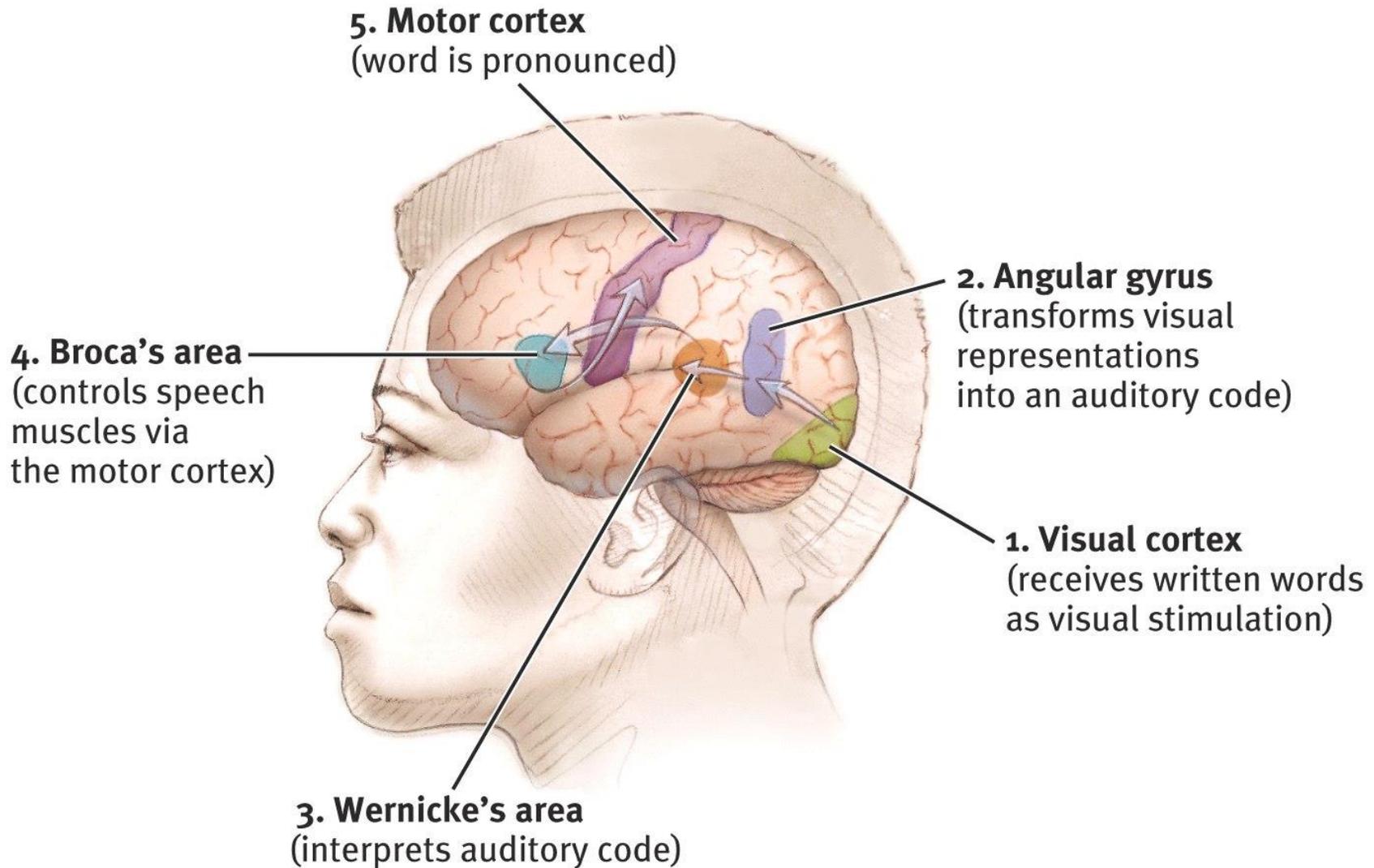


Language



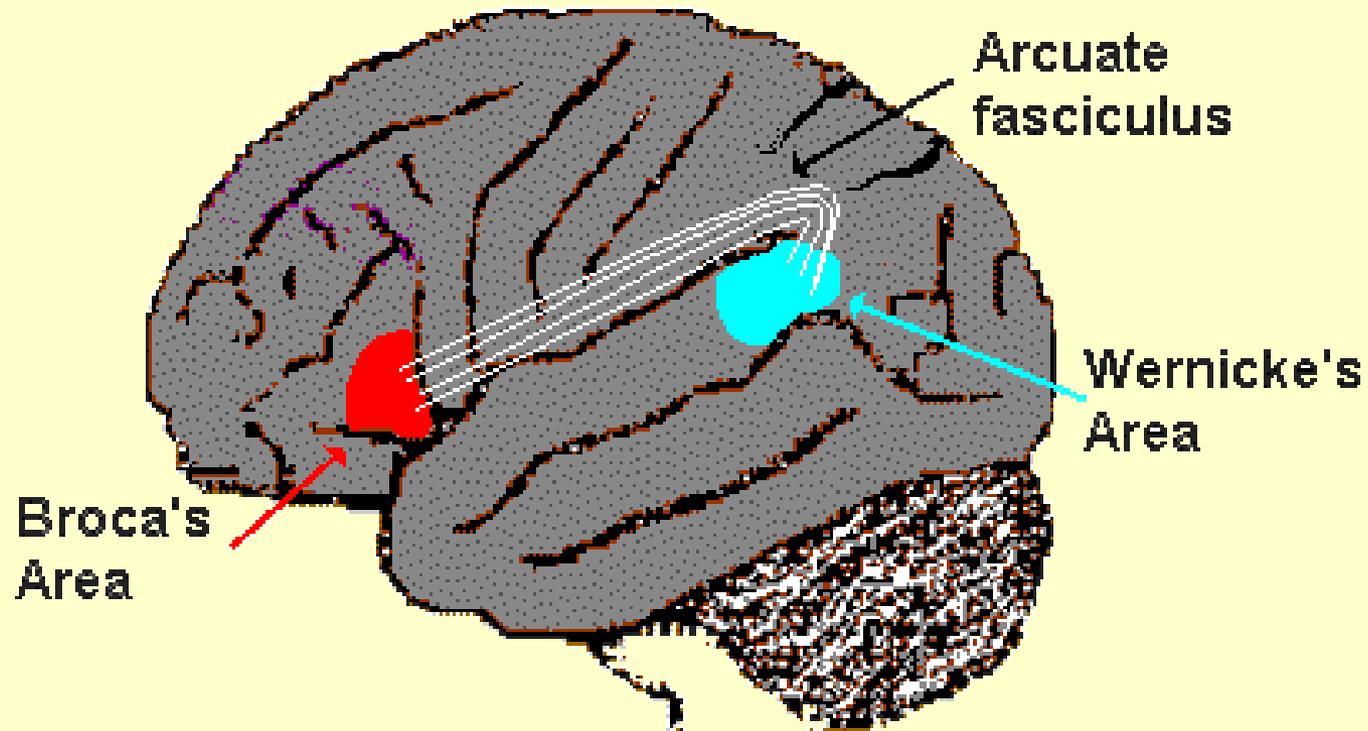
Speech In Humans - Left Hemisphere (98%)

- **Broca's area** - frontal lobe, for muscles involved in speech. In the brain's left hemisphere which is responsible for speech production

Speech In Humans - Left Hemisphere (98%)

- **Wernicke's area** - temporo-parietal lobe. in the brain's left hemisphere which is reasoned to be responsible for processing of meaning, especially as it relates to verbal communication

