

How we found 'gold' on a treasure hunt with an open mind and low expectations..

- echolocation, a tool for individuals with hearing impairments/hearing aid users?



Oslo



11.11.2025

1

Background



Documentation?



What traditions do we have for echolocation?

- ▶ **Danish survey (master's thesis by Gitte Thranum Haldbæk)**
- ▶ **Sweden**
- ▶ **Daniel Kish / Visioneers**
- ▶ **Thomas Tvedt**
- ▶ **Norway?**

Talk to your neighbor, 2 minutes:

- ▶ Have you provided training in echolocation?
- ▶ Do all your O&M students receive training in echolocation?

Some concepts



Echolocation

- ▶ Echolocation means orienting oneself based on reflected sound. There is a distinction between passive and active echolocation.

Statped.no

Passive echolocation

- ▶ If one uses reflected sounds from the environment for orientation, it is called passive echolocation.

Statped.no

Active echolocation

- ▶ When the sound source you use for orientation comes from yourself, for example by clapping, snapping, or clicking with your tongue, it is called active echolocation.

Statped.no

Prerequisites for echolocation

- ▶ Have 'sufficient' hearing
- ▶ Auditory attention
- ▶ Mobility program?

Mobility program

- ▶ The most important thing about a mobility program is that it is a separate program that can be activated when needed. It has an omni-microphone, disabled or minimal automatic functions.
- ▶ The mobility program was set up by the audiologist at the beginning of the course.

Talk to your neighbor:

- ▶ What kind of experience do you have in teaching students with hearing impairments the skill of echolocation?
- ▶ In what contexts has it been particularly useful for your hearing-impaired student to use echolocation? (if you do not have students with hearing impairments, share your experiences regarding the same question for your hearing student)

Training Curriculum

Active echolocation for people with visual impairment

Methods for training and suggestions for exercises
in perceiving and understanding the surroundings
by means of self-produced sound.

The publication elaboration leaders:

Instituttet for Blinde og Svagsynede, Denmark

Kommunikationscentret, Region Hovedstaden, Denmark

This publication is elaborated within the project "Echolocation for People with visual impairment" with the support of Erasmus+ programme of European Union.

Partner organizations participating in the project:

Fundacja Instytut Rozwoju Regionalnego, leader, Poland

Instituttet for Blinde og Svagsynede, Denmark

Kommunikationscentret, Region Hovedstaden, Denmark

Kauno Prano Daunio ugdymo centras, Lithuania

Teaching people with hearing impairment

- ▶ “Much hearing loss occurs in the high frequency range and it is the low frequency sounds that may be sufficient to enable somebody to walk parallel to a wall, find corners, or to locate an opening in a corridor” (Kish, 2017, p. 327)

Further from the same paragraph

1. Age-related hearing loss of high frequencies limits the detailed observation of echoes
2. With one-sided/monaural hearing it is very difficult to determine and hear from where the sound comes
3. Hearing aid must be in the ear, not behind the ear
4. Settings of the hearing aid must focus environmental sound and not for communication (s.63)

Examples of exercises taken from the Training Curriculum



Choice of sound source



- Tongue clicking
- Clicking with a clicker
- Clap
- Snap
- The sound of the cane
- Stamping with feet

What can you expect students with hearing aids to achieve in echolocation?

▶ The indoor startup exercises in the compendium worked only to a certain extent.

- Difficult to hear wall and corner
- Difficult to walk parallel to wall
- Bowl easier than flat plate

▶ Easier to hear larger differences

- From a big room to a smaller room
- From a room with lots of textiles to a staircase with hard surfaces.

▶ ‘I wasn’t aware of sound before the course. So at first I didn’t understand how it worked. What should I listen for? I decided that I just had to see if I could hear something. I clicked away and suddenly I heard ‘ding’. It was the sound of metal from a power box that stood in front of the wall’

quote from a participant

Little did we know
that this was a
hallmark...



... metallic sound, then the sound suddenly disappears



‘I heard the wall, but then there was something pushing down from above towards me. It was the balcony boxes, and in the gap between them, the sound disappeared upwards with a metallic clang.’

quote from a participant

Or that a fire
escape could
warn of a
dangerous exit...



What can be hallmarks?

- ▶ What nuances can be distinguished between?

Eaves

- wavy concrete



Eaves

- glass



Eaves

- wood



Entryway

- plastered wall
- wood
- tiles
- bricks





What stands out as auditory hallmarks in this street? ...



Contrasts



Contrasts



Contrasts



Nuanses



What kind of benefits do the participants get from echolocation?

'If I walk outside alone, I use a cane and a clicker. This way I detect if there is an obstacle or a person in front of me. Then I stop to check with my residual vision what I have heard. This helps me avoid walking into things.'

Quote from participant

‘Now I find the entrance to my house on my own. I hear that I am passing hedges, house walls, and fences. When I perceive the garage door in front of me, I continue until I hear the garbage bin. Then I know that my entrance is to the right’

quote from participant

What benefits does the mobility program provide?

Very individual and different in various situations

- No difference
- Too much noise
- Absolutely invaluable

‘I use the mobility program when I am alone. Then I can hear the footsteps of those coming from behind better, and it is easier to hear the direction of traffic.’

Quote from a participant

‘I can hear different tones from different surfaces; glass, wood, and brick. I can hear that the sound changes when I walk under a tree canopy’

Quote from a participant

‘If I drop something on the floor,
I stop and listen for the
direction in which the object
fell.’

Quote from a participant.

‘With the mobility program, I get much more information about my surroundings. This summer on a mountain hike, I could hear the sound of the river from a long distance, I heard the birds and the wind between the mountains. There are different sounds that would have been filtered out by the usual conversation program.’

Quotes from the participant.



Talk to your neighbor:

- ▶ Are you familiar with 'Training curriculum'?
- ▶ If you have not provided training in echolocation, what has prevented you from doing so?

Our experience in providing training in echolocation

- ▶ Like teaching in Braille
- ▶ Describe the surroundings
- ▶ Difference in learning echolocation with and without sight
- ▶ Challenging to hear when one has residual vision, sight takes all attention

Echolocation and directional hearing

- ▶ Poor sense of direction
- ▶ Still benefit from echolocation

Tips for O&M training for the deafblind

- ▶ Listen for volume differences if direction is not possible
- ▶ Masking of car number 2
- ▶ Moving sound source = stay still
- ▶ Stationary sound source = move

Anne May Førland



Tips for O&M training for the deafblind

- ▶ Be aware of people with differences between their ears.
- ▶ Do not take it for granted that people with impaired vision are experts in sound localization.

Anne May Førland

Summary

- ▶ **Audiograph**
- ▶ **Curiosity**
- ▶ ***Gold***

Litteratur

- ▶ Human echolocators adjust loudness and number of clicks for detection of reflectors at various azimuth angles L. Thaler¹ , R. De Vos² , D. Kish³ , M. Antoniou⁴ , C. Baker⁴ and M. Hornikx²
- ▶ Gitte Thranum Haldbæk Ekkolokalisering Fænomenologisk livsverdens perspektiv på O&M-specialisters erfaring med at anvende ekkolokalisering som metode i O&M-undervisningen
- ▶ Training Curriculum Active echolocation for people with visual impairment Methods for training and suggestions for exercises in perceiving and understanding the surroundings by means of self-produced sound. The publication elaboration leaders: Instituttet for Blinde og Svagsynede, Denmark Kommunikationscentret, Region Hovedstaden, Denmark

Fra Statped Artikkel 01.08.2024 Mobilitet Ekkolokalisering

[Localization 101: Hearing Aid Factors in Localization | The Hearing Review](#)