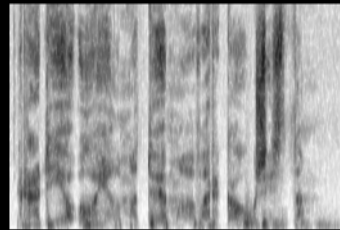


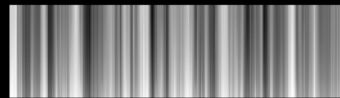
Vibrotactile Aids in Daily Living Solutions

Liisa Sammalpenger & Stina Ojala

- “Let your whole body hear”
- NF2 and others
- Visual methods
 - Signed languages
 - Subtitling
 - Speech-to-text
 - Visual alerts
- Touch-based methods
 - Vibrotactile aids
 - Haptic feedback alerts
 - Vibroacoustic methods



acoustic hearing | body percept



When your ears cannot hear, let your whole body do the job. This is the case for some deafened NF2 patients, even with ABI or CI as they might not benefit from the devices in their full capacity or do so with minimal benefit. There might also be contraindications. Furthermore, the devices might be unreachable for people in the developing countries.

On the right, there are two figures showing acoustical voice image on the top and the body percept of the same sentence below. As you can see, there is still a lot of information coming through the body, the main element being the prosody, that is pitch and intensity characteristics.

This information is conveyed through the touch-based methods listed on the left. Those can be combined with the visual communication methods either within a conversation or in enjoying music. The vibration alerts on smart phones also use sense of touch to relay the information.

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1 Solutions for alerts

- Built-in
- Specialised systems

2 Solutions for speech

- 1 Vibrotactile aids
- 2 Often outside-the-box
- 3 Creative natural methods



Traditionally people with no acoustical hearing have used their palm under the jawbone on the side of the neck of the speaker to get a bone-conductive bridge from the speaker to the listener. However, in the times of Covid-19 and social distancing the longer the wooden spoon or shooehorn, the better the listener can maintain social distancing while keeping at optimal lipreading distance. The best vibrations are via juniper, maple, ash, rowantree and Canary Island pine. They give deep vibrations. We wish for better research co-operation with acousticians and timber specialists, as there are situations one cannot use electric devices, such as in the rain or when swimming. Also, these natural solutions function in hot and humid conditions without circuit breaks.

The specialised vibrotactile aids have been developed for speech perception to support lipreading. However, despite all effort, they in some cases provide mainly environmental soundscape rather than speech parameters. Pitch and intonation patterns are the main elements of speech suitable for tactile perception. Some vibrotactile aids widen the scope by coding higher frequency bands in transducer electrodes with specific vibratory locations, and their use needs to be learned.

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3 Solutions for music

- 1 Vibroacoustic aids
- 2 Often outside-the-box
- 3 Creative natural methods

4 Combinating solutions

- 1 Weather conditions
- 2 Electricity supply
- 3 Other factors



The best experience usually comes by trial, error and thinking out-of-the-box. In a concert one can use leather handbags, balloons - or the metal handrails in the venue to listen to music. Then you can let the music flow through you and not just surround you. Let the soles of your feet and your chest participate in the music listening - this is most obvious in a rock concert with loud bass sounds when the music literally rocks you.

You can also listen to pre-recorded music with a loudspeaker that fits like a glove, it is fit for purpose and nice to touch, but you have to find out the best-fitting glove for yourself.

With a vibroacoustic cushion you can hug your favourite music! That allows more in-depth feel of musical vibrations. Both devices are wireless using Bluetooth.

References

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- Humu.fi
- Taikofon.com
- Vibrac.fi
- Spens et al. 1998
- Galvin et al. 1992
- Ifukube 2017
- Öhngren 1992
- Summers 2000



Here is a short list of references where you can start finding out more about the vibrotactile aids, touch-based communication methods and case studies about combining everything together.

There is a need for new wireless touch-based solutions which would benefit not only deafened NF2 patients but also others in need for meaningful, communicative touch for increased quality-of-life.

The last photo of this slide show highlights the developer of Tactilator, his work being done mostly 20 years ago – Gustaf Söderlund.

Thanks for listening!