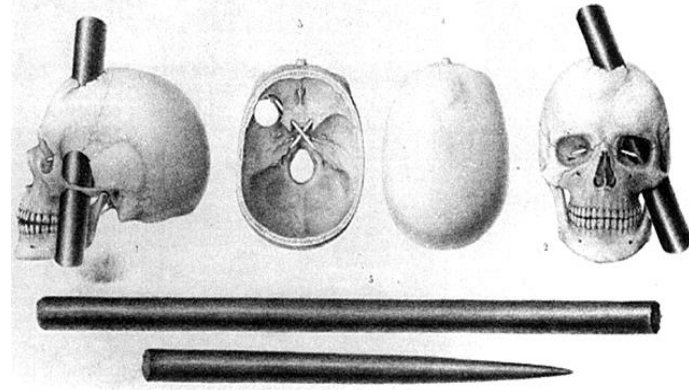




Phineas Gage



- Railroad foreman
- Well-respected, hard-working
- 1848: tamping iron accident
- He never lost consciousness, and had no obvious neurological symptoms
- "perseveration" (repeating a response despite cessation of a stimulus.)
- But he was "no longer Gage"

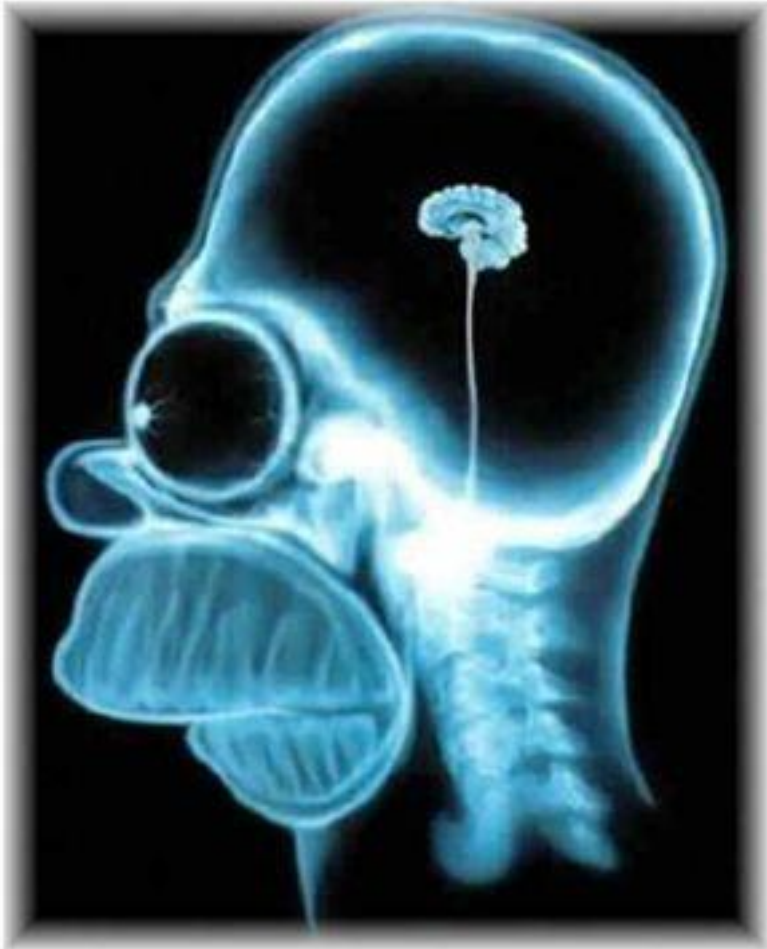
Key Points:

- Connection between limbic system and frontal lobes were severed, allowing the LS to fire unrestrained.
- 4% of cerebral cortex damaged, but 10% of white matter.
- Demonstrated that physically changing the brain can result in changing more "abstract" personality of an individual.

Personality changes

- Damage to the pre-frontal cortex/frontal lobes may result in the failure to make inappropriate mappings between events and their outcomes.
- The following are some additional problems:
 - Lack of concern for the future
 - Working memory deficits
 - Lack of social graces
 - Irritability
 - Mild euphoria
 - Pseudo depression.

Do we really only use 10% of
our brain?



NO!

That is a myth.

Where may that myth
have come from???

