

ABSTRACT

There is a certain focus in the hearing-device research community on how realistic laboratory tests should be performed. Another question is how we can collect reliable data in the field. The aim of the current study was to investigate ways to collect detailed information in the field and compare these results with results from commonly used laboratory tests. Two HA settings were compared using a double-blind design. Findings from preliminary analyses:

As a complement to developing more realistic lab studies, we should try to refine our field-trial outcome measures.

- The diary helped participants find relevant situations for assessment, and valuable data were collected.
The questionnaire, exploring a number of situations/activities, was useful, especially for participants who used the diary sparingly.
The data log validated the other evaluations in the field.
The Paired Comparison (PC) data from the lab showed similarities with field data (diary and questionnaire) with regard to preference for speech intelligibility and comfort.
The lab tests used in this study could not explain the participants' general preference, reported in an interview after the field trial.

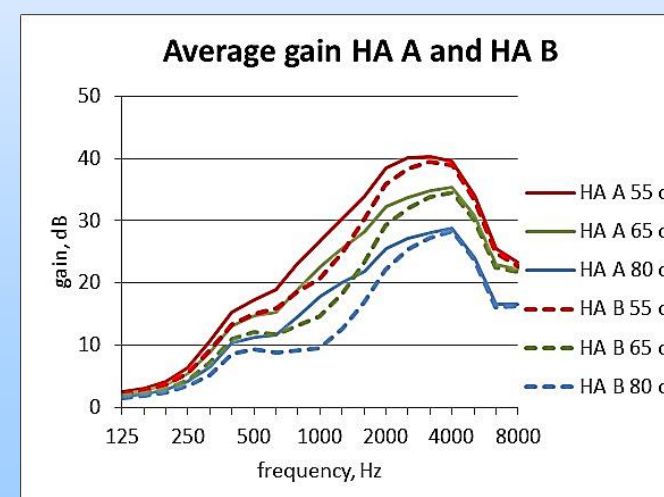
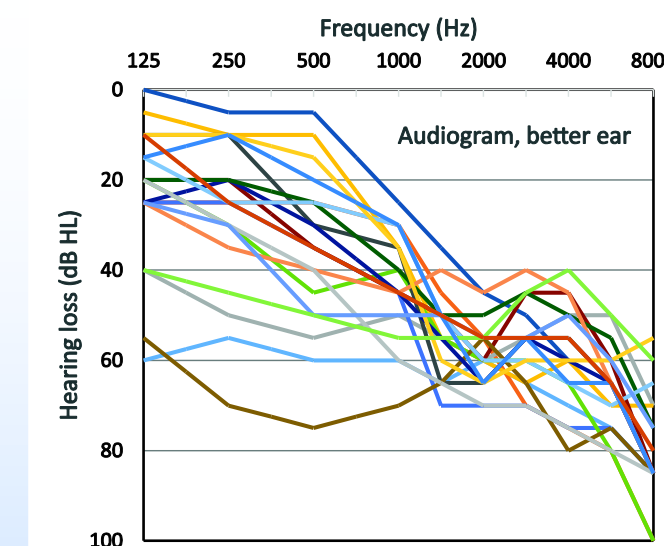
METHOD

Participants

- 20 experienced HA users, 8 females, 12 males
Average age 74 years

Hearing aids

- Research RIC hearing aids
Custom (15 people) or standard (5 people) domes with varying vents/openness
Directional microphones
SII-based noise reduction
Two settings, A and B (average coupler gain shown to the right for three input levels)



FIELD TESTS

Interview Overall Preference

An interview was performed after the field test. Main question: 'Which program did you prefer?'. Rating of confidence in 5 levels.

9 persons preferred setting A, 11 preferred setting B, with varying degree of confidence.

Diary

Participant-specific examples of predefined situations established before the field trial.

Date: Thursday May 4th

Table with 5 columns: Time, Situation, Sit.no., Prefer prg., Comment. Contains two entries for May 4th.

Questionnaire

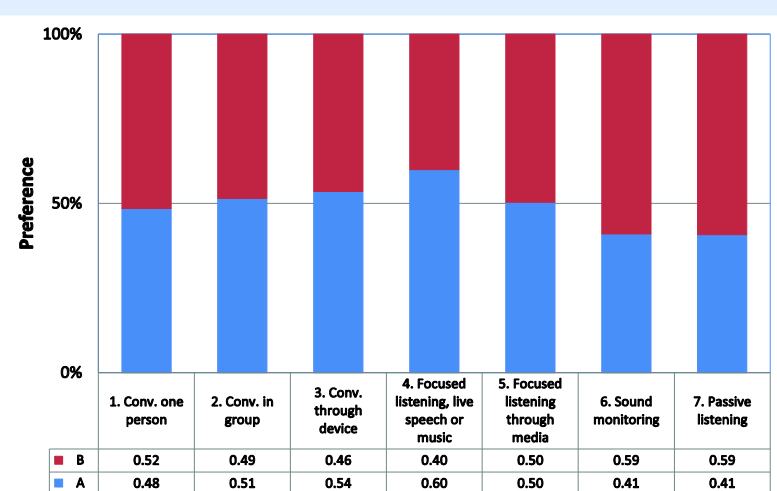
After the field test, participants also filled out a questionnaire together with the audiologist.

