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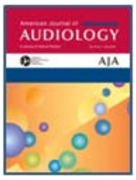
Hearing Technology and Cognition



Kalluri Sridhar &Humes, L.

American Journal of Audiology 338 • Vol. 21 • 338–343 • December 2012.

The interaction between hearing loss – cognition and hearing technology is a hot topic these days. This article has to scope to summarize existing data on these topics and to give indications on how future studies and research should be designed to allow quality conclusions. In the literature research a lot of evidence was found on the interaction between cognition and hearing technology on the short term. Not treating hearing loss can have negative consequences for both auditory function and cognitive function and hearing technology can affect short-term cognitive processing. But on the other hand, cognitive capacities will also affect the way that information is used and how successful technology will be. On the long term impact of hearing technology on cognition there is much less evidence in the literature. Therefore there is a need for well designed rigorous studies of older adults and the impact of long term hearing aid use on cognitive function.

Initial-Fit Approach Versus Verified Prescription: Comparing Self-Perceived Hearing Aid Benefit

Abrams H., et al.

J Am Acad Audiol 23:768-778 (2012)

Hearing aid manufacturers propose default initial fit proposals in their fitting software. Some audiologists use this as a starting point for hearing aid fitting. Other audiologists start with a fitting rule and verify with insertion gain (REM) if this target is reached. In both strategies fine tuning will be conducted based on end-user request. In this study the two strategies were compared in a single blind cross over design (The end-user didn't know which strategy was used and half of the subjects started with the first strategy and the other half with the second strategy). The end-user preference and a satisfaction questionnaire (APHAB) were filled out to evaluate the self perceived benefit. For both strategies the hearing aids were used between 4 and 6 weeks.
For the 3 of the 4 APHAB subscales (EC-Ease of communication / RV-Reverberant situations/BN-understanding in Background Noise) the verified prescription resulted in a higher benefit score – this was not the case for the Global APHAB score and over Aversiveness for loud sounds. 7 of the 22 subjects preferred initial fit and 15 preferred verified prescription.

The goals of the study are relevant and the fact that a single blind cross over design is used is good. But the fact that only experienced users are participating and the fact that the verified prescription is much closer to the initial fit result than to the NAL-NL1 target is a strong limitation for this study. So it's not surprising that the difference are small between the two fitting strategies.

Generational Differences in the Reporting of Tinnitus

Nondahl, David M. et al

Ear & Hearing. 33(5):640-644, September/October 2012.

In this study two large populations were used to evaluate if there are generational differences in the reporting of tinnitus. The first population "Epidemiology of Hearing Loss Study (EHLS)" had 3704 participants and the second *population, the "Beaver Dam Offspring Study (BOSS) " had 2158 participants. The groups were studied in birth cohorts and were based on more than 12000 observations. When clustering the subjects in age groups, recent birth cohorts are more likely to report tinnitus than earlier birth cohorts … so the older the generation, the less likely they will report tinnitus if you keep the age controlled. This observation is in line with the fact that more recent birth cohorts also rate the self-reported health status lower. So younger generations are more likely to be aware of symptoms which may result in more interventions from healthcare providers in the future.*

Overall, very well designed and impressive study leading to surprising results.

Tinnitus Retraining Therapy: Mixing Point and Total Masking Are Equally Effective

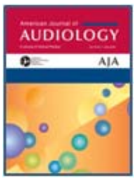
Tyler, Richard S. et al

Ear & Hearing. 33(5):588-594, September/October 2012.

Forty eight tinnitus patients were randomly divided into three groups, each getting a different tinnitus management strategy. The first group received only counselling, the second group received counselling and bilateral noise generators – set to fully mask the tinnitus and the third group received counselling and bilateral noise generators – set to optimal mixing point (the tinnitus will be just audible). The tinnitus handicap questionnaire (THI) was administered before and after 12 months of treatment. Surprisingly there were no significant differences between the three groups. The basis for tinnitus retraining therapy – that masking should be at the mixing point to ensure habituation – is contradicted in this study. Other sound therapy strategies use different levels of masking.

