

Mapping auditory specialization within human frontal cortex

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ABSTRACT

Large swaths of lateral frontal cortex (LFC) are often characterized as domain-general or multiple-demand, due to their apparent recruitment in a wide range of cognitive tasks [e.g 1,2]. However, using fMRI to contrast brain activity during auditory attention or working memory with that brain activity during matched visual tasks has robustly identified a number of bilateral auditory-biased regions in lateral frontal cortex [3,4]. The supplementary motor area (SMA), transverse gyrus bridging precentral sulcus (tgPCS), caudal inferior frontal sulcus/gyrus (cIFS/G), anterior central operculum (aCO), and frontal operculum (FO) are bilaterally recruited for demanding auditory - but not for visual - tasks. Resting-state functional connectivity analysis confirms that these regions participate in a network with other auditory structures in superior temporal lobe. A seed-to-whole-brain analysis of functional connectivity [5] revealed additional regions of frontal cortex that are significantly more strongly connected to the auditory network than to the corresponding visual network. Both the auditory frontal network and these extended network regions show substantially lower levels of domain-general recruitment than do corresponding visual network regions, suggesting that human auditory cognition may rely on specialized cortical machinery.

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