Questionnaire form with 3 questions about situation occurrence, preference, and confidence. Includes Likert scale options from 'Very uncertain' to 'Very certain'.

Diary and Questionnaire tables. Diary lists various situations like 'Conversation one person quiet', 'Conversation group', etc. Questionnaire lists corresponding situations for the lab test.

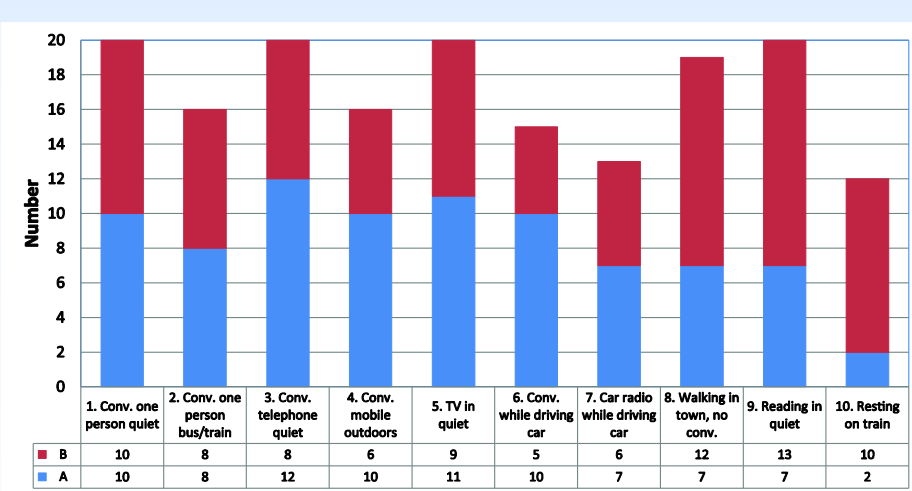
Results

Close to equal preference, but A slightly preferred for live focused listening and B for sound monitoring and passive listening.



Results

Close to equal preference, but A preferred for speech and B in passive listening situations.



Discussion

The diary and its instructions, with suggested general 'activities' and participant-specific examples, was an attempt to make the field trial more controlled. It generally worked as intended.
Assessments in a variety of relevant sound environments, performing various activities. Median 27 entries (range 4-80), often described in detail.
Participants seemed to make judgments without too much bias from previous comparisons in similar situations.

Discussion

The questionnaire listening situations were similar to the categories used in the diary. They were selected to be general enough for many participants to encounter.
Particularly useful for participants who did not use the diary much.
Generally, responses from the diary and the questionnaire agreed well.

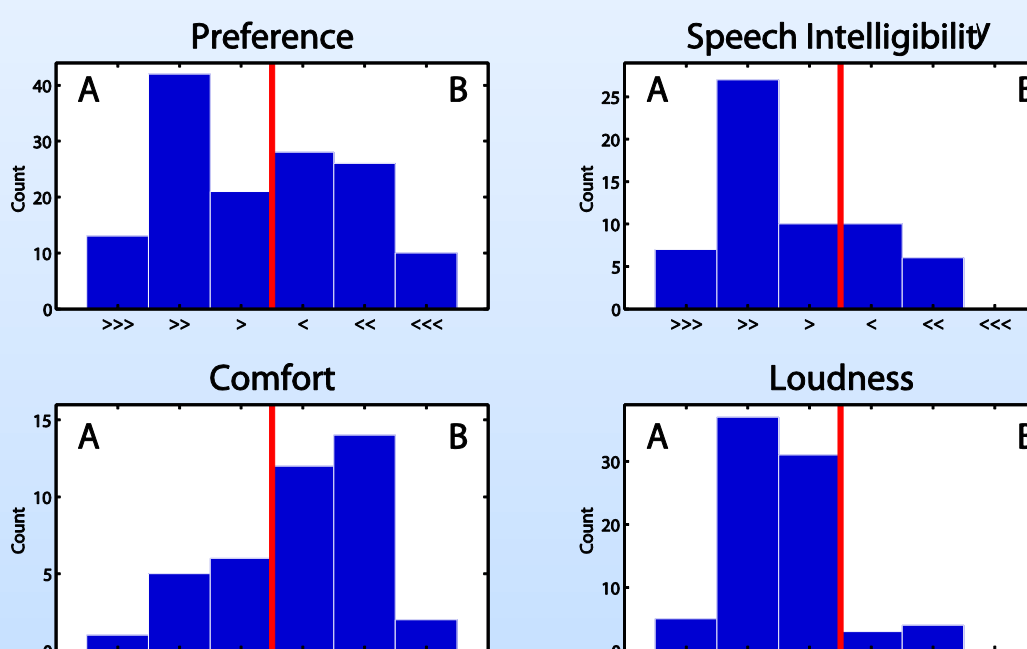
LAB TESTS

Paired Comparisons (PC)

