



Dr. Lore Thaler - Psychology, Durham University

## A window into human brain plasticity and brain function

### Background

The human brain adapts to change. In my lab we use echolocation to investigate how these changes happen and what might be driving them. It is well established that certain bats and marine mammals use echolocation to navigate and hunt prey. But people can echolocate, too. Echolocation is an ideal way to investigate human brain plasticity and sensory function because (a) most people will be new to this skill providing a good 'baseline' and (b) it is a learnable skill. Echolocation has benefits for people who are blind, in particular for mobility and orientation. As part of our work we teach echolocation skills to people who are blind.

### Aims and Methods

Research questions that we investigate are for example: 1. How do vision impairment and age affect the ability to learn a new skill such as echolocation? 2. How does sensory processing change as people learn to echolocate? The methods we use include psychophysical testing, MRI and fMRI, and 3D motion capture. Research is conducted both with sighted and blind participants with varying levels of expertise in echolocation.

### Relevance

The work bridges interests across psychology, neuroscience and engineering. It has value for both basic science and applications. The echolocation training we provide has positive implications for people with vision impairments.

### Training

The candidate's research activity will be based in Durham, Psychology. If the project involves neuroimaging it will also take place in Durham Centre for Imaging (DCI). The candidate will receive general

research training and advanced subject specific training appropriate to the

specifics of the project (e.g. psychophysical methods, Matlab programming, motion capture, modeling, neuroimaging). Due to working with diverse participant groups the candidate will also acquire considerable organizational skills.

### Suitable for

PhD and MSc by Research students.

### References and Further Read

Thaler, L. & Goodale, M.A. Echolocation in People: An Overview. *WIREs Cogn Sci*, doi: 10.1002/wcs.1408

Norman, L., Dodsworth, C., Foresteire, D., Thaler, L. (2021). **Human click-based echolocation: Effects of blindness and age, and real-life implications in a 10-week training program.** *PLOS ONE*. doi: 10.1371/journal.pone.0252330.

Norman, L. & Thaler, L (2023) **The occipital place area is recruited for echo-acoustically guided navigation in blind human echolocators.** *Journal of Neuroscience*, doi: 10.1523/JNEUROSCI.1402-22.2023