

Supporting people with epilepsy

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Welcome to the Brain

CONTROL CENTRE that's in charge of everything we do - from heart beat to memory storage.

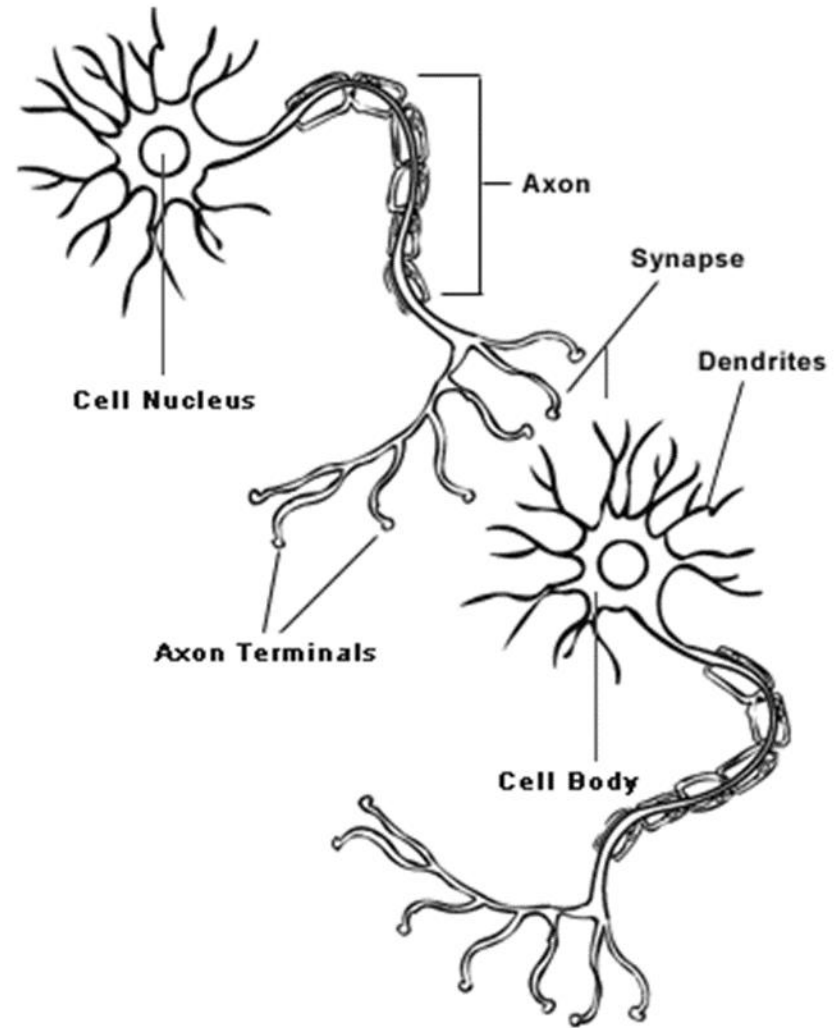
Contains about 85,000,000,000 **NEURONS**, specialised cells communicating via **ELECTRICAL & CHEMICAL SIGNALS**

Links neuron groups via long connections called **AXONS** to form **NEURAL CIRCUITS** which are organised differently in discrete **BRAIN REGIONS** carrying out specific tasks.

Contains support cells, **GLIA**, which provide & maintain optimal environment in which neurons can grow & interact.

Different regions **INTERCONNECT** to co-ordinate actions – such as guiding motor skills using visual information.

