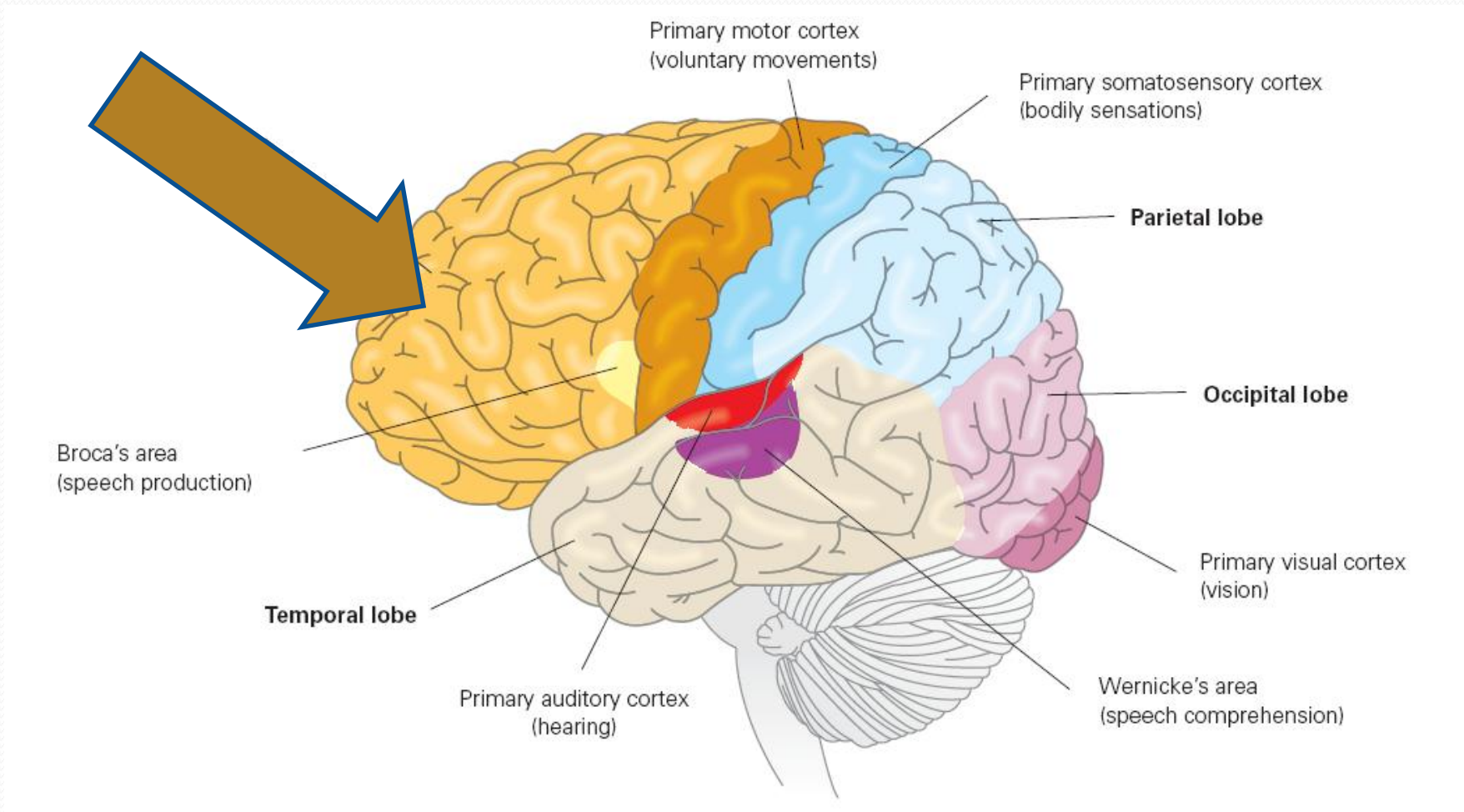


Four Lobes of the Cerebral Cortex

Structure and function: different parts of the brain
control different functions.

The frontal Lobe



The frontal Lobe

- **Primary motor cortex** – movement
- **Broca's area** speech production
- Forward area association judging planning initiative
- Expression of characteristics associated with personality and emotional behaviour
- *(The motor is in the front of the car Broca' is driving)*

The frontal Lobe as a car?

Broca is up the front driving the car, he is sitting in the left seat, as **Broca's area** is also in the **left hemisphere** of the frontal lobe.

