Chapter 6: Vision

General Principles of Sensory Processing

The Visual Stimulus

The Anatomy of the Visual System

Coding of Light and Dark

Coding of Color

The Primary Visual Cortex

Perception of Visual Information

Perception of Visual Information

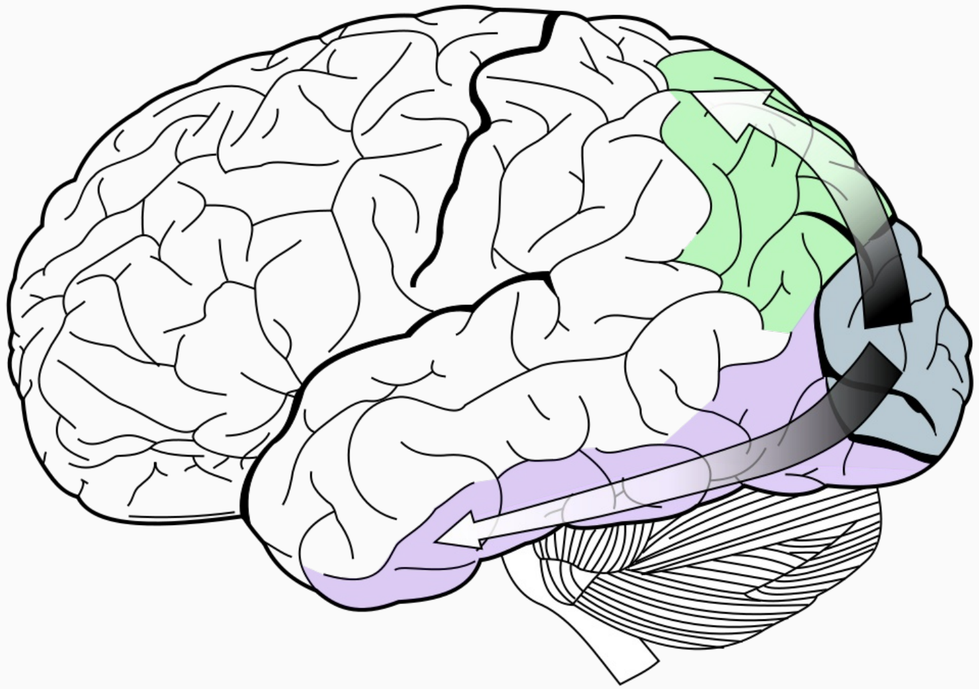
Two Streams of Visual Analysis.

Dorsal Stream =

- mostly magnocellular
- important in:
  - identifying spatial location
  - organizing movement toward objects

Ventral Stream =

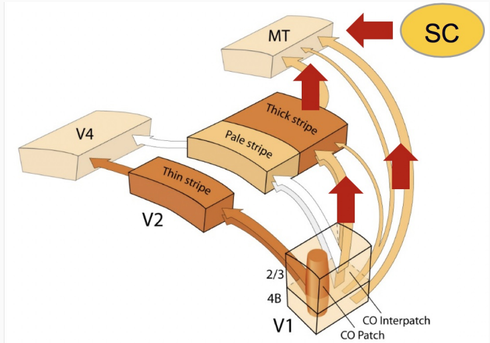
- mostly parvocellular
- important in:
  - color vision in identifying forms
  - features of objects

