

## FINE STRUCTURE PROCESSING AND MUSIC PERCEPTION: IMPLICATIONS FOR PEDIATRIC COCHLEAR IMPLANTATION

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### OBJECTIVES

To identify whether processing strategy provides benefit for recognizing musical instruments with a cochlear implant.

### METHODS

Forty-nine normal hearing children and 21 children with cochlear implants were tested on a 6-choice musical instrument identification task. In addition, a similar instrument identification task was presented to 15 adult cochlear implant users utilizing novel fine structure processing (FSP) and high definition continuous interleaved sampling (HDCIS) maps.

### RESULTS

Normal hearing children reached adult levels of musical instrument identification by around age 12 years. While implanted children improved their instrument identification performance with age, they performed well below their age-matched normal hearing counterparts. The effect of processing strategy could not be adequately analyzed in children due to variability in duration of implant use and the small sample size. Analysis of performance of adult subjects who routinely used FSP as their daily strategy showed they perform significantly better overall on a musical instrument identification task than those using HDCIS daily ( $p=0.03$ ).

### CONCLUSION

Children who develop with a cochlear implant as their principal access to auditory information do not achieve the same level of ability to recognize musical instruments as their normal hearing counterparts. Based on the adult testing, however, chronic use of FSP may improve overall auditory performance with musical instrument identification. Chronic use of FSP may therefore promote or maintain important central auditory processes for complex sound perception. This may have greater implications for the pediatric population who use such processing strategies during critical periods in auditory development.

## SOUND CATERPILLAR - ASSESSMENT AND TRAINING OF SOUND AND MUSIC PERCEPTION SKILLS IN HEARING IMPAIRED CHILDREN

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### OBJECTIVES

We assessed and compared the development of timbre and melody discrimination and representation skills in prelingually deaf children using cochlear implants (CI), in severe hearing-impaired children using hearing aids (HA) and in normal-hearing children (NH).

### METHODS

36 CI children, 36 HA children and 136 NH children, divided in three age categories (6-8 yo, 9-10 yo, 11-12 yo), were asked to perform timbre and melody discrimination and representation tasks in the framework of a social, interactive sound game - Sound Caterpillar - developed as an assessment battery within the scope of this research project.

### RESULTS

Results show no significant differences between NH, HA and CI for timbre discrimination and show a clear development of timbre discrimination abilities with age regardless of the hearing impairment or aid. For melody discrimination we find a strong development in older NH-children, whereas this improvement is not established in HA and CI children. Moreover, both HA and CI children do not succeed in obtaining better than chance scores for melody discrimination up to the age of 12. Concerning sound representation, HA and CI children focus much more on aspects of sound quality to represent sounds, whereas NH-children rely on sound identification or association.

### CONCLUSIONS

We established and compared developmental curves for timbre and melody discrimination in CI, HA and NH children. These results are now used to further develop the social sound game Sound Caterpillar into a research-based and age-appropriate auditory training tool for severe hearing impaired children.