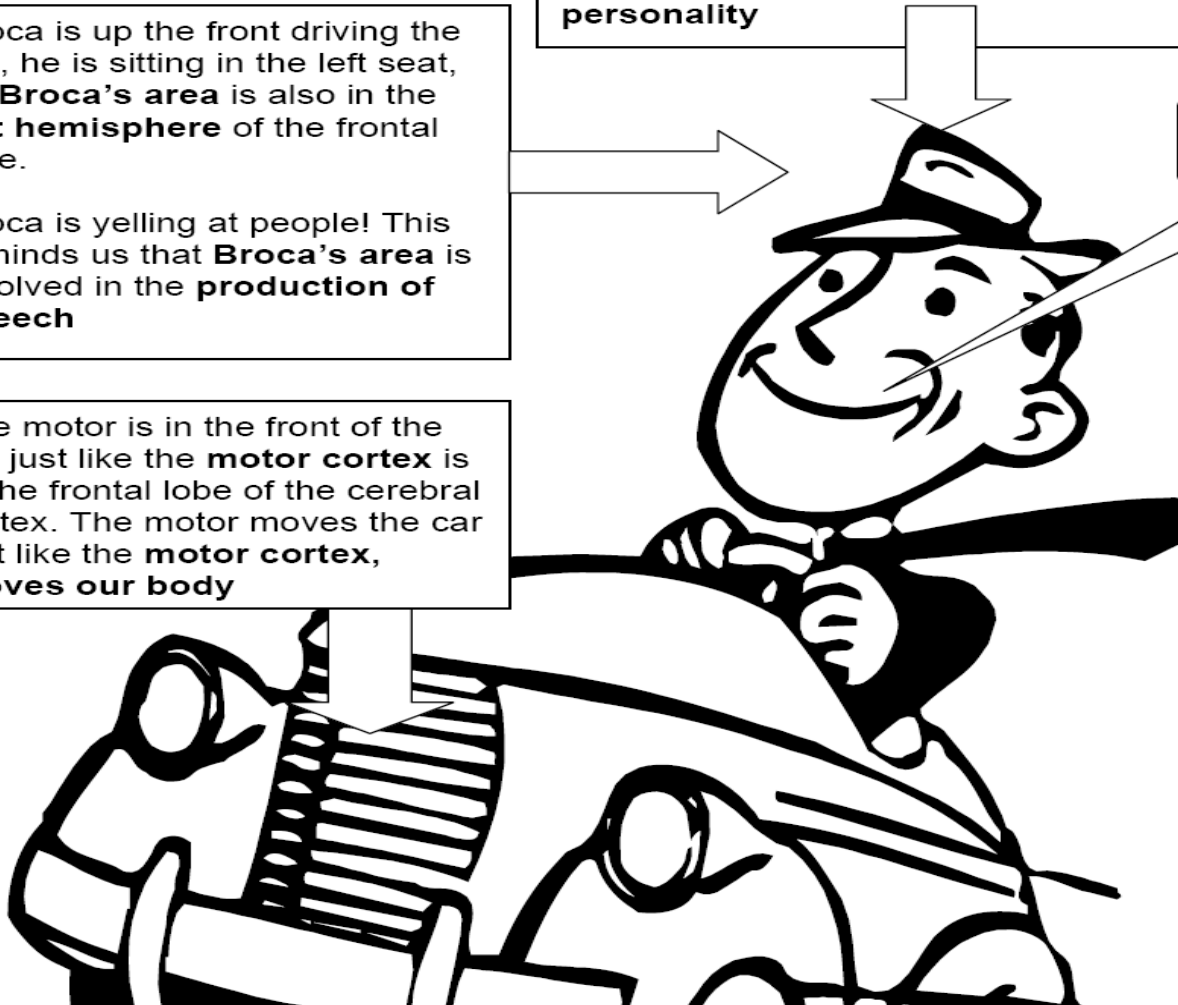
Broca is yelling at people! This reminds us that **Broca's area** is involved in the **production of speech**

The motor is in the front of the car just like the **motor cortex** is in the frontal lobe of the cerebral cortex. The motor moves the car just like the **motor cortex**, **moves our body**

Imagine Broca having road rage as a way of remembering that the frontal lobe is also involved in **emotional behaviour**
The fact that he gets road rage also relates to **personality**

Get out of the way moron!!!

Imagine Broca planned a trip in his car as a way of remembering that the frontal lobe is also involved in **planning an initiative**



Phineas gage – frontal lobe damage

- September 13, 1848, 25-year-old Railway foreman
- Packing gun powder into a hole with a steel pole to blow up rock
- Sparks from the pole ignite the gun powder and send the pole under gage's cheek and out the top of his head
- Before the accident he was well liked, organised, calm and polite