Well conducted study – unusual in tinnitus management strategy evaluation – very critical towards all strategies and offering interesting suggestions for evidence based tinnitus therapy.

Sequential Bilateral Cochlear Implantation: Speech Perception and Localization Pre and Post-Second Cochlear Implantation



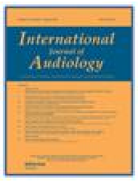
Dunn Camille C. et al

American Journal of Audiology • Vol. 21 • 181–189 • December 2012.

13 adults with post lingual deafness received sequential bilateral Cochlear Implants (CI) and participated in this study. Speech perception in quiet, Speech perception in noise (cueing the listener) and Localisation in noise were evaluated. Bilateral CI improved speech perception and localization in noise significantly compared to unilateral CI, but didn't have an impact on speech perception in quiet. Duration between the two surgeries, duration of deafness and duration of bilateral use didn't result in any significant differences.

The "Cueing the listener" speech in noise test is a very interesting procedure. First the listener will get a sound cue ("Hey I am over here" or "she saw me") to guide the listener to the speaker from which the words will be presented. Unfortunately the number of subjects was to limited to draw any conclusions from this study. The trend of the findings were interesting and we refer to the Asp et al. Study in the next review for further exploration of this topic.

Bilateral versus unilateral cochlear implants in children: Speech recognition, sound localization, and parental reports



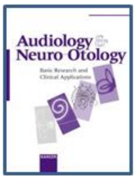
Asp ,Filip. et al

International Journal of Audiology 2012; 51: 817–832.

Sixty four hearing impaired children fitted with cochlear implants on both ears (average age 8 yrs) and thirty normal hearing children (control group) participated in this study. For speech in quiet, the overall results are significantly better with binaural implants compared to unilateral, but some subject perform worse with binaural implants. For speech in noise, there was also a significant improvement with bilateral implants and the improvement was more remarkable, but again a few subject s performed better in the monaural condition. Localisation improved with bilateral implants both for low frequencies (dog barks) as for high frequencies (cricket chirps) and the results were better than chance – limitation of this study was that they only used 5 loudspeakers for this test – the hearing impaired subjects in the binaural CI condition, scored better than the normal hearing subjects in the monaural condition. Parental reports show similar or better results with bilateral implants for all subjects and a significant improvement for the group in seven daily situations. The improvements were present within six months after the second implantation.

Interesting study showing encouraging results for children bilateral cochlear implants. The set-up for the localisation task was a limitation and it would have been more realistic to use a control group experienced with a unilateral implant. But a group of sixty four hearing impaired children using bilateral implants is large enough and the critical way the data are discussed make this study certainly worthwhile.

Development of Auditory Localization Accuracy and Auditory Spatial Discrimination in Children and Adolescents



Kühnle ,S.. et al

Audiology & Neuro Otology 2013;18:48–62.

136 subjects clustered in three age groups participated in this study (N=43 – 6_7 years / N=78 – 8_12 years / N= 15 – 13_18 years). All tests were performed in a 40m² anechoic, sound attenuated room. A semicircular bow with 47 loudspeakers cover by black gauze was used to present the stimuli (Gaussian noise bursts LF (0,3_1,2 kHz) and HF (2_8 kHz). For the localization experiment, the subjects had to use a laser pointer to indicate where the sound was coming from (during the stimulus they had to face straight ahead). For the spatial discrimination experiment they had to push a button on a response box indicating if the three presented signals came from the same or a different direction – signals could be centred at 0° - 30° - 60° or 90°. There is a clear age effect for spatial discrimination but only a small effect for localisation accuracy - the older subjects perform better than the younger subjects. Results are better in the frontal (0°) than lateral locations. And results were better for the low than for the high frequency stimuli – so the subjects were better in using inter aural time difference than inter aural intensity differences. The is a very weak correlation between the performance for localisation accuracy and spatial discrimination – leading to the conclusion that these are two different features that develop independently.

Interesting experiment on the development of localisation accuracy and spatial discrimination. The set-up is not realistic for clinical use, but is well designed for fundamental research. Younger children will perform poorer than adults and the task will be more difficult for high frequencies than for lower frequencies.