

The brain and how to study it

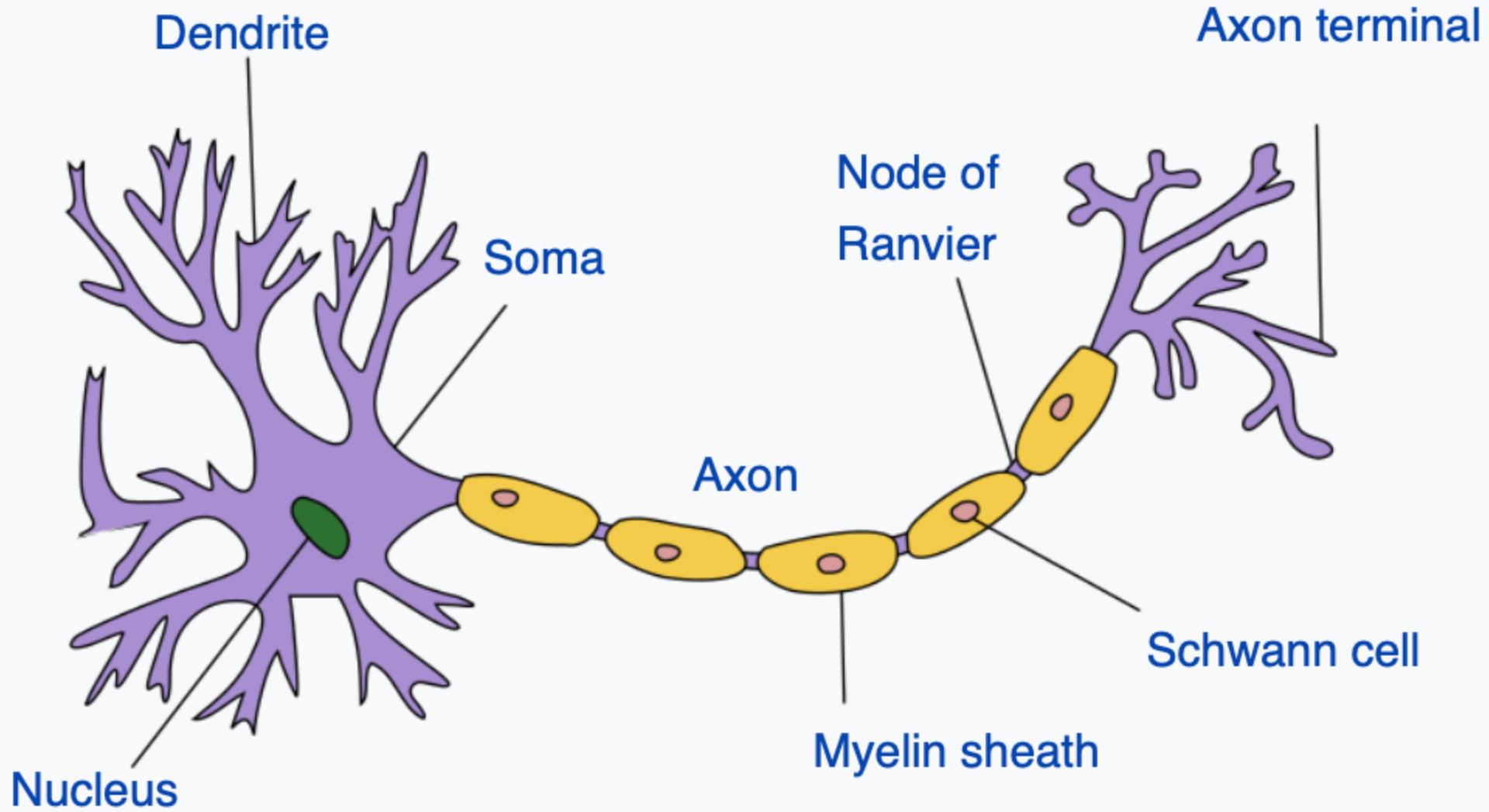


Brain facts

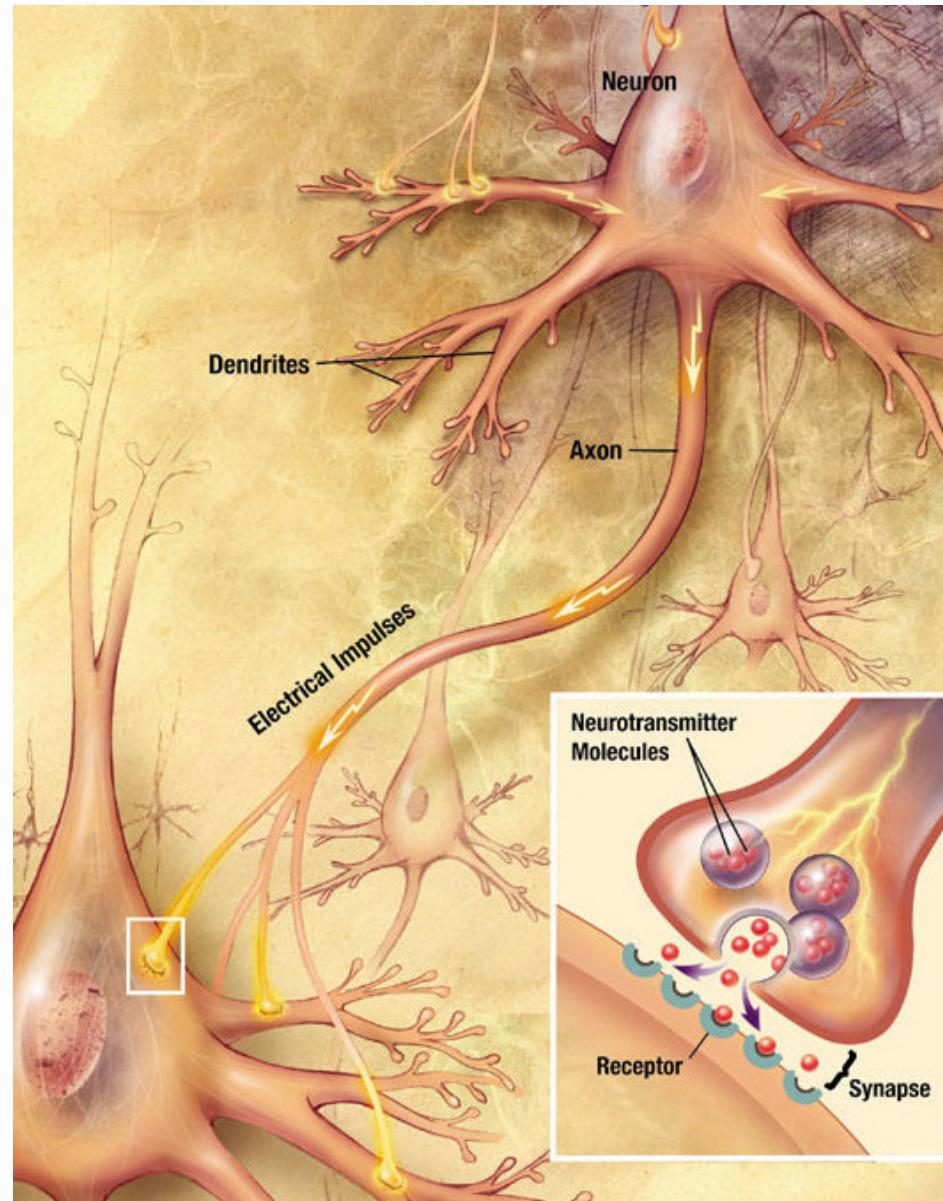
- By far the most complex organ
- Cerebral cortex has about 15 billion neurons
- Cerebellum has 55-70 billion
- Each neuron connects to up to several thousands other neurons