Welcome to the Brain



Cerebrum

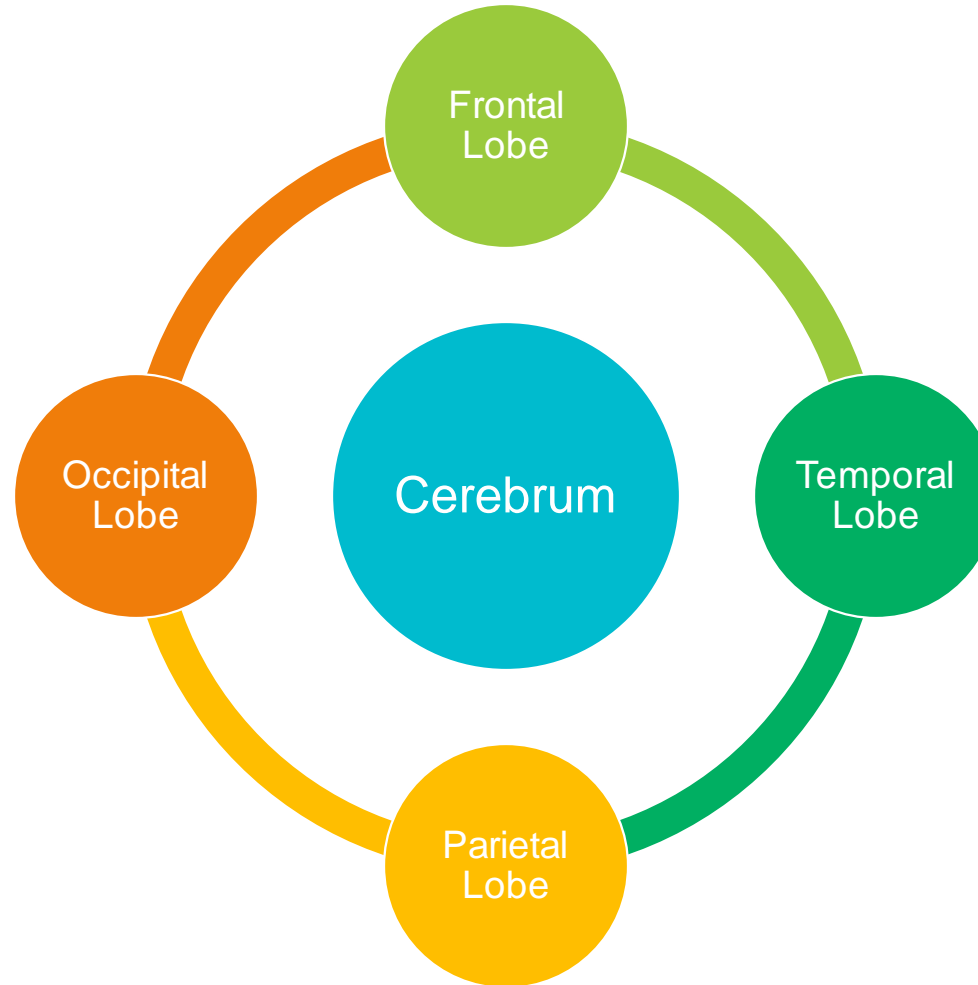
Is divided into **2 SYMMETRICAL HALVES** by a deep longitudinal cleft.

These halves are connected by the **CORPUS CALLOSUM**.

