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PSYCHOPHYSICS & MUSIC PERCEPTION

MELUDIA: a music tool for cochlear implant users

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Background

Music perception remains a challenging aspect for cochlear implant (CI) users. Assessing music and singing skills can be a valuable tool in evaluating the daily benefits of CIs, with the results also proving helpful in the rehabilitation process.

Objectives

To evaluate different music tasks through the Meludia music platform in experienced CI users and compare the results with their normal hearing (NH) peers. Differences among three age groups.

Methods

Population: Postlingually deaf adults and prelingually deaf children using CI(s), with at least 1y of stable fitting. Subjects were divided in 3 age groups: adults ≥17y; children 6-10y; and adolescents 11-16y. Our study also included a control group of NH subjects.

The evaluation test was the Discovery level of Meludia, an online interactive music tool (Fig.1). Four music tasks were evaluated including Rhythm (how many beats are recognized), Spatialization (distinguish between a lower/higher note), Stable/Unstable (the sound feels stable/unstable), Melody (the melody is ascending/descending), and Density (sounds that are played at the same time, one/more). Each task comprises 5 levels of difficulty. The scoring system for each task was 0-3 points.

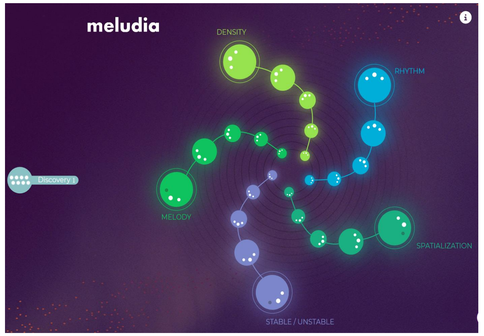

Fig.1. *User interface of Meludia*

Results

69 CI users participated. Of these, 39 were adults, 14 children, and 16 adolescents. The same number of age matched NH controls were collected. The percentage of implanted adolescents who completed all 5 levels in each category was higher than the rest of the CI users, being: Spatialization (100%), Rhythm (81%), Melody (44%), Density (50%), and Stable/Unstable (31%) (Fig.2). However, NH participants completed more levels than implantees. Considering the mean score for each task, adolescents performed better than children in Rhythm (2.3 vs 1.3) and Melody (1.7 vs 0.8); and also better than adults in Spatialization (2.7 vs 2.0), Melody (1.6 vs 1.0), and Density (1.6 vs 1.2). However, adults outperformed children in Rhythm (2.2 vs 1.3) (Fig.3). When comparing with their NH-matched, NH adults outperformed in all categories, NH children performed better only in Melody (1.6 vs 0.8), and NH adolescents outperformed in Stable/Unstable (2.1 vs 1.2) and Density (2.3 vs 1.6).

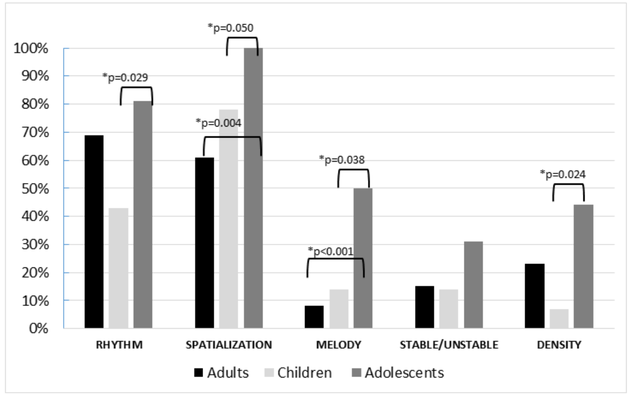

Fig.2. *Percent of CI users who completed the five levels of each task*

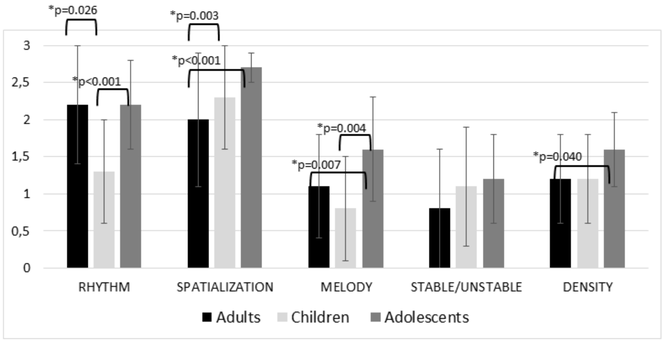

Fig.3.*The mean scores and standard deviations of the three age groups of CI users on each task. Higher scores indicate better performance.*

Conclusion

Meludia is an adequate tool to evaluate music performance in CI users. Adolescents perform better than children and adult CI users in some musical tasks. Pediatric CI users achieve similar results to their NH peers in terms of musical perception.

References

.Calvino M, Zuazua A, Sanchez-Cuadrado I, Gavilán J, Mancheño M, Arroyo H, et al. Meludia platform as a tool to evaluate music perception in pediatric and adult cochlear implant users. Eur Arch Otorhinolaryngol. 2024;281:629-38.

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