

## Objectives:

To assess chronic **real-world outcomes** with the Marvel CI sound processor for:

- Hearing performance
- Bluetooth and Roger streaming
- Device usability and comfort
- Datalogging usability



## Methods:

- Subjects: Fifteen CI recipients (n= 16 CI ears)
  - 14 children, 1 young adult (ages 6.5 to 22; median 11 yrs)
  - 14 unilateral, 1 bilateral
- Study duration: Up to **12 months**
- Devices: Naída CI M system (prototype), Slim HP, curved batteries, Roger pen
- Fitting:
  - Target CI + NoahLink wireless
  - Program 1: AutoSense OS 3.0 (automatic classifier with default settings)
  - Program 2 (backup): Calm situation (omni mic)
- Outcome Measures:
  - Speech perception scores (PB words presented at 65 dBA in the programing room (ambient noise levels fluctuated between 28 dBA to 56 dBA)
  - Custom questionnaires (5-point rating scale)
  - Open-ended reports
  - Datalogging reports

## Results: Hearing Performance:

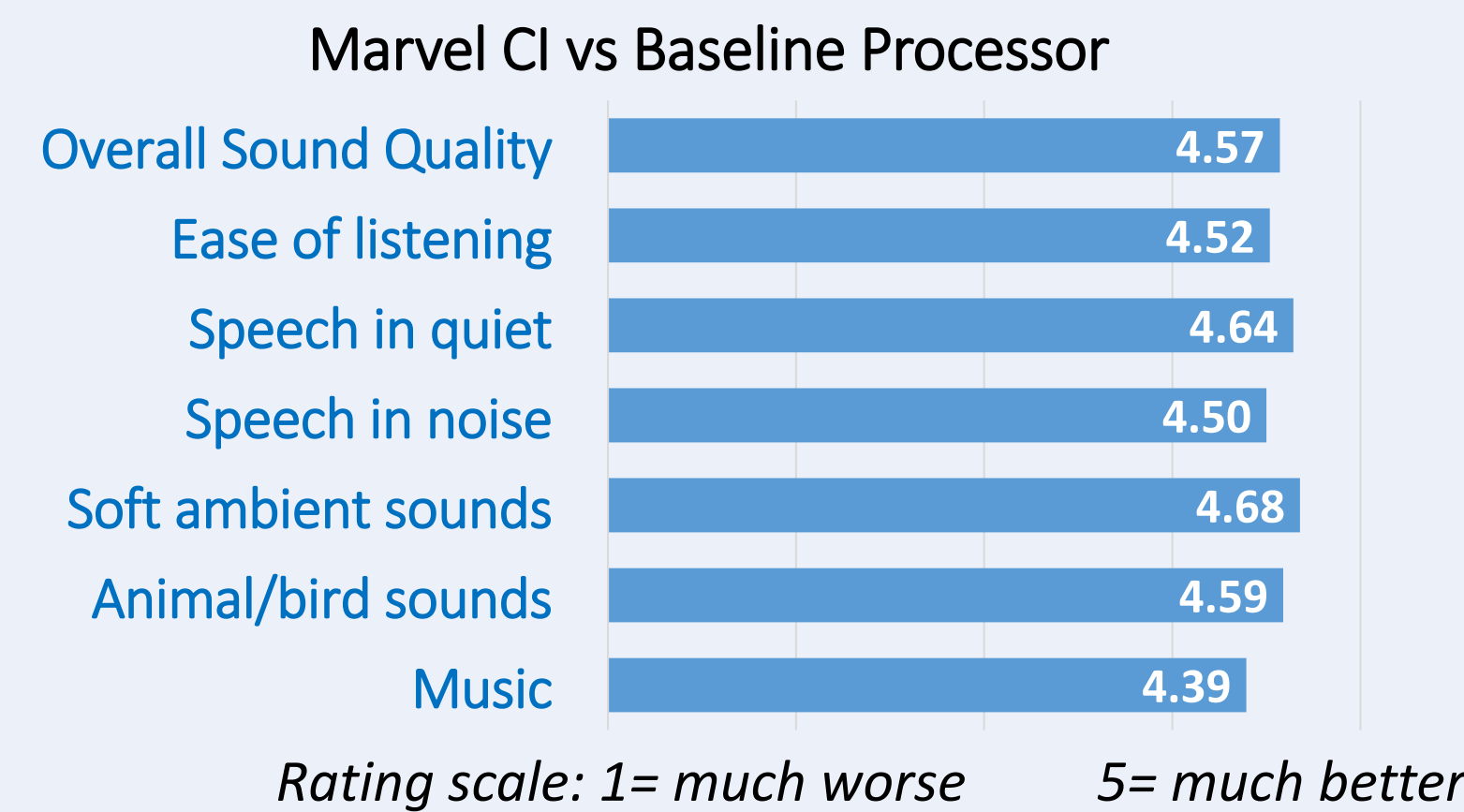
**AutoSense OS 3.0 was acceptable as every day program by all subjects.**

- Seven subjects needed fine-tuning of mic mode settings for 'Speech in Noise' classification.