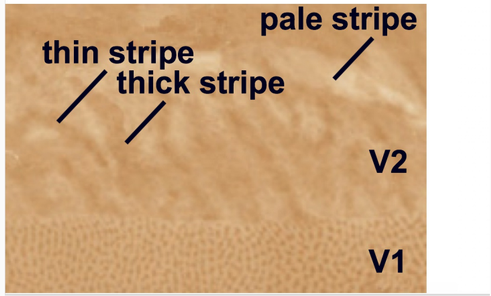


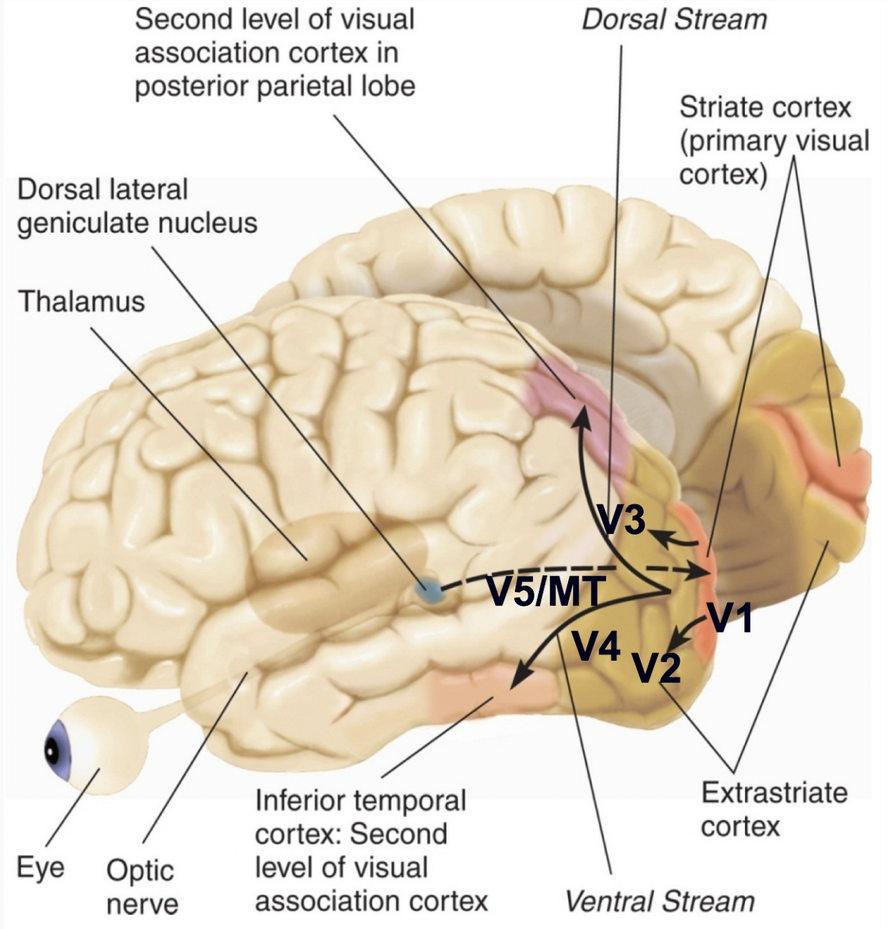
Perception of Visual Information

Dorsal Stream: Where?

