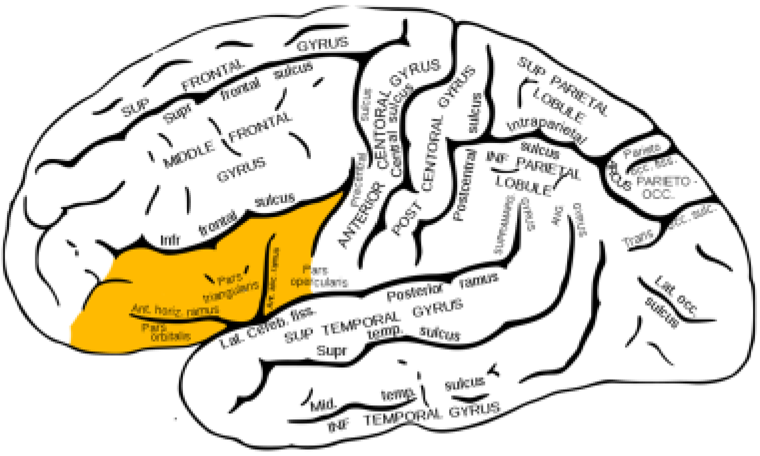
# Inferior frontal gyrus

- Resting-state connectivity and task-based cortical response in post-stroke executive dysfunction: A fNIRS study
- Sex differences in attention deficit hyperactivity symptom severity and functional connectivity of the dorsal striatum in young adults
- Causal relationships between brain and spinal motor neuron excitability during motor imagery: Using NIRS and evoked electromyogram study
- Attentional dysfunction arises from right frontocentral and occipital network connectivity in Parkinson's disease
- Aerobic exercise is associated with region-specific changes in volumetric, tensor-based, and fixel-based measures of white matter integrity in healthy older adults
- Refocus on stopping! Replication of reduced right amygdala reactivity to negative, visual primes during inhibition of motor responses
- Measuring cognitive load in multitasking using mobile fNIRS
- Assessing dynamic brain activity during verbal associative learning using MEG/fMRI co-processing




Broca’s area is located in the inferior frontal gyrus

Its superior border is the inferior frontal sulcus (which divides it from the middle frontal gyrus).

Its inferior border the lateral fissure (which divides it from the superior temporal gyrus), and its posterior border is the inferior precentral sulcus.

Above it is the middle frontal gyrus (the gyrus frontalis medius), behind it the precentral gyrus (the gyrus praecentralis).

The inferior frontal gyrus, like the middle frontal gyrus and the superior frontal gyrus, is more of a region than a true gyrus.

The middle frontal gyrus is usually more sinuous than the inferior frontal gyrus (IFG) or superior frontal gyrus (SFG).

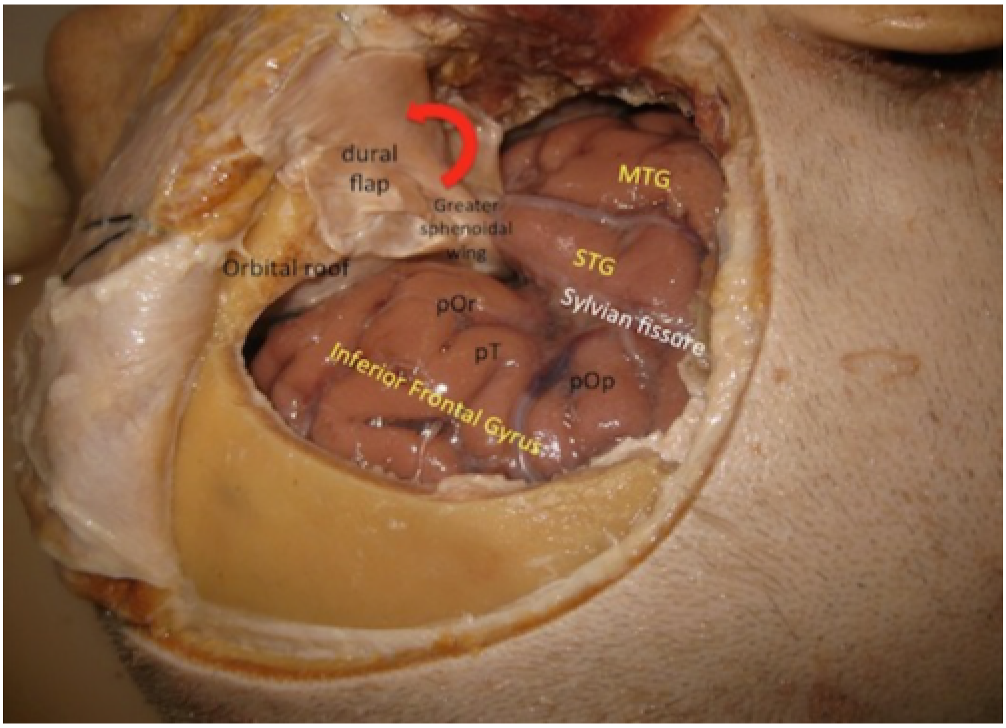
The uncinate fasciculus: connects the anterior temporal lobe to the inferior frontal gyrus. Damage can cause language dysfunction.