**Open-ended feedback:** Parents reported improved awareness, responsiveness to incidental speech, greater engagement in conversations and perception of new environmental sounds.

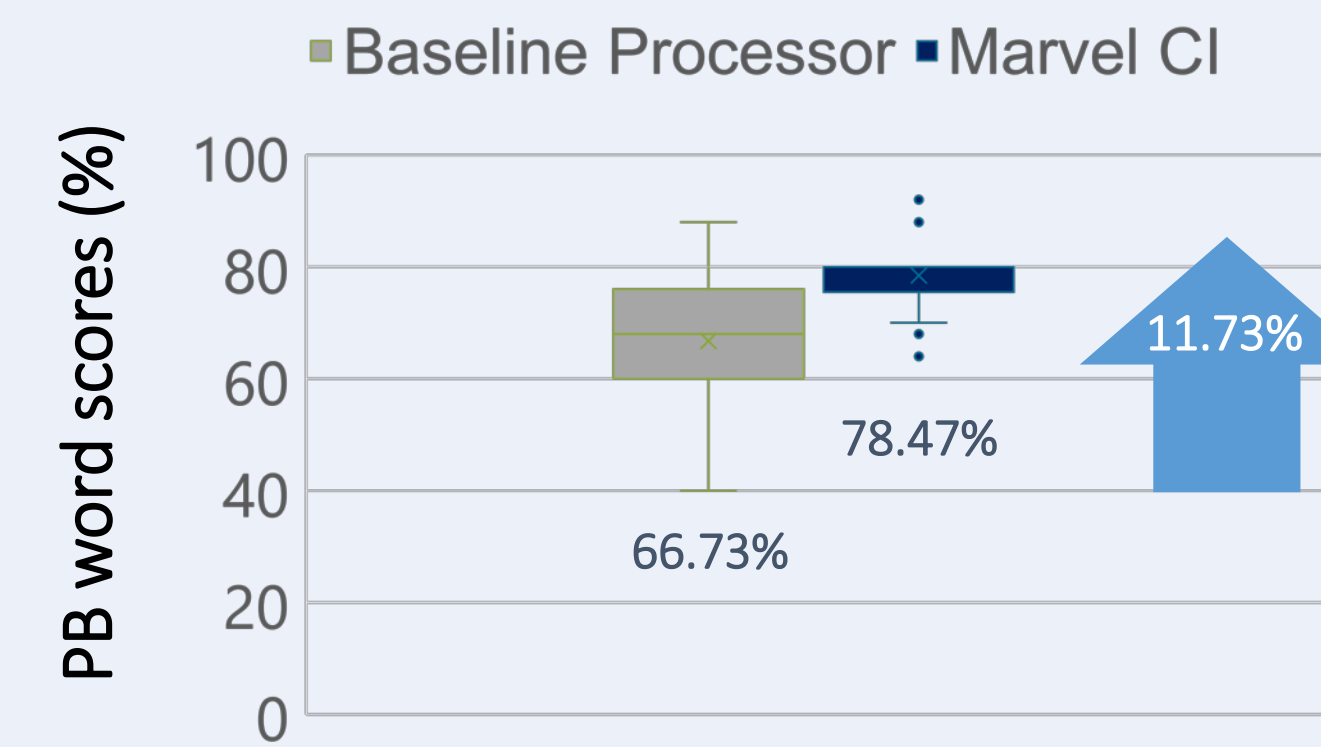
### Subjective Outcomes:

Marvel CI was rated as being 'better' or 'much better' than the baseline processor for following:



