

# Lecture 23

---

## **The concept of lateralization**

### **The corpus callosum connects the hemispheres**

- Variety of projections
  - Contraleateral
    - Homotopic
    - Heterotopic
  - Ipsilateral
- Complications: homotopic versus heterotopic connections, alternative pathways for communications (e.g., anterior and posterior commissures)

## **Fiber tractography of the corpus callosum**

- DTI
  - Blue: corpus callosum

## **Posterior and anterior commissures**

- Smaller fiber tracts
  - Split brain patients
    - One of the four only nobel prizes in structural neuroscience
-

# **Split brain patient studies and hemispheric specialization in the human brain**

## **Hemispheric processing in split brain patients**

- **Fixation control**
- Normal brain
  - Right-hemisphere stimulus
  - Left-hemisphere processes it
  - Information sent to left-hemisphere and verbal response produced
- Partial split
- Complete split

## **Hemisphere bias for local or global information**

- Letters made up of little letters
- What was the small/big letter?
- Spatial frequency: a Fourier domain, property of visual stimuli
- Right: visual, left: language

## **Hemispheric characteristics**

- Hemispheres may be in cooperation or competition, it isn't yet clear
- Even after the split brain procedure, some functions appear to be unified (e.g., spatial orienting, attention).
- Language comprehension seems to occur in both hemispheres,  
**language production only on the left.**
- The left hemisphere seems to be involved in complex thought,

reasoning and planning, the right seems to be more immediate and direct.

- The left hemisphere may be tuned for higher spatial frequencies (local), while the right may be tuned for lower spatial frequencies (global).