**Introduction**

- Children with cochlear implants (CIs) show significant variability in outcome measures including speech understanding in quiet and in noise. Numerous factors can contribute to such variability, including:
  - Auditory experience prior to the onset of deafness and implantation
  - Downstream effects of deafness including Neurocognitive abilities
  - Neural health
  - Integrity of the auditory pathway

- Much of the research to date on speech understanding in children with CIs has utilized standardized test lists or sentence materials consisting of highly predictable content.
- However, when navigating realistic listening situations, children are likely to be presented with information that is complex and unpredictable. To fully understand speech understanding outcomes in children with CIs, the content of sentences should vary in level of predictability, or context.
- To investigate the extent to which children with bilateral CIs benefit from spatial separation of target speech from background noise, speech release from masking (SRM) was investigated, comparing performance on sentences with high- and low-predictability.
- Prior to testing children with CIs, SRM was examined in a previous study for children with TH using sentences vary in the level of predictability, or context (Figure 1).

**Participant Characteristics and Test Environment**

- Six (6) TH native English speakers aged 9 to 15 years
- Passed audiometric hearing screening at 20 dB HL, bilaterally, from 250Hz – 8000Hz
- Speech recognition task was conducted in a sound-attenuated booth.
- All stimuli was presented through loudspeakers (0° +76° azimuth).

**Methods**

- Participants attended two, 2.5-hour sessions
  - Session 1: vocoder exposure
  - Session 2: post-exposure testing

- Participants were instructed to listen to the target sentences in Quiet and in Noise, with a speech masker, and to repeat back the target sentences. An experimenter transcribed responses in real-time.

- Target sentences were presented at 0° azimuth from the front speaker and the speech masker was either co-located with the target or spatially separated at +8° azimuth.

- Percent correct (accurate) was determined from the number of correct words in each transcription.

- Visual feedback was provided during the vocoder exposure session. No feedback was provided during post exposure testing.

- This study has used an 8-channel noise vocoder with the Phase Software to vocode the sentence materials.

**Design**

- Studies phase I: Vocoder Exposure with IEEE sentences
- Participants were presented with 10 coherent vocoded sentences with speech maskers at +8 dB SNR
- Half the sentences were presented in quiet at 60 dB SPL, half presented with background speech maskers at +16 dB SNR

**Results**

- Semantic predictability remained constant during the two hours of exposure with vocoded IEEE sentences. This indicates that predictability may not be a learning effect for these stimuli, which differ from a priori familiarizable sentences.

- Performance varied among the six participants tested and between runs, but overall performance in the +8 dB SNR remained substantially lower than in Quiet.

- With the large degree of masking observed, the next phase in the study will be to test performance with the vocoded and unprocessed sentences that are either coherent or anomalous.

**Discussion**

- Understanding of the vocoded speech was increased with added exposure.
- In the exposure phase of the study there was no observable effect of improvement over a 2-hour exposure to vocoder speech.
- As expected, performance was better in Quiet than in +8 dB SNR unprocessed conditions in comparison with vocoded speech.
- Anomalous predictability sentences (Coherent) were better understood than semantically unpredictable sentences (Anomalous) in vocoded conditions.

**Acknowledgments**

**References**