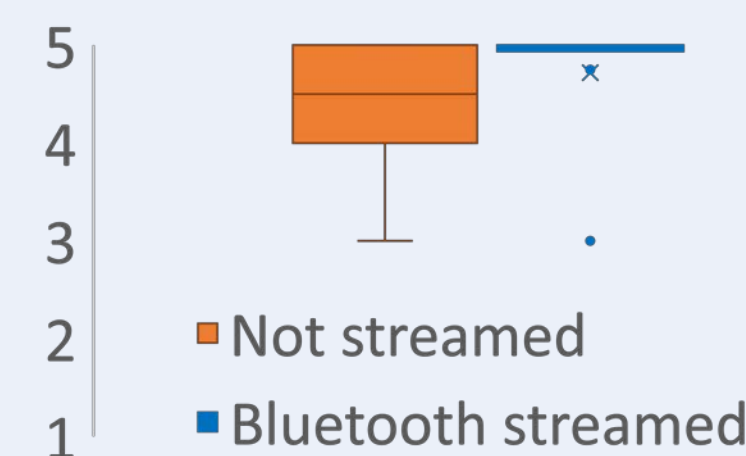
### Speech perception scores:

PB word scores were higher with Marvel CI than with baseline processor (paired t-test, p= .0033).



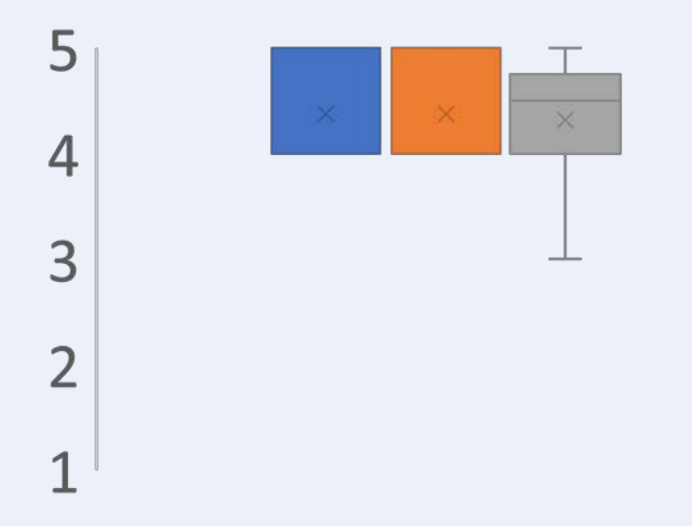
## Wireless Streaming (Bluetooth, Roger):

### Bluetooth: Perception of Online Learning Audio



Questionnaire, rating scale: 1= very poor; 5= very good.

### Roger Pen Outcomes



Perception of online learning audio was rated highly without and with Bluetooth streaming- the latter trending higher.

Roger mic use was beneficial, even at home.

## Usability and Comfort:

### Marvel CI vs Baseline Processor



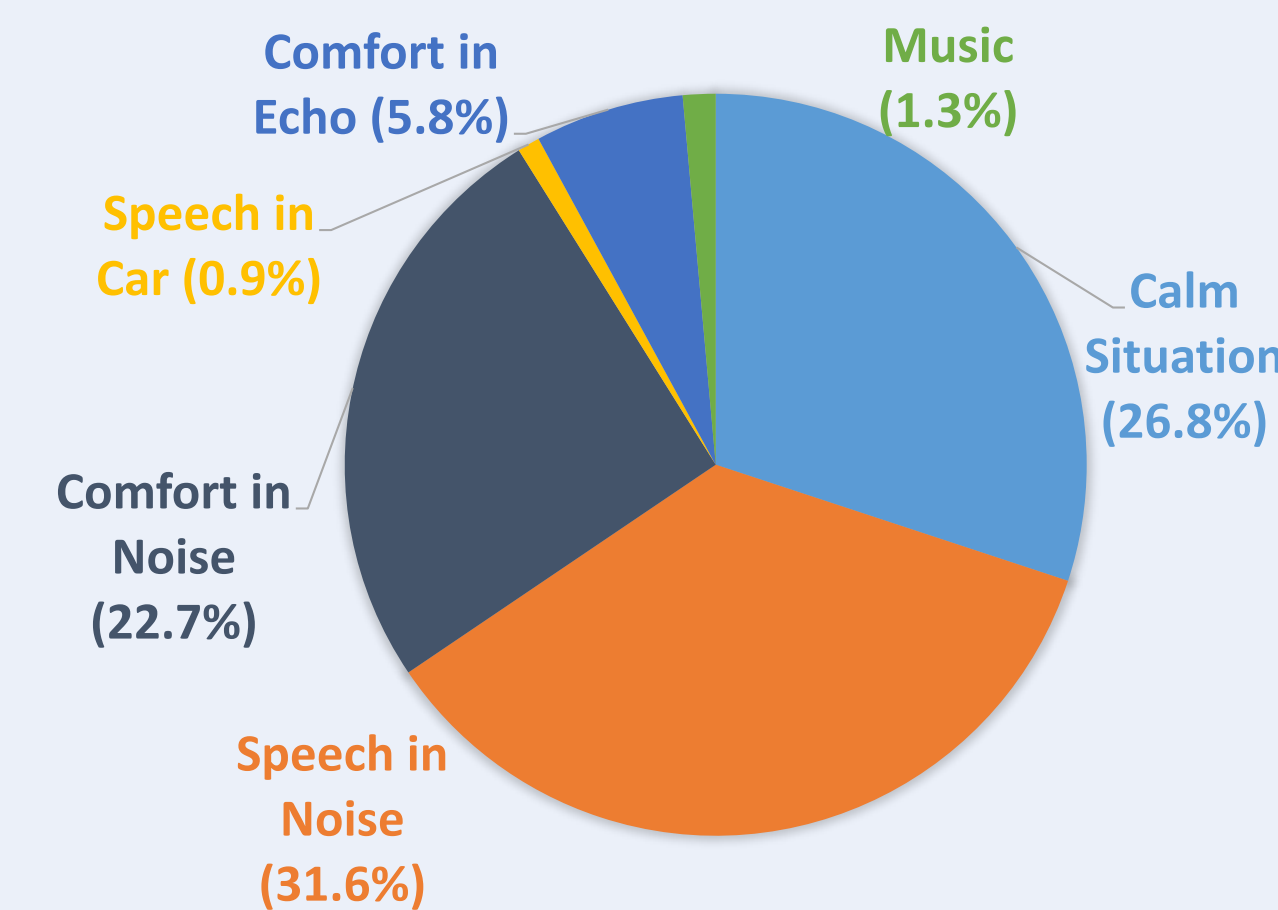
Marvel CI was rated as 'better' or 'much better' than the baseline processor.