- **occipital → parietal cortex**



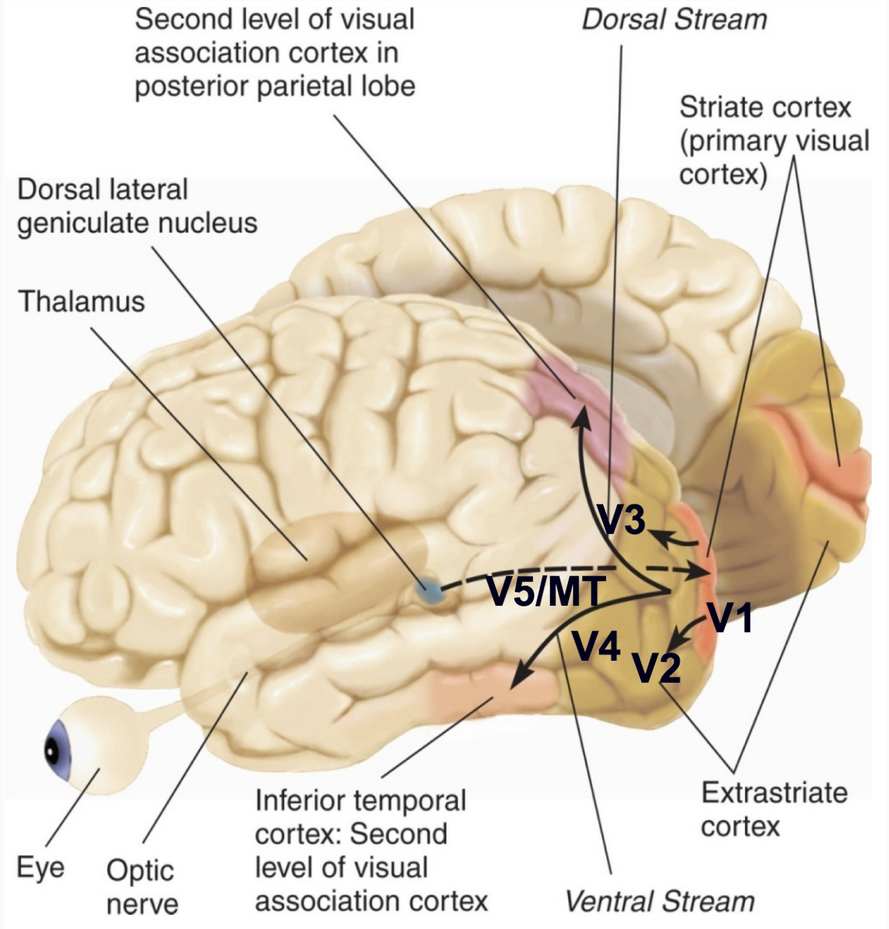




Perception of Visual Information

Dorsal Stream: Where?

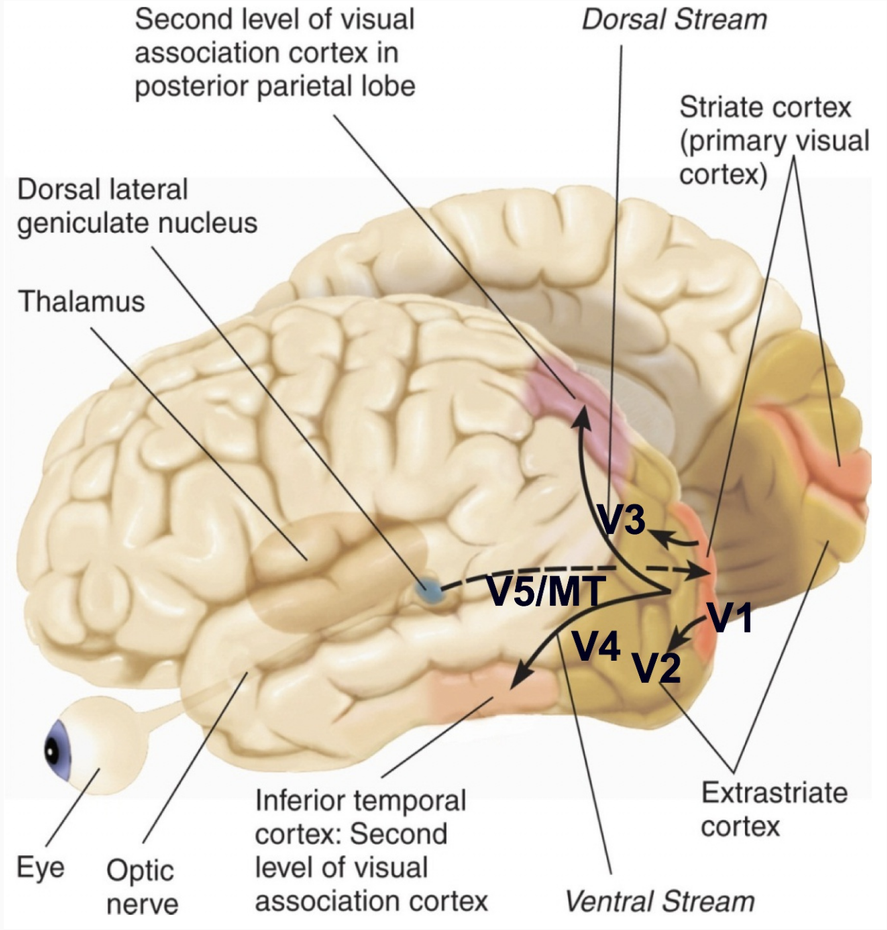
- cells in **V5/MT** analyze
  - simple motion and direction
- cells detect movement
  - specific direction
  - speed
- regardless of size, brightness, color, shape...



Perception of Visual Information

Dorsal Stream: Where?