Association Areas

- Any area not associated with receiving sensory information or coordinating muscle movements.
- Neurons in the association areas integrate information by associating various sensory inputs with stored memories.
- Involved in high mental functions such as learning, remembering, thinking and speaking.
- Found in all four lobes

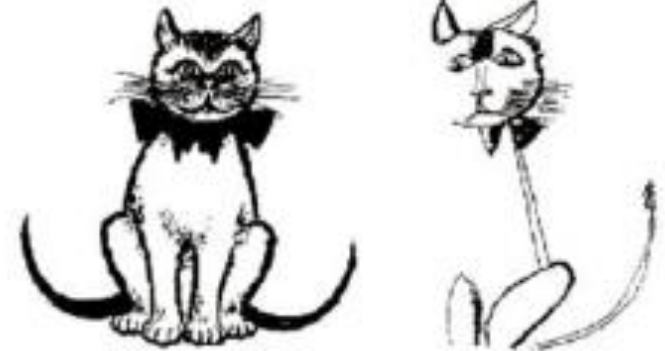
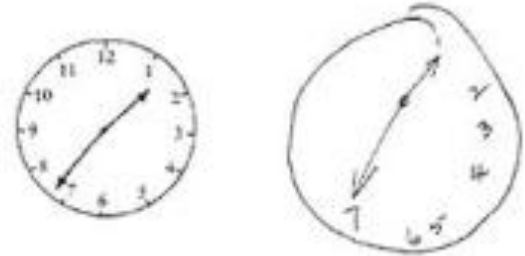


Visual Neglect – disordered association areas in Parietal Lobe

Neglect for visual, auditory, and somatosensory stimulation on one side of the body or area.

Examples:

1. Patient draws objects like clock, house, flower with missing side.
2. If patient was asked to read "foot ball" or "ice cream" she will read "ball" or "cream".
3. May shave only right side of the face.
4. May not use one side of the body even if there is no biological weakness.

