2.1

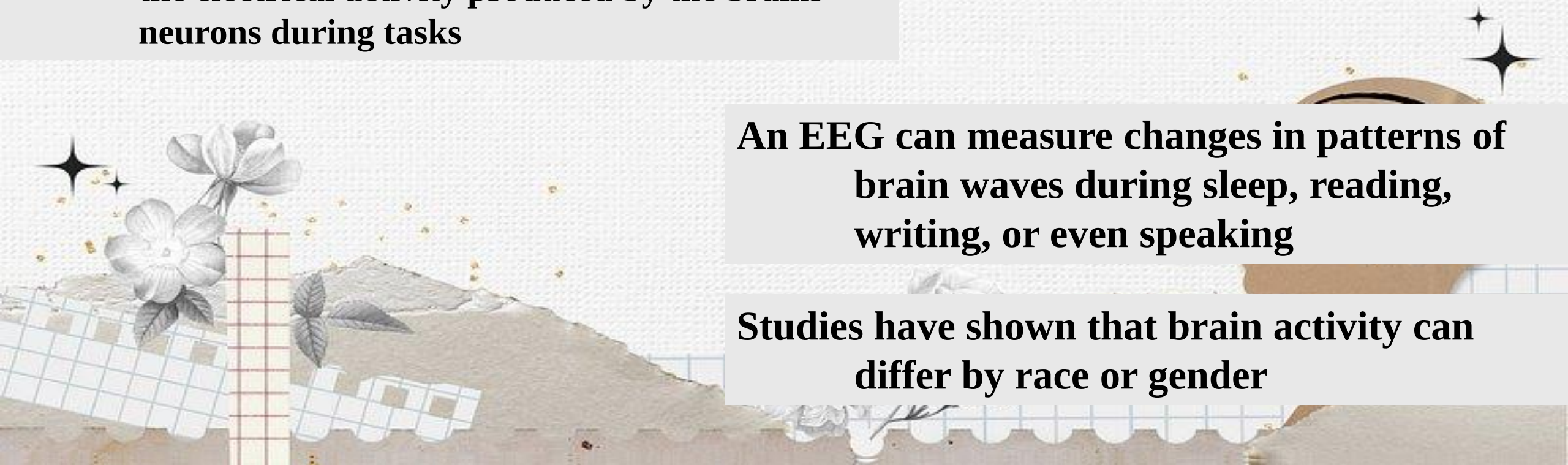
Your Brain: A User Manuel

As a Young Psychologist, I will be able to…

Study of the Brain

Some of our earliest knowledge about how the brain works came from past brain injuries

Electroencephalography (EEG)- Placement of electrodes on a person's head & then measuring the electrical activity produced by the brains neurons during tasks



An EEG can measure changes in patterns of brain waves during sleep, reading, writing, or even speaking

Studies have shown that brain activity can differ by race or gender

Structure…MAP IT OUT!!

Computed Tomography (CT)- **X-rays of the brain**

Magnetic Resonance Imaging (MRI)- **shows small details in an X-ray.**

Function…MAP IT OUT!

Electroencephalogram (EEG)- Records the electric activity of the cortex of the brain

Position Emission Tomography (PET)- An injection of radioactive glucose & the study of how the brain uses it.