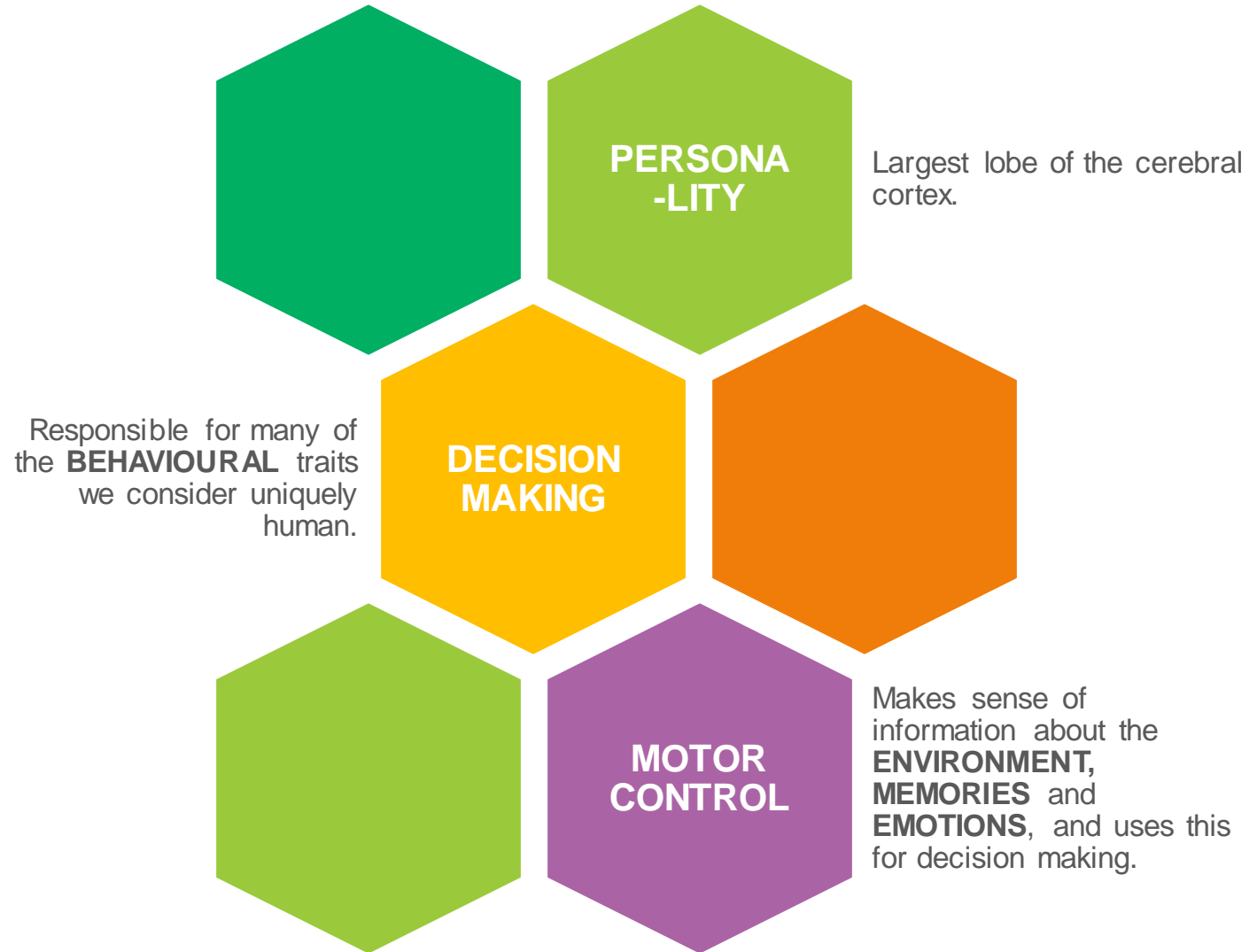
The surface of the cerebrum shows winding rounded ridges – **GYRI CEREBRI** – which are separated from one another by deep furrows.

