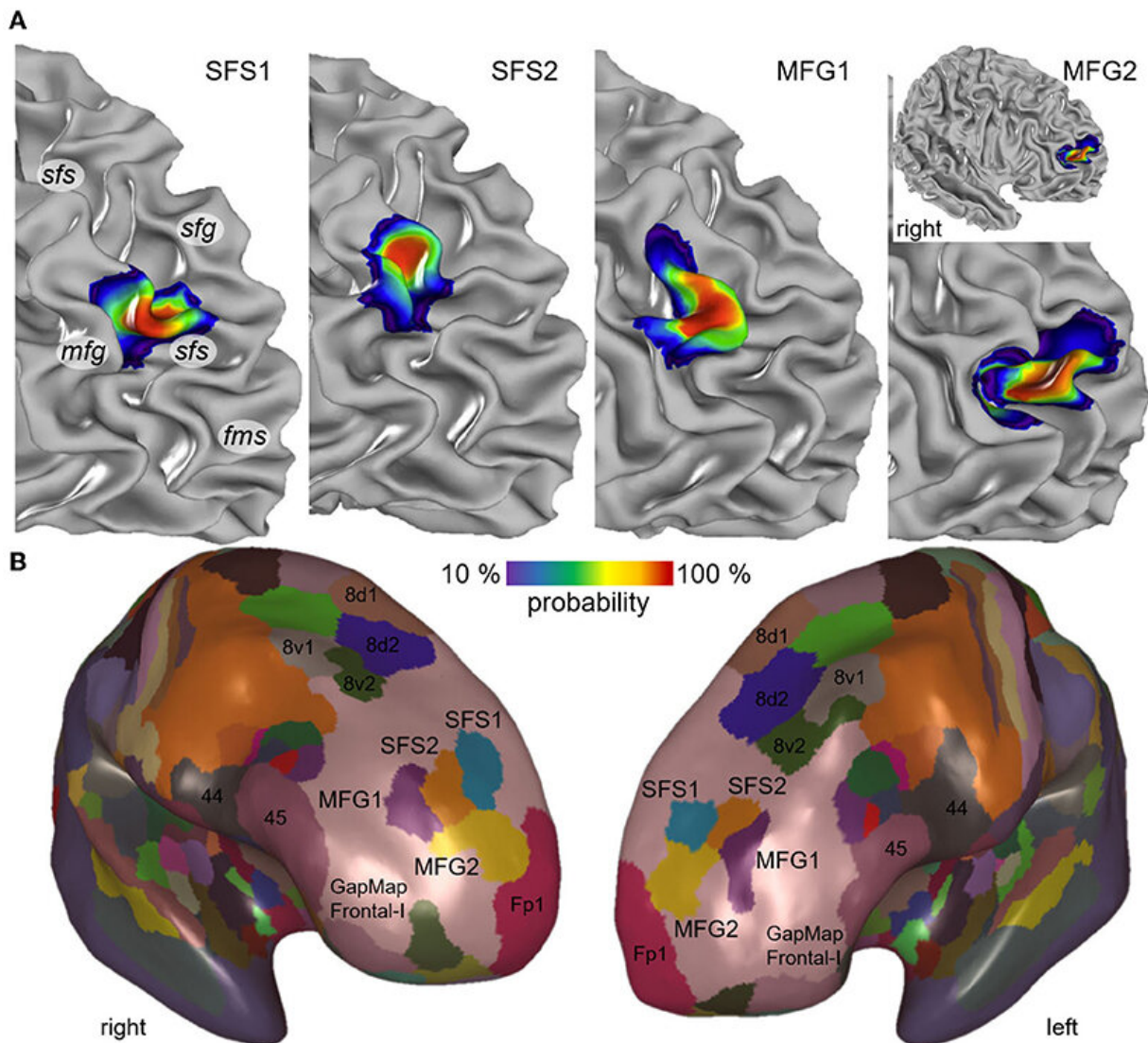


# Researchers map four new brain areas involved in many cognitive processes

September 19 2022, by Lisa Vincenz-Donnelly



Probability maps of the four newly identified areas SFS1, SFS2, MFG1 and MFG2. Credit: *Frontiers in Neuroanatomy* (2022). DOI:

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Researchers of the Human Brain Project (HBP) have mapped four new areas of the human anterior prefrontal cortex that plays a major role in cognitive functions. Two of the newly identified areas are relatively larger in females than in males.

The human dorsolateral prefrontal cortex is involved in cognitive control including attention selection, working memory, decision making and planning of actions. Changes in this [brain](#) region are suspected to play a role in schizophrenia, [obsessive-compulsive disorder](#), depression and [bipolar disorder](#), making it an important research target. Researchers from Forschungszentrum Jülich and Heinrich-Heine University Düsseldorf now provide detailed, three-dimensional maps of four new areas of the brain region.

In order to identify the borders between brain areas, the researchers statistically analyzed the distribution of cells (the cytoarchitecture) in 10 post mortem human brains. After reconstructing the mapped areas in 3D, the researchers superimposed the maps of the 10 different brains and generated probability maps that reflect how much the localization and size of each area varies among individuals.

High inter-subject variability has been a major challenge for prior attempts to map this brain region leading to considerable discrepancies in pre-existing maps and inconclusive information making it very difficult to understand the specific involvement of individual [brain areas](#) in the different cognitive functions. The new probabilistic maps account for the variability between individuals and can be directly superimposed with datasets from functional studies in order to directly correlate structure and function of the areas.

When comparing the brains of female and male tissue donors, the researchers found that the relative volumes of two of the newly identified areas were significantly larger in female than in male brains. This finding may be related to sex differences in cognitive function and behavior as well as in the prevalence and symptoms of associated brain diseases. The maps are being integrated into the Julich Brain Atlas that is openly accessible via EBRAINS.

The research was published in *Frontiers in Neuroanatomy*.

**More information:** Ariane Bruno et al, Cytoarchitecture, intersubject variability, and 3D mapping of four new areas of the human anterior prefrontal cortex, *Frontiers in Neuroanatomy* (2022). [DOI: 10.3389/fnana.2022.915877](https://doi.org/10.3389/fnana.2022.915877)

Julich Brain Atlas: [julich-brain-atlas.de/](https://julich-brain-atlas.de/)

Provided by Human Brain Project

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