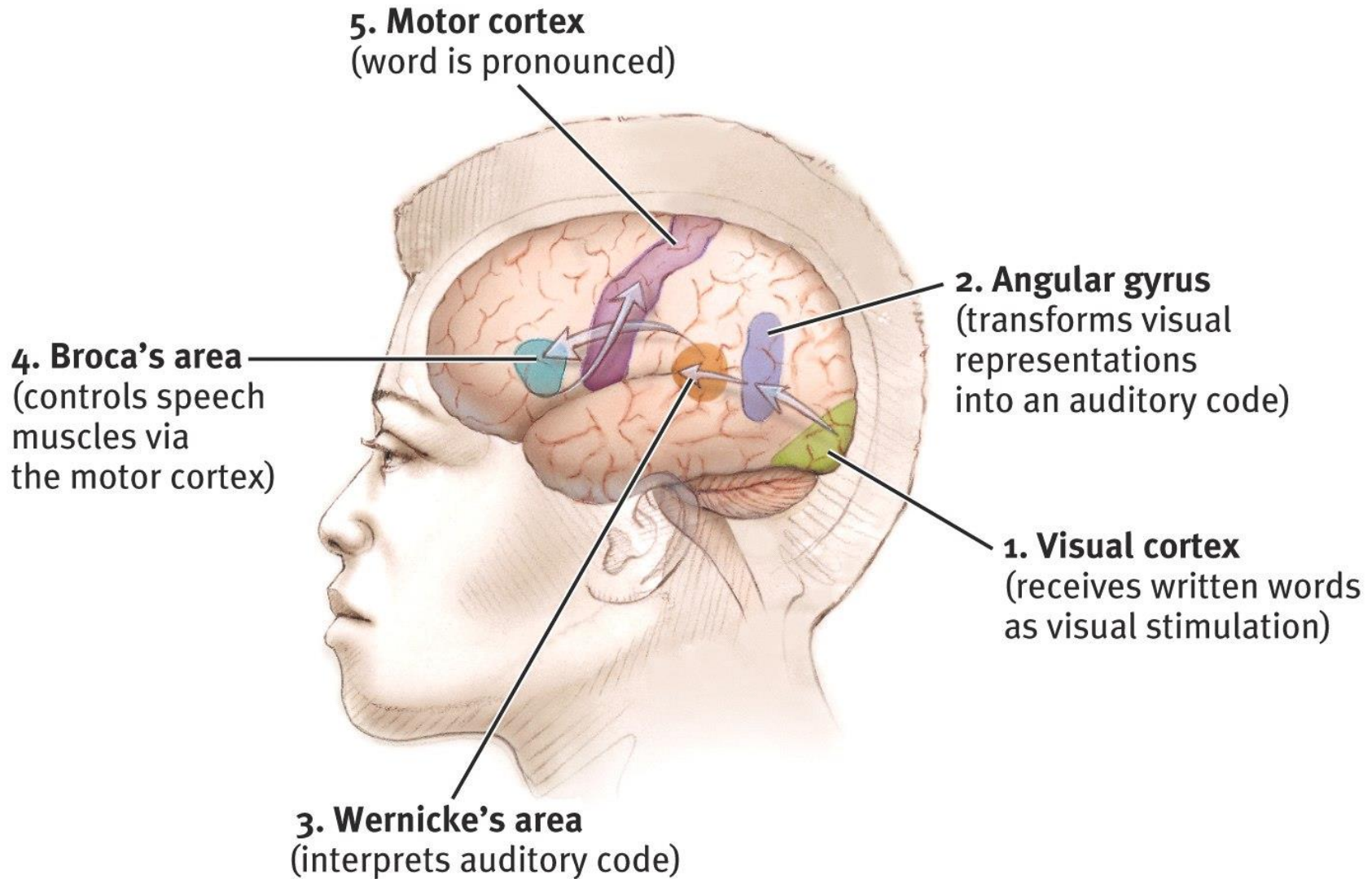


Neuroprosthetics

[CBS Video](#)

- Neuroprosthetics are implantable devices designed to replace or improve the function of a certain aspect of the central nervous system.
 - Sensory prosthetics get information into sensory areas like hearing and sight.