Cerebrum

The cerebrum is subdivided into the following **FOUR LOBES**:



Frontal Lobe



Frontal Lobe

- Maintains **CONNECTIONS** to nearly every other part of the brain
- **FILTERS** vast amounts of information to ensure we only focus on the relevant – without it, we wouldn't have much of an attention span.
- Provides us with **WORKING MEMORY**, which keeps relevant information available for a short time to make complex decisions.

Temporal Lobe

The temporal lobe...

... houses...

- memories
- emotions
- language comprehension

... contains...

- hippocampus
- primary auditory cortex
- Wernicke's area

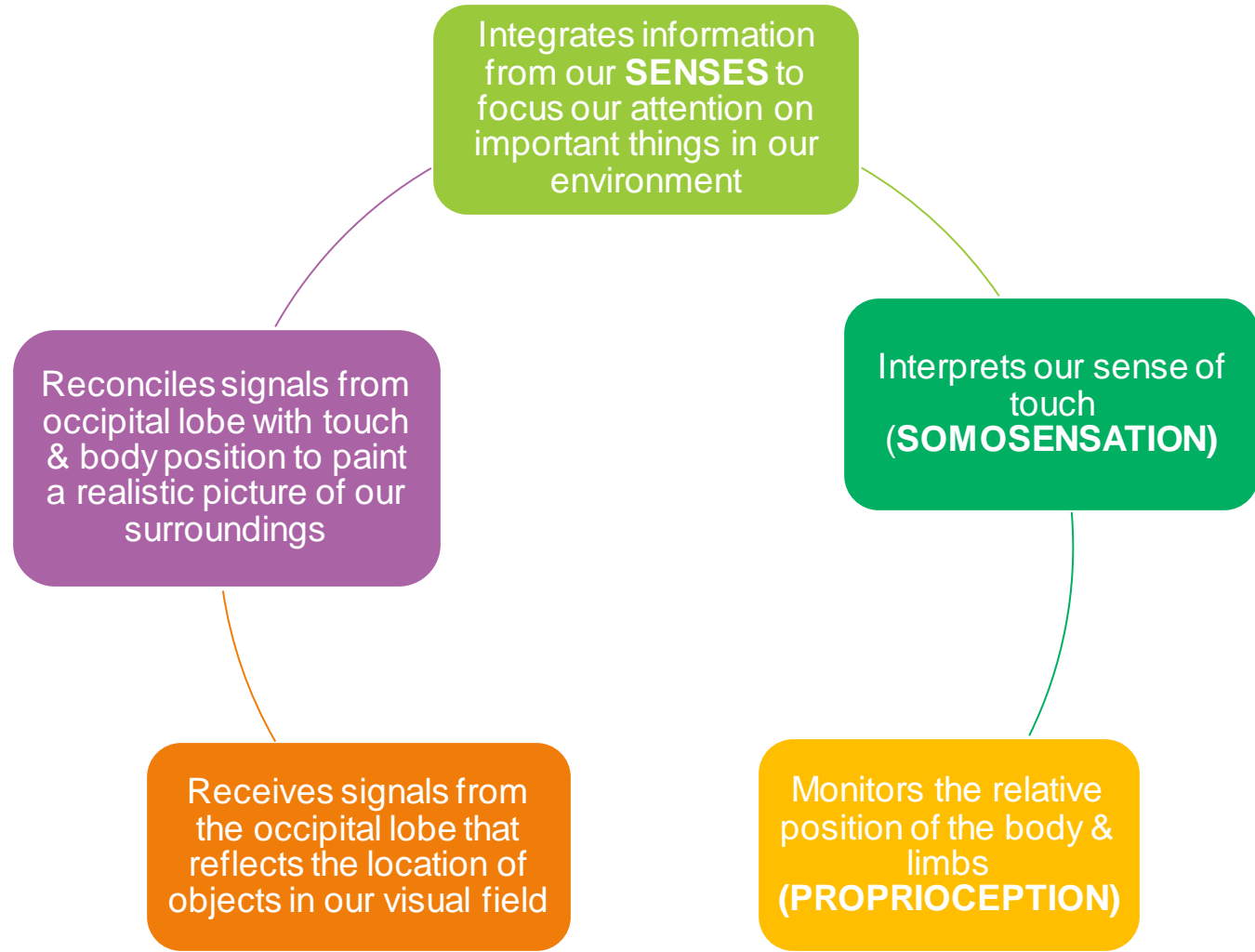
... is key for...

