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On the dynamics of the preference-performance relation for hearing aid noise reduction

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Motivation

- Speech understanding in noise (SiN) is an important but demanding daily-life situation, especially for hearing impaired people.
- Noise reduction (NR) algorithms are supposed to be helpful in such situations.
- However, there are indications that some hearing impaired like NR – the stronger the better – while other people dislike this kind of signal processing.
- Furthermore, the relation between preference for and performance with NR algorithms is not clear (e.g., Neher 2014; German et al. 2016).

In the data shown here, we try to shed a light on the potential influence of hearing aid experience, age and hearing loss on the preference-performance relation.

Subjects

- Experimental group (novice vs. experienced HA users)
- Preference group (initially measured preference with spatial dynamic SiN task: Indifferent vs. NR-lovers)
- Age, PTA

Hearing Aid conditions

- KEMAR recordings with aided is correlation in Fischer, Age and PTA4) (OLSA SRT):
- & Preference at SiN and over Which covariates in 27 groups

Subjects are instructed to follow the German speaker while ignoring the SiN talkers the 27 on P1 Neurosci F combinations while setting Symposium Vol und experience to SiN Wagener, 78 listeners 43 and conference, 23 in influence Target and distractors switched their spatial positions from trial to trial assessed aid task Audiology International used 2

Performance measures

- Listening span test (LST): N correct final word recognition and recall
- Spatially dynamic SiN task: N correct repeated numbers (1 per sentence)
- Speech intelligibility (OLSA): SRT in dB

Results

Preference results (ANOVA with covariates Age and PTA4)

- Main effect of NR condition (F₁,₁₅₉ = 39.073, p < .001): In general, P2 is preferred over P1
- Interaction NR condition & Preference group (F₁,₁₃₅ = 21.178, p < .001): ‘Indifferent’ people have a stronger preference for P1 than NR-lovers, for P2 vice versa (post-hoc t-tests with Bonferroni correction; p < .01)

Performance results (ANOVA with covariates Age and PTA4)

- LST recall P1 and P2:
  - Significant effect of Age (F₁,₁₃₅ = 6.005, p < .05) and trend significant effect of PTA4 (F₁,₁₃₅ = 4.118, p = .051)
  - Spatially dynamic SiN task N correct:
    - Significant effect of Age (F₁,₁₃₅ = 11.275, p < .01) and PTA4 (F₁,₁₃₅ = 5.627, p < .05)
  - Speech intelligibility (OLSA SRT):
    - ‘Indifferent’ effect of PTA4 (F₁,₁₃₅ = 8.641, p < .01)

Conclusions

- Although NR-lovers clearly prefer a setting with single-channel noise reduction and directional microphone, they show same performance in an Omni-directional condition as the group with no preference for either hearing aid setting
- New and experienced hearing aid users do not differ in their performance and preference relation
- In general, people perform worse the higher their hearing threshold is and the older they are
- Future focus: evaluation of long-term stability of preference & performance

References:


Sabin Hochmuth, Tim Järgens, Thomas Brand & Birger Kilmer (2015). Talker- and language-specific effects on speech intelligibility in noise assessed with bilingual talkers: ‘Which language is more robust against noise and reverberation?’. International Journal of Audiology, Vol. 54(article exp); 29-34


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