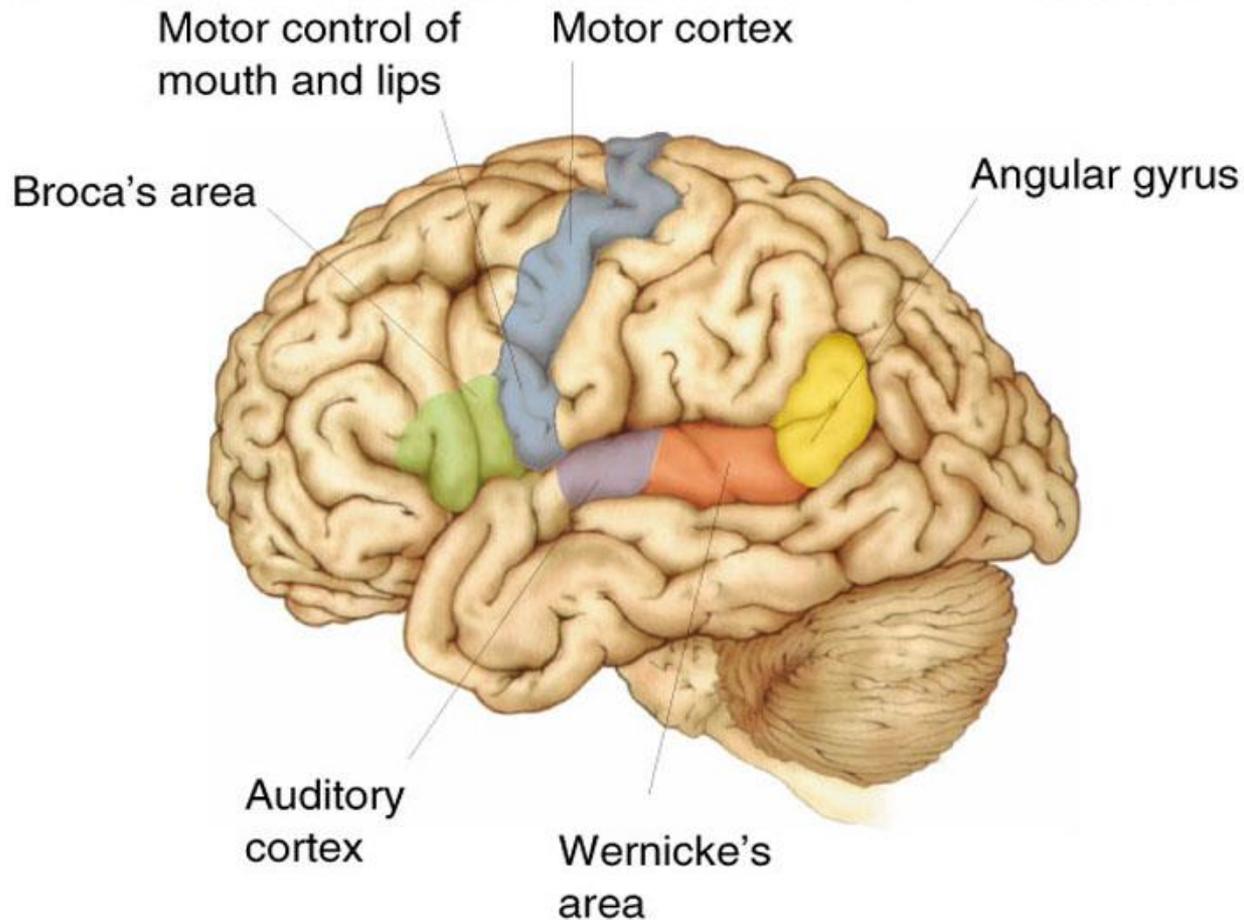
- **Arcuate fasciculus** - pathway from Wernicke's area to Broca's area



Language Areas of the Brain

Figure 20.1

Key components of the language system in the left hemisphere. In the frontal lobe, Broca's area lies next to the area that controls the mouth and lips in motor cortex. Wernicke's area, on the superior surface of the temporal lobe, lies between auditory cortex and the angular gyrus.

