



Hearing Aids for Music

**Exploring the music listening behaviour of people
with hearing impairments**

Conference 2017

14-15 September 2017

School of Music, University of Leeds

At a Glance

| Thursday 15 September | |
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| 09:00 | Registration and Coffee |
| 09:45 | Welcome |
| 10:00 | Reflections of a deaf church organist. Brian Henderson |
| 10:15 | AHRC-funded Hearing Aids for Music project. Alinka Greasley |
| 10:45 | Effects of hearing aids on music perception. Sara Madsen and Brian Moore |
| 11:15 | Coffee |
| 11:45 | Consideration of physical and perceptual factors in aided music listening. Maja Serman and Mirko Arnold |
| 12:30 | “Beyond the audiogram: A consideration of factors which may impact music engagement. Lena Batra |
| 13:00 | Lunch and Exhibition |
| 14:00 | Workshop 1 Cognition, hearing aids and music. Thomas Behrens |
| | Workshop 2 Starkey hearing technologies workshop. Sue Falkingham and Paul Lamb |
| | Workshop 3 Providing support for music listening within hearing rehabilitation. Harriet Crook and Heather Austin |
| | Workshop 4 Virtual hearing aids, binaural audio, and gamification for better hearing aid adoption. Lorenzo Picinali and Yuli Levto |
| 15:00 | Musicians and the prevention of hearing loss. Marshall Chasin |
| 15:30 | Coffee |
| 16:00 | Considerations of a professional musician who happens to be deaf. Cathy Bowker |
| 16:15 | Musicians first? Christine Rocca |
| 17:00 | Exhibition, Networking and Wine Reception. |
| 18:00 | Concert: FORTE Ensemble. |
| 19:00 | End |

| Friday 16 September | |
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| 09:00 | Registration and Coffee |
| 09:15 | Hearing aids from the view of a professional musician. Rick Ledbetter |
| 09:30 | Music in the view of a hearing aid manufacturer. Volker Kühnel |
| 10:00 | Improving music preference in hearing loss. Kei Kobayashi |
| 10:30 | Hearing aids and music: An analysis of the factors influencing user satisfaction. Rémi Marchand, Jörg Buchholz, Harvey Dillon and Valerie Looi |
| 11:00 | Coffee |
| 11:30 | Music Appreciation and Participation in Children with Hearing Loss. Erik Jorgensen and Elizabeth Walker |
| 12:00 | A musical challenge. Christine Rocca |
| 12:30 | Music perception of adult cochlear implant and hearing aid users. Valerie Looi |
| 13:00 | Lunch and Exhibition |
| 14:00 | Workshop 5 Developing self-directed music learning activities for adult hearing aid users. Valerie Looi |
| | Workshop 6 Optimising hearing technology for music: It's not all down to software. Gary Holland |
| | Workshop 7 Hearing is Believing. Chris Cartwright |
| | Workshop 8 Wired and unwired for sound – the next stage in the development in technology for listening to music. Richard Vaughan and James Mander |
| 15:00 | Hearing loss in the audio/visual field. Sam Lanes |
| 15:15 | Plenary and Future Directions. Marshall Chasin and Alinka Greasley |
| 16:00 | Coffee |
| 16:30 | End |

Communication support

BSL interpretation will be provided by Dave Wycherley and Alexia Blohm-Pain.

In the main hall

- Remote captioning will be provided by AI Media in the main hall.
- BSL interpretation for all main presentations.
- Loop system available.
- If you would like to use a personal FM system, please let us know on arrival.

In the workshop rooms

- We will have a FrontRow soundfield system available in all workshop rooms.
- BSL interpretation by arrangement.
- If you would like to use a personal FM system, please let us know on arrival.



Thursday 14 September

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| 9:00-09:45 | Registration and Coffee |
| 09:45-10:00 | Welcome |
| 10:00-10:15 | Reflections of a deaf church organist Brian Henderson Brian will share the highs and lows of using his digital hearing aids in his return to a church organist role following his sudden and distressing hearing loss. |
| 10:15-10:45 | AHRC-funded Hearing Aids for Music project Alinka Greasley Music listening fulfils a variety of functions as people go about their daily lives and has been shown to have a significant positive impact on health and well-being, particularly in older adults. Despite growing literature on the beneficial effects of music, few studies have taken hearing impairments and the use of HA technology into account. There are currently over 10 million people with some level of deafness in the UK, representing one in six of the population, and this figure is set to rise dramatically to 14.5 million by 2031. The AHRC-funded Hearing Aids for Music project is currently exploring how music listening experiences are affected by deafness and the use of HA technology. A series of four studies have been implemented. This includes a small-scale clinical survey among HA users to establish any problems with music listening, and discussions about music with audiologists in clinic; an interview study to explore experiences in more depth with the collection of audiometric data; a survey which asked practitioners about the types of advice and strategies they utilise in the management of music listening through HAs; and a large-scale online survey among HA users which explored links between levels of hearing loss, age of onset of deafness, HA technologies, musical genres and formats (live and recorded), levels of musical training and music listening experiences. Key findings across all four studies will be outlined, followed by a discussion of how insights will be translated into resources for patients and practitioners to maximise the impact of the research. |
| 10.45-11.15 | Effects of hearing aids on music perception Sara Madsen and Brian Moore Hearing aids and fitting methods for hearing aids are mainly designed to optimize speech intelligibility. Perhaps this is the reason why many hearing-aid users are not satisfied with their hearing aids when listening to music. Reports of such dissatisfaction inspired the internet-based survey presented here. The survey was designed to identify the nature and prevalence of problems associated with listening to live and reproduced music with hearing aids. Responses from 523 hearing-aid users to 21 multiple-choice questions and one open question are presented and the relationships between responses to questions regarding music and questions concerned with information about the respondents, their hearing aids and their hearing loss are described. Large proportions of the respondents reported that they found their hearing aids to be helpful for listening to both live and reproduced music, although less so for the former. The survey also identified problems such as distortion, acoustic feedback, insufficient or excessive gain, unbalanced frequency response and reduced tone quality. The results indicate that the enjoyment of listening to music via hearing aids could be improved by an increase of the dynamic range, extension of the low-frequency response, and improvement of feedback cancellation and automatic gain control systems. |
| 11.15-11.45 | Coffee |