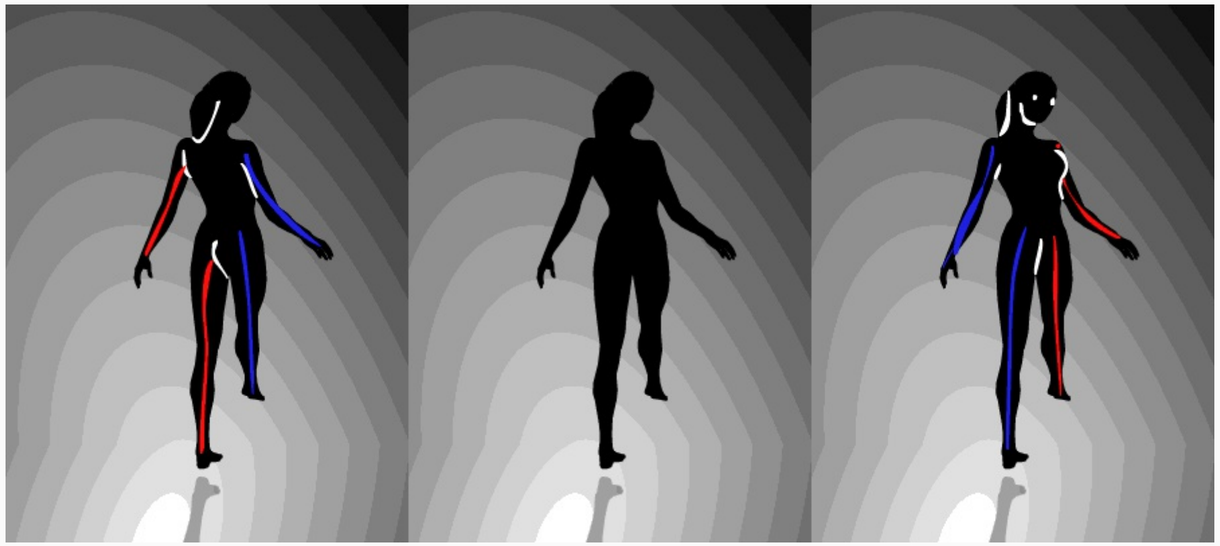
- **Medial superior temporal** cortex (area **MST**)
- important for analysis of:
  - complex circular motion
  - spiral motion

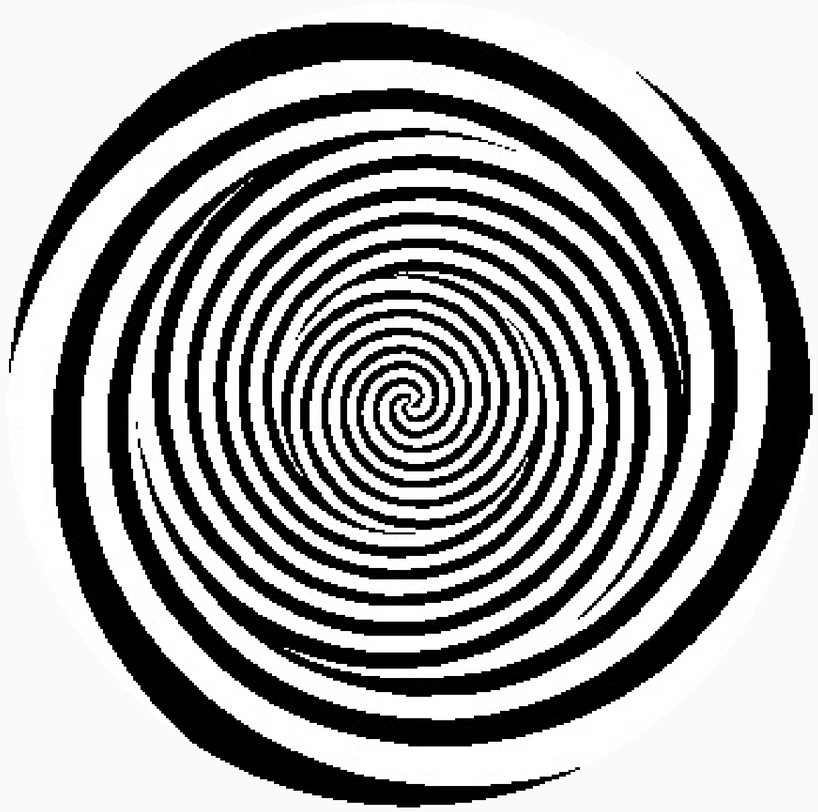


Perception of Visual Information

Dorsal Stream: Where?