 - Motor prosthetics help regulate or stimulate malfunctioning motor functions.
 - Cognitive prosthetics are a largely still-on-the-drawing board field of future prosthetics for replacing or improving problem areas in the brain itself.

Language



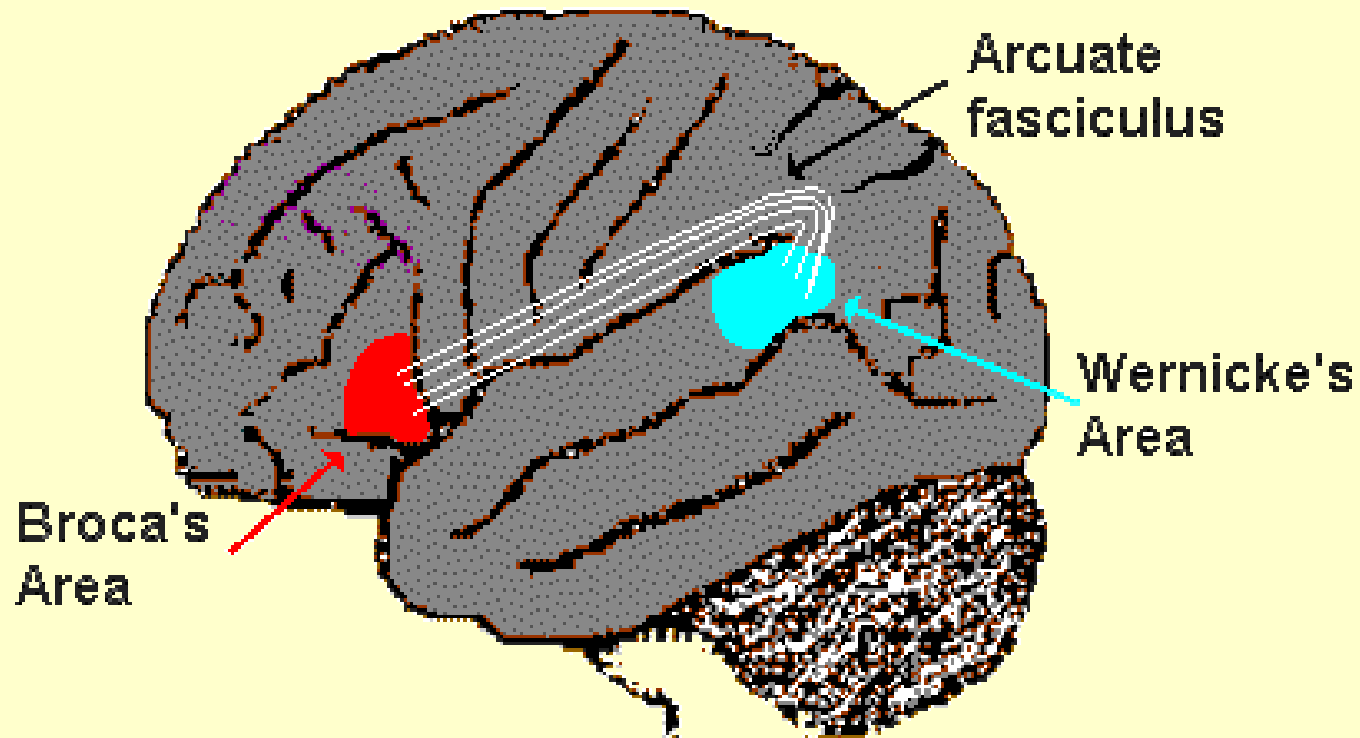
Speech In Humans - Left Hemisphere (98%)

