What does auditory-biased prefrontal cortex do?
fMRI evidence gathered across multiple domains

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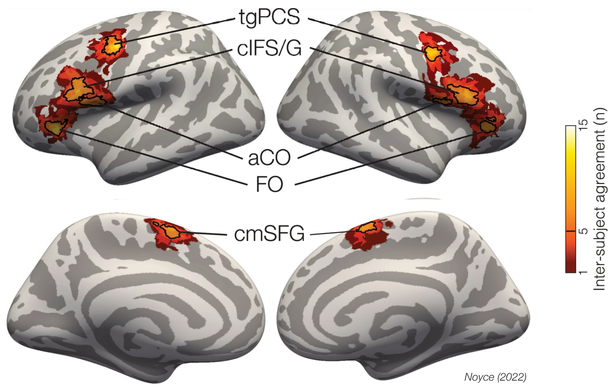
Prefrontal cortex contains discrete areas for **auditory** or **visual** cognition

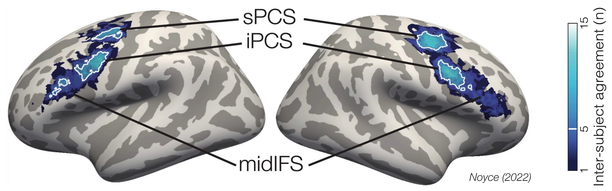
Robust, replicable network of auditory-biased structures across prefrontal cortex.



cmSFG caudomedial superior frontal gyrus
tgPCS transverse gyrus bridging precentral sulcus
cIFS/G caudal inferior frontal sulcus/gyrus
aCO anterior central operculum
FO frontal operculum

Five bilateral areas that respond more strongly during auditory working memory than during visual working memory

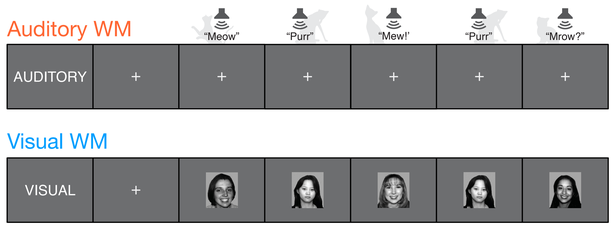
Interdigitated with a corresponding network of visual-biased structures.



sPCS superior precentral sulcus
iPCS inferior precentral sulcus
mIFS mid inferior frontal sulcus

Three bilateral areas that respond more strongly during visual working memory than during auditory working memory

Regions mapped in individual subjects via direct contrast of Auditory WM - Visual WM (*AV-2back*)

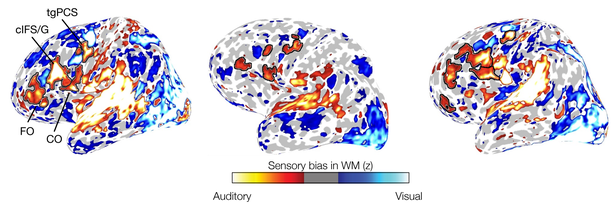


Task from Noyce (2017, 2022); 2-4 runs per subject; TR 2 s, TE 30 ms; SMS 3.

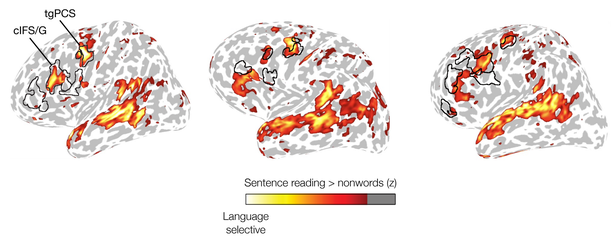
Substantial overlap between auditory PFC and **language network**

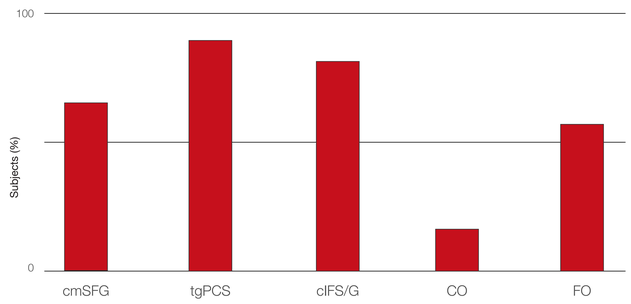
Activation for both non-linguistic auditory WM and sentence reading in two regions of left PFC.

Auditory-biased regions of PFC identified using AV-2back in individual subjects.



In those same subjects, sentence reading consistently recruits tgPCS and cIFS/G, and often recruits cmSFG and FO.





RSVP paradigm displaying sentences and matched non-words.

Sentence example

MIKE	PASSED	THROUGH	IT	AND	MOVED	TOWARD

Nonword example

VISS	UCIPER	OS	SETHER	EF	FOVE	CHIGSHEN

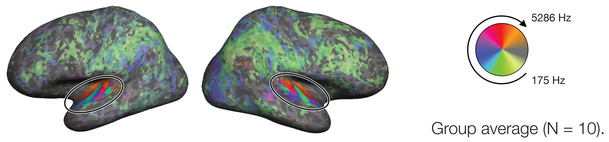
Alternating blocks of sentences and nonwords, counterbalanced (after Federenko 2010); sixteen blocks per run; two runs.