A



B



C



D



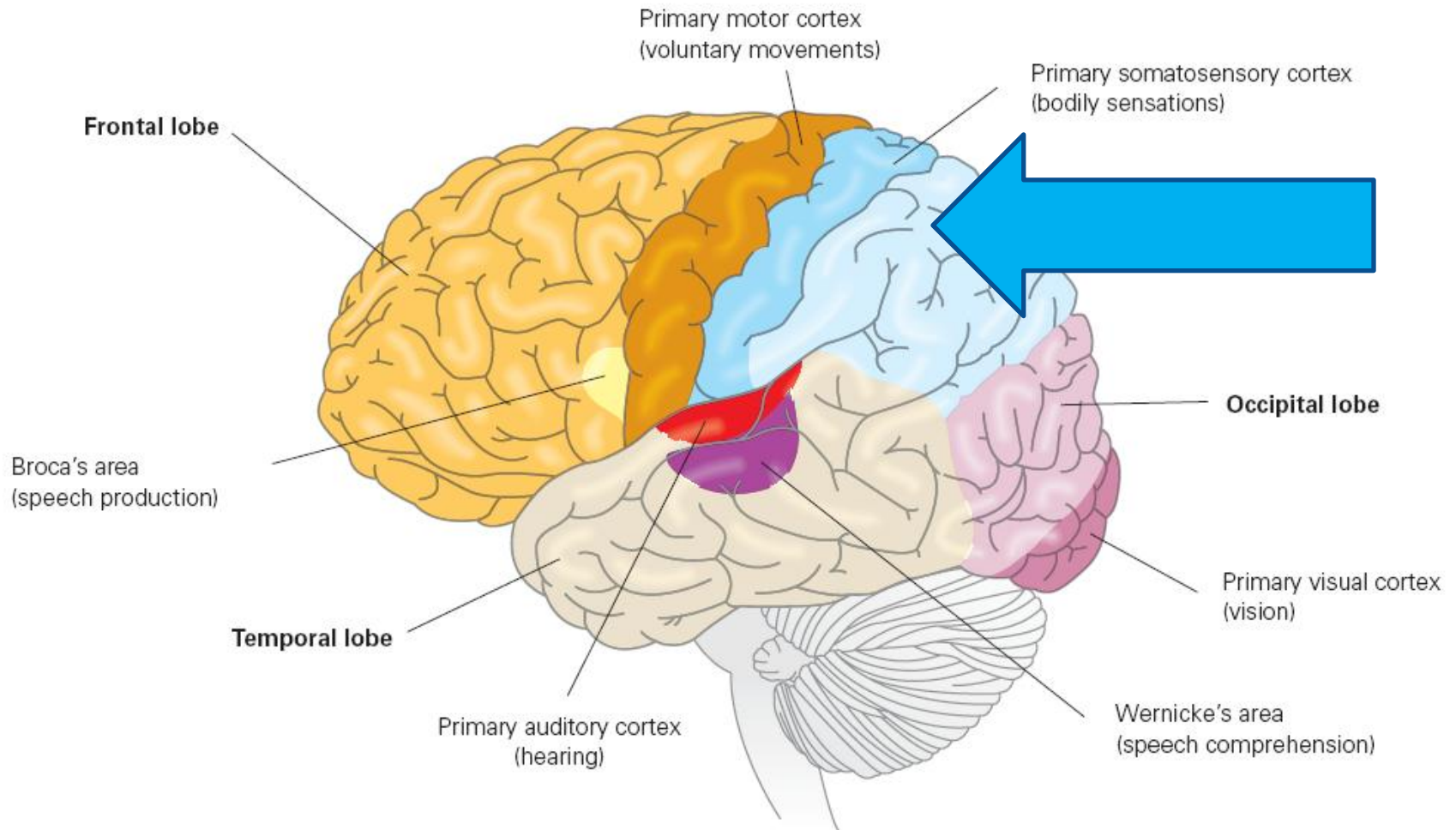
Phineas gage – frontal lobe damage

- After the accident Phineas suffered severe personality changes
- Became impulsive, aggressive, disorganised
- Could not continue his work as foreman
- Appeared for a time at Barnum's American Museum in New York
- February 1860, Gage had the first in a series of increasingly severe convulsions
- died in or near San Francisco on May 21 — just under twelve years after his accident

- Gage's case along with others suggest the frontal lobes important role in emotion and personality, planning and initiative



The Parietal lobe



The Parietal lobe

- **Primary Somatosensory cortex**
- Receives info from senses
- Somatosensory cortex at front of temporal lobe next to primary motor cortex which is at the back of the frontal lobe
- *(The party lobe, your senses are going wild at a party)*

The Parietal lobe – on fire at a party?