- **Broca's area** - frontal lobe, muscles involved in speech. Located 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 thought to be responsible for processing of meaning, especially as it relates to verbal communication

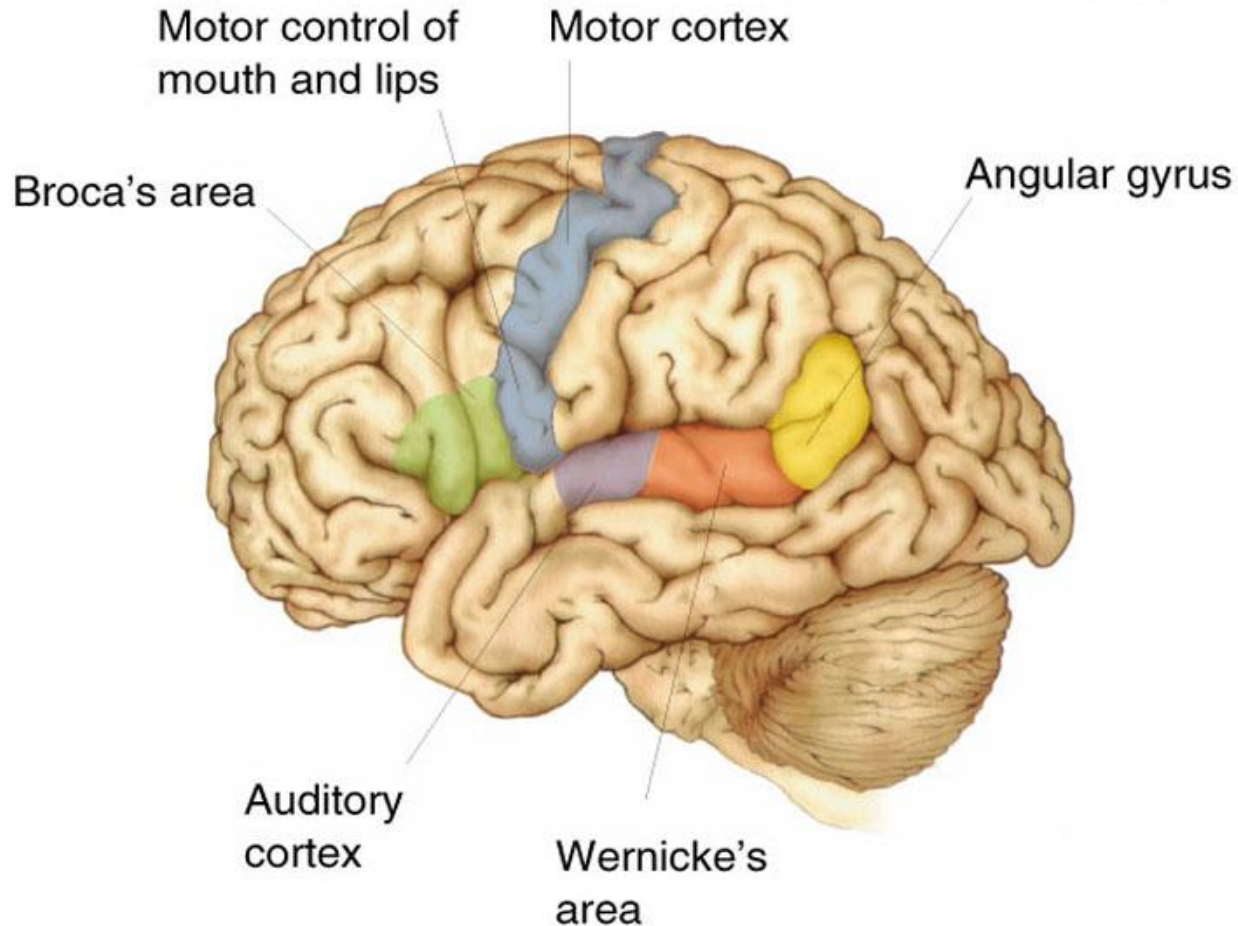
- **Arcuate fasciculus** - pathway from Wernicke's area to Broca's area



