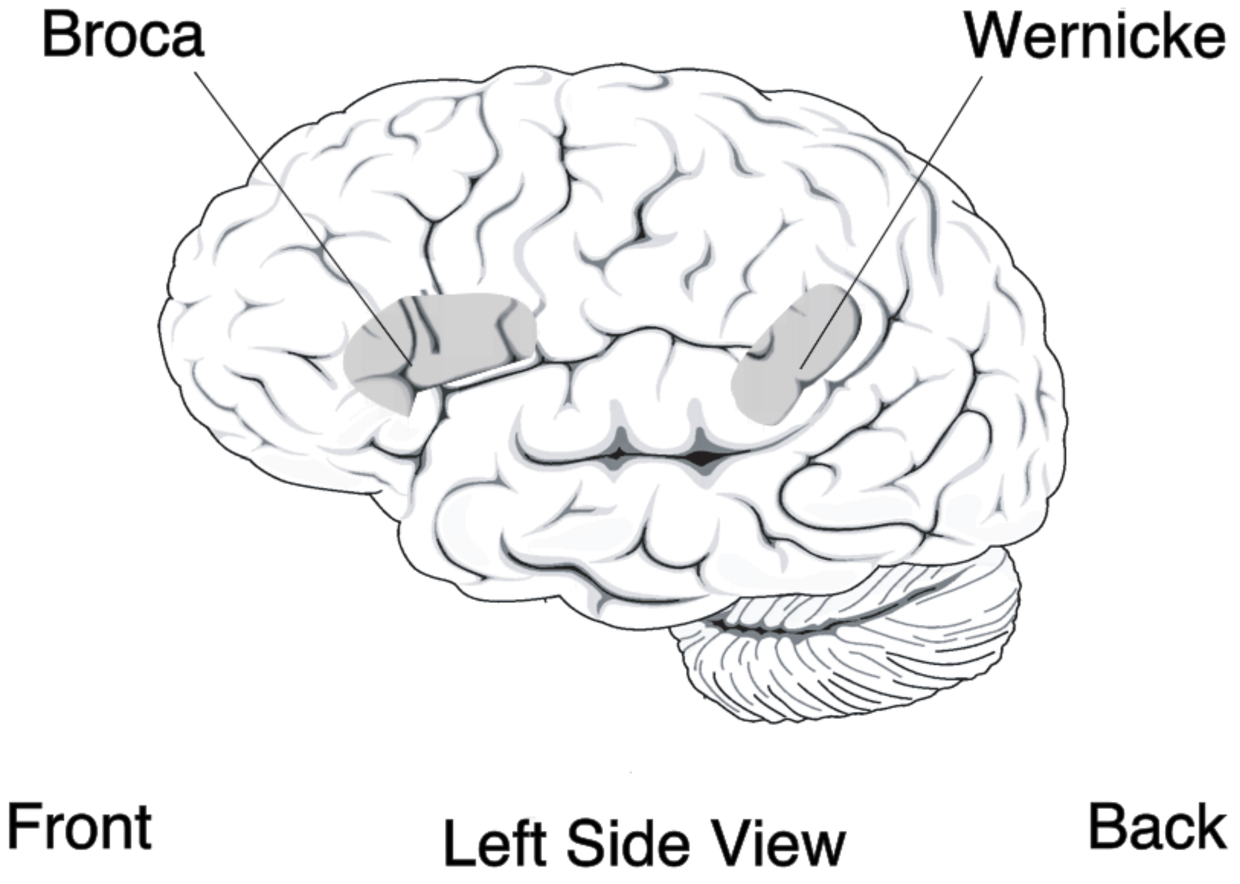
THE LOCALIZATION OF LANGUAGE

LOCALIZATION OF FUNCTION

- Different areas of the brain are in charge of different cognitive functions
- Left (or dominant) hemisphere is where the speech center is located
  - Split-brain patients: fail to complete verbal tasks when the stimulus is presented only to the left visual field (right hemisphere)
  - Broca's Area: language production
  - Wernicke's Area: language comprehension