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| 11:45-12:30 | <p>Consideration of physical and perceptual factors in aided music listening Maja Serman and Mirko Arnold</p> <p>Music listening can be examined from two perspectives. From the physical perspective, music, as any other sound, is defined as propagation of pressure disturbance through a medium. From the perceptual perspective, these pressure disturbances are coded and represented throughout various stages of the auditory system, resulting in a multitude of experiences which we think of as sound.</p> <p>With regard to the physical realm, hearing aid processing must create a faithful rendition of a wide range of signals that comprise musical sounds, with as high spectral resolution and as little delay and distortion as possible. In the perceptual realm, the properties of the auditory system and the broader cognitive characteristics of hearing impaired listeners influence their listening experiences (e.g. short term tonal and verbal memory, musical background etc.).</p> <p>In our talk, we will present ongoing research and development in the Sivantos R&D team, where we explore music listening with hearing aids from both of these perspectives. The audible characteristics of music depend heavily on the way it is performed, recorded and reproduced. We will discuss three different music programs, which have been developed to cover a wide spectrum of current music listening situations. We shall also discuss recent study results exploring the influence of tonal working memory and musical background on speech performance in hearing impaired listeners.</p> |
| 12:30-13:00 | <p>Beyond the audiogram: A consideration of the factors which may impact music engagement following hearing loss Lena Batra</p> <p>Hearing loss and remedial technology play a significant part in an individual's auditory perception of music following hearing loss.</p> <p>However, on the basis of my clinical observations of music lovers and musicians attending the audiology setting, the extent to which music engagement is perceived to become, and remain, a problem for an individual wearing hearing aids does not consistently correlate with the severity of hearing loss.</p> <p>This talk discusses other factors which can play an important role in the willingness and ability of the client to engage with music using listening technology, while also providing an overview of the practical rehabilitation measures which can materially enhance the appreciation of music for hearing aid users.</p> |
| 13:00-14:00 | Lunch and Exhibition |
| 14:00-15:00 | Workshops |
| 15:00- 15:30 | <p>Musicians and the prevention of hearing loss Marshall Chasin</p> <p>Music exposure can pose a problem, especially with the advent of “portable” music. Despite the complexity of the human auditory system, it does not know the difference between industrial noise and music. Indeed, many of the factors can equally affect music exposure as well as industrial exposure. This talk is an overview of those factors affecting hearing for musicians as well as environmental strategies and hearing protection to minimize the potential damaging effects of music.</p> |
| 15.30-16.00 | Coffee |

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| 16:00-16:15 | <p>Considerations of a professional musician who happens to be deaf Cathy Bowker</p> <p>Working in interactive music making and performance as a deaf musician is still seen as a surprising choice of career. It is, of course, essential to monitor one's own perception of hearing and musicianship, to maintain a confidence in accuracy. Of paramount importance, however, is the technological understanding and support from the audiologist. Critically, there is a need to find some common language, to effect the individual link between the technology and one's own personal world of sound. Cathy will speak about her experiences of trialling new hearing aids this year, and methods that she feels help to maintain her levels of listening and musicality, in varied and challenging circumstances.</p> |
| 16:15-17:00 | <p>Musicians first? Christine Rocca</p> <p>Is there a difference in training a musician who is deaf? This presentation will demonstrate work over 25 years with a range of musicians who are deaf and the modifications established in approaches to improve training techniques. Outcomes will be demonstrated to highlight the challenges and positive aspects of training across age groups, with reference to practical aspects and educational restrictions. Considerations for future developments within this field will be demonstrated and discussed.</p> |
| 17:00-18:00 | Exhibition, Networking and Wine Reception |
| 18:00-19:00 | <p>Concert: FORTE Ensemble Ruth Montgomery, Sean Chandler, Eloise Garland, Danny Lane</p> <p>Formed by Music and the Deaf in 2016, the FORTE Ensemble is a unique group of four deaf professional musicians who are committed to raising expectations of what deaf people can aspire to and achieve in music, and promoting more high profile performance opportunities for musicians with a hearing loss.</p> |

Friday 15 September

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| 09:00- 09:15 | Registration and Coffee |
| 09:15- 09:30 | Hearing aids from the view of a professional musician Rick Ledbetter Rick will talk about his experiences using and programming hearing aids for music, and his advice for other musicians with a hearing loss. |
| 09:30-10:00 | Music in the view of a hearing aid manufacturer Volker Kühnel Traditionally the main functionality of hearing aids is making soft speech sounds audible and intelligible again while keeping the loudness of loud sounds comfortable. Typically different flavours of automatic dynamic gain control (AGC) are applied to achieve this goal. In addition directional microphone technology helps to get speech in noisy situations above the noise to enable communication in adverse listening situations to enhance clarity (improve the SNR). In recent years perception of music with hearing aids is getting in the focus of researchers more and more. Here the listening goal is a natural sound quality. Modern hearing aid technology, when configured correctly, has made some progress over the last years. Factors influencing the perceived sound quality of music are discussed (namely: frequency response, dynamic range, system noise, distortions at high sound pressure levels and the effect of dynamic gain control). A study investigating different aspects of music perception with different hearing aid solutions is presented. An expert panel of hearing impaired listeners rated different attributes that contribute to the perceived sound quality. These attributes are discussed. Another aspect is the availability of low energy Bluetooth technology which enables direct audio streaming e.g. from a TV set or smartphones to the hearing aids. This allows wireless listening to high quality audio media. Factors affecting sound quality in this application are discussed. Important factors here are the performance of the audio codec applied, and the treatment of direct sound and venting in the hearing aid. |
| 10:00-10:30 | Improving music preference in hearing loss through fitting psychoacoustic model with their equivalent rectangular bandwidth Kei Kobayashi Timbre perception in music almost certainly depends on the frequency selectivity of the ear, and the resulting spectral shape is then represented in the excitation pattern. In an ear with cochlear damage, frequency selectivity and loudness recruitment are usually aggravated which may result in greater difficulty in identifying contrast in the excitation pattern (cf. Moore, 1998). To address these issues, the author investigated individual equivalent rectangular bandwidth (ERB) over five center frequencies (0.25, 0.5, 1, 2, 4kHz), manipulated a psychoacoustic model for the individual and developed spectral subtraction to suppress excessive loudness and associated masking which improved spectral contrast of multiple musical components (e.g. musical instrument, formants/ consonants in vocals). The processing effect was investigated using a musical preference questionnaire which asked participants to rate the target sound (on loudness, fullness, clearness, naturalness and dynamics) compared to the original sound. A pop track (tempo: 94bpm) composed of male vocal and musical instruments (two guitars, one bass, drums, piano) was used. 34 elderly adults participated (mean age = 72.7, SD=6.2; 21 normally hearing and 13 hearing impaired in average absolute threshold). Results of paired t-tests showed that preference ratings were significantly higher in the processed music conditions. In particular, loudness preference was significantly improved (p<0.01). This result indicates feasibility of a front-end spectral enhancement technique to manage a sound optimization by manipulating psychoacoustic model. |

