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Influence of individual factors and acclimatization on the perception of noise reduction settings

Kirsten C. Wagener1, Matthias Vormann1, Rosa-Linde Fischer2 & Tobias Neher2
1Hörzentrum Oldenburg GmbH, Oldenburg, Germany, 2Sivantos GmbH, Erlangen, Germany, 3Institute of Clinical Research, University of Southern Denmark, Odense, Denmark

INTRODUCTION

- Speech understanding in noise (SIN) is important but demanding for hearing-impaired persons
- Amplification and noise reduction (NR) are supposed to help, but hearing aid (HA) users can respond very differently to them
- The relation between preference for and performance with NR algorithms is not clear (e.g. Neher 2014; Serman et al. 2016), nor is the influence of auditory acclimatization and HA experience on these outcomes
- We investigated these aspects in novice and experienced users over time, i.e. initially (t1), after 6 weeks (t2), and after 12 weeks (t3) of HA use

MATERIAL & METHODS

Participants, HA settings and setup

<table>
<thead>
<tr>
<th>Experimental group</th>
<th>Novices (N = 21, 9 *)</th>
<th>Experienced users (N = 20, 6 *)</th>
<th>Controls (N = 10, 5 *)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTA4 [dB HL]</td>
<td>µ min max</td>
<td>µ min max</td>
<td>µ min max</td>
</tr>
<tr>
<td>Age [yr]</td>
<td>70 56 79 69 73 76 72 63 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA experience [yr]</td>
<td>- - - 8 0.5 38 9 0.5 34</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Novices and experienced users fitted bilaterally with Signia Pure 7px devices according to NAL-NL1 – 3 dB at 0. Controls continued using their own HAs
- Additional subdivision according to preferred NR strength (assessed at t1): Strong NR (N = 24) vs. weak NR (N = 9) vs. indifferent (N = 8); no differences in terms of age, PTA4 or HA experience among these groups
- KEMAR recordings made with HAs in the experimental setups; stimulus presentation via equalized Sennheiser HD2000 headphones

RESULTS

Influence of HA experience and acclimatization (Novices, Experienced users, Controls, for Visit 1 to 13)

- Spatially dynamic SIN task, performance: Visit × group, F1,4(4) = 2.6, p < .05 (Fig. 1).
- Listening span test (LST, after Neher et al. 2018)
- Sentences from “Basler Satztest” (Tischopp & Züst 1994), similar to Speech Perception in Noise Test (SPIN, Kalikow et al. 1977), presented from 0° at +12 dB SNR in spatially diffuse cafeteria noise (65 dB SPL)
- Performance measure: No. of correctly recalled final sentence words (recognition rate at ceiling throughout)

CONCLUSIONS

- Influence of HA acclimatization and experience on performance with HAs
- Novices and (re-)fitted experienced users improved on spatially dynamic SIN task, while Controls remained at the initial performance level
- Experienced users seem to be able to compensate for their worse PTA4 compared to novices after 12 weeks of HA use
- Change vs. stability of initial NR preference during HA acclimatization: different treatments might be indicated
- Users with initial preference for strong NR potentially show loudness normalization (slightly increased preference for weak NR (P1) and decreased preference for strong NR (P4)); decrease of NR strength
- Weak NR group show stable preference pattern; keep parameterization

INFLUENCE OF INITIAL NR PREFERENCE AND ACCLIMATIZATION (GROUPS STRONG NR, WEAK NR, INDIFFERENT FOR VISIT 1 TO 13)

- Strong NR group: P1 least preferred; decrease in preference for P4 and increase for P1 over acclimatization
- Weak NR group: P1 and P2 most preferred; stable over acclimatization
- Indifferent group: Preference for P1 < P2; P3 < P2 & P4; t3 preference pattern similar to Strong NR group

REFERENCE


