3D Tune-In: Evaluating Applications Designed to Support Hearing Aid Users in the Customisation of their Hearing Experience

Presented by: Madeline Hallewell, The University of Nottingham (m.hallewell@nottingham.ac.uk, MaddyJHallewell)

Authors: Madeline Hallewell[1], Harshada Patel[1], Davide Salanitri[1], Mirabelle D'Cruz[1], Yuli Levtov[1], Luca Simeone[3]

[1]The University of Nottingham, [2]Reactify, [3]Vianet

1. Introduction

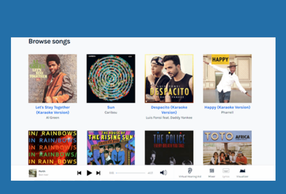
▪ 3D Tune-In is a European project aiming to develop applications (apps) to help hearing aid (HA) users to better understand their hearing loss and to optimise their hearing through customising the different functionalities of HAs.

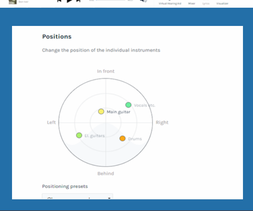
▪ Two apps have been created for adults that employ a virtual HA (VHA) which mimics a real HA using a binaural spatialization toolkit that has been developed for the project:

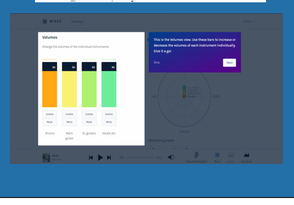
- Play & Tune is an app developed by Vianet that includes a number of engaging games. Each game simulates a series of virtual scenarios with realistic sounds where players face different challenges and learn how to calibrate the different functions of their HAs: gaining volume in the right ear - left ear, noise reduction, directionality, etc.
- Musiclarity is a website developed by Reactify which aims to increase engagement with, and enjoyment of, music for HA users. It also aims to highlight certain features of modern HAs which may have otherwise gone unexplored or unused.

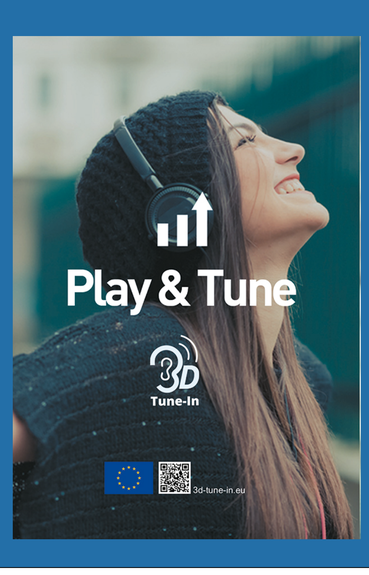
2. Methods

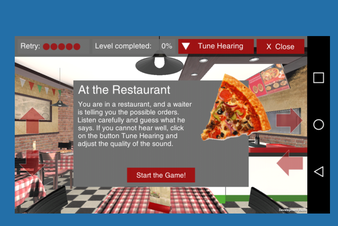
- The apps were played by 14 adult HA users in the UK.
- HA users were given 30 minutes to play with the apps using a tablet or PC. They were given no prior instructions about the games, however a researcher was available to assist where help was required.
- Following the play session, adults took part in paired interviews with another HA user who had also used the apps.
- Participants gave feedback on
    - Audiological aspects,
    - Game play & story (if applicable),
    - Game mechanics,
    - Accessibility,
    - Usability & aesthetics.
- Participants also gave suggestions for improvement.
- Interviews were transcribed and analysed using a thematic analysis approach to identify positive and negative information, and to create suggestions for improvement for developers to incorporate into the development of their apps.

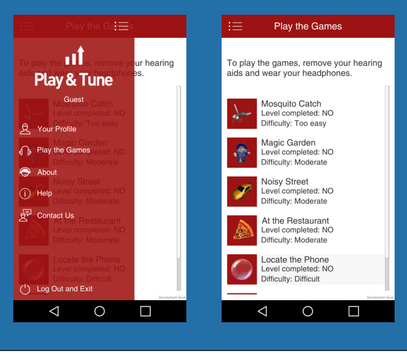












3. Results

•Play & Tune

- Participants enjoyed the tasks and thought it would make a useful addition to their audiologist's supervision; some suggested it could make a fun alternative/addition to traditional hearing test procedures.
- They found it easy to use, that it gave good feedback, and that the tasks were relevant to every day life.
- However they suggested that the audiological aspects be improved owing to difficulties identifying the effect that HA calibrations had on sounds.
- Some thought it was too simple and that some tasks were unrelated to hearing.
- Some found that the hearing tasks did not reflect the function of HAs, and as a result would not help them to understand HAs better.

•Musiclarity

- Participants thought that Musiclarity could have a significant impact on their enjoyment of music as they were able to calibrate sounds to their own hearing abilities and preferences.
- They found it easy to use and navigate and enjoyed the audio and visual aesthetics.
- Some found it helped them to understand their own hearing which might increase their confidence in discussing specific issues with their audiologist.
- One suggestion was that Musiclarity could be expanded to consider the variety of music tastes, the variety of devices used for playing music and potentially non-music sounds such as speech.
- Participants raised concerns about usability for people with dexterity problems and those with little musical or hearing related knowledge.
- Participants noted that regardless of what they could do with the VHA, they were unable to make changes to their own HA without an audiologist.

4. Discussion

•The app developers were provided with action points with which to improve and refine the apps prior to upcoming evaluations of the next prototypes.

•The findings show that HA users would benefit from being able to customise their hearing experience. They were keen to play with the settings available within the VHA and found it a useful experience, yet they recognised that they couldn't do the same with their own HA. It is suggested that audiology practices should enable more autonomy for HA users to customize their HA settings.

•Participants were generally positive about the concept of sophisticated and well-designed apps aimed at exploring their own hearing and the functionalities of HAs. It is suggested that HA users are underserved in this respect, and that they would benefit from a wider market of services and products that facilitate their autonomy and sense of control over their hearing loss.

•Overall, the project is providing developers with crucial insights into their potential market, such feedback would have previously been difficult to access owing to limited research resources. It also provides opportunities for researchers to contribute to knowledge on the subject.

•Moreover, the final products have the potential to significantly improve the hearing experience of HA users, and improve the ability of audiologists to meet their clients' needs by providing data about how their HAs cope with real-world environments.

5. Future Directions

•Since the reported evaluations were conducted, the apps have been further developed and updated prototypes are to be evaluated by a wider population, including children and participants in Spain and Italy.

•Final apps will be available from May 2018.

•Details: http://3d-tune-in.eu/ @3DTuneIn

EU Horizon2020 - Contract No 644051