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| 10:30-11:00 | Hearing aids and music: An analysis of the factors influencing user satisfaction Rémi Marchand^{a,b,c}, Jörg Buchholz^{a,b,c}, Harvey Dillon^{a,b,c}, Valerie Looi^d ^a National Acoustic Laboratories, ^b The HEARing Cooperative Research Centre, ^c Macquarie University, Department of Linguistics, ^d Sydney Cochlear Implant Centre Most hearing aid research has focused on optimizing speech perception in noise, and little attention has been given to listening to music. In this study, a survey was conducted with the aim to better understand the musical listening habits of hearing aid users, whether or not they use their hearing aids to listen to music, and to identify the main issues they experience while listening to music. The survey consisted of 42 multiple choice and open ended questions. Respondents were recruited from two large databases available at the National Acoustic Laboratories, providing detailed information about the respondents such as their age, gender, type and degree of hearing loss, and information about their hearing aids. Preliminary results from 41 respondents show that hearing aid users are mainly listening to recorded music at home. The majority of them responded that they did not know if their hearing aids included a music program and most of them do not change the settings of their hearing aids when listening to music. The survey identified that the most prevalent problems are difficulties to understand the lyrics, the soft passages of music being too soft, the music being too loud, melody perception issues, and lack of clarity of the music. Respondents reported being generally satisfied by the performance of their hearing aids for listening to music, although they were generally less satisfied with live music than recorded music. Hence, hearing aids need to be modified to improve the enjoyment of music depending on the listening conditions. |
| 11:00-11:30 | Coffee |
| 11:30-12:00 | Music Appreciation and Participation in Children with Hearing Loss Erik Jorgensen and Elizabeth Walker, University of Iowa Much research has examined the role of music in the lives of patients, particularly adults, with cochlear implants. Little research, however, has been undertaken to better understand how children with hearing aids engage with music in their daily lives. We surveyed two cohorts of children with hearing aids as they were finishing fifth grade to ask them about their appreciation and participation in recorded music, live music, and musical practice and performance. Children were surveyed across three sites as part of the larger Outcomes of School Aged Children who are Hard of Hearing study. Early results suggest that music is critically important to children who wear hearing aids, and that every effort should be undertaken to ensure that these children have the best possible access to the music signal. We will continue to follow these children as they progress through school to understand how the role of music in their lives changes and how their musical engagement differs from that of their normal hearing peers. |
| 12:00-12:30 | A musical challenge Christine Rocca Research indicates combined electric and contralateral acoustic stimulation provides substantial benefits to bimodal listeners, such as better speech understanding in noise and enhanced localisation abilities. However, whilst some benefits for music are indicated through current research, the integration of acoustic and electrical signals still present musical challenges. This presentation aims to discuss the results from a pilot session with 15 adults using hearing aids and cochlear implants, which focused on integrating the strength of the musical brain with latest bimodal technology through a musical approach to improve musical outcomes for adults using hearing aids and cochlear implants. |

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| 12:30-13:00 | Music perception of adult cochlear implant and hearing aid users Valerie Looi <p>In many areas of research and technology, the hearing aid (HA) literature is far more advanced than the cochlear implant (CI) literature. For example, automatic scene selection and automatic background noise reduction are comparatively new features in CI processors. However on the topic of music perception, the research from the CI field is significantly more advanced than the HA literature. It is well accepted that adult CI recipients score significantly lower on music perception tests, and rate music to sound poorer than normally hearing (NH) listeners. In more recent times, it has also been shown that although CI users perform worse than HA users with significant hearing loss at some music tasks, HA users do not perform equivalently to NH listeners, and on some tasks, score similarly to CI recipients.</p> <p>This presentation will start by summarising the current state of knowledge on music perception and appreciation of adult CI recipients, and then compare these findings to outcome from adult HA users with significant sensorineural hearing losses. Although HA users with moderately-severe to profound hearing losses are better than CI recipients at pitch and melody perception tasks, they perform similarly on timbre perception tasks, and seem to rate music to sound less pleasant than CI recipients. These findings suggest that a significant sensorineural hearing loss impacts on music perception, regardless of whether acoustic or electric hearing is used. However, music training programs have been shown to be beneficial for CI recipients, and to a lesser extent, HA users. Implications and findings from the CI literature that should be considered in music training programs for adult HA users will also be discussed.</p> |
| 13:00-14:00 | Lunch and Exhibition |
| 14:00-15:00 | Workshops |
| 15:00-15:15 | Hearing loss in the audio/visual field Sam Lanes <p>Working in a creative field such as music or video production with a hearing loss adds a level of difficulty to everyday work, particularly in respect to equipment. Very few manufacturers produce equipment that accommodates hearing aid users.</p> <p>Sam shares his experience of working as an editor and video producer, and how he looks to overcome this problem, ensuring that his hearing aids continue to be a help, not a hindrance, when carrying out everyday tasks.</p> |
| 15:15-16:00 | Plenary and Future Directions Marshall Chasin and Alinka Greasley <p>This plenary session will ask delegates to reflect on the content and debates raised during the conference. Guided by consideration of hearing aids users' experiences when listening to and performing music, strategies that HA manufacturers have employed to address the challenges, and current rehabilitation services, resources and tools, it will discuss areas for future research and potential collaborations.</p> |
| 16:00-16:30 | Coffee and close |

Workshops

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| WORKSHOP 1 | Cognition, hearing aids and music Thomas Behrens Oticon <p>New research is adding to our understanding of how hearing loss affects cognitive processing. A central aspect of cognitive processing is selective attention, as it is helping us suppress competing sounds in a busy and constantly changing world. In two recent studies, different techniques were used to look at general cognitive load and selective attention. The studies provide evidence that attention is a fragile concept that is jeopardized by the added cognitive load of hearing loss. This workshop will review and discuss these studies to provide a framework for how hearing loss affects detailed auditory perception, as needed for music appreciation. It will further review and discuss how modern hearing aids can be programmed to reduce different kinds of noises, amplify and compress to improve perception. Finally, it will discuss how reduction in cognitive load (as evidenced by recent studies) imposed by hearing loss can be reduced, freeing up capacity for improved auditory perception. With more cognitive capacity available, the latest evidence suggests music appreciation is improved and people can better remember their musical experiences. The outcome of these discussions can inform future research and clinical work related to how hearing aids can be further improved to make music appreciation even better for people with hearing impairment.</p> |
| WORKSHOP 2 | Starkey hearing technologies workshop Sue Falkingham and Paul Lamb Starkey <p>Music has a wider bandwidth and greater dynamic range than speech. It enables us to enjoy the soaring high notes of a flute and the deep lows of a bass drum when we can hear the full range of those extremes. For many years, we have compromised on the amplification of music in our wide dynamic range compression instruments. We had good reason to do that as we know WDRC works well for speech understanding and this has taken priority over music amplification. Starkey Hearing Technologies have developed a new way to amplify music within their Muse and Halo 2 Hearing Instruments. With a dedicated second compression system designed to give a wider dynamic range to the musical inputs and a more linear approach to amplification we can allow soft music to be audible whilst loud music retains its punch. We will demonstrate the music amplification of Muse products and explain some of the research behind the dedicated features, formula and fine tuning available in the products. Streaming directly to hearing instruments requires an approach that compensates for acoustic differences between a microphone and a streamed input. As streaming becomes ever more common and useful to the end user of a hearing instrument we will take this opportunity to cover some of these differences and how you might optimally use streamed inputs for music amplification.</p> |