Neurons

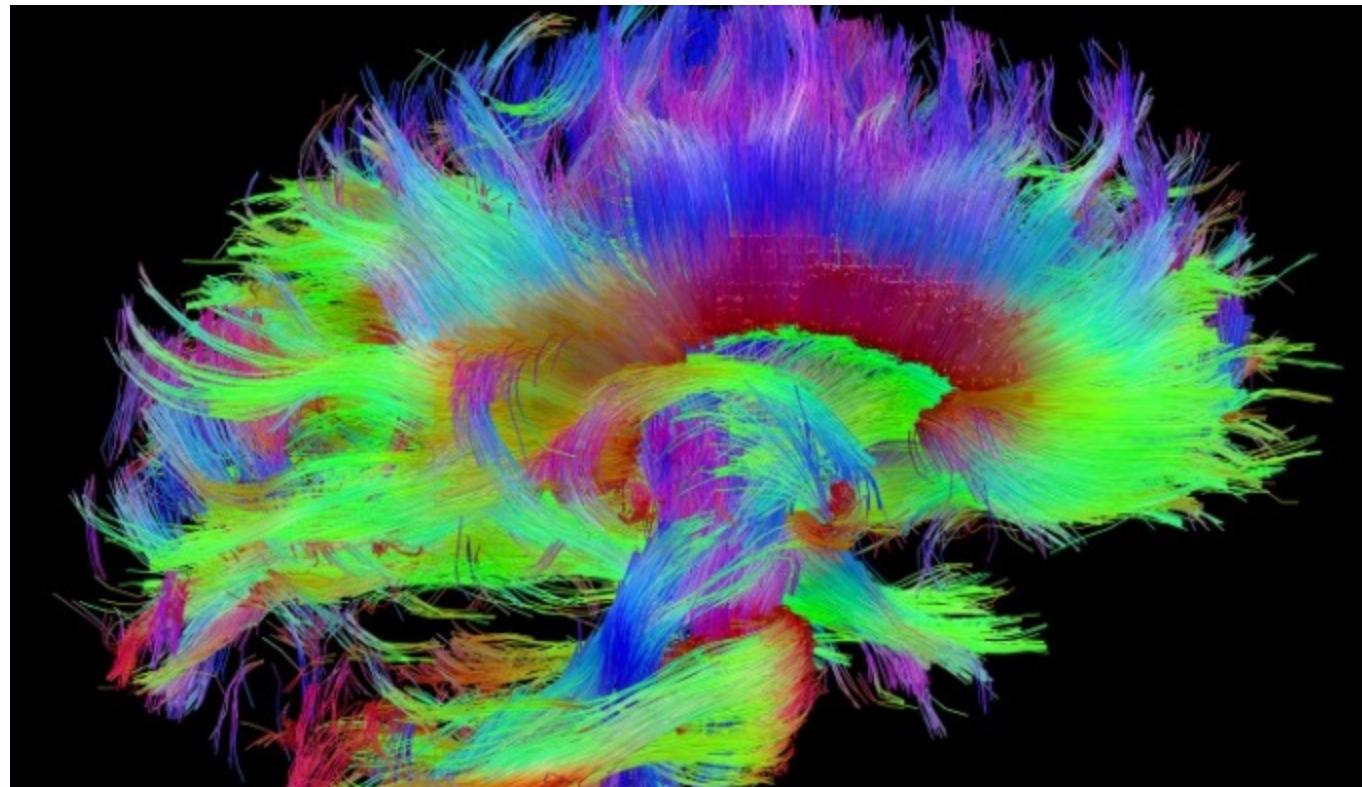
Neuron (peripheral nervous system)



