



# ANGER AND THE BRAIN

Supports Week 1 of your journal: Understanding Anger

## HOW THE BRAIN REACTS TO THREAT

Anger starts in the brain before we are aware of it. Knowing how the brain reacts to a threat helps explain **trigger thoughts**, the first thoughts that flash through your mind when something upsets you, and why a **pause** before you respond makes such a difference.

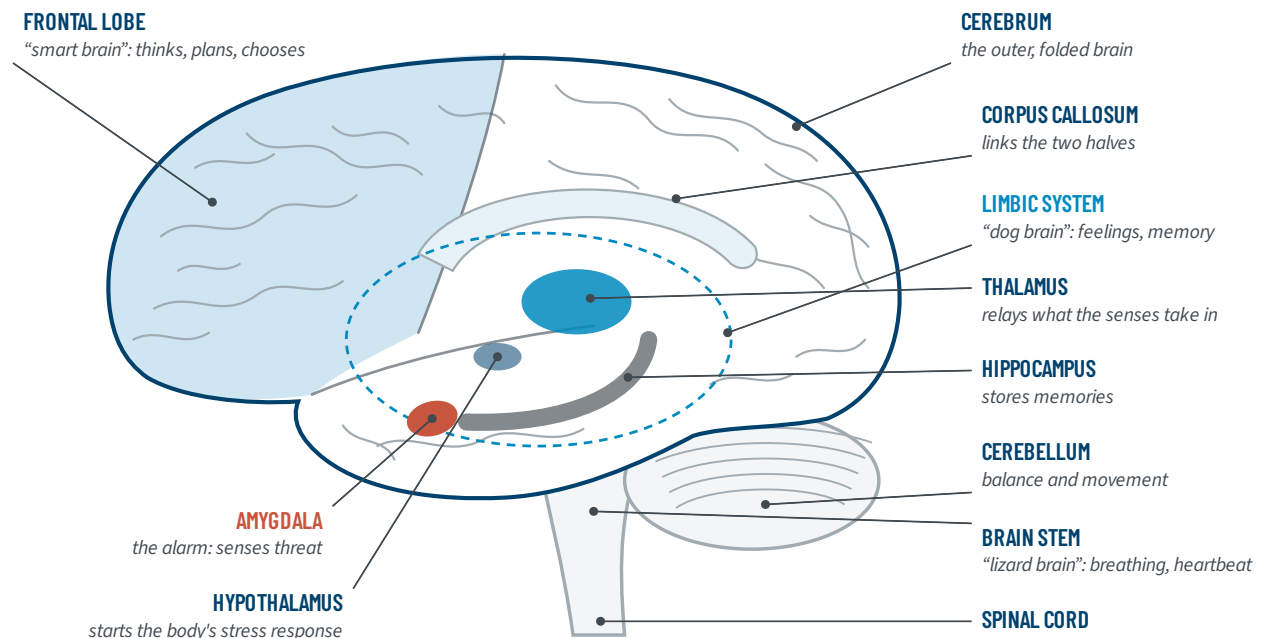
### Three Parts of the Brain

A simple way to picture the brain is in three parts, from the oldest to the newest:

The “lizard brain”: the brain stem and cerebellum. Keeps us alive without our having to think about it: breathing, heartbeat, balance and movement.

The “dog brain”: the limbic system. The feeling brain. It holds our emotions and memories, and it contains the brain’s alarm, the **amygdala**. It reacts fast.

The “smart brain”: the cerebrum, especially the **frontal lobe**. The thinking brain. It plans, solves problems, weighs consequences and makes choices. It is slower.



The three parts are always working together. The picture is a simplification, but it shows something important: the feeling brain can react before the thinking brain has caught up.

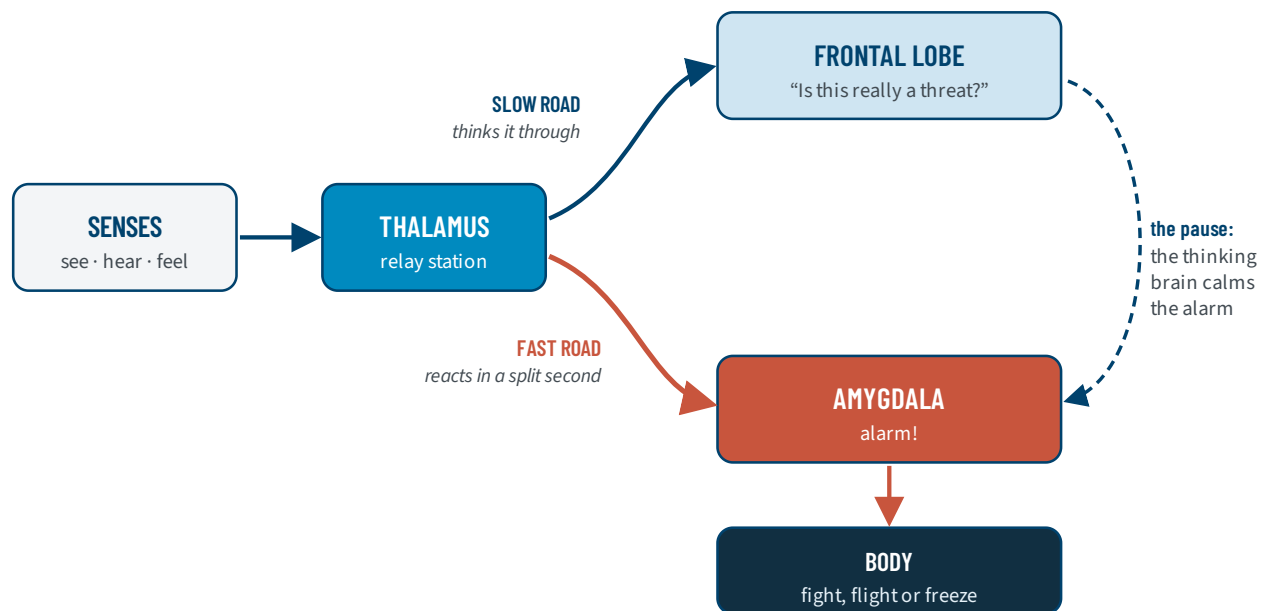
## The Limbic System

The limbic system sits deep in the middle of the brain. Four of its parts matter most for anger:

- **Thalamus:** a relay station. It takes in what the senses see, hear and feel, and passes it on.
- **Amygdala:** the alarm. Named for the Greek word for “almond” because of its shape, it scans for danger and sets off the threat response.
- **Hypothalamus:** turns the alarm into action in the body. It releases stress hormones such as adrenaline and cortisol, which make the heart pound and the muscles tense.
- **Hippocampus:** stores memories, including memories of past hurts. It helps the amygdala decide what counts as a threat.

## TWO ROADS TO THE ALARM

When something happens, the message travels two roads at once.