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| WORKSHOP 3 | <p>Providing support for music listening within hearing rehabilitation Harriet Crook and Heather Austin Sheffield Teaching Hospitals NHS Foundation Trust</p> <p>This workshop covers the practicalities of providing a hearing aid equipment and support service within routine audiology services with a focus on how this can support music listening. At Sheffield Teaching Hospitals we have provided a longstanding hearing aid equipment support service. This covers counselling to optimise use of aids, ensures users are empowered to understand their hearing loss and their own aids, and are aware of all the listening options available to them (e.g., assistive listening devices, loop, phone) for a variety of listening settings. It allows trials of equipment and tailored provision of advice in addition to help accessing other support services. We have found many patients struggling with music listening have benefited from this service and will present some case examples of these. This is informed by the findings of the Hearing Aids for Music (HAFM) research project in relation to hearing aid users' expectations and common misunderstandings about hearing loss and hearing aids. We will discuss the pathway used, and what to consider in establishing a similar service and resources that can be used for music. In addition, this workshop will include an interactive session with participants to gather information on what is currently being provided, resources that are available regionally around the UK, and other online resources that are being used for music. This includes what is provided by clinics, charities and music venues nationally. The aim of the workshop is to pool data that can be shared via the HAFM website as a resource for clinicians and hearing aid wearers.</p> |
| WORKSHOP 4 | <p>Virtual hearing aids, binaural audio, and gamification for better hearing aid adoption Lorenzo Picinali and Yuli Levto Imperial College London, Reactify Music</p> <p>3D Tune-In is an EU-funded project with the primary aim of improving the quality of life of hearing aid users. Musiclarity, one of the applications being developed as part of the project, is dedicated to improving the experience of listening to music for hearing aid users. This talk provides an overview of how Musiclarity uses virtual hearing aid technology and binaural audio to improve the music listening experience, and provides a novel way of improving communication between audiologists and their patients.</p> <p>After the presentation, there will be the possibility for attendees to try the Musiclarity web application, and to install on their computers the 3D Tune-In Toolkit test application (see http://www.3d-tune-in.eu/toolkit-developers), which allows to perform full binaural audio spatialisation with any chosen audio track(s), including hearing loss and hearing aid simulations.</p> |
| WORKSHOP 5 | <p>Developing self directed music learning activities for adult hearing aid users Valerie Looi Advanced Bionics</p> <p>The aim of the workshop is to develop collectively a list of different music activities which could be given to adult HA users who want to re-introduce themselves to, and/or improve their music perception. The facilitator published a list of music activities in 'ENT and Audiology news' in 2016 that could be provided to adult CI users wanting to work on their music listening skills independently. Examples include listening to the same piece through different playback modes (e.g. stereo, computer, MP3 player) and noting any differences in the sound; listening to contrasting styles within preferred styles (e.g. orchestral vs. chamber) with a focus on instrumentation; and listening with different programs (e.g. everyday vs. music program) to explore similarities and differences in sound quality. In this workshop, participants will look at the activities and discuss their suitability for adult HA users, or how they can be modified to be more applicable for HA users. Further, additional activities that could be included will also be discussed and developed.</p> |

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| | <p>The goal is for workshop participants to help in the construction of a list of different music activities which are suitable for HA users with different levels of hearing losses and different musical abilities that practitioners can then suggest to HA users. As part of the workshop, we will discuss how each activity could be 'introduced' and explained to HA users, and built upon as their skills progress, as well as any resources that could be recommended. The workshop will draw on the expertise of different participants (HA users, practitioners, manufacturers) to adapt a CI-specific resource to HA users; the list of the CI music activities will be provided to the participants prior to the workshop for them to read and consider.</p> |
| WORKSHOP 6 | <p>Optimising hearing technology for music: It's not all down to software. Gary Holland AudioLogical Limited</p> <p>Hearing instrument technology has advanced at a rapid rate since the introduction of DSP technology in 1996. However the main focus of technology has been on optimising speech for the user and, in particular, speech in noise. Whilst there are some similarities between speech and music signals, there are also some huge differences. The whole patient journey starting with the hearing assessment followed by hearing instrument selection, fitting, programming, verification and validation need to be considered differently where listening to music is important. Simply relying on a 'Music' programme from the manufacturer is unlikely to produce the best results, especially if the basic acoustics have not been properly considered. It's also possible that the patient/client's satisfaction with the hearing technology could be negatively impacted if it does perform as expected with music signals. In this workshop we will review some of the practical factors that can have a major impact on the success (or failure) of using hearing technology for music listening. Using real examples, we will consider some of the tips and tricks that can optimise hearing instrument performance for the user, and also review some limitations that may be difficult to address. Whilst the workshop will be of particular interest to Audiologists and Hearing Care Practitioners, it will also cover some practical solutions that the hearing technology wearer can use to maximise their enjoyment when listening to music.</p> |
| WORKSHOP 7 | <p>Hearing is Believing Chris Cartwright Phonak UK</p> <p>This workshop will use sound samples processed through different hearing instrument music programmes and the output recorded via a Kemar manikin. The recorded samples will be presented via headphones to participants in the form of an 'a-b-c' comparison which participants will be asked to perceptually rate in rank order. In this listening task, any perceived differences will be considered to arise from respective algorithms and/or technical limitations.</p> |
| WORKSHOP 8 | <p>Wired and unwired for sound – the next stage in the development in technology for listening to music Richard Vaughan and James Mander Connevens, The Ewing Foundation</p> <p>Hearing aid users have long been able to maximise the benefits their hearing aids offer them by connecting to other audio devices. Methods such as the telecoil or direct audio input (DAI) shoes with connecting leads remain popular, effective and affordable.</p> <p>However with the developments of the wireless technology by the manufacturers, a new range of possibilities for listening to music with flexibility and convenience has emerged.</p> <p>This workshop will examine the developments in assistive listening and wireless connectivity options for hearing instruments and give an overview of the range of accessories currently available. Also we hope to share experiences of users and their ability to listen and enjoy music.</p> |

Poster Presentations

Posters will be on display in the conference Exhibition area.

Insights into the complexities of music listening for hearing aid users
Alinka Greasley¹, Harriet Crook², Robert Fulford¹, Jackie Salter¹

¹School of Music, University of Leeds, Leeds, UK

²Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK

Music listening has significant health and well-being benefits, including for people with all levels of hearing impairment. Digital hearing aids (HA) are optimised for speech amplification and can present difficulties for music perception. The Hearing Aids for Music project is exploring how music listening behaviour is shaped by hearing impairment and the use of HA technology. Findings from two studies are reported.

Study 1: A clinical survey explored the extent of music listening issues and the frequency and success of discussions with audiologists about music. Data from 176 HA users (age range 21-93, average=60.35, SD=18.07) showed that problems with music listening were often experienced, and almost half reported that this negatively affected their quality of life. Participants described issues listening to live music performances, hearing words in songs, the loss of music from their lives and associated social isolation. Most had never talked with their audiologist about music and, for those that had, improvements were rarely reported.