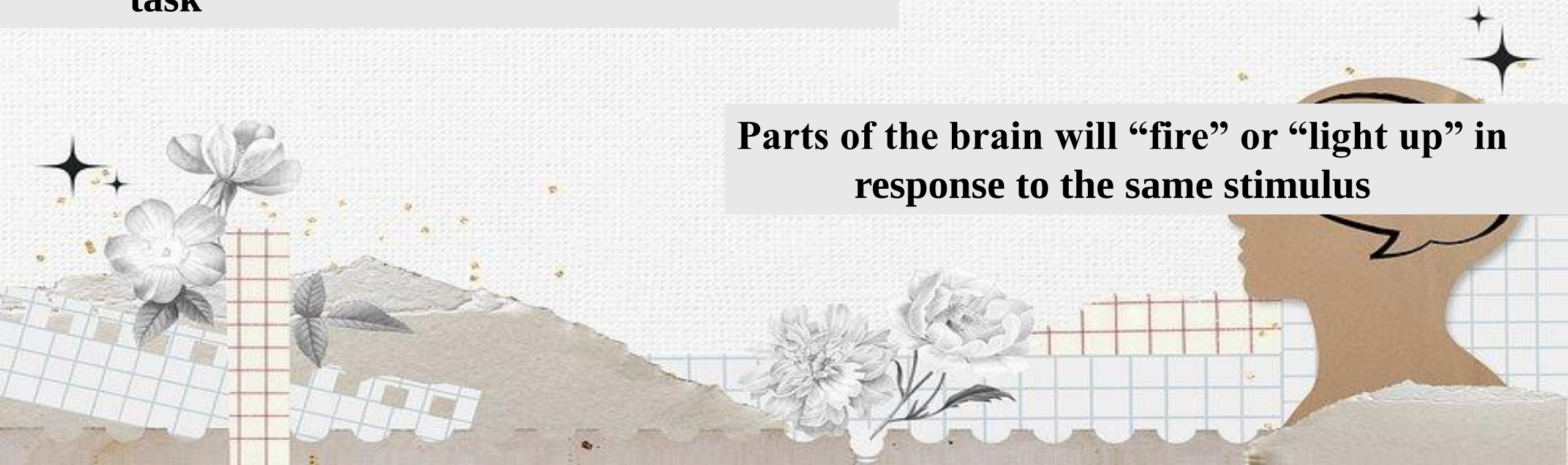
Functional MRI (fMRI)- measures the changes of oxygen in the blood.

MRI & fMRI

An MRI is used to examine a picture of the brain's anatomy

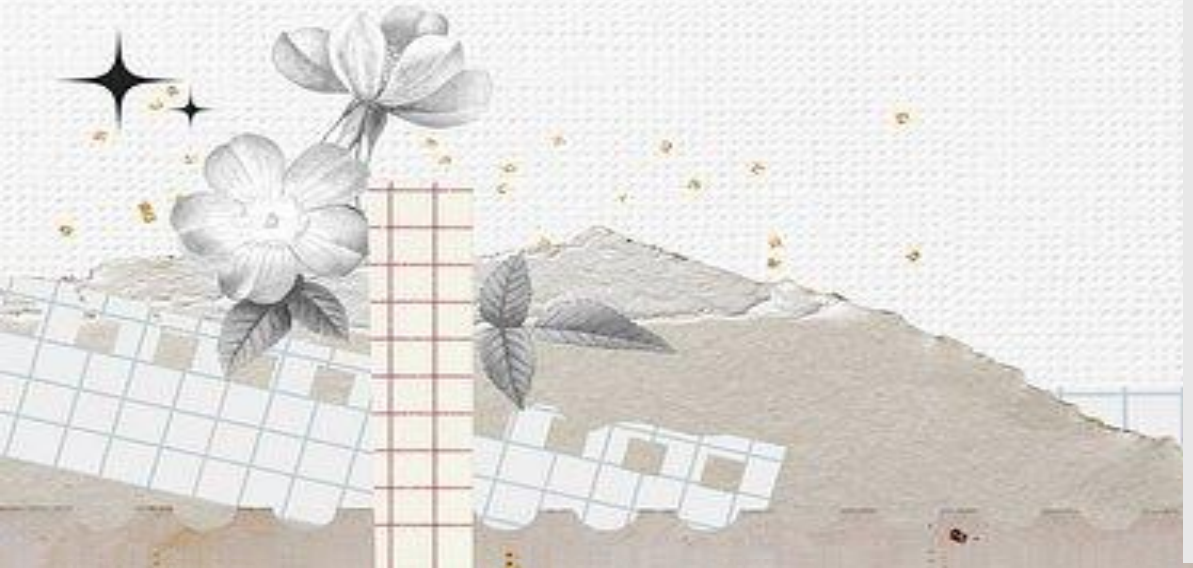
An fMRI measures small changes in blood flow that the brain experiences while doing a task

Parts of the brain will "fire" or "light up" in response to the same stimulus



Case Study

One study using fMRI data examined patterns of brain activity in young kids as they looked at math equations where the answer shown might be correct or not.