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.

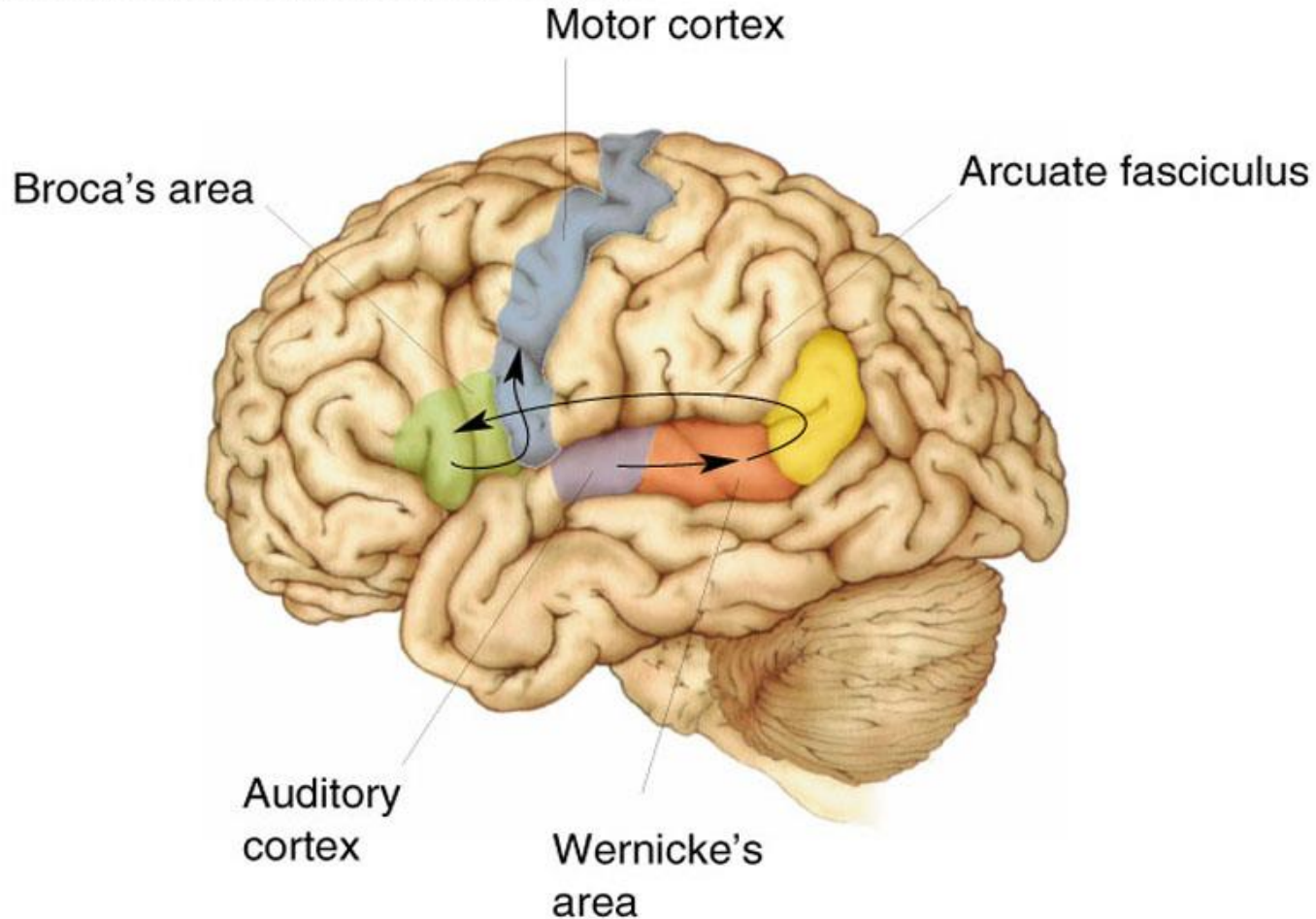


Speaking/Repeating a Heard Word

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.