- recognition of objects, places and people

Temporal Lobe

- Information through the brain is funnelled through the **ENTORHINAL CORTEX** of the temporal lobe and into the hippocampus to create memories.
- The temporal lobe **LINKS WORDS** – written or spoken – to their semantic meanings.

Parietal Lobe



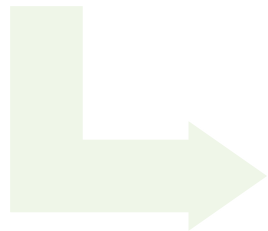
Occipital Lobe

RETINA
(in the eye)

- Bears some of the burden of detecting colours, edges and movement in our field of vision
- Sends visual information to the thalamus



THALAMUS



OCCIPITAL LOBE

- Decodes **VISUAL SIGNALS**
- Informs us about **WHERE, HOW & WHAT** we are seeing

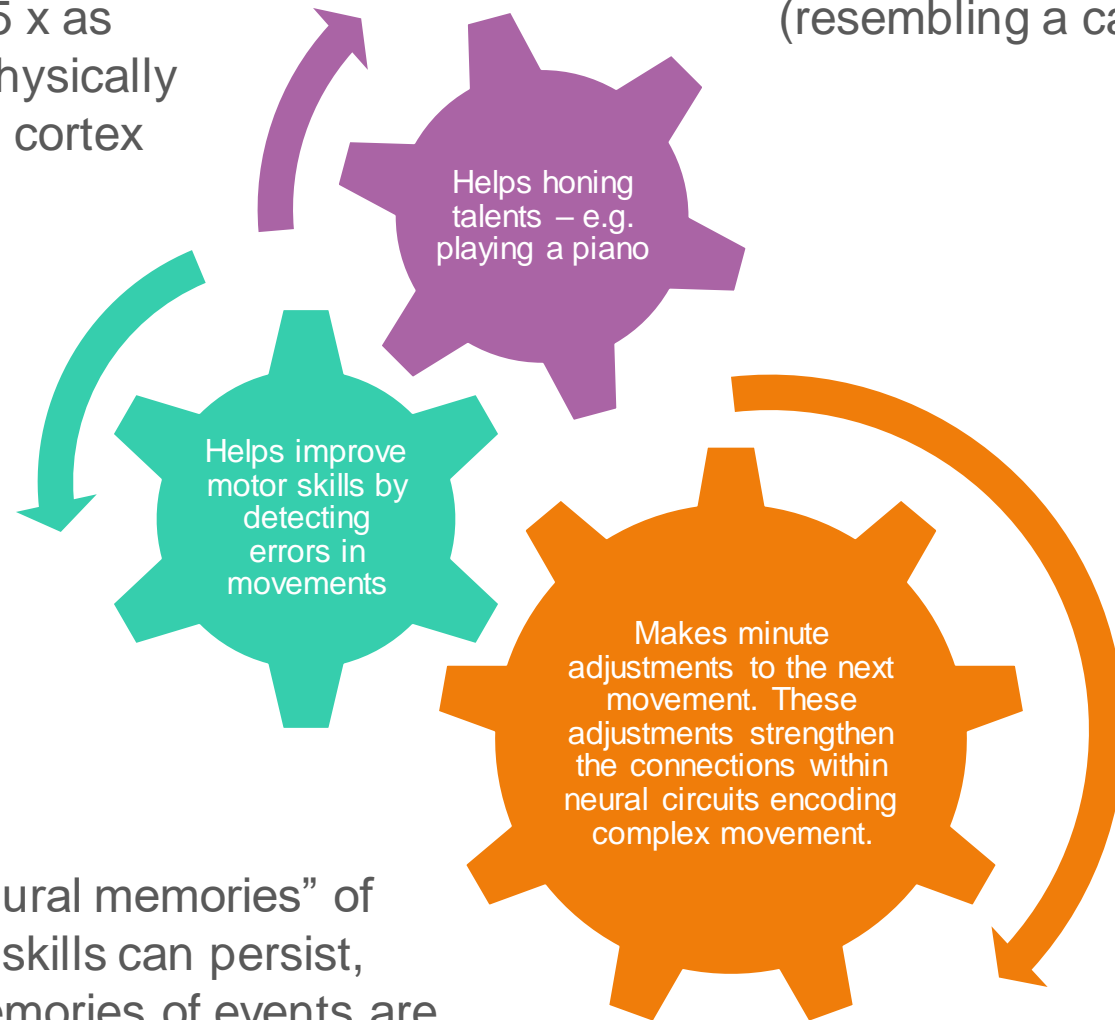
Occipital Lobe

- The **PRIMARY VISUAL CORTEX** is the first part to receive visual information
- **NEURONS** in this area detect high-contrast edges and their orientations, and motion
- Information is relayed through the rest of the occipital lobe either
 - up towards the parietal lobe for a response based on motion
 - or**
 - down towards the temporal lobe to recognise objects

Cerebellum ("Little Brain" in Latin)

Contains **70 BILLION NEURONS** – 5 x as many as the physically larger cerebral cortex

Highly convoluted (resembling a cauliflower)

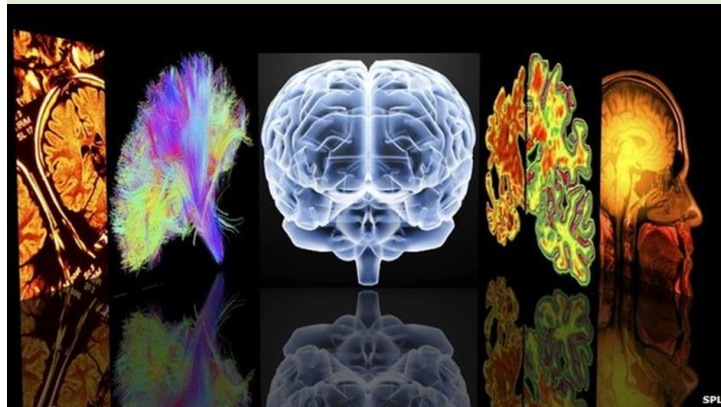


These “procedural memories” of learned motor skills can persist, even when memories of events are disrupted by damage to the hippocampus.

Pons & Medulla oblongata

Pons

- Contains the **LOCUS CERULEUS**, an area important for **ATTENTION**.



Medulla oblongata

- Houses breathing control centres, including an area called the **PRE-BOTZINGER COMPLEX**, which generates breathing rhythm.

Corpus Callosum

Corpus callosum

- Thick bundle of neural connections linking **left and right hemispheres** cerebral cortex
- Biggest superhighway in the brain

Axons

- Neural wires that neurons in either hemisphere stretch through the corpus callosum to **communicate with neurons** in the opposite hemisphere.

Corpus Callosum

Glia

- Specialised cells that wrap fatty deposits, known as **myelin**, around axons to provide insulation for **electrical signals** (akin to the plastic insulating cables around electrical wires)

White matter

- There is so much fatty myelin in the corpus callosum that is white in appearance
- **Superhighway** for information

Grey matter

- Contains cell bodies of neurons
- Where computations are made in the brain

Thank you!