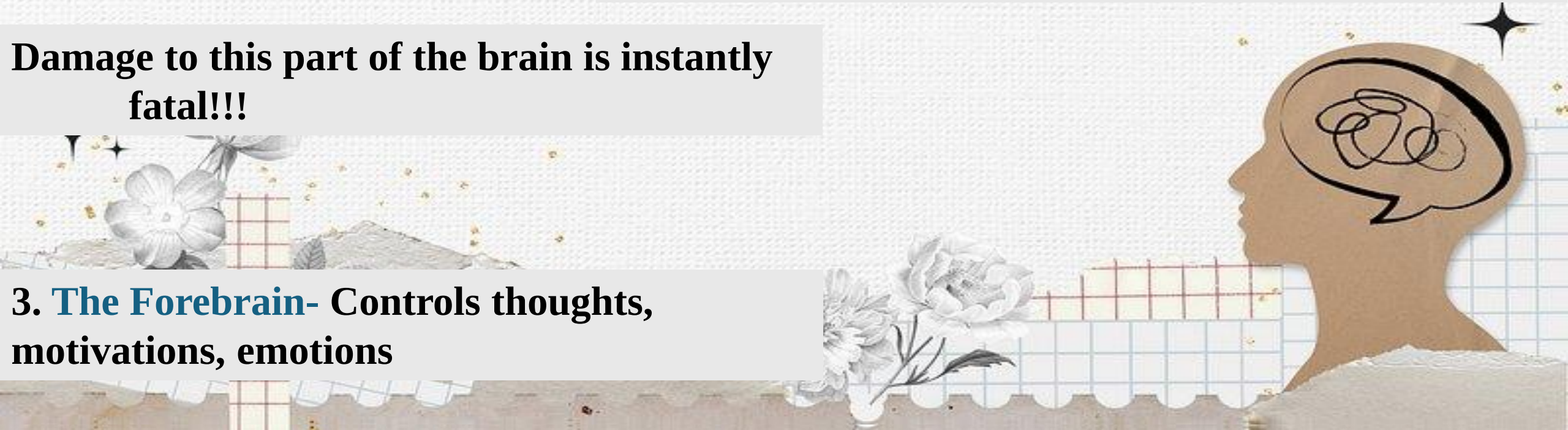
Children who were high in math anxiety showed less activity in a particular part of the brain that's responsible for mathematical reasoning, showing the part of the brain that should have been evaluating the answer wasn't really engaging.

Three Parts of the Brain

1. The **Hindbrain-** This area relays information & controls muscle movement & balance

2. **The Midbrain-** This area contains a network of neurons that maintain consciousness, regulate behavior, & alerts other parts of the brain

Damage to this part of the brain is instantly fatal!!!



3. **The Forebrain-** Controls thoughts, motivations, emotions

THE FOREBRAIN & THE LIMBIC SYSTEM

The Thalamus- **Works as a relay system for sensory information**

The Hypothalamus- **Controls body temperature, thirst, hunger, sleeping & waking up**

