Frequency-dependent auditory space representation in the human planum temporale.

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Created 9/15/2016
By elsc_admin September 15, 2016

Shrem, T, Deouell LY. 2014.

Abstract:

Functional magnetic resonance imaging (fMRI) findings suggest that a part of the planum temporale (PT) is involved in representing spatial properties of acoustic information. Here, we tested whether this representation of space is frequency-dependent or generalizes across spectral content, as required from high order sensory representations. Using sounds with two different spectral content and two spatial locations in individually tailored virtual acoustic environment, we compared three conditions in a sparse-fMRI experiment: Single Location, in which two sounds were both presented from one location; Fixed Mapping, in which there was one-to-one mapping between two sounds and two locations; and Mixed Mapping, in which the two sounds were equally likely to appear at either one of the two locations. We surmised that only neurons tuned to both location and frequency should be differentially adapted by the Mixed and Fixed mappings. Replicating our previous findings, we found adaptation to spatial location in the PT. Importantly, activation was higher for Mixed Mapping than for Fixed Mapping blocks, even though the two sounds and the two locations appeared equally in both conditions. These results show that spatially tuned neurons in the human PT are not invariant to the spectral content of sounds.

Journal:
Frontiers in human neuroscience

Volume:
8

Pagination:
524

Date Published:
2014

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