



Beyond Speech Workshop 2025: *Language and Neurodiversity in children and young people who are deaf and hard-of-hearing*

Thursday, 11th December 2025, 9.20am-1.30pm

Neurodivergent populations, including Autistic people or those with Attention-Deficit Hyperactivity Disorder, show distinctive profiles of speech and language development. These groups are more frequently identified among the deaf and hard-of-hearing population, comprising more than 12% of children receiving audiological support (Bonino et al., 2025; Ramanathan et al., 2023). A better understanding of the unique strengths and communication experiences of these children can enhance our knowledge and inform more inclusive and responsive approaches to support their speech, language and hearing development.

Building on the Beyond Speech multidisciplinary workshops held from 2020 to 2024, this year's online workshop will introduce new research findings and expert keynotes on neurodiversity in children who are deaf or hard-of-hearing. The workshop will bring together clinicians and researchers to discuss supportive strategies and consider future directions for the field.

Keynote speaker

Amy Szarkowski (NextSense)

Organising committee

Nan Xu Rattanasone, Trudy Smith, Rebecca Holt, Joanna McAdam, and Katie Neal

Workshop sponsors

- Macquarie University Child Language Lab
- NextSense
- The Shepherd Centre
- Australian Hearing Hub

Program

9.20am	Welcome	Distinguished Professor Katherine Demuth (Macquarie University)
9.30am	Keynote: Autism and neurodiversity among children who are deaf or hard of hearing	Dr Amy Szarkowski (NextSense)
10.30am	Perceptual anchoring to auditory textures in autistic and non-autistic listeners	Dr Heivet Hernandez-Perez (Macquarie University)
11.00am	Break	
11.30am	Mandarin-speaking children with cochlear implants can modulate pitch for contrastive focus	Feng Xu (Macquarie University)
12.00pm	Seeing and hearing irony: Do multimodal cues support children with cochlear implants?	Jessi Qianxi Yu (Macquarie University)
12.30pm	Panel discussion: Parent perspectives on hearing and neurodiversity	Lauren Baker, Laura Fox, Virginie Lecomte, Suzie Robertson
1.30pm	Closing remarks	Dr Nan Xu Rattanasone (Macquarie University)

Autism and neurodiversity among children who are deaf or hard of hearing

Dr Amy Szarkowski (NextSense)

Many people are familiar with autism and with the term neurodiversity. Audience members for this conference will have knowledge about what it means for a child to be deaf or hard of hearing (DHH). Yet, life at the intersection of these, being DHH and having a “spectrum disorder” is less well understood. This keynote presentation will offer insights about autism spectrum disorder and neurodiversity among children who are DHH from the lenses of cognitive neuroscience, psychology, and child development. Importantly, in addition to introducing the science, this presentation will highlight the insights of those with lived experience who identify as Deaf Autistic or Deaf and Neurodivergent. Considerations and evidence-informed suggestions and “take aways” for teachers, allied health providers, and parents/carers will also be shared.



Bio: Amy Szarkowski, PhD is a psychologist specializing in working with children who are deaf or hard of hearing (DHH) and their families. She has worked clinically with families with DHH children who have ASD or are neurodivergent - conducting assessments that contribute to diagnostic profiles, providing family-based support, and offering individual counselling to this population of young people. Academically, Dr. Szarkowski has published on the topic of Autism Spectrum Disorder (ASD) among Children

who are DHH alongside leading scholars in this field, served on an international consensus panel to adapt ASD assessment tools for use in diagnosing DHH children, and contributed to conceptualization of the unique needs of DHH who experience ASD and neurodiversity for major international paediatric associations. Amy has worked extensively with schools and teachers, providing guidance and suggestions for how to accommodate and modify instruction to meet the needs of DHH children who have ASD or other neurodiverse learning profiles.

Perceptual anchoring to auditory textures in autistic and non-autistic listeners

Dr Heivet Hernandez-Perez (Macquarie University)

Background: New sensory knowledge can be acquired automatically by extracting regularities from within external stimuli or environments. This process is known as statistical learning (SL). One mechanism by which this passive learning arises is by forming a perceptual anchor i.e., a repeated regularity is extracted and stored for later use. Auditory textures contain intrinsic modulations that are relatively stable over time, making them ideal for exploring how sound environments are processed (e.g., crackling Fire, Insects chirping or bubbling Water). Investigating how Autistic listeners learn and extract patterns from auditory textures may reveal unique perceptual strategies that contribute to the diversity of auditory experiences reported by Autistic people.

Objective: To characterize SL of auditory textures in Autistic and non-autistic listeners.

Methods: This co-produced study includes an in-person sample of 13 Autistic and 26 non-autistic listeners (age 23-50 years old and typical hearing (audiometric thresholds within the typical range $< 20\text{dB HL}$). Participants listened to sounds delivered by calibrated headphones via a computer. Four synthetic sound textures excerpts were created in this study: wind blowing (task familiarization), crackling Fire, Insects chirping, and bubbling Water. Listeners identified if two auditory textures samples were identical. Participants encountered three blocks of 80 trials per synthetic texture: 20 Repeated-Fix (two identical excerpts within and across trials), 20 Repeated-Novel (two identical excerpts within the trial but never heard again) and 40 Novel (two different excerpts presented within and across trials).