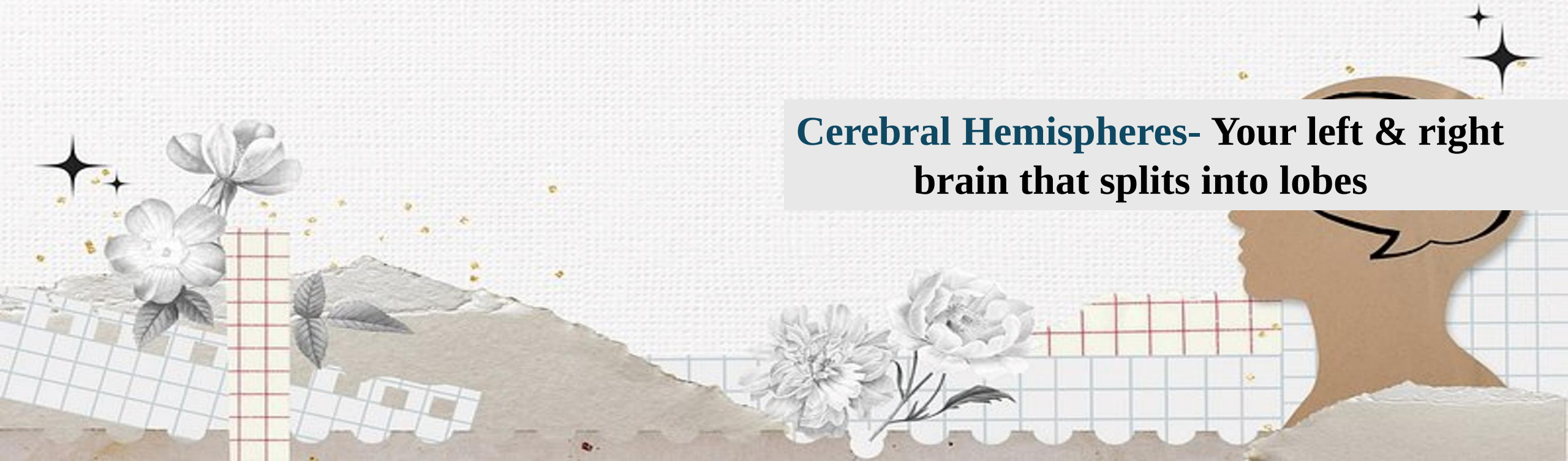
The Hippocampus- **Forms our long-term memories before storage**

The Amygdala- **Our fear factory & our memory of fear**

MORE FOREBRAIN

The Cortex- Higher thought processes & interprets sensory input

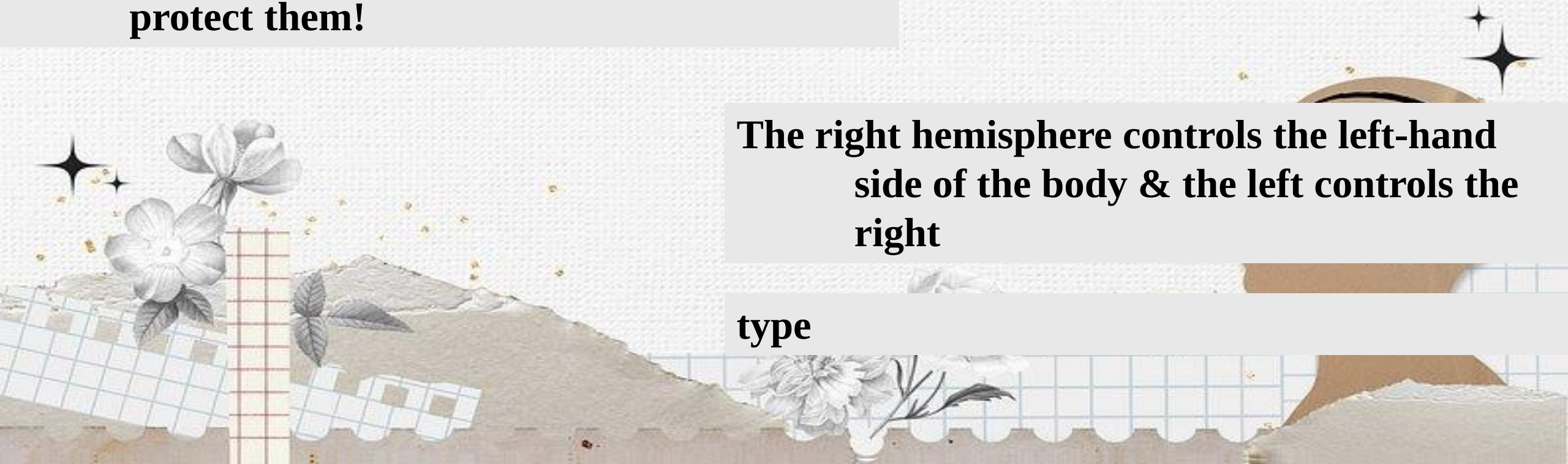
Cerebral Hemispheres- Your left & right brain that splits into lobes