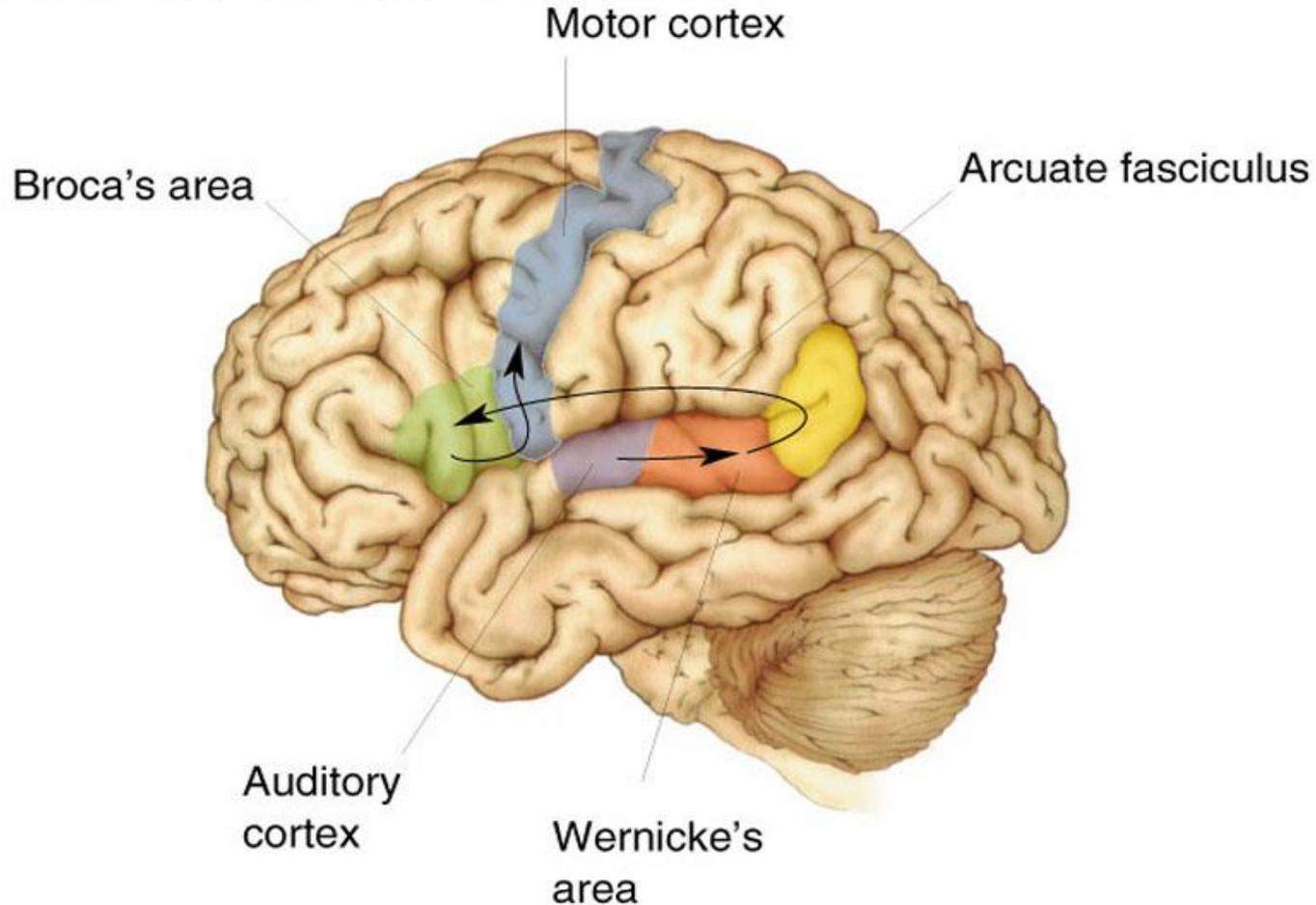


Speaking/Repeating a Heard Word

1. Primary auditory cortex
 2. Wernicke's area
 3. Arcuate fasciculus
 4. Broca's area
 5. Motor cortex
-

Speaking a Heard Word

Figure 20.2
Repeating a spoken word, according to the Wernicke-Geschwind model.