# Parts

Pars opercularis

Pars triangularis

Pars orbitalis




The bone flap has been removed and the dura mater has been opened as a flap pediculated towards the greater sphenoid wing previously roungered to improve parasellar visualization. Sylvian fissure, Inferior frontal gyrus, Superior temporal gyrus and Middle temporal gyrus are exposed. Three pars of parasylvian inferior frontal gyrus must be distinguished: pars orbitalis (pOr) in relation to the orbital roof; pars triangularis (pT) the widest area of sylvian fissure (good place for start opening of sylvian fissure); pars opercularis (pOp) where Broca's Area is located.

# Connections and Functions

Briggs et al. identified a callosal fiber bundle connecting the inferior frontal gyri bilaterally was also identified. The IFG is an important region implicated in a variety of tasks including language processing, speech production, motor control, interoceptive awareness, and semantic processing [1].

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In 7 of the 14 patients, we identified nine sites where cortical stimulation interfered with syntactic encoding but did not interfere with single-word processing. All nine sites were localized to the inferior frontal gyrus, mostly to the pars triangularis and opercularis. Interference with syntactic encoding took several different forms, including misassignment of arguments to grammatical roles, misassignment of nouns to verb slots, omission of function words and inflectional morphology, and various paragrammatic constructions. The findings suggest that the left inferior frontal gyrus plays an important role in the encoding of syntactic structure during sentence production [2].

# Pathology

Removal of glioma from the dominant side of the inferior frontal gyrus (IFG) is associated with a risk of permanent language dysfunction. While intraoperative cortical and subcortical electrical stimulations can be used for functional language mapping in an effort to reduce the risk of postoperative neurological impairment, the extent of resection is limited by the functional boundaries. Recent reports proposed that a two-stage surgical approach for low-grade glioma in eloquent areas could avoid permanent deficits via the functional plasticity that occurs between the two operations.

In a patient with World Health Organization (WHO) grade II oligoastrocytoma in the left inferior frontal gyrus, in functional plasticity of language occurred in the interval between two consecutive surgeries. Intraoperative electrical stimulations suggested that a language area and related subcortical fiber crossed the pre-central sulcus during tumor progression owing to functional plasticity. In the present case, the authors integrated neurophysiological data into the intraoperative neuronavigation system. They also confirmed the peri-lesional shift of language area and related subcortical fiber on image findings. Consequently, the tumor was sub-totally removed with two separate resections. Permanent language disturbance did not occur, and this favorable outcome was attributed to functional plasticity. The present experience sustains the multistage approach for low-grade gliomas in the language area. A combination of intraoperative electrical stimulations and updated neuronavigation may facilitate the characterization of brain functional plasticity [3].

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In an event-related fMRI study of overt speech production, Pützer et al. investigated the relationship between gestural complexity and underlying brain activity within the bilateral inferior frontal gyrus (IFG). They operationalized gestural complexity as the number of active articulatory tiers (glottal, oral, nasal) and the degree of fine-grained temporal coordination between tiers (low, high). Forty-three neurotypical participants produced three types of highly-frequent non-word CV-syllable sequences, which differ systematically in gestural complexity (simple: ['dadada], intermediate: ['tatata], complex: ['nanana]). Comparing blood oxygen level-dependent (BOLD) responses across complexity conditions revealed that syllables with greater gestural complexity elicited increased activation patterns. Moreover, when durational parameters were included as covariates in the analyses, significant effects of articulatory effort were found over and above the effects of complexity. The results suggest that these differences in BOLD-response reflect the differential contribution of articulatory mechanisms that are required to produce phonologically distinct speech sounds [4].

# References

1)

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