

Scouting for Sound Solutions

By **Carolyn Mee**, Sound Scouts CEO



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Digital technology is changing how hearing difficulties are identified and assessed, particularly for people who may have limited access to traditional hearing services.

An Australian digital hearing health company, **Sound Scouts**, has been working in this area for more than a decade, following an initial four years of research and development. Sound Scouts was originally created to make hearing screening more accessible for children starting school, including those living in regional and remote communities. Its services have since expanded to include adult hearing screening, auditory processing disorder (APD) assessment tools and auditory training.

Sound Scouts has facilitated over 250,000 hearing screenings working with thousands of schools, health services and residential aged care facilities. The Sound Scouts app offers two screening options: the original Triple Factor Hearing Screener, with three interleaved tests – speech-in-quiet, tone-in-noise and speech-in-noise – identifying both hearing loss and listening difficulties in noise; and a gamified Automatic Audiometer. The Audiometer has been refined over the past few years, with support from Aged Care Research & Innovation Australia (ARIA) facilitating improvements to

enable use of the app and supporting software, in Residential Aged Care Facilities. Residents from 68 to 100 years reported finding the test easy to undertake, and inbuilt reliability checks confirmed that results remained reliable even for those with cognitive issues. Sound Scouts is a TGA-registered medical device, so it meets the highest evidence and development standards.

Sound Scouts is one of the first software-based medical devices in Australia to leverage gaming technology. And while most would recognise the advantages of disguising what is typically a boring test in a playful game, the benefits of using game-based technology extend far beyond the visual rewards. Games generate a reservoir of data and almost every development decision Sound Scouts makes is informed by either data or customer requirements. Recent analysis of over 220,000 hearing screenings has provided insights to inform further research and development.



Screening activities often lead to referrals to either an audiologist or doctor. The doctor is typically the first point of call when a conductive hearing loss is detected, a common issue amongst children, often caused by glue ear (fluid behind the eardrum) or wax. Audiologists are our hearing experts and will unpack hearing issues that can't be treated by your doctor. An increasing number of audiologists are adding auditory processing disorder (APD)

assessment to their clinical offering, and Sound Scouts is excited to be supporting this change by streamlining testing with a suite of APD tools. Working with Macquarie University and Professor Harvey Dillon, the tools are designed to investigate the underlying cause of listening difficulties in noise – some tests are well-known (LiSN-S) and others are relatively new (AudiCloze).

So, what is APD? Most of us know what it feels like to struggle to follow a conversation in a noisy café, classroom or meeting. For some people, this is a persistent problem that affects learning, work, relationships and confidence. APD describes difficulty in the way the brain processes sound. A person with APD may have normal hearing thresholds, meaning they can detect quiet sounds during a standard hearing test, but still struggle to make sense of speech when there is background noise, competing talkers, reverberation or all three.

So, while an audiogram is important, it only tells part of the story. It measures the softest tones a person can hear at different pitches and is useful for identifying different levels of loss. It does not show how well someone can separate voices, recognise speech sounds, use language to fill in missing information, remember what they have heard or maintain attention while listening.



How APD can affect everyday life?

In the classroom, a child may hear the teacher's voice but lose parts of the message when other children are talking or when sound is bouncing around the room. They may miss instructions, respond slowly, appear distracted or rely on watching the teacher's face. Listening can require so much effort that less mental capacity remains for understanding, remembering or completing the task.

At home, a child may not respond when spoken to from another room, struggle with multi-step instructions or become overwhelmed when several people are talking. This can be mistaken for poor attention, behaviour or effort.

Adults may experience similar problems in meetings, open-plan offices, restaurants and social gatherings. They may avoid group conversations, feel exhausted after prolonged listening or worry that others think they are not paying attention.

Importantly, not every listening difficulty is caused by APD. Similar problems can arise from hearing loss not obvious on an audiogram, difficulty identifying speech sounds, language difficulties, reduced memory, attention problems, or a combination of factors.

Professor Harvey Dillon says the key question is not simply whether "APD is present", but what is causing the listening difficulty, how large the problem is and what can be done about it.

Listening Difficulty Unravelling

This is the thinking behind the Sound Scouts APD Suite. The Suite gives audiologists a structured battery examining different parts of the listening process. The aim is to identify the most likely underlying cause of difficulty listening in noise so that recommendations can be better targeted. The tests automatically generate age-corrected scores and interpretive reports.

LiSN-S - Listening in Spatialized Noise - Sentences test measures how well a person understands sentences when competing voices appear to come from different locations. It can identify spatial processing disorder, a type of APD in which the listener has difficulty using spatial cues to separate a target voice from surrounding speech.

LiSN-U - Listening in Spatialized Noise - Universal test uses nonsense syllables rather than words or sentences. Because performance is far less dependent on language knowledge, it helps determine whether poor speech-in-noise performance is more likely to arise from auditory or speech-sound processing rather than language.

AudiCloze looks at the ability to use language to work out a missing word from the surrounding sentence. This reflects an everyday skill: using context to “fill in the gaps” when speech is partly masked by noise or reverberation.

DigiSpan measures short-term and working memory by asking the listener to repeat number sequences forwards and backwards. Memory matters because difficult listening situations often require a person to hold information in mind while interpreting it.

DDdT - Dichotic Digits difference Test - assesses how the listener manages different information arriving at each ear at the same time. Comparison conditions help distinguish dichotic listening difficulty from performance influenced by memory, attention or difficulty managing simultaneous sounds.

ToLD-U - Test of Listening Difficulties - Universal measures sentence understanding in a realistic simulation of a noisy, reverberant environment. It's designed to detect speech-in-noise difficulty but is not intended to identify the cause by itself.

Dr Sharon Cameron, who devised LiSN-S over 20 years ago, notes that the value comes from interpreting the pattern both across and within tests. Two people may report the same problem, “I cannot hear in noise”, but have quite different underlying causes and need different support.

Diagnosis to meaningful support

Identifying the underlying cause is important to ensure the best management strategies are put in place. One person may benefit from auditory training, another from language assessment, memory or attention support, classroom changes, communication strategies or a remote microphone system. Some will need a combination.

To contribute to remediation, Sound Scouts is beta testing a new phoneme-based auditory training tool, Soundiverse. Refinement of the language-independent tool has been funded by a grant from the Industry Growth Program. Like all good rehabilitation, Soundiverse auditory training relies on adherence to a 10-week program, with 10-15 mins of auditory exercise five days per week. Sound Scouts has again employed gaming technology to ensure the daily exercise routine is both fun and effective.

Sound Scouts, as a company, is focused on leveraging digital technology to improve access, outcomes and awareness across the hearing spectrum. Informed by our data and customer and client insights, we hope to continue contributing in a meaningful way to the development of new ‘game-changing’ tools to support both clients and clinicians.