- Rating attributes: 'Preference', 'Speech Intelligibility', 'Comfort', and 'Loudness'
7 sound stimuli, duration about 1 min
15 s HA pre-conditioning
Volume control disabled
Playback loop until decision made
Binary choice and magnitude of difference determined
For each rating attribute, a number of sound stimuli were used
A and B settings randomized before each sound stimulus presentation

Results

Close to equal overall preference. A better for speech intelligibility, B better for comfort.



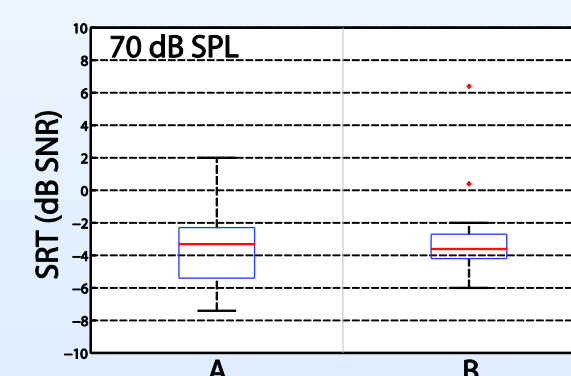
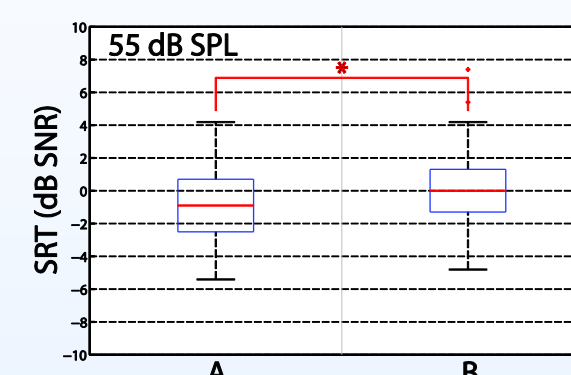
Discussion

The paired comparison data showed that setting A was preferred more often for speech intelligibility and setting B was preferred more often for comfort. This finding agreed with the picture from the diary and questionnaire, but the PC data did not correlate with the main interview question about overall preference.
Potential explanations:
Unrealistic presentation. The participants only listened in the lab, whereas own voice issues affect the results in the field.
Certain easily identifiable details might have dominated the judgments.
Focus on small loudness differences could play a larger role in the lab than in the field.

Speech test HINT

- Adaptive SNR, sentence scoring
Female talker (0°)
Noise from three loudspeakers
Two noise levels: 55 and 70 dB SPL

Similar results, but A significantly better than B for 55 dB SPL noise level.

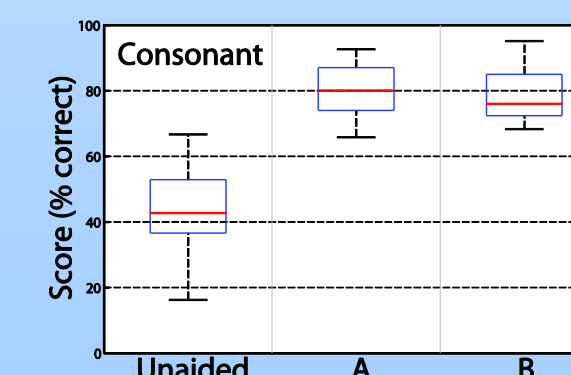


ORCA Speech Test (OST)

- Nonsense CVCVC test
Female talker (0°)
Noise from three loudspeakers
Fixed SNR = 10 dB
Speech level: 65 dB SPL
Phoneme scoring (word scores calculated)

Results

No statistically significant difference between A and B.



Discussion

The speech results were very similar and there is no reason to think that this difference will play a large role for the overall preference expressed in the interview.

MEASURE RELATIONSHIPS

Correlation analyses were performed using Spearman's rank correlation coefficient between measures. Significant correlations (p<0.05) are marked in the matrix to the right.

Assuming the reported overall preference after the field trial is the 'true preference', a statistically significant correlation with this outcome was found for 6 out of 7 diary categories and for 6 out of 10 questionnaire questions. In contrast, the data from the lab showed poor agreement with the 'true preference'.

Large correlation matrix table with columns for Field - Sound Environment Questionnaire, Field - Diary, Lab - Paired comparisons, and Lab - Speech. Contains Spearman's rank correlation coefficients between various measures.

SUMMARY

- Based on the results we will:
Refine the way we collect data in the field, in particular how 'listening situations' or 'activities' should be grouped and presented to the participants.
Revisit the way we make Paired Comparisons in the laboratory.