- motion detection constructed in your brain





Perception of Visual Information

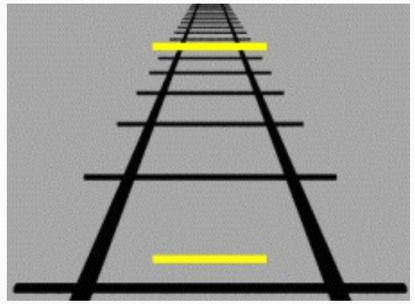
Dorsal Stream: Where?

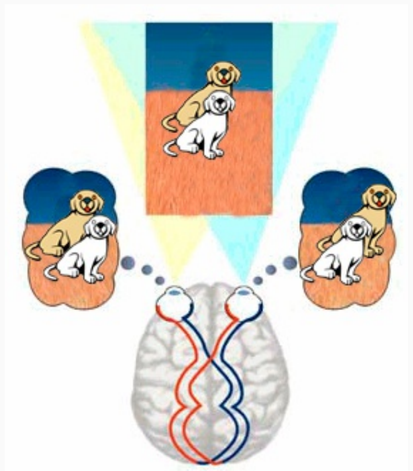
- area at junction of temporal and parietal lobes stabilizes visual image
- area MSTd important for optic flow

Perception of Visual Information

Dorsal Stream: Where?

- depth perception analyzed by monocular/binocular cues
- **monocular** cues:
  - perspective
  - relative retinal size
  - loss of detail in distance
  - relative apparent movement as you move your head
- **binocular** cues:
  - retinal disparity