Speaking a Written Word

1. Visual cortex

2. Angular gyrus Where the written word is translated to internal monologue.

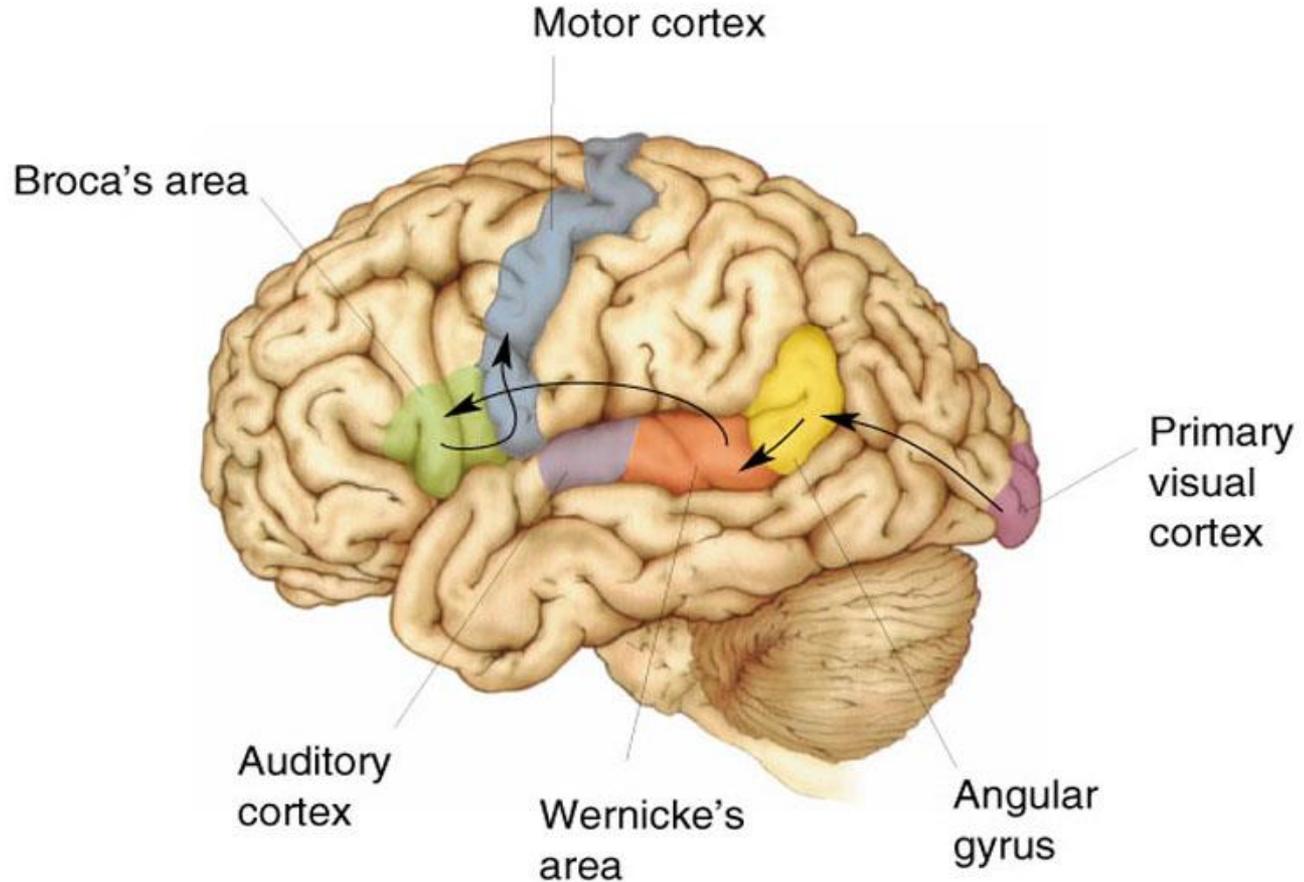
3. Wernicke's area

4. Arcuate fasciculus

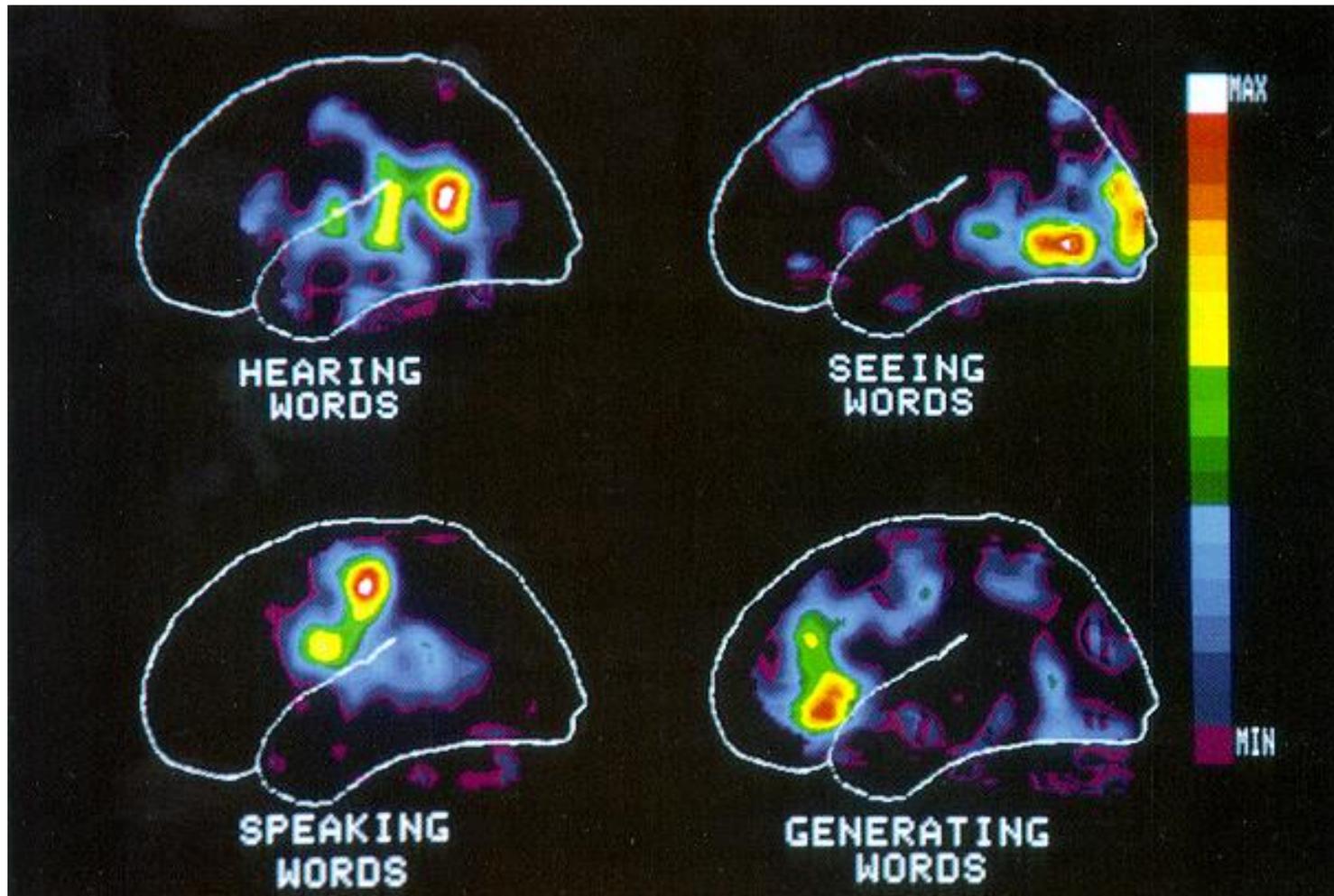
5. Broca's area

6. Motor cortex

Speaking a Written Word



Human PET Scans:



Speech Disorders

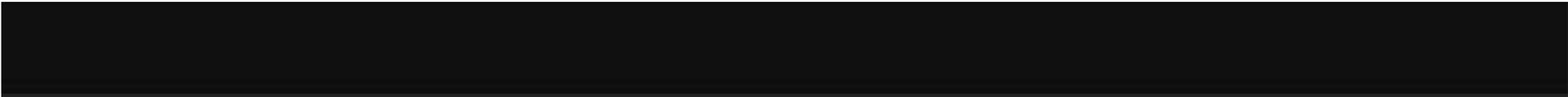
- Broca's (Expressive) aphasia - good comprehension but poor articulation (motor) of speech. (Can be caused by stroke.)
- Usually accompanies by *agraphia*, the inability to express thoughts in writing.
- Wernicke's aphasia - poor comprehension and fluent but meaningless speech. (Can be caused by a stroke.)
- Global aphasia (lesion of arcuate association area) - all aspects of language affected, poor comprehension and speech



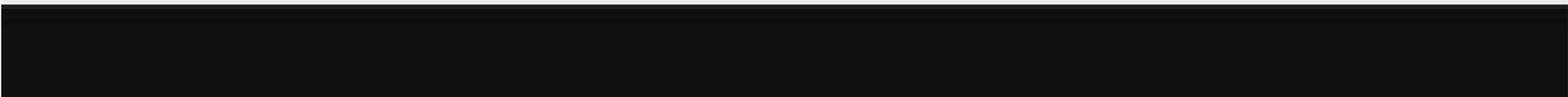


Broca's aphasia with
severe agrammatism





Wernicke's aphasia:
Answering interview questions



Those suffering from Wernicke's Aphasia think that they are speaking correctly so if they could not sense that people were not understanding them, they would not know that they had a disorder.





Patient # 2

Hemispheric Dominance

- hemispheric damage in the adult \Rightarrow nearly permanent loss
- damage in the child results in functions being assumed to variable extents by the other hemisphere - plasticity

Brain Plasticity



- The ability for our brains to form new connections after the neurons are damaged.
- The younger you are, the more plastic your brain is.
- Can occur during normal brain development when the immature brain first begins to process sensory information through adulthood.
- Can occur as an adaptive mechanism to compensate for lost function and/or to maximize remaining functions after a brain injury.

Brain Plasticity