Rating scale: 1= much worse 5= much better

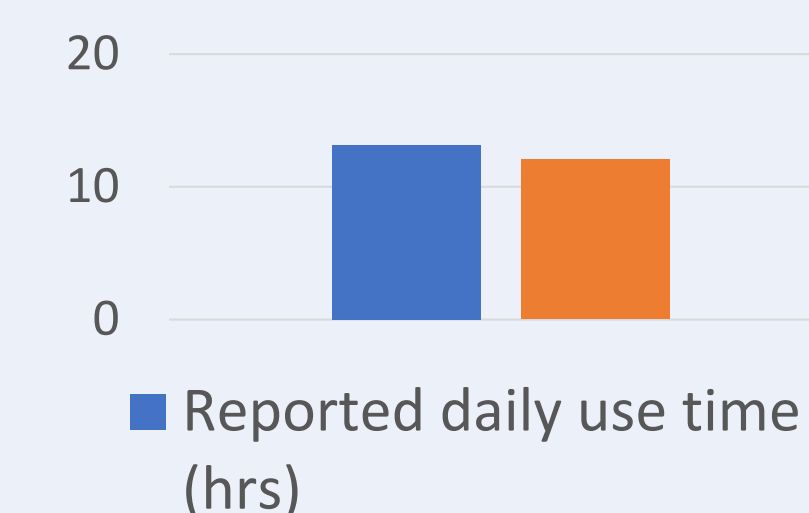
## Datalogging:

Subjects collectively logged 4861 days/ 57,156 hours of Marvel CI use.

- >50% acoustic input was logged 'in noise'. Ambient noise levels are typically high in Indian cities. Parents confirmed that home can be noisy: multi-family, located near busy streets, construction sites, etc.
- Datalogs were used to confirm acceptance of AutoSense settings, counsel about improving SNR and using wireless mics like Roger at home, including online educational and aural rehab activities.



Reported daily usage matched logged usage after deducting any downtime (e.g., shower time, naptime).



## Speech-Language-Voice Clinical Observations

Following changes were noted by Ms Jagmaag, a long-term speech-language therapist & audiologist to 8/15 study subjects:

- S01:** Improved expressive language, intelligibility and rate of speech. Responds to out-of-context questions quickly, without needing repetitions, also in secondary language.
- S02:** Vocabulary has increased.
- S03:** Not drawling speech anymore. Voice quality is better, more natural and less nasal.
- S04:** Faster and more accurate responses to random, low-context questions. Intonation is more natural.
- S05:** Improved incidental hearing and participation in conversations.
- S06:** Is speaking more. Improved articulation but needs to continue therapy.
- S07:** Improved intelligibility and rate of speech. Needs fewer repetitions.
- S08:** Improved intelligibility and rate of speech.

## Conclusion:

Based on the study experiences and findings, the Marvel CI system can be fit easily in children and has the potential to bring multi-dimensional benefits to the young recipients and their families.