Cerebral Hemispheres

The brain is divided between these two hemispheres & it makes up 80% of the brains weight

These hemispheres are made up of about 30 billion neurons & 9x as many glial cells to protect them!



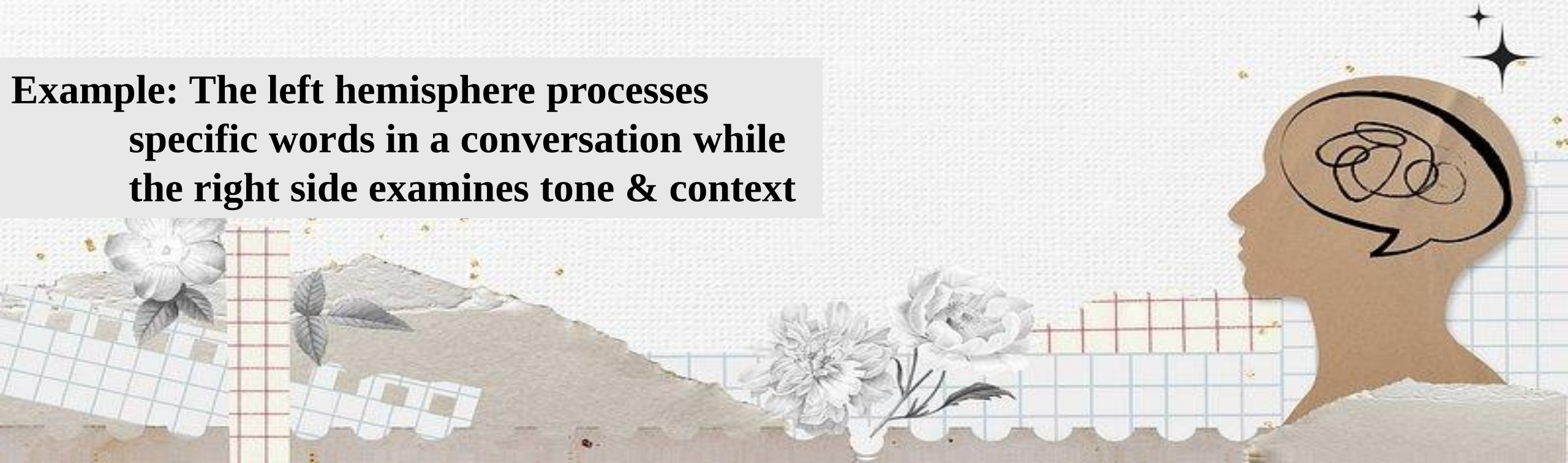
The right hemisphere controls the left-hand side of the body & the left controls the right

type

Hemispheres

Corpus Callosum- Large bundle of more than 200 million nerve fibers located above the thalamus

Example: The left hemisphere processes specific words in a conversation while the right side examines tone & context



THE LOBES

Occipital Lobe- Rear part of brain, contains our visual centers

THE LOBES

Parietal Lobes- Top & back part of the brain- centers for touch, temperature, & body position

***** Also holds the Somatosensory Cortex**

THE LOBES

Temporal Lobes- Behind your temples-sense of hearing & meaningful speech!