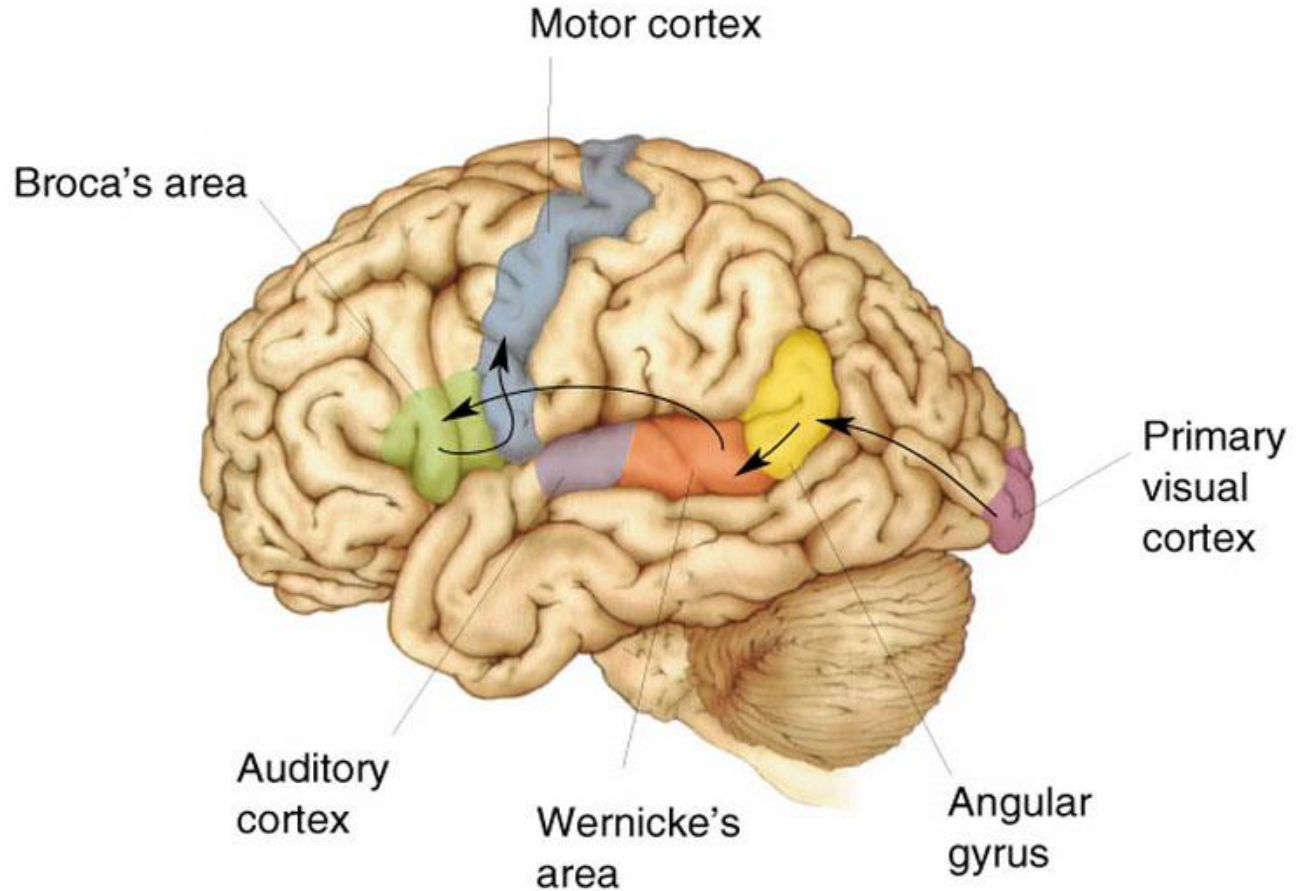
3. Wernicke's area

4. Arcuate fasciculus

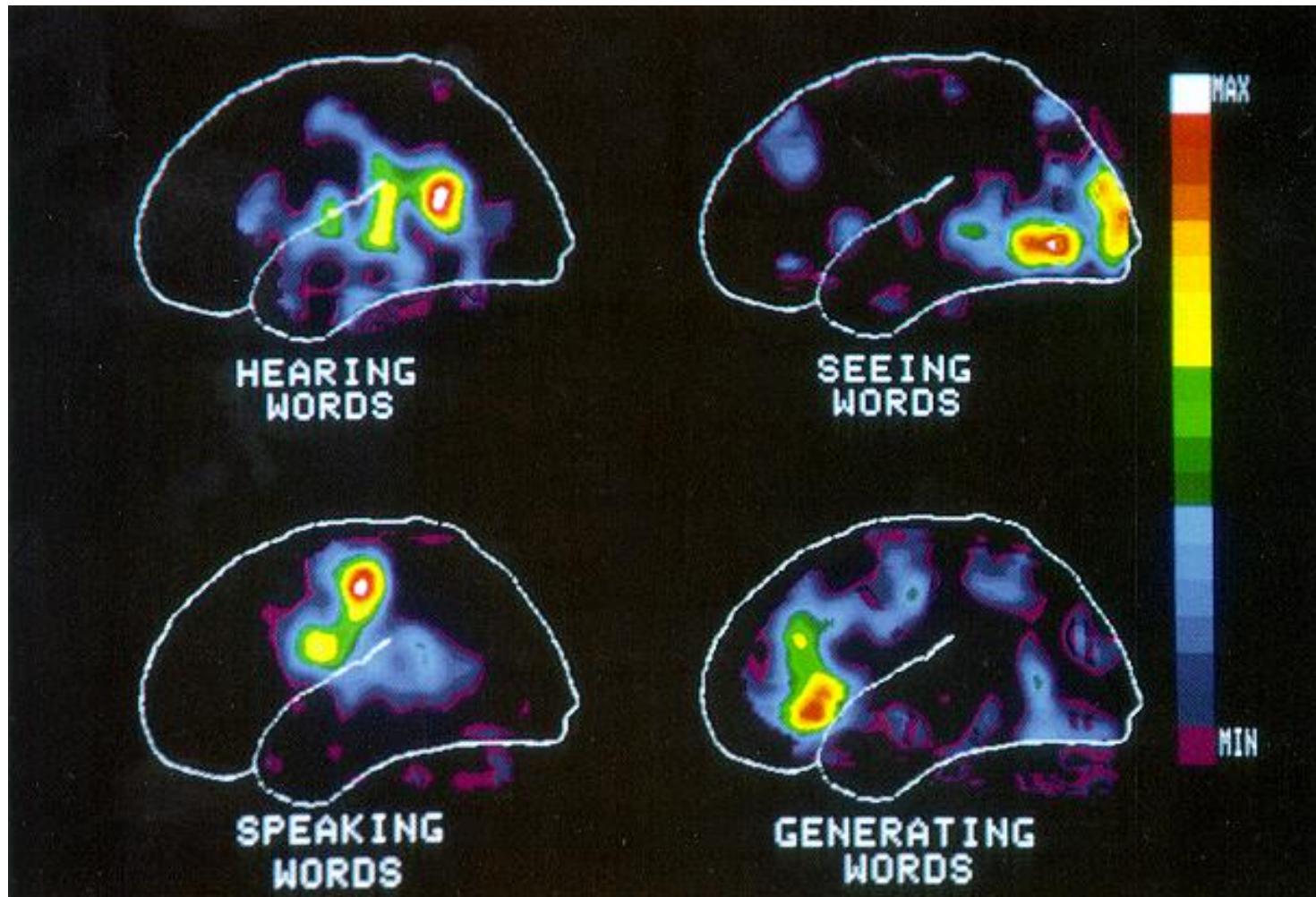
5. Broca's area

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
