Today’s plan

• A whirlwind tour of cortex
• Language
  – Lateralization
  – Aphasia
  – Broca’s area
  – Wernicke’s area
• fMRI – A window into the functioning brain

Four main lobes
frontal, parietal, occipital, temporal

Matthews 21-2
General function of main lobes

- Occipital – vision
- Parietal – spatial processing, somatosensation
- Temporal – hearing, face & object recognition, emotions
- Frontal – motor performance, planning, higher-level executive function

Lateralization of function

- Split brain patients – interruption of corpus callosum to treat severe epilepsy
Left brain sees object and can name it

Matthews 21-1a

Right brain sees object and cannot name it, but can point to a similar object

Matthews 21-1b
Speech and language

Broca’s area

- Dr. Paul Broca – French neurologist 1824-1880
- Studied patients with aphasia
- Found a region in left frontal lobe that, when damaged (e.g. stroke or trauma), led to difficulty in producing speech – expressive aphasia
- Localization of function

http://www.uic.edu/depts/mcne/founders/page0013.html
Wernicke’s area

• Dr. Carl Wernicke – 1848 – 1904
• Identified a region of the left temporal lobe essential for speech comprehension – receptive aphasia
• Discussed in context of a separate area for the motor aspects of speech (Broca’s area)

http://www.uic.edu/depts/mcne/founders/page0101.html
Conduction aphasia

Matthews 21-4

Conduction aphasia

Matthews 21-5
Conduction aphasia

- Due to damage to arcuate fasciculus
- Comprehension preserved
- Impaired fluency of speech production
- Difficulty translating from sensory to motor domains

Functional Magnetic Resonance Imaging

- fMRI
- Measures local blood flow by measuring oxyhemoglobin vs. deoxyhemoglobin (BOLD = blood oxygen level detection)
- Measures differences between 2 conditions, so careful experimental design is essential
- Just a beginning – this just tells us where to begin looking further
Activity in visual cortex