Results: Non-autistic listeners showed a significantly higher sensitivity, quantified as d' , for the Repeated-Fix than for Repeated-Novel stimuli for all textures explored (Figure 1), paired t-test: Fire [$t(1, 25)=3.20$, $p=0.002$, Cohen's $d=0.63$]; Water: [$t(1, 25)=3.57$, $p<0.001$, Cohen's $d=0.70$] and Insects: [$t(1, 25)=5.35$, $p<0.001$, Cohen's $d=1.05$]. Autistic listeners showed an anchoring effect for Insects [$t(1, 12)=2.59$, $p=0.12$, Cohen's $d=0.72$] and Water [$t(1, 12)=3.36$, $p=0.003$, Cohen's $d=0.93$] textures, but not for Fire [$t(1, 12)=0.13$, $p=0.45$, Cohen's $d=0.035$], for which they showed equal sensitivity to the Repeated-Fix and Repeated-Novel stimuli. When analysing acoustic measures of sound textures such as kurtosis (short-duration peaks like a sharp click), Fire exhibits a high kurtosis in the distribution of sound-energy modulations compared to Water and Insects.

Conclusions: In-person findings demonstrate the suitability of auditory textures for investigating statistical learning. Overall, our data reveal stimulus-specific differences in perceptual anchoring between Autistic and non-autistic listeners, suggesting a potential mechanism contributing to the diverse auditory experiences reported by autistic individuals. Specifically, we propose that sound

features such as kurtosis might underpin the high sensitivity to both Repeated-Fix and Repeated-Novel stimuli that Autistic listeners exhibited for Fire texture.



Bio: Heivet Hernandez-Perez is a Macquarie University–Cochlear Research Fellow whose work examines how the auditory system adapts, reorganises, and learns in complex listening environments. Her research focuses on crossmodal plasticity in cochlear implant users, neurodivergent listening experiences, and the cortical–subcortical ‘listening loops’ that shape perception and learning. She approaches this by bringing a systems neuroscience framework – often applied to animal research – to human research in the auditory brain. As Research Lead of the Neurodivergence and the Listening Brain program, she employs a co-produced, participatory research framework to ensure that study design, interpretation, and translation are guided by lived experience.

Mandarin-speaking children with cochlear implants can modulate pitch for contrastive focus

Feng Xu (Macquarie University)

Prosody (duration and pitch) can be used for focus marking to highlight the most important information in an utterance, and pitch serves as the most robust cue. However, acquiring focus marking poses challenges for children with cochlear implants (CIs) due to the limited pitch transmission in CIs. This is particularly challenging for those speaking Mandarin, a tonal language where pitch is not only critical for focus but also for word meanings. Previous studies have found that Mandarin-speaking children with CIs can modulate prosodic cues appropriately for other linguistic functions, such as boundary marking. It remains unclear whether they also modulate prosodic cues appropriately for focus as well. This study addressed this question using an elicited focus production task with recruiting 4-6-year-old children with CIs and their typically hearing (TH) peers. The results showed that children with CIs successfully modulated pitch correctly for focus marking but not duration. However, their productions cannot be reliably identified by native listeners. These findings suggest that Mandarin-speaking children with CIs have acquired the appropriate mapping between different prosodic cues and their discourse functions, while their acquisition is incomplete.



Bio: Feng Xu is a PhD candidate in the Department of Linguistics at Macquarie University. His research investigates the acquisition of prosodic cues to discourse functions by Mandarin-speaking children with cochlear implants, and whether their performance compares to that of typical hearing children.

Seeing and hearing irony: Do multimodal cues support children with cochlear implants?

Jessi Qianxi Yu (Macquarie University)

This study investigated irony comprehension in Mandarin-speaking preschoolers with cochlear implants (CIs), focusing on the role of prosodic and visual cues, and whether second-order Theory of Mind (ToM) is necessary for using these cues. Fifty-two children with CIs (aged 3–7) and fifty-two age- and gender-matched children with normal hearing participated. All children completed a ToM test and a story comprehension task, with ironic stories presented in three conditions: (a) context-only, (b) context and prosody, and (c) context, prosody, and visual cues. The results showed that both prosodic and visual cues improved irony comprehension for children with CIs, regardless of whether they passed the second-order ToM test. The study is the first to demonstrate the benefits of multi-modal ironic cues in irony comprehension for children with CIs, offering insights for intervention strategies.



Bio: Jessi Qianxi Yu is an incoming PhD student in Linguistics at Macquarie University. Her research focuses on identifying the challenges in language development faced by Deaf and hard-of-hearing children, with a particular interest in exploring how multimodal cues in everyday language can help address these challenges.