Study 2: A second interview study explored listening experiences of HA users in greater depth, with the collection of pure tone audiometry to facilitate interpretation of accounts. The sample (n=22, age range 24-82, average=62.05, SD=24.07) included participants with a range of hearing impairments and levels of musical training. Participants described a variety of listening behaviours and preferences combined with different patterns of HA and Assistive Listening Device use. Analyses showed interactions between contextual factors such the individual nature of hearing loss (e.g. type, level, duration); levels of musical engagement (e.g. daily exposure, training) and contexts (e.g. recorded music at home/travelling, live performances).

These studies provide new data on a poorly understood topic and were used to inform the design of a national survey that seeks to identify patterns in the listening behaviour of a wider population of HA users.

Electroacoustic correlates of subjective sound quality for hearing aid processed music
Jonathan Vaisberg^{1,2}, Paula Folkeard¹, Ewan Macpherson^{1,3}, Vijay Parsa^{1,3}, and Susan Scollie^{1,3}

¹Western University, National Centre for Audiology, London, ON

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³Western University, School of Communication Sciences & Disorders, London, ON

Background: Hearing aid design largely reflects the acoustics of speech rather than music. As a result, hearing aids optimized for speech may not amplify music as effectively. Manufacturers often include dedicated music programs in their products. However, a music program's electroacoustic behaviour is not always transparent, and its efficacy improving music sound quality is often left unmeasured.

Objective(s): The purpose of this study is to compare hearing impaired listeners' subjective sound quality ratings of hearing aid processed music between several premier hearing aids and the hearing aids' respective universal and music programs. This study also strives to identify electroacoustic characteristics associated with changes in subjective sound quality.

Methods: Hearing impaired listeners rated the sound quality of music samples recorded via the universal and music programs of five hearing aids. Recordings were individualized using each hearing aid's proprietary fitting formula. Recordings were electroacoustically evaluated using measurements of bandwidth and intensity. Bandwidth measures included sensation levels, and upper and lower limits of audibility. Intensity measures included dynamic range, compression ratio, and envelope detection index.

Results: Sound quality differences were most apparent between hearing aids. A music program improved ratings for two hearing aids, although the magnitude of improvement was less than the difference between a high- versus low-rated hearing aid. The most predictive electroacoustic correlates of sound quality were sensation level in the low frequency range and the lower limit of audibility.

Conclusions: Optimal music sound quality appears to be a question of hearing aid selection, rather than music program selection. However, it is possible that measureable parameters in signal processing adjustments may be related to music sound quality, which may inform clinical fine tuning.

Concert

FORTE Ensemble

Formed by Music and the Deaf in 2016, the FORTE Ensemble is a unique group of four deaf professional musicians who are committed to raising expectations of what deaf people can aspire to and achieve in music, and promote more high profile performance opportunities for musicians with a hearing loss. In less than a year, the FORTE Ensemble has given concerts at Sage Gateshead, Kings Place London, the House of Lords, Arlington Arts Centre and was recently featured on BBC Breakfast.



The musicians: Ruth Montgomery, Sean Chandler, Danny Lane, Eloise Garland



Music and the Deaf is the only UK charity entirely dedicated to providing access and opportunities in music for deaf and hard of hearing children, young people and adults. Founded in 1988, Music and the Deaf has built an international reputation for pushing the boundaries of what deaf musicians can aspire to and achieve.

Biographies



Mirko Arnold

Mirko Arnold graduated in media technology from Ilmenau University of Technology, Germany, with focus on audio signal processing. He received his Ph.D. in computer science from Trinity College Dublin, Ireland, where he investigated topics in computer vision and machine learning in the context of endoscopy. He continued his work afterwards as a post-doctoral researcher in Trinity College before joining Siemens Audiologische Technik (now: Sivantos) in 2014 to work as a research audiologist. His focus is on audiological optimization of hearing aid algorithms and study design.



Heather Austin

Heather worked as a Speech and Language Therapy Assistant in the Audiology Department of Sheffield Teaching Hospitals NHS Trust for 14 years before her retirement in July 2016. She worked alongside Speech and Language Therapists and

Audiological Scientists in delivering a holistic service to people with mild to profound hearing loss including many with cochlear implants. Her main role within the team was to provide emotional and practical support to help people to adjust to their hearing loss, alongside demonstration and explanation of environmental aids. As Heather has had a hearing loss since her early 20s she was able to use her own experience - not only of hearing loss - but also her knowledge around environmental aids which she has found useful in her personal life - to help people to find the most suitable piece of equipment to help them adjust to life with a hearing aid. During both her personal life and working life she has found that hearing music is one of the most difficult to come to terms with after hearing loss so is honoured to be able to share her knowledge and skills with people today.



Lena Batra

Lena Batra is a registered Hearing Therapist. She completed her training at Bristol University and the Royal National Throat Nose and Ear Hospital in 2004 and is a member of the Registration Council for Clinical Physiologists. Lena has held a number of clinical posts. These have included setting up the first Hearing Therapy service in Hertfordshire and working with a complex patient caseload as an Advanced Hearing Therapist for 6 years at the Royal National Throat Nose and Ear Hospital.

Lena's role is to facilitate the holistic rehabilitation of adults with acquired hearing loss. This entails using a wide range of practical and therapeutic interventions to facilitate the change process for the client. Effective clinical work focuses on helping clients navigate and manage the wide-ranging practical and psychosocial challenges they may face in daily living. As a music lover with hearing difficulties from childhood, Lena's personal experience has had an important influence on her professional interest in understanding the barriers to music engagement which can exist, and how this can inform the rehabilitation process with the client.



Thomas Behrens

Thomas Behrens is the Head of Audiology and Director at the Centre for Applied Audiology Research at Oticon global headquarters in Denmark. He is responsible for clinical research, professional communication and definition of the audiology in new products for Oticon. Prior to this Thomas was for 10 years a Researcher and Project Manager at the Oticon Research Centre, Eriksholm. Thomas' areas of expertise in particular are spatial hearing, signal processing for hearing aids, technical audiology, outcome measures and methods for laboratory as well as field trials. Thomas has a master's degree in Applied Signal Processing and a bachelor degree in Business Administration.



Cathy Bowker

Cathy Bowker is a music therapist and accompanist working in education, therapy and performance. For the last 15 years she has worked part time at the Mary Hare Music Therapy Unit with Christine Rocca specialising in music and deafness, co-composing for resources published for parents and professionals and also in outreach, working with children and young adults who have special needs. As a self-employed musician she teaches in mainstream and specialist settings, and works as an accompanist for ballet, soloists, and choirs, requiring performances within small ensembles and orchestras.



Chris Cartwright

Chris worked in a number of NHS hospitals around the UK since 1981 including Lecturer at the School of Audiology in Birmingham, Audiology Services Manager at Queens Hospital Burton on Trent and finally as Clinical Audiologist at the Oak Tree Lane Centre Birmingham; assessing and managing the most challenging clients with severe brain injury, profound learning disabilities and multi-sensory impairment.