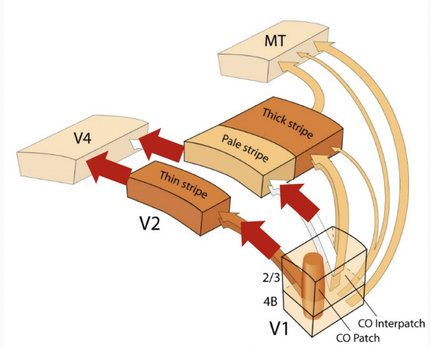


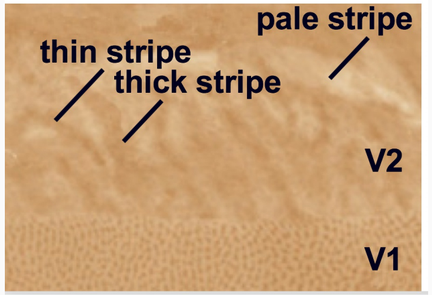


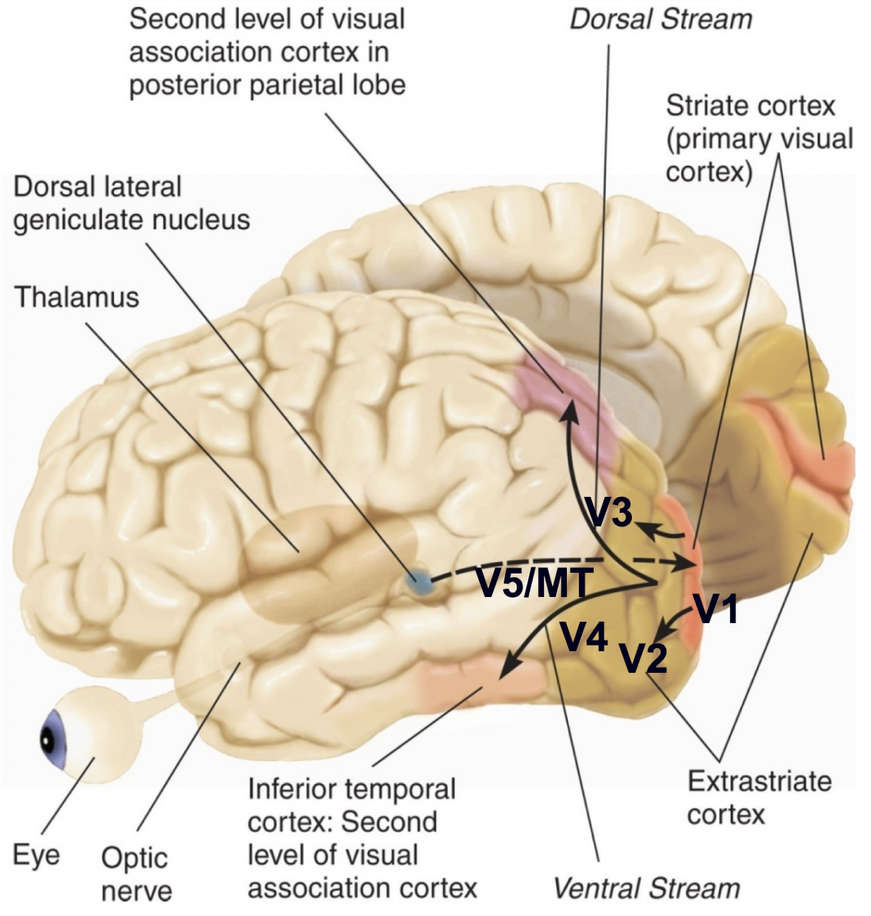
Perception of Visual Information

Ventral Stream: What?

- **occipital → temporal**, and **temporal → frontal cortex**



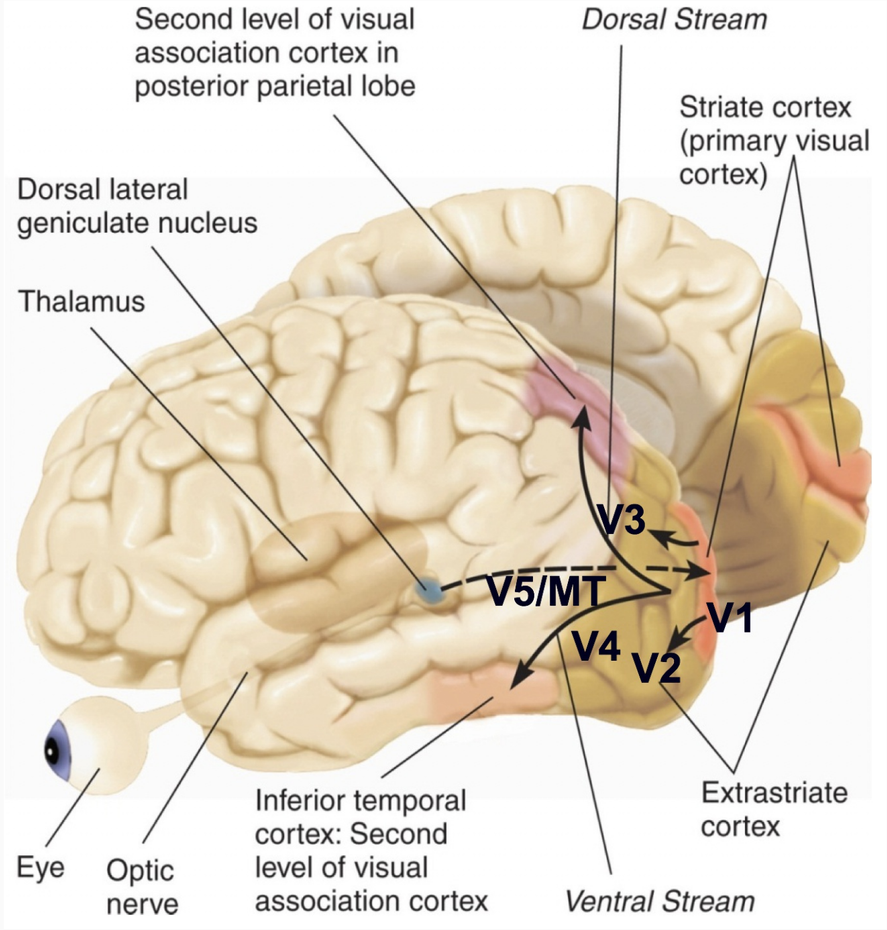




Perception of Visual Information

Ventral Stream: What?