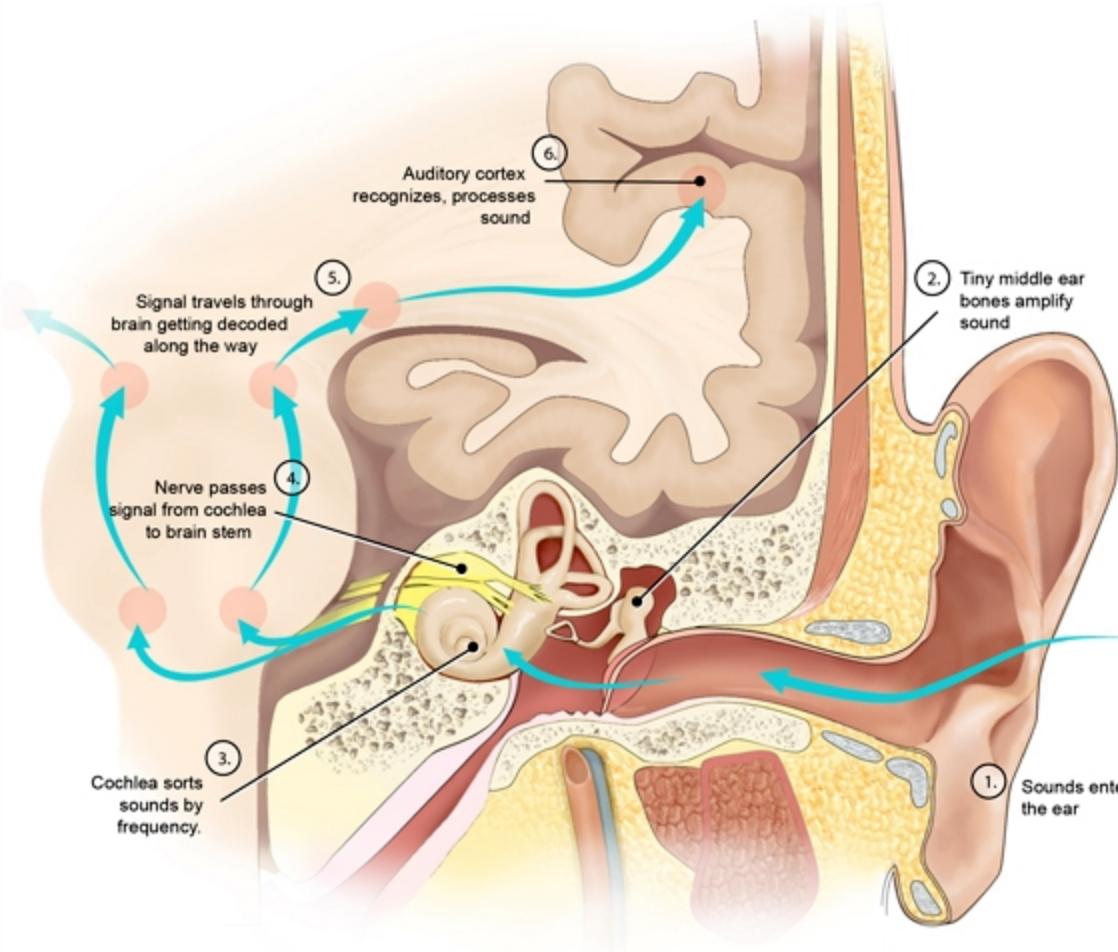
Neurons synapse with each other



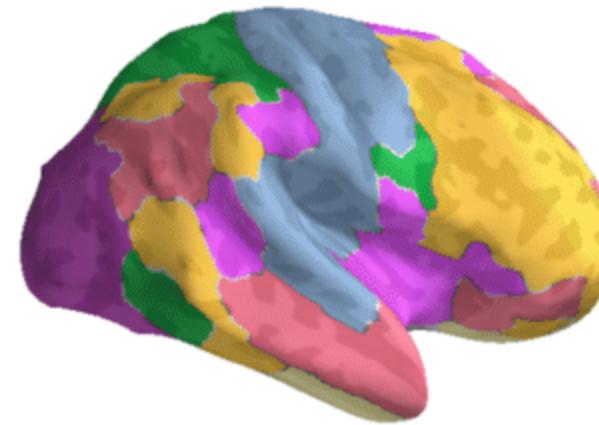
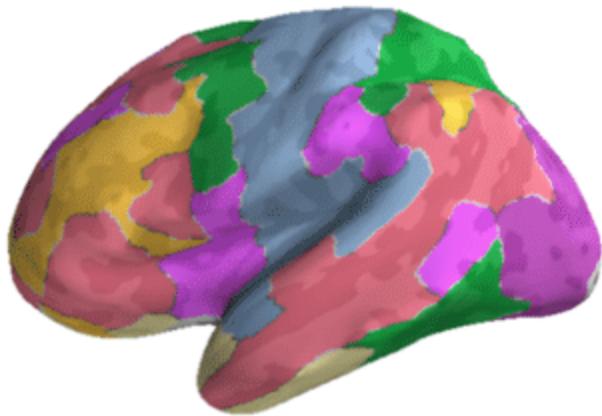
Whole brain is connected