In 1997 Chris joined Phonak UK, and here again he has worked in a number of roles including Key Projects Manager. Chris is frequently requested to contribute to various projects both within the UK and Switzerland more often due to the network - internally, externally and internationally that has developed over the years as a result of his eLearning activities which has also directly contributed to the training and educational needs of professionals.



Sean Chandler

Sean has a severe hearing loss as a result of contracting meningitis aged three months. He now teaches in Liverpool alongside a flourishing freelance career as a performer and workshop leader.



Marshall Chasin

Dr. Marshall Chasin is an audiologist and the Director of Auditory Research at the Musicians' Clinics of Canada, Adjunct Professor at the University of Toronto (in Linguistics), and Associate Professor in the School of Communication Disorders and Sciences at the Western University. He is the author of over 200 articles and 8 books including Musicians and the Prevention of Hearing Loss. He currently writes a monthly column in Hearing Review called Back to Basics and a weekly blog at www.HearingHealthMatters.org/HearTheMusic. Dr. Chasin has been the recipient of many awards over the years including the 2012 Queen Elizabeth II Silver Jubilee Award for service to Canada. He has developed a new TTS app called Temporary Hearing Loss Test app.



Harriet Crook

Dr Harriet Crook is Lead Clinical Scientist for complex hearing loss at Sheffield Teaching Hospitals NHS Foundation Trust. She has worked as a Clinical Scientist in the NHS since 2002. Prior to undertaking training in Audiology Dr Crook undertook a PhD in Auditory Processing at Sheffield University and has maintained funded research activities and research fellowships alongside her clinical work with collaborations with the Departments of Music, Computer Science and Human Communication Sciences at the University of Sheffield and The School of Music at the University of Leeds in addition to a forthcoming Arts Council Project With STH NHS Trust. Her research interests are Music and CI, Music and Hearing aids and Auditory Streaming. She has an undergraduate degree in Music and Philosophy from the University of Wales Cardiff and is a clarinettist as well as having a longstanding profound unilateral hearing loss from childhood, with current projects combining personal academic and professional research interests in hearing loss and music.



Sue Falkingham

Sue Falkingham has been an Audiologist in Training and Education at Starkey Hearing Technologies for 7 years. Her role is to deliver training to all Starkey Customers to make them competent and confident to fit Starkey products.

As a qualified Clinical Audiologist, Hearing Therapist and Registered Hearing Aid Dispenser Sue brings 27 years of varied work experience to the team from both the NHS and Commercial sides of the industry. Currently Vice President of the British Academy of Audiology Sue is passionate about the role of the audiologist in rehabilitation for adults with hearing loss.



Eloise Garland

Eloise completed her Music degree at City University London in 2016, having previously studied voice under Helen Francis at the prestigious Chetham's School of Music in Manchester. She has sung with the Liverpool Philharmonic

Youth Choir and the London Philharmonic Choir, and worked with musicians such as Sir David Hill, Maggie McDonald, and Sir Mark Elder. Eloise has since embarked on a busy freelance career that has taken her all over the UK and overseas as a teacher and workshop leader.



Alinka Greasley

Dr. Alinka Greasley is Associate Professor of Music Psychology in the School of Music at the University of Leeds having studied a BSc in Human Psychology at Aston University and a PhD in Music Psychology at Keele

University. She specialises in social-psychological research into musical preferences and listening behaviour, using both quantitative and qualitative research methods, and is currently Principal Investigator on an AHRC-funded project 'Hearing Aids for Music' which is exploring how hearing impairments and the use of hearing aid technology affect music perception and appreciation. She is a Chartered Psychologist with the British Psychological Society, Fellow of the Higher Education Academy and a member of the Society for Education, Music and Psychology Research. She is also a violinist, pianist and DJ.



Brian Henderson

Born and educated in Liverpool, Brian is a Physics graduate with an interest in music. He taught Physics to A and S level in a variety of schools. He has been an organist in churches for over 50 years with particular involvement in

Bromsgrove Methodist Church, Worcestershire, since 1972. Brian is now moderately deaf following sudden hearing loss in his left ear in 2010 and then in his right ear in February 2016. The loss at high frequency had devastating effects on his perception of organ sound. His gradual return to playing using NHS digital aids has been a time of mixed emotions, involving both frustration and satisfaction.



Gary Holland

Gary has been an Audiologist for over 40 years. Initially training as a student Physiological Measurement Technician in Newcastle upon Tyne, he then progressed to being one of the youngest Senior Chief Audiologists in the NHS when he

took over the running of the Audiology department in Sunderland in 1979 aged 21. He then worked with PC Werth as a regional manager before setting up a very successful independent hearing care practice near Newcastle upon Tyne in the early 1990's. He no longer dispenses himself, but now dedicates his time to keeping up to date with Best Practice in Audiology, and helping other independent business owners ensure that they are able to offer the best possible service for their customers. He has collaborated with Widex UK for more than 6 years now, assisting with development of the Widex Best Practice Programme. He has designed and delivered educational seminars and workshops on topics as diverse as "Setting up a tinnitus service" to "Pricing transparency and unbundling". He has also helped with practical practice design and is a self-confessed stickler for detail.

Many of the customers that he visits say that they find it extremely useful to have an external pair of eyes look at their practice, and then offer not just advice, but also practical assistance in updating clinical and business standards. The provision of hearing aid services has changed dramatically in the last few years, and there will surely be many more changes to come. Gary is committed to providing independent hearing aid audiologists with the knowledge and tools that they will need to flourish in this constantly changing market.



Erik Jorgensen

Erik is an AuD/PhD student at the University of Iowa. He is currently a fellow in the Iowa Leadership and Education in Neurodevelopmental and Related Disorders program. His primary research interests are in music perception, auditory ecology,

and psychoacoustics. He is also an active composer of new music. He has a BA in philosophy from Columbia University.



Kei Kobayashi

Dr. Kei Kobayashi is an Honorary Academic in Faculty of Engineering who received his doctorate (Electronics Engineering) from Sophia University in Japan after working for 10 years in SONY where he had worked on design and

management of various consumer products, such as digital hearing aids, infrared headphones, speakers, integrated remotes and computer OS. He has a wealth of engineering experience from software/hardware design to manufacturing. He has moved to NZ and joined in Audiology as research fellow since 2007 where he has contributed to various auditory research and software. He is currently in Communication acoustics lab in Acoustics centre and working on digital signal processing and acoustics for hearing instruments. He is Deaf (profound hearing loss) and his hearing aid use and engineering expertise allows an appreciation of hearing loss and its challenge to engineering for the community.



Volker Kühnel

Volker Kühnel, PhD, received his degree in Physics in 1995. Since 1998 he has worked with Sonova AG (formerly Phonak) in Switzerland. Currently his role is as principal expert for hearing performance. His work is focused on the audiological

quality of Phonak hearing instruments, especially the initial-fit as well as sound quality and user benefit from advanced audio signal processing. Working at the interface between hearing aid algorithms, fitting software and audiological research is motivating him. Volker is married, has two children and besides enjoying time with his family, sailing and music – especially singing in choirs is very much to his heart.



