

A neural portrait of the human mind ~

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The author begins by emphasizing that our brain is not a generalized or single processing system but a collection of specialized components working collectively or as an individual to bring into our existence of being a human. Prosopagnosia, a brain disorder in which a person is unable to recognize faces (familiar ones or his own), rest functions work fine, is caused by damage to a specific face recognition part of the brain. Syndromes like this give a perfect understanding of how most functions are specific to a particular brain region. With the advent of state-of-the-art imaging technologies such as MRI, we're better able to discover more and more specialized regions. MRI only gives structural anatomy of the brain, fMRI also measures neuron activation by indirectly measuring the blood flow increase in localized brain regions (BOLD signal) where neurons are activated. To find the region of the brain involved in face recognition, the author analyzed fMRI images from a reasonable amount of subjects under fMRI scan, they were shown images of faces and non-faces during the scan, brain activations were observed in the same region of all subjects for the former case and fewer activations were observed in the same region for the latter case. To further confirm this region of the brain as face recognition, a patient with epilepsy was experimented with. He had two electrodes in his brain, which passed through the region claimed for face recognition. When no current was passed through the electrode, the patient described that nothing is changed to the person in front of him, but when 4mA current was passed, the same person's face was described as being metamorphized, nose got saggy and went to the left and so on. This confirmed that the region was responsible for face recognition so that alterations to its electric impulses causes impairment. There are other specialized regions discovered as well, such as language, color, spatial perception, audition, one specialized region also keeps track of our thought of "what other persons are thinking about us" and so on. Discovering such regions may not always be straightforward through fMRI, as described by an experiment by one of her colleagues to find food regions, who found activated brain regions for food pictures but the same regions also got activated by showing non-food material of the same pattern and color. So, it might be a color region. A collection of specialized regions or the brain itself may perform a generalized function as well. All these specialized regions were found to be the same in each normal subject. We can trace individual neuron connections also through diffusion imaging and maybe be able to create the entire brain connection map someday. How do the connections develop? During childhood or over the evolutionary phase of humans. Scientists are scanning animals, human infants, etc. also for better understanding. All this research may also help us to heal Alzheimer's or Autism and the list goes on, and even though it doesn't it would be worthwhile knowing the complex functioning of the sophisticated thought machine-the human brain.