*Parietal sounds like party– Parietal reminds us that our senses were going wild when we danced so hard we **caught fire** at a great party*

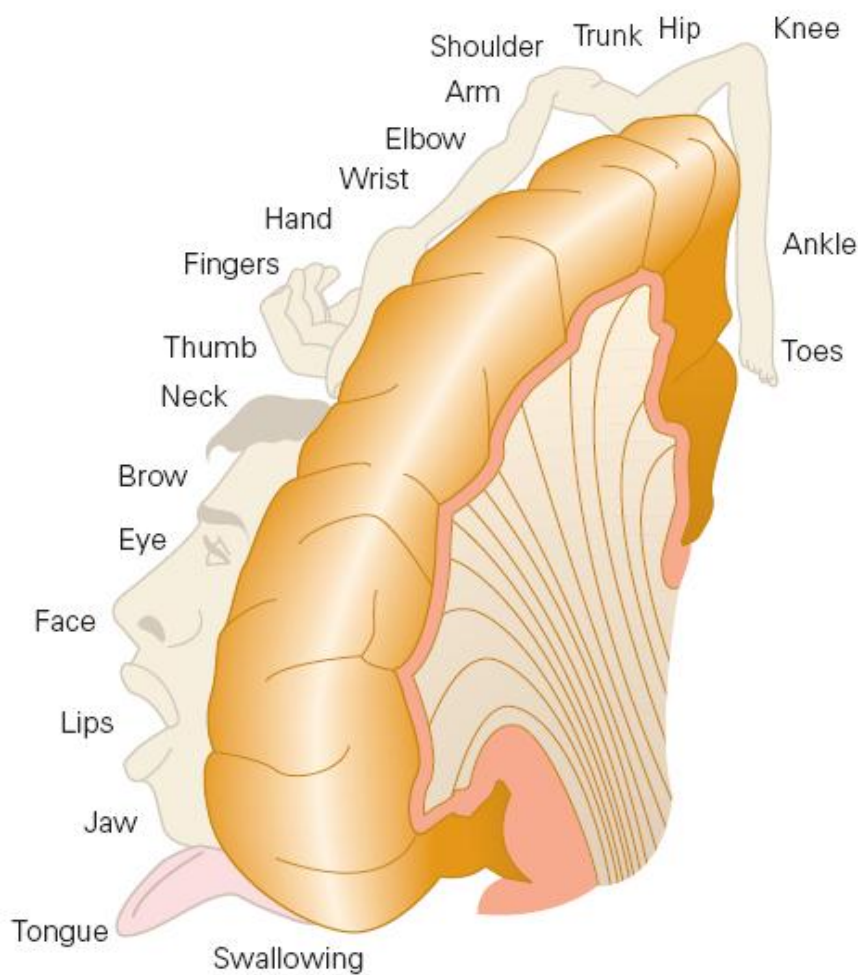
The pain of the burns is registered in the parietal lobes



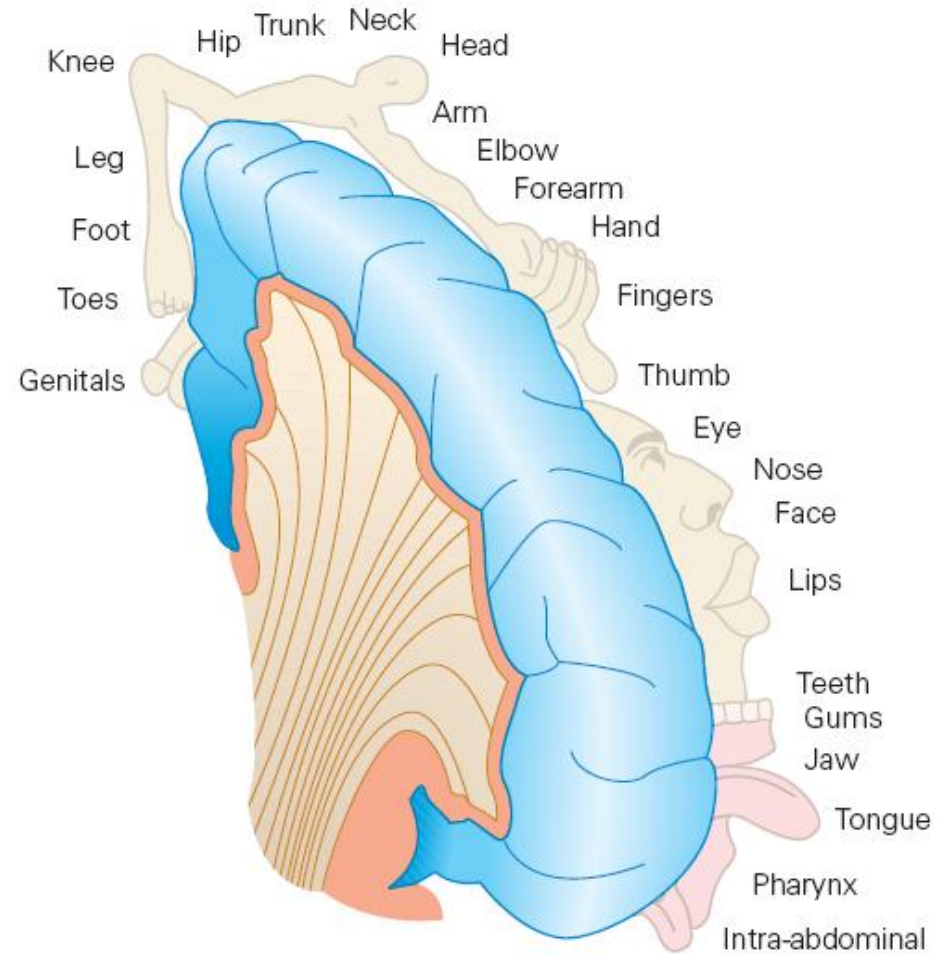
The pressure of the ground on your skin as you roll to put the fire out is registered by the parietal lobe