Example - auditory pathway



Neurons form functional networks



Visual

Somatomotor

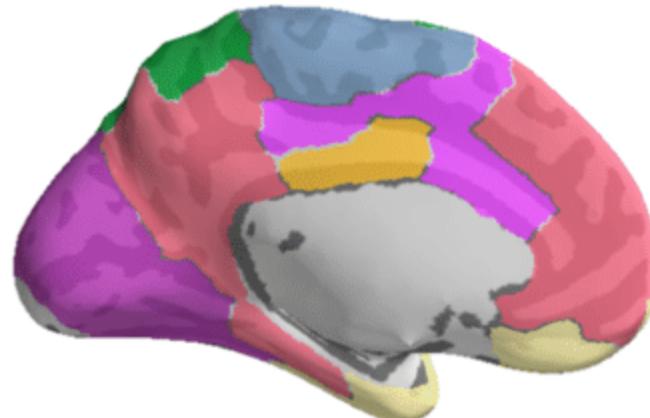
Dorsal Attention

Ventral Attention

Limbic

Frontalparietal

Default Mode



Networks and function

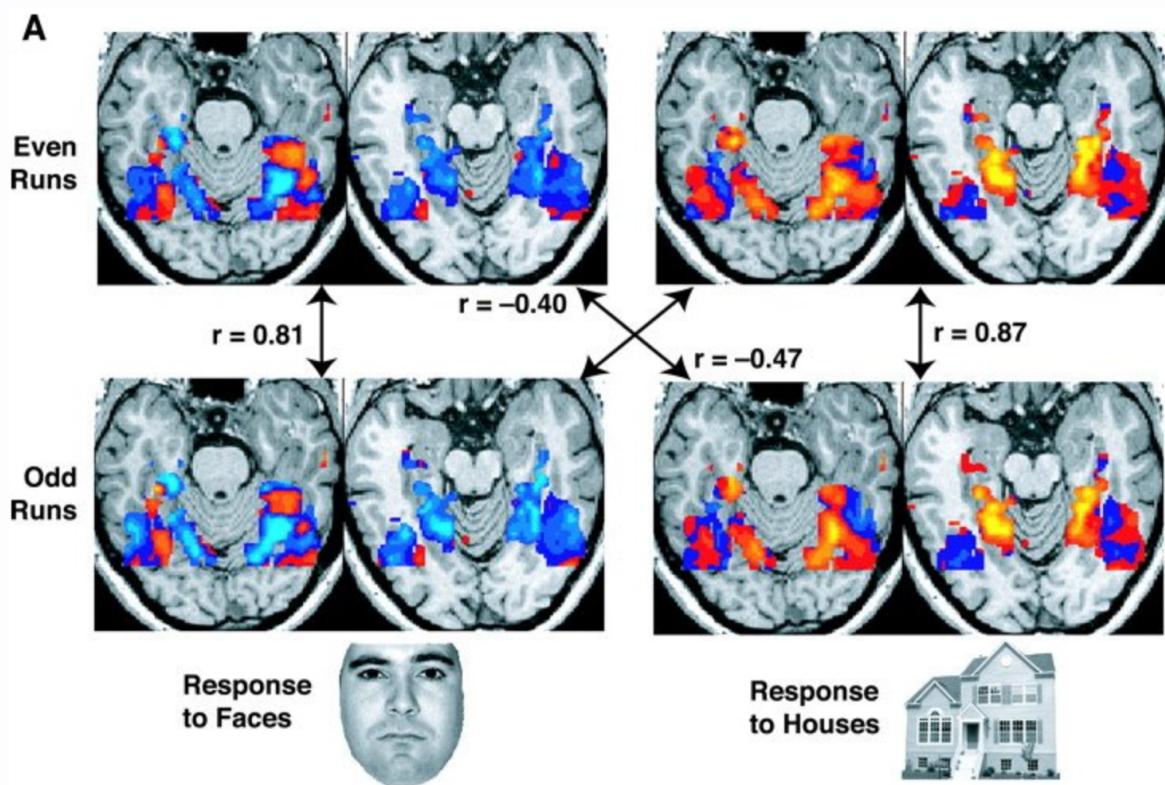
- Many networks perform a given function
- Many functions are performed by a given network

How do we know all this?

Functional Magnetic Resonanse Imaging (fMRI)



fMRI



fMRI

- Blood-oxygen-level dependent signal (BOLD)
- You can see the function *in vivo* (kinda)
- Good spatial resolution
- Poor temporal resolution

Electroencephalography (EEG)



EEG results



Other methods

- MEG (magnetoencephalography)
- PET (positron emission tomography)
- NIRS (near-infrared spectroscopy)
- Pupillometry
- Electrodermal response