Paul Lamb

Paul Lamb has worked with Starkey for 30 years and is Technical Director. Paul is responsible for overseeing the education and training initiatives for the Starkey brand both in the UK and Europe. He joined the company in 1987

and gained invaluable experience working across manufacturing, technical support and training within the organisation. Paul has led the Professional Services group to create and deliver Training for all customer groups and plays a key role in all Starkey UK Event planning and delivery. Externally Paul has lectured on hearing aid technology for numerous U.K. Universities. Paul is registered with the HCPC and a member of BSHAA.



Danny Lane

Danny has been profoundly deaf since birth. He obtained his Grade 8 Piano at the age of 17 under the tuition of Vivien Toll from the Royal Academy of Music, and received a degree in French and Music, with a distinction in spoken French, at

Keele University. Danny joined Music and the Deaf in 2003 and is now the charity's Chief Executive Officer.



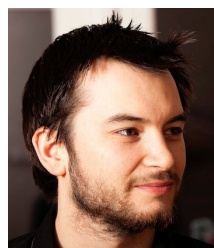
Sam Lanes

Sam is a video producer and editor at the University of Leeds. He is a lifelong hearing aid user.



Rick Ledbetter

Rick is a professional musician with a progressive profound loss who has been self-programming his hearing aids for almost a decade now, through five pairs of HAs.



Yuli Levtov

Yuli is co-founder and director of Reactify - a unique music production company focussing on formats of music that go beyond simply listening. Projects include sound installations, VR apps, games and web-based tools, and span the landscape of generative, interactive and reactive music.



Valerie Looi

Valerie is both a clinically-certified audiologist and a registered music therapist. She completed her Masters in Clinical Audiology at the University of Queensland, and her PhD in Audiology from the University of Melbourne. Her PhD research investigated the music perception skills of cochlear implant (CI) recipients compared to hearing aid users. After working at the University of Canterbury in New Zealand, as a Senior Lecturer in Audiology for 5 years, she moved back to Australia and was previously the Senior Research Manager for the Sydney Cochlear Implant Centre (SCIC), the largest cochlear implant clinic in Australia. She currently is the Regional Research Manager covering Asia Pacific for Advanced Bionics. She also holds adjunct positions with both the National University of Singapore and Macquarie University, supervising Audiology Masters and PhD students for these institutions. Her research has focused on the music perception and appreciation of CI recipients, and more recently, on developing music training programs for hearing impaired adults. Her other research interests include lexical tone perception, quality of life, and clinical outcomes for the hearing impaired. She has published over 30 peer-reviewed papers, and made over 35 oral conference presentations, including 10 as an invited speaker, and is very honored to be involved in this unique conference.



Sara Madsen

Sara is a postdoctoral researcher in the Hearing Systems Group at the Technical University of Denmark where she previously studied biomedical engineering (BSc) and Engineering Acoustics (MSc). Sara received her PhD in 2014 from the Department of Psychology at the University of Cambridge, under the supervision of Prof. Brian Moore. Sara has a background in music which has heavily influenced her research. She has previously studied flute performance at North Carolina School of the Arts, USA and the Royal Conservatory of Music in Aarhus, Denmark. Her PhD was concerned with effects of hearing impairment and hearing aids on listening to music. Her postdoctoral work investigates abilities of normal and hearing impaired listeners to use pitch cues for sound segregation. Sara is currently funded by the Carlsberg Foundation.



James Mander

I trained as an Audiologist at The Royal National Throat Nose & Ear Hospital and have experience of working in a number of Audiology departments in London. I then worked at the Manchester Royal Infirmary specialising in cochlear implants. Using this knowledge I moved into the commercial sector by joining the technical team at Advanced Bionics and subsequently worked closely with Phonak Communication on wireless products. I currently work for the Ewing Foundation - a UK based charity supporting deaf children. I bring together experience and technical knowledge from working in the NHS, the Sovona Hearing Group and from working in partnership with teachers who look after deaf children in the education environment.



Rémi Marchand

Rémi Marchand is currently pursuing a PhD on Hearing aids and music at the National Acoustic Laboratories (NAL) in Sydney (Australia) and supported by the HEARing Cooperative Research Centre. In 2015, Rémi concluded a Masters of Research in Acoustics, in Le Mans (France). His Master's thesis took place at the Acoustical and Mechanical Laboratory (LMA) in Marseille (France) working on the Psychoacoustic simulation of Cochlear Implants. Prior to this, in 2014, he concluded a Master's Degree of Electronics and Signal Processing Engineering, in Toulouse (France) and Hamburg (Germany). Rémi is passionate about music and plays guitar.



Ruth Montgomery

Born profoundly deaf into a musical family, Ruth earned her B.Mus Honours performance degree at the Royal Welsh College of Music in Cardiff, alongside receiving tuition at the Royal Academy of Music in London. She now gives recitals, has a successful established teaching practice and leads music workshops around the country.



Lorenzo Picinali

I am a Senior Lecturer in Audio Experience Design, and the Director of Undergraduate Studies in the Dyson School of Design Engineering at Imperial College London. In the past years I have worked in Italy, France and UK on projects related with 3D binaural sound rendering, spatial hearing, interactive applications for visually impaired individuals, hearing aids technologies, audio and haptic interaction and, more in general, acoustical virtual and augmented reality.



Christine Rocca

Christine Rocca MA, PGCE, TOD is Assistant Principal at the Mary Hare. As Director of the Mary Hare Music Therapy Unit she has published research papers and works with cochlear implant centres, educational settings, early interventionists and professionals throughout the world to develop support materials, particularly focused on music for parents, babies, children and adults with hearing aids and cochlear implants, including children with an additional need. She has been an International Consultant for Advanced Bionics since 2005.



Maja Serman

Maja Serman holds a diploma in mechanical engineering and a M.Sc. in power engineering, from the University of Zagreb, Croatia. She completed a Ph.D. in modelling change detection in melodic processes at the University of Limerick, Ireland and the Embark Initiative Postdoctoral Fellowship in temporal multi-scale modelling of auditory short-term memory. Ms Serman works as a research audiologist in hearing aid industry since 2007. Her activities include the development and optimisation of hearing aid related algorithms, as well as designing and conducting studies with normal hearing and hearing impaired listeners.



Jonathan Vaisberg

Jonathan Vaisberg is a PhD/MCISc Candidate at the National Centre for Audiology at Western University, London, Ontario, Canada. Jonathan's early doctoral work focused on extended-bandwidth real ear and coupler-based verification techniques, and has published in International Journal of Audiology and Journal of the American Academy of Audiology. Drawing on his background in music cognition (BSc, McMaster University), Jonathan's current research interests include the impact of hearing loss on music perception, and optimizing hearing aid sound quality for music. Jonathan is concurrently obtaining his professional qualification to practice as a registered audiologist at Canada's largest professional training program in audiology.



