**Introduction**

Accurate localization of sounds is required for navigation, communication, predation and escape. It is therefore not surprising that neural and structural specializations have evolved to perform this complex task. The human cortex for example continuously integrates sensory input across modalities to estimate the relative direction and distance of objects (things) in the environment. Whereas the topography of visual and somatosensory space is represented by a point‐by‐point mapping of primary receptors, the auditory scene must first be computed from incoming sound waves. In this scenario, the direction-dependent filtering profile of the pinnae and upper body result in spectral cues that aid in the inference of sound source location.

As these filters underlie lifelong changes, beyond the developmental period, the auditory system must maintain its ability to recalibrate the mapping of spectral cues to locations in space. [source]

DCN – early separation spectral features

is detected by nuclei of the auditory pathway to aid in the inference of sound source direction. [source]

based on subcortically extracted spectro-temporal features of the incoming sounds. The directional filter functions produced by torso, head and outer ears comprise such an acoustic cue

Whereas the topography of visual and somatosensory space is represented by a point‐by‐point mapping of primary receptors, the auditory scene must be computed from spectro-temporal features of the incoming sounds.

are subcortically extracted and compared between the two ears for sound source localization. The directional filter functions produced by torso, head and outer ears are the

The estimation of distance and azimuthal direction of a sound source is mostly based on binaural cues, comparing auditory input between both ears.

estimated based on binaural comparison of the input . On the vertical axis however, monaural detection of

Much of a sounds sources direction and distance is conveyed by comparing inputs from both ears, but on the horizontal plane

Due to natural obstacle bending waves diffraction frequency notches indicate direction head and torso Frequency notches in the spectrum of

The detection of spectral and temporal cues is achieved by highly specialized populations in the auditory pathway. To estimate direction and distance of sound sources in the environment spectro-temporal cues

, temporal and spectral cues are detected by nuclei of the auditory pathway

to estimate direction and distance of sound sources in the environment.

Look into how adaptation is formed and retained.

Furthermore, plasticity can be observed in

Nuclei of the auditory pathway encode temporal and spectral features in the acoustic signal to compute direction and distance of sound sources.

The human cortex integrates internal models of sensory space across modalities to estimate the location of objects in the environment. Whereas the topography of visual and somatosensory space is represented by a point‐by‐point mapping of primary receptors, auditory space is extracted subcortically based on the shape of incoming sound waves. Nuclei of the auditory pathway encode spectral-temporal cues in the acoustic signal to compute direction and distance of sound sources.

Cues depend on head / body shape -> short term plasticity due to early growth

Nuclei of the auditory pathway extract spectral-temporal features of incoming sound waves to compute the direction and distance of sound sources.

Early plasticity in auditory pathway remains intact (trapeau, schönwiessner ITD adaptation paper)

sensory recalibration due to

plasticity in cortical areas and

The structural (outer ear)

Motor learning

many species to their environment. Is key aspect of survival: Sounds travel fast, are rich in information and do not depend on   
One of

…

The human auditory system uses a wide range of acoustic cues to estimate direction and distance of sound sources in the environment.

The human auditory system is able to localize sound sources in the environment \*compare accuracy reported from the 3 axis + sources

Signal complexity

Sound: -

Detection

Segregation

recognition

HRTF Intro + research

Sound source directionally dependent filtered by head, torso and outer ears.

HRTF can be learned

In many species, localizing environmental sounds is critical for navigation, predation, escape and mating.