The position of your limbs as you run around and wave them in panic is registered by the parietal lobes

Motor and Sensory Cortex organisation



Primary motor cortex

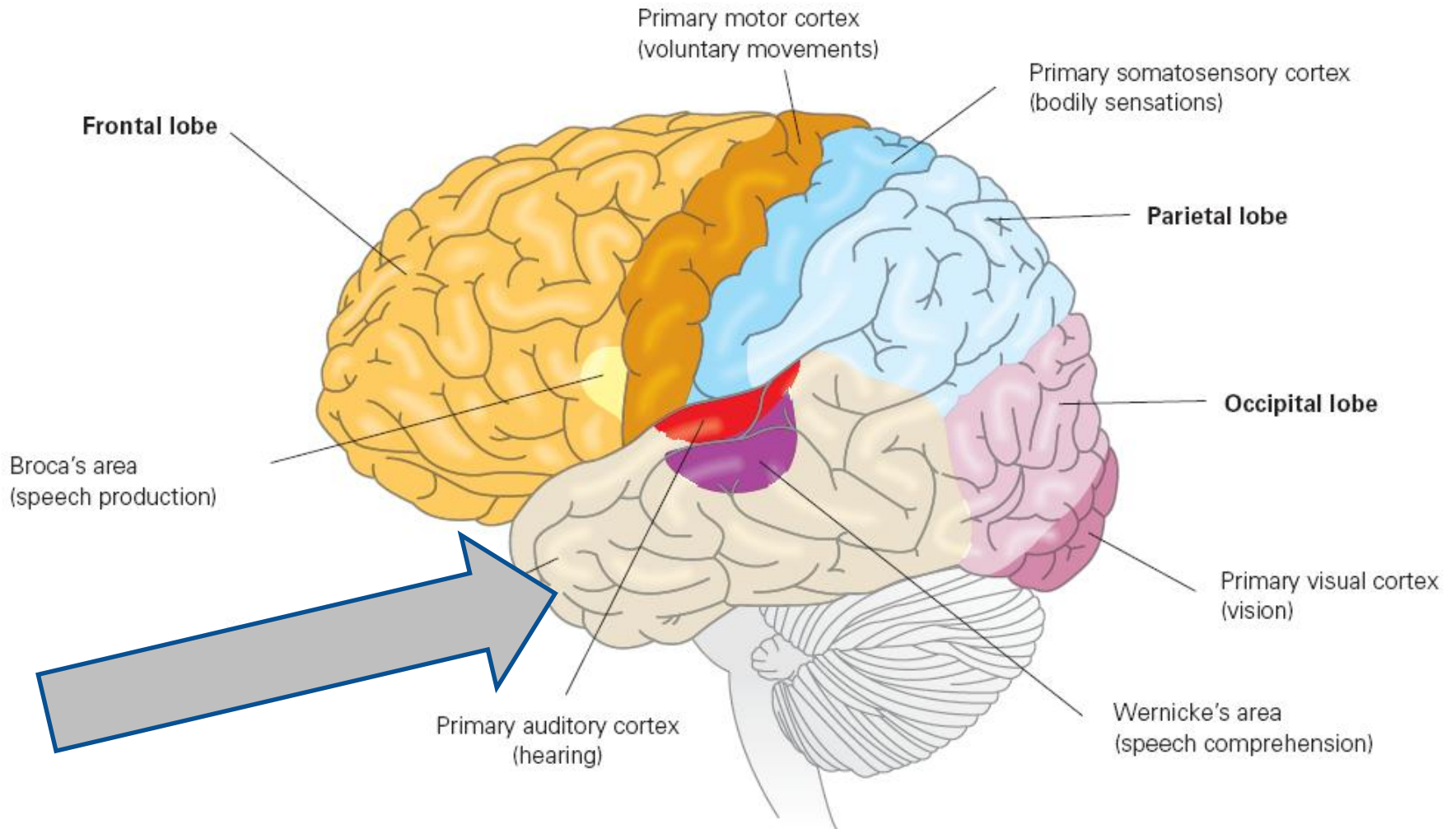


Primary somatosensory cortex

The homunculus man



The temporal Lobe



The temporal Lobe

- **Primary auditory area**
- **Wernicke's area** speech comprehension
- Primarily associated with hearing
- Also important role in memory
- Decisions made about which features of environment we will remember
- Facial recognition also performed in temporal lobe
- *(Temporal sounds like tempo, the tempo of the music)*

The temporal Lobe as a drummer?