Richard Vaughan

Richard Vaughan is Customer Support Manager at Connevans Limited. Connevans is an independent family run company established over 55 years ago, specialising in meeting the needs of people who are deaf or hard of hearing. Connevans is proud to have been awarded the Royal Warrant of Appointment to Her Majesty Queen Elizabeth II as Manufacturer and Supplier of Audio Equipment. Richard joined Connevans ten years ago. Prior to this he was Technology Services Manager at the National Deaf Children's Society, responsible for providing information services to families and professionals and for leading on policy work to improve the provision of technology to deaf children.

Supporters



3D Tune-In

3D Tune-In (3D-games for TUNing and LEarnINg about hearing aids) is an EU-funded project that brings together relevant stakeholders from traditional gaming industries, academic institutes, a large European hearing aid manufacturer and hearing communities to produce digital games in the field of hearing aid technologies and hearing loss, addressing social inclusion, improving the lives of hearing impaired individuals and improving their use of hearing aids.

www.3d-tune-in.eu



Connevans Limited

Connevans specialises in meeting the needs of people who are deaf or hard of hearing and we have developed a reputation for supplying quality products. By continually listening to the needs of the deaf community we are able to identify areas for product development to add to our catalogue and websites.

www.connevans.co.uk

EWING FOUNDATION

for deaf children

Ewing Foundation for deaf children

Ewing Foundation is a national charity, promoting inclusion and achievement for deaf children through listening and speaking. Our team of Education Consultants and Specialist Audiology Technicians supports professionals in acquiring the skills and confidence needed to help deaf children use their residual hearing, access technology and develop natural spoken language.

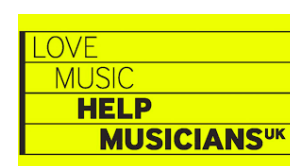
ewing-foundation.org.uk



FrontRow

Educationalists know that building children's listening skills is critical to brain development, improves attention, behaviour and the general classroom soundscape. FrontRow's Juno soundfield is the most advanced available, yet portable and easy to use and set-up. Juno offers superb speech and music reproduction with multiple inputs whilst the infra-red mics give presenters freedom of movement.

www.gofrontrow.com



Help Musicians UK

Help Musicians UK is the leading independent charity for professional musicians of all genres. Since 1921, they've helped thousands of musicians establish themselves in the music business, get through a serious crisis, cope with long term difficulties and enjoy retirement. As well as providing advice and guidance, they give financial and emotional support.

www.helpmusicians.org.uk



Oticon

Founded in 1904 by Hans Demant, whose wife suffered from hearing loss, Oticon was built on care and empathy from the very beginning. Powered by a relentless drive for innovation, Oticon has since been at the absolute forefront of technology that improves the lives of people with hearing loss.

www.oticon.com



Phonak

Together with our partners, hearing care professionals around the world, we are fully committed to fighting the stigma attached to hearing loss, to tearing down barriers for the hearing-impaired and to finding new and innovative ways to help everyone reconnect to the beauty of sound.

www.phonak.com



Reactify

Reactify is a creative technology company looking to challenge the ways we experience and create music. Reactify builds groundbreaking mobile apps for labels and artists, interactive music installations for events and festivals, custom musical instruments for the stage, and much more.

www.reactifymusic.com



Sivantos

The Sivantos Group serves hearing care professionals globally, and has built up market-leading positions in many countries. In fact, every fourth hearing aid worn around the world is developed and manufactured by Sivantos. The firm has a strong tradition of helping people with hearing loss, since having developed the first receivers and electric audometers over 100 years ago. The hearing aids produced by the Sivantos group are sold under the brands of Signia, Siemens, Audio Service, Rexton and A&M. The product portfolio also includes complementary accessories, fitting software, smartphone apps and diagnostics workflow solutions. Today, the Sivantos Group employs more than 5,000 people in more than 25 countries, united in their wish to help hearing impaired people enjoy the sound of life.

www.sivantos.com



Starkey

Starkey Hearing Technologies is much more than the hearing aids we produce. We are in the business of connecting people and changing lives. We believe being able to hear the world and the people around us is as essential to the human experience as breathing.

www.starkey.com



Widex

Widex is a family owned company founded in Denmark in 1956. Today, it is one of the world's largest manufacturers of hearing aids. Our mission is to provide the absolute best hearing aids and customer services. We offer the most advanced, natural sound on the market. Our products let people connect and communicate easily.

www.widex.co.uk

Our project

Hearing Aids for Music: exploring the music listening behaviour of people with hearing impairments

Funded by the Arts and Humanities Research Council
(AH/M00368X/1) Feb 2015 - Mar 2018

This three-year project represents the first large-scale systematic investigation of how music listening experiences are affected by deafness and the use of hearing aids. The project is interdisciplinary and brings together academic researchers and practitioners in the fields of music psychology, audiology, auditory perception, deaf education, computer science and hearing therapy. Through a series of studies with HA users and practitioners, it explores links between hearing impairments, hearing aids and music listening behaviours, and seeks to improve the perception of music using hearing aid technology.

The research findings will directly benefit people with all levels of deafness and HA users, both in the UK and internationally through open access content on the website, and via more traditional modes of dissemination including conferences. HA users will benefit from knowledge exchange provided by psychological insights into aural musical rehabilitation. It will support audiologists in addressing music listening challenges presented by patients in their clinics in a field in which there exists no formal training. It will also provide an empirical basis for manufacturers of HAs to align their signal processing research and development activities with real-world problems and experiences of everyday music listening.

Improved access to music using HAs will benefit people of all ages, facilitating music education for deaf children and young people, musical listening and performance in adulthood, and continued musical engagement into old age. The research has the potential to transform thousands of people's lives.

Project Team

Alinka Greasley

Associate Professor in Music Psychology, School of Music, University of Leeds

Harriet Crook

Lead Clinical Scientist for Complex Hearing Loss,
Sheffield Teaching Hospitals NHS Trust

Amy Beeston

Postdoctoral Research Fellow, School of Music,
University of Leeds

Advisory board

Guy Brown

Professor of Computer Science, University of Sheffield

Paul Checkley

Clinical Director at Harley Street Hearing and Musicians
Hearing Services, London

Robert Fulford

Independent Researcher

Brian Moore

Emeritus Professor of Auditory Perception, University of
Cambridge

Jackie Salter

Lecturer in Deaf Education, School of Education,
University of Leeds

Ruth Swanwick

Professor in Deaf Education, School of Education,
University of Leeds

Rachel van Besouw

Research Fellow, Institute of Sound and Vibration
Research, University of Southampton

Paul Whittaker

Deaf Musician

Further information about the Hearing Aids for Music project

Our website

<http://musicandhearingaids.org>

Online survey

<http://musicandhearingaids.org/survey>

Further resources

<http://musicandhearingaids.org/resources>

Connect with us

Twitter

@musicndeafness

Blog

<http://musicandhearingaids.org/blog/>

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Research Council

Sheffield Teaching Hospitals
NHS Foundation Trust



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