**INTRODUCTION**

Studies of sound localization ability use either spatial acuity measures (e.g., minimum audible angle, MAA), or an absolute localization task, where sound source location identification accuracy is quantified.

Children who use bilateral cochlear implants (BiCIs) are remarkably adept at discriminating left vs. right hemifields. However, many of the children have difficulty on an absolute localization task.

- **Purpose**
  - To use the sound localization paradigm to investigate the ability of children who use BiCIs to map acoustic space to a spatially-relevant perceptual representation.
  - To explore the relationship between the localization mapping ability in an absolute identification task and spatial acuity measures across- and within-hemifield.
  - To investigate the sensitivity to interaural time difference (ITD) and interaural level difference (ILD) cues, using direct electrical stimulation.

**METHODS**

**Experiment 1: Absolute sound source identification**

- **Participants**
  - 38 children who use bilateral cochlear implants (BiCIs)
  - Repeated annual tests occurred x4 for 1 child; x3 for 3 children; x2 for 9 children; x1 for 25 children.
  - Ages at time of testing: 4 to 12 years old
  - Amount of BiCI experience at time of testing: 13 to 50 months

- **Stimuli**
  - Spondees spoken by adult male talker (e.g. “airplane”)
  - 60 dB SPL, 4 dB/rev
  - 15 loudspeakers, 10° intervals (-70° to 70°)

- **Procedure**
  - To identify sound source location.
  - Feedback: Flashing icon on monitor indicated correct target location

**Experiment 2: Left-right discrimination (MAA_LR)**

- **Task**
  - (1I-2AFC) Target location
  - Left vs. Right
  - 10 trials per condition, randomized order
  - Target angles fixed during blocks of 20 trials. Angle blocks varied adaptively.
  - MAA_LR estimated as 70.9% correct.

**Experiment 3: 0° reference (MAA_0H) and 50° reference (MAA_50H) within-hemifield discrimination**

- **Task**
  - (2I-2AFC). Interval 1: at reference location. Interval 2: at reference, or on the side. 10 trials per condition, randomized order
  - Yes/No task: Did stimulus location change or not?
  - Reference location (dog icon) at P or R
  - Comparison target (cat icon) at an angle whose separation from the reference is varied within-hemifield, on the side of subject’s first CI.

**Localisation examples**

- **Participants**
  - Grouped into 4 Groups, based on results to discrimination tasks.
  - One example is shown for each grouping.

**Conclusions**

- **Within-hemifield discrimination abilities serve as better predictors of the perceptual mapping observed in this absolute localization task than does discrimination of the right vs. left hemifields activates different populations of neurons whereas within a hemifield spatial mapping is more finely tuned within a given neural population.

**References**