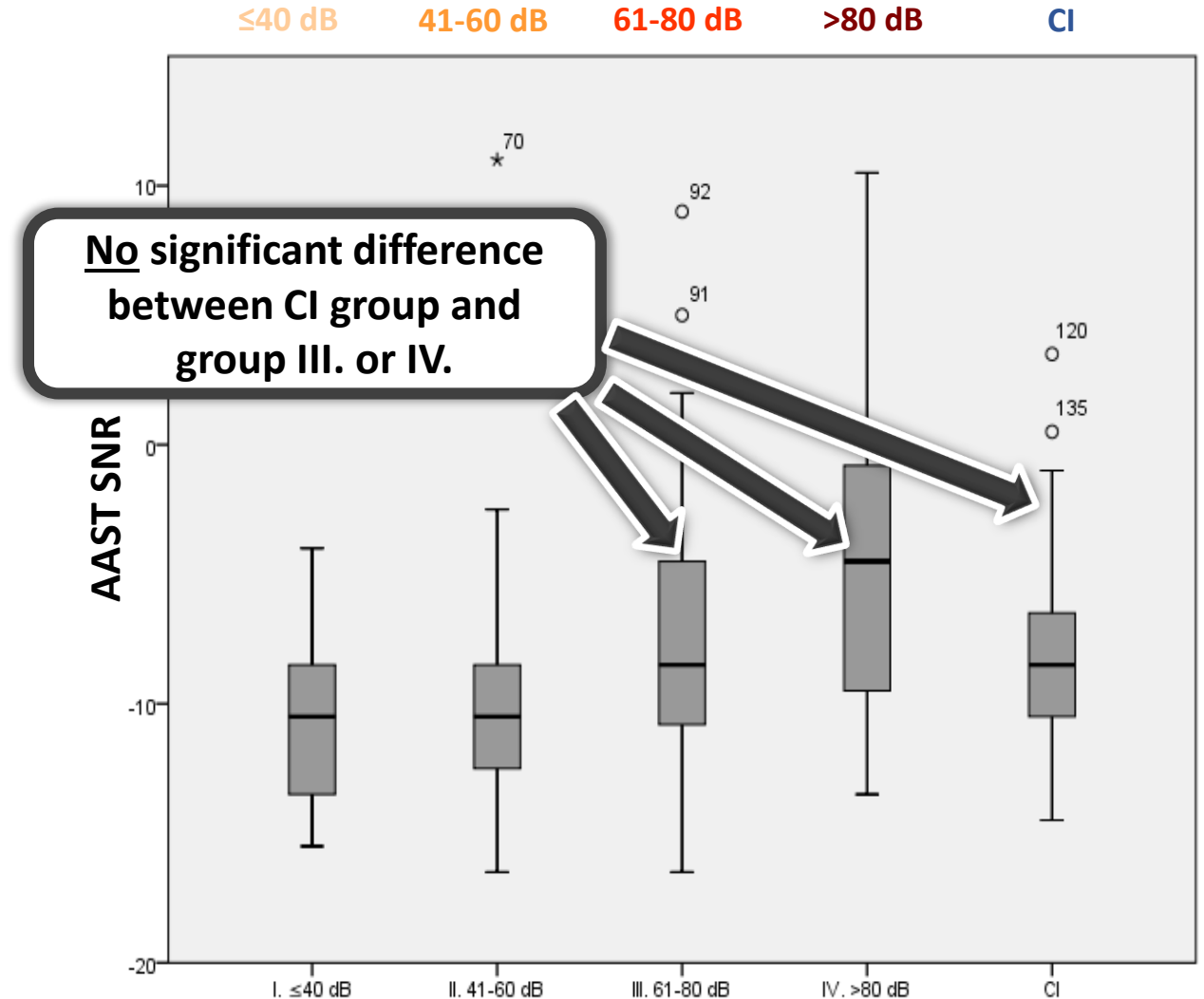
Indication of **better auditory speech perception skills** within **group of CI users** than within group of HA users with profound AND severe hearing losses (in quiet!)



“Equivalent” performance between the group of CI users and the group of HA users with a moderate HL (41-60 dB)

CONCLUSION

Low speech perception skills **in noise** within group of CI users in comparison to their „overall“ performance



FURTHER QUESTIONS AND CONCLUSIONS

- Correlation between results and speech perception skills on *more complex language level* (e.g. open set tests, sentence tests)?
- Effect of *early intervention*?
- Influence of *school setting*?
- unilaterally aided CI users;
→ awareness of **difficulty in noise**, especially in an educational environment!
Bilateral test results?
- Outcome after CI in terms of auditory gain - especially speech perception skills;
→ **not only beneficial in cases of profound hearing loss**