Imagine the drummer in the temporal lobe looks into the audience and recognizes a friend's face – **facial recognition** is also a process performed by the temporal lobe.

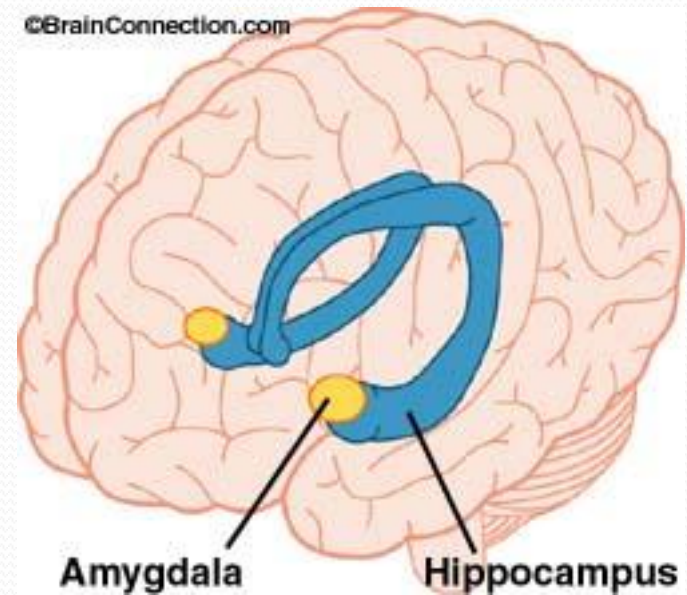
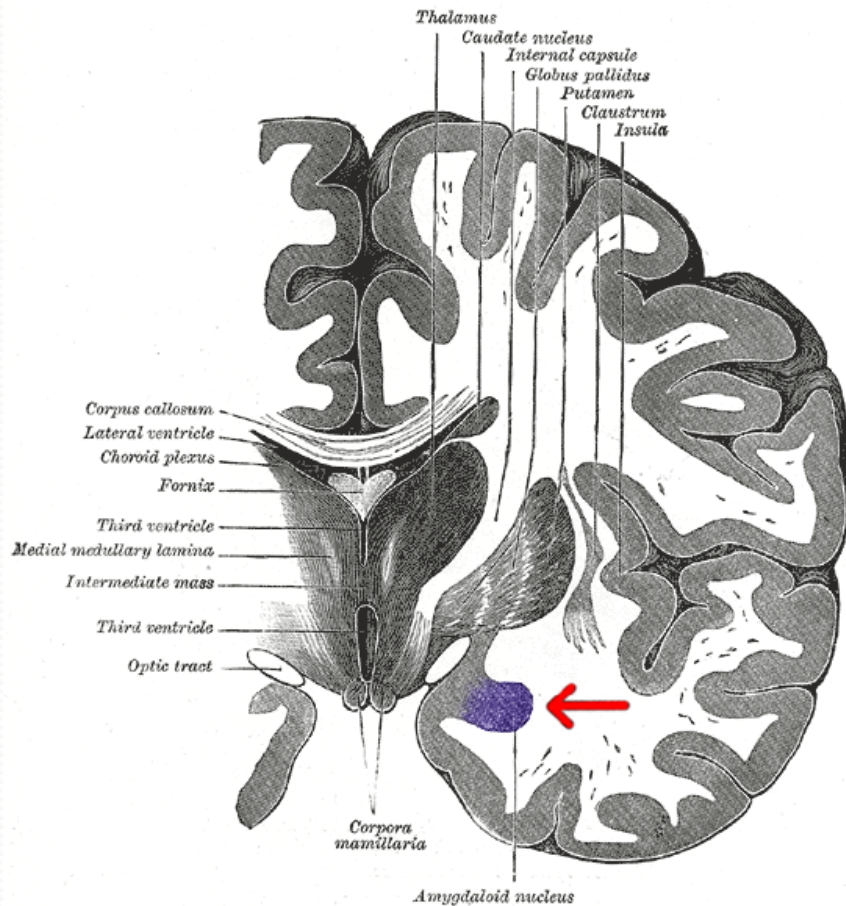
Imagine the drummer setting the **tempo of the music** in the temporal lobe – Music is sound which reminds us that the **temporal lobe processes auditory information**