Broca
Wernicke
Front
Left Side View
Back

BROCA'S AREA

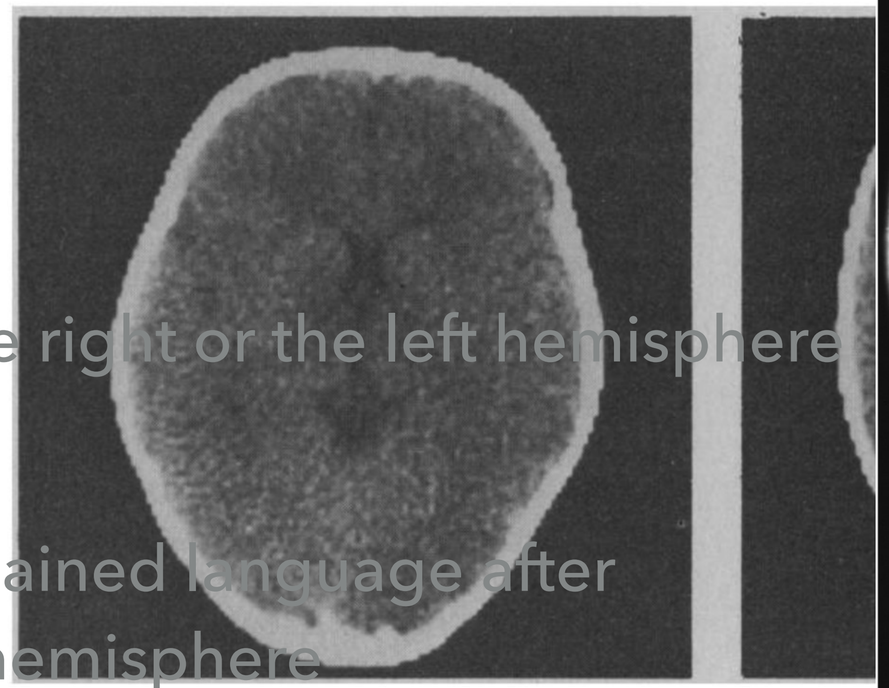
- Broca's area is not only involved in language production
- also plays a role in understanding actions:
  - representation of action sequence
  - physical performance of the sequence
- music
  - shared networks
- Broca's area is involved in processing syntactic structures

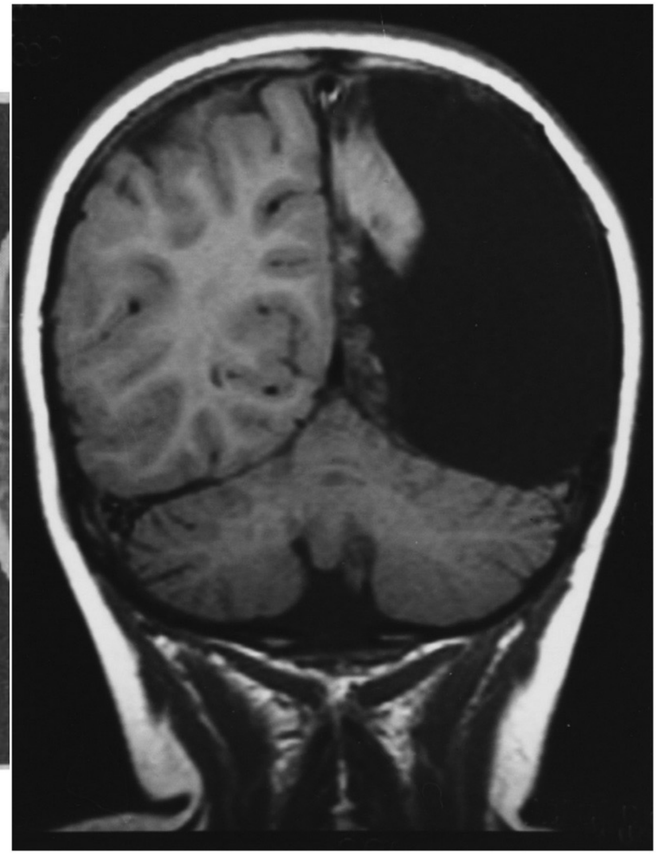
TECHNICAL ISSUES

- fMRI
  - One of the most commonly used technology to study the brain
  - shows changes in blood flow
  - increased blood flow in one area = activation of that area
  - activation in one area ≠ the function is localized in that particular area

NORMAL LANGUAGE IN ABNORMAL BRAINS

- Hydrocephalus: abnormal accumulation of cerebrospinal fluid (CSF) in the ventricles of the brain
  - “virtually no brain”
  - normal language ability
- Hemispherectomy: either the right or the left hemisphere is removed
  - patients (up to 47 y.o.) regained language after removal of the dominant hemisphere





CONCLUSIONS

- the localization of function theory is not accurate enough for current studies
- complex cognitive functions are highly distributed
- processing relies on networks (that is relatively flexible) rather than locations

THE LOCALIZATION OF LANGUAGE

THE NETWORK OF LANGUAGE