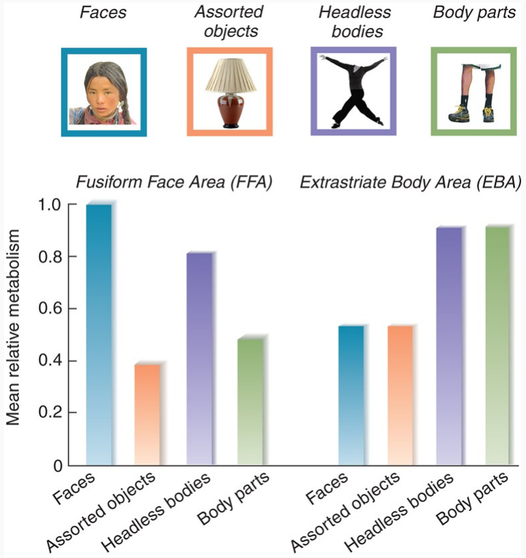
- complex recognition at higher (more frontal) levels
- posterior = general information about objects
- anterior = recognition of individual faces

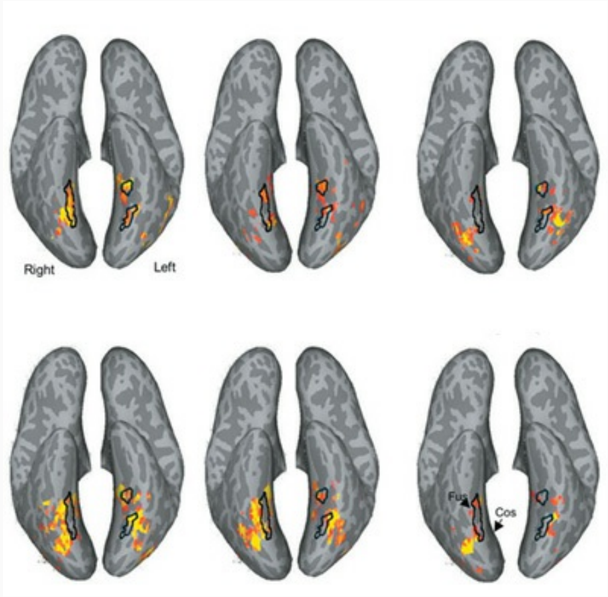


Perception of Visual Information

Ventral Stream: What?

- specific regions for recognition of specific classes of objects (e.g. fusiform cortex for facial recognition, extrastriate body area for body parts)

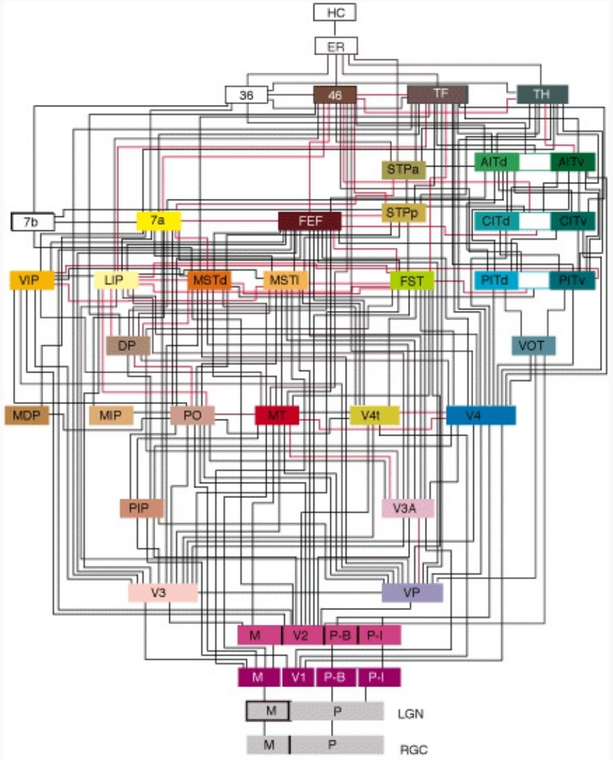




Perception of Visual Information

Higher Order Processing

- more than 50% of primate cortex implicated in visual processing and associated functions



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