Per block: three 12-word sentences followed by a button-press cue.

Dick et al. (2017). *J. Neuroscience.*
van der Heijden et al. (2018). *J. Neuroscience*
Michalka et al. (2015). *Neuron.*
Noyce et al (2017). *J. Neuroscience.*
Noyce et al. (2022). *Cerebral Cortex.*
Federenko et al. (2010). *J Neurophysiol.*

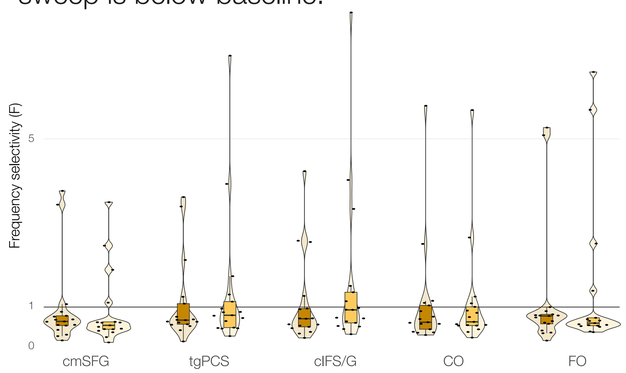
No evidence for **preferred pitch** or frequency in auditory PFC

Successfully mapped organization of auditory cortex with phase-encoded tonotopy.

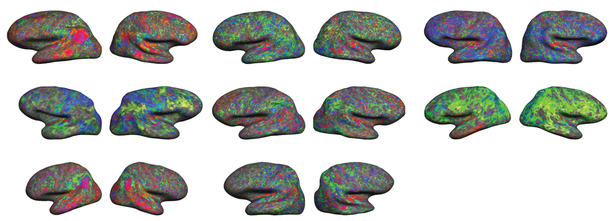


Group average (N = 10).

Across auditory PFC, response to frequency-sweep is below baseline.

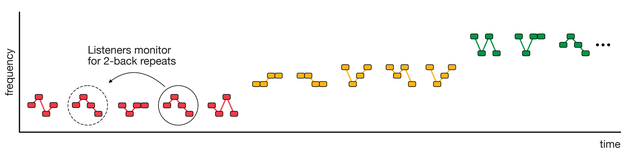


Extreme heterogeneity of "best" phase in PFC.



Unthresholded maps, individual subjects.

Frequency-sweep paradigm with embedded two-back task

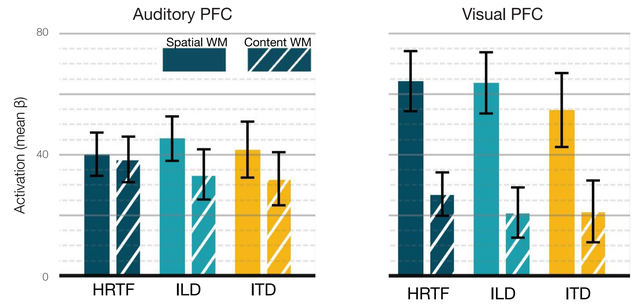


Sweep over 10 frequency steps from 185 Hz - 5286 Hz (after Dick et al. (2017).

Each frequency step comprised five 4-note melodies (component tones at -2, 0, +2 semitones).

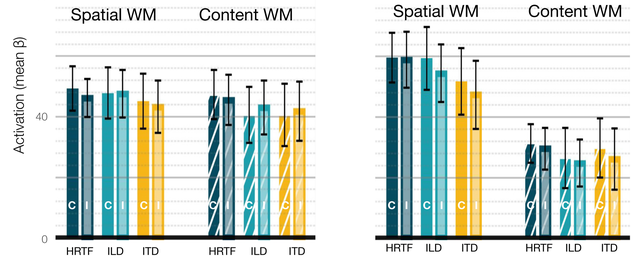
Little selectivity for **WM domain**, auditory **spatial info**, or **stimulus location** in auditory PFC

Activation during auditory WM replicates prior finding of spatial preference in visual PFC.



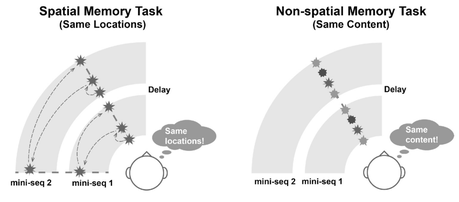
Across PFC, spatial task preference (or lack thereof) is not modulated by auditory spatial information.

Memoranda in ipsilateral and contralateral hemifield yield equivalent activation.



Across PFC, hemifield bias (or lack thereof) is not modulated by auditory spatial information.

Purely auditory WM task for spatial locations or stimulus exemplars.



Change detection on short sequences of "crash" stimuli presented in one hemifield (loosely after Michalka et al., 2017).

Spatialized using generic head-related transfer functions (HRTFs), inter-aural level differences (ILDs), or inter-aural timing differences (ITDs), after van der Hejden (2018).

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