Imagine the drummer is listening to the lyrics of the song. In order to understand the words he / she will use **Wernicke's area**. **Wernicke's area is involved in processing and comprehending human speech.**

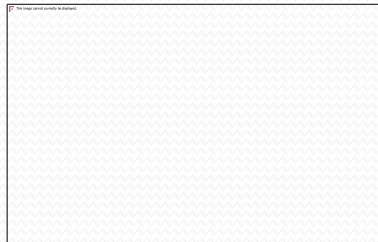
Imagine this gig was so fantastic the drummer would remember it forever. To do this he / she will use the temporal lobes. The temporal lobes are also **involved in memory** (particularly episodic, memory of one's own life events)

Deep within the temporal lobe- the amygdala



Deep within the Temporal lobe – the hippocampus

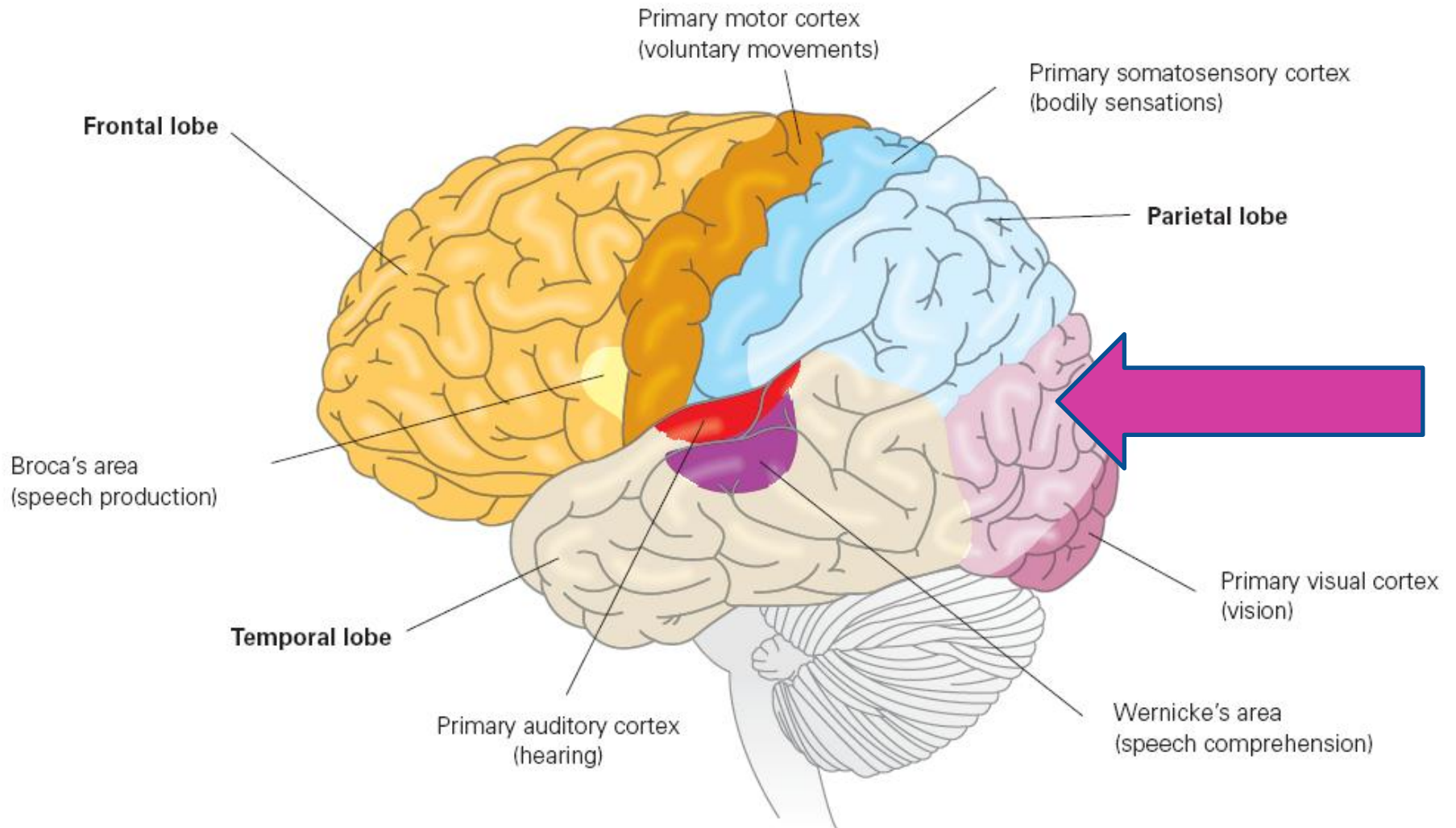
- Memory formation – not memory storage
- Damage leaves patient unable to form new long term memories
- The hippocampus lives on memory lane