THE LOBES

Frontal Lobes- Front Top part of brain!- Higher mental processes, decision making, & meaningful speech!

Motor Cortex- Sends motor commands to your muscles

PARTS OF THE HINDBRAIN

The Medulla- **Responsible for breathing, swallowing, & heart rate**

The Pons- **Involved in sleep, dreaming, left-right body coordination, and arousal**

MORE HINDBRAIN

The Reticular Formation (RF)- Sleep, alertness, & the ability to pay attention to certain information in your surroundings.

Cerebellum- controls all involuntary, rapid, fine motor movement.

Association Areas!

* Areas of each lobe of the cortex in charge of coordination & interpretation of info!

Broca's Area- Devoted to production of speech. Specifically, how to speak smoothly & fluently.

Association Areas!

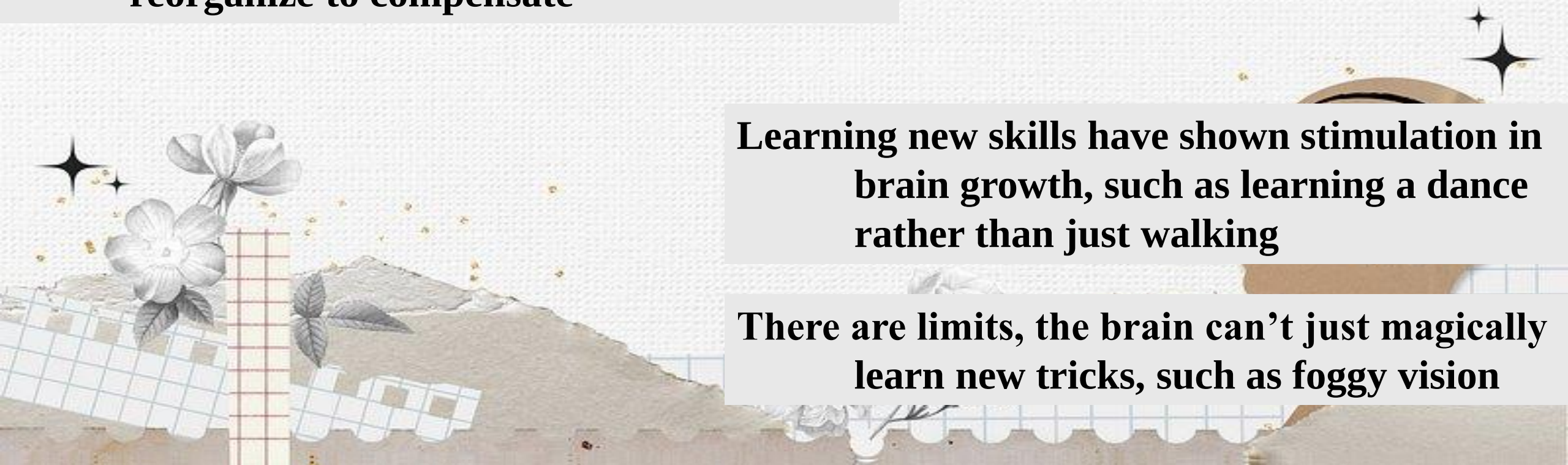
Wernicke's Area- The understanding of words

Spatial Neglect- Where damage to right parietal & occipital lobes cause a person to ignore everything in their left field.

Neuroplasticity

The brain's ability to adapt to our changing needs, based on experience.

When the brain is damages, other parts of the brain take over their functions, letting it reorganize to compensate



Learning new skills have shown stimulation in brain growth, such as learning a dance rather than just walking

There are limits, the brain can't just magically learn new tricks, such as foggy vision

More Types of Change

The brain can change due to experience. Blind people who use Braille have their parietal lobe expand- the part dedicated to touch.

Story-telling to small children has shown more activation in the Broca's area.

As we grow and learn, the brain creates new neural connections, making processing of information slow & inefficient