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THÈME

# The influence of deafness and cochlear implant on working memory development in children

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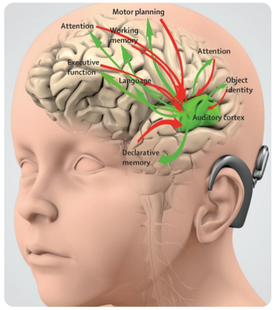
## Abstract

Deafness generates a connectome disease (Kral et al 2016), which impacts the neuronal connections and affects the development of language, attention, and cognitive functions such as executive functions including memory. Early auditory rehabilitation through a cochlear implantation (CI) can counteract the deleterious impact of deafness and facilitate language acquisition, albeit with great inter-individual variability in performances.

Previous studies have exemplified the impact of deafness and cochlear rehabilitation on executive functioning (Kronenberger et al). However, little is known about the influence of deafness on the development of executive function in toddlers nor the impact of the cochlear implant.




## Objectives

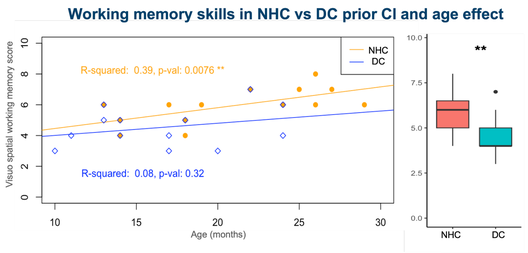
The aim of this longitudinal study was to :

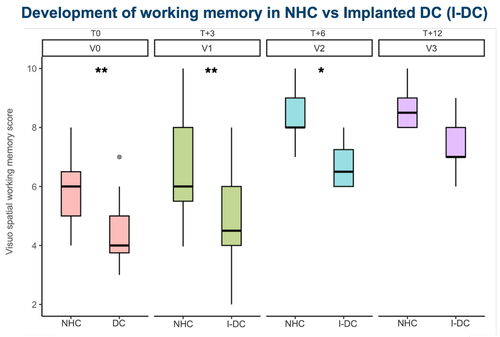
1. Evaluate the visuo-spatial working memory capacities of deaf children (DC) prior cochlear implant compared to normally hearing children (NHC).
2. Identify the influence of the cochlear implant (CI) on working memory capacities over time (12 months) post cochlear implantation.

## Materials and Methods

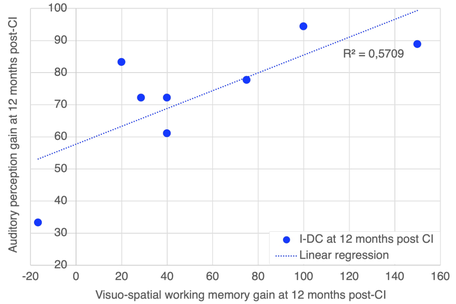
- **Population :** 16 NHC (19 +/- 5 months) and 14 DC prior CI (17+/- 5 months) were included in a 12 month longitudinal study (T0, T+3, T+6 and T+12 months). DC realised T3, T6 and T12 post CI activation.
- **Task :** A-not-B (Diamond, 1985; Espy et al.,1999) - Visual spatial working memory task with a fixed 10 seconds delay and 10 trials. Number of correct responses extracted.

## Results




- DC prior CI perform signficiantly worse than NHC on a visuo-spatial working memory task.
- Absence of an age effect in DC prior CI compared to NHC at inclusion.
- At 12 months post-CI DC catch up to NHC peers in their visuo-spatial working memory performances.
- Significant correlation in DC at 12 months post-CI between auditory gain and visuo-spatial working memory gain.




## Conclusion

- **Congenital deafness impacts significantly on spatial working memory** performances in children under 2 years of age and its development as **no age effect observed** in DC prior CI.
- **Deafness causes cortical reorganisation** that influences some aspects of executive functions such as working memory in accordance with the connectome.
- Auditory perception through a CI, **enhances** visuo-spatial working memory performances in DC at 12 months post-CI.
- **The cochlear implant facilitates and restaures working memory development in DC.**

**References**

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