Deep within the temporal lobe- the amygdala

- Mediation of fear
- Seizures involving the amygdala involve intense fear
- Damage leaves a person unable to learn a fear response through classical conditioning
- Involved in remembering the emotional significance of an event
- Damage leaves us unable to judge emotional component of facial expressions in others – i.e. angry person perceived as calm or even happy

The Occipital Lobe



The Occipital Lobe

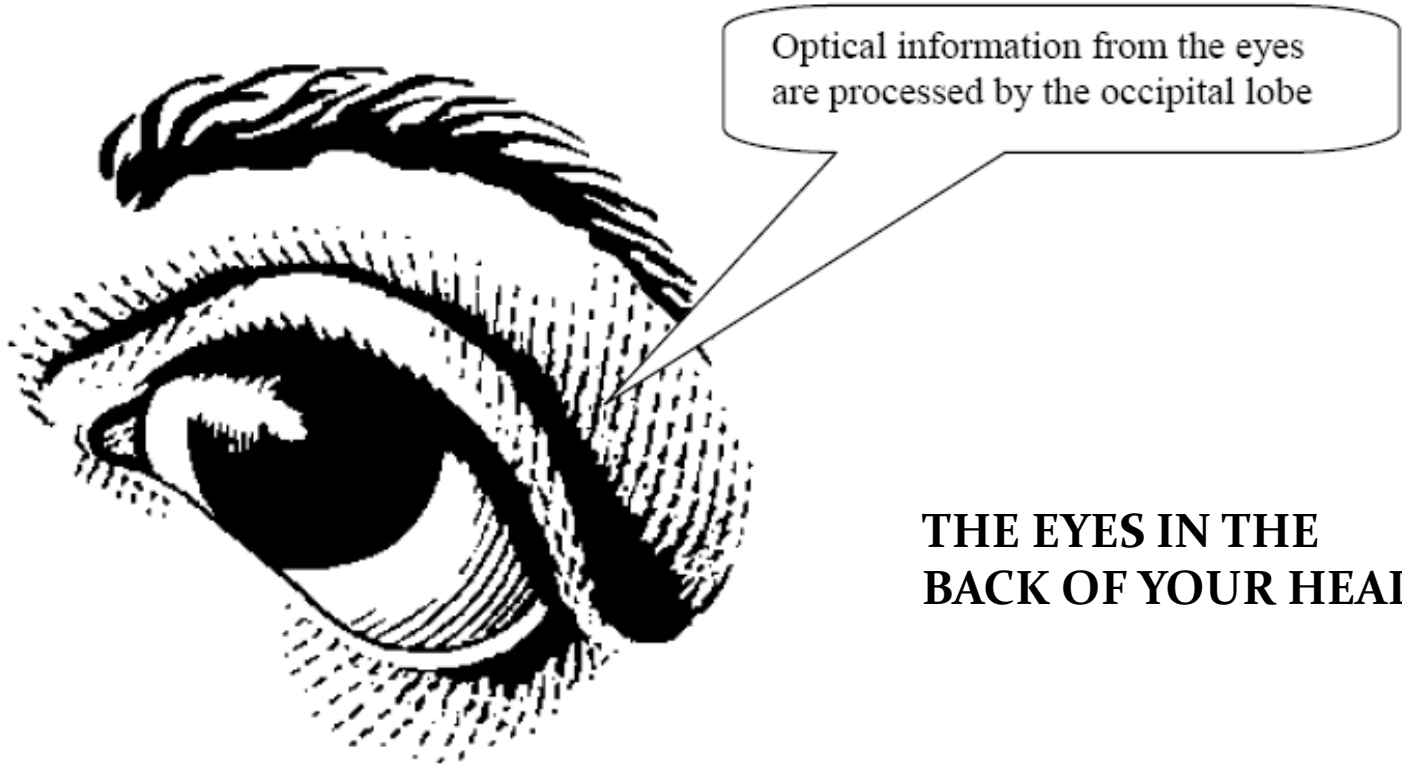
- **Primary visual area**
- Visual cortex at bottom of occipital lobe
- Other areas visual association areas – identifying objects etc.

- *(Occipital sounds like optical, optical relates to vision)*

The Occipital Lobe as an eye?

The occipital lobes process **visual information**.

Occipital sounds like Optical – Optical reminds us of the eyes!



**THE EYES IN THE
BACK OF YOUR HEAD!**



MAKE A BRAIN BALL in pairs!

Does it show:

- The 4 lobes (car, party, drummer, eye)
- Primary role of each lobe
- **Primary motor cortex** – movement
- **Broca's area** speech production
- **Primary Somatosensory cortex**
- **Primary auditory area**
- **Wernicke's area** speech comprehension
- **Primary visual area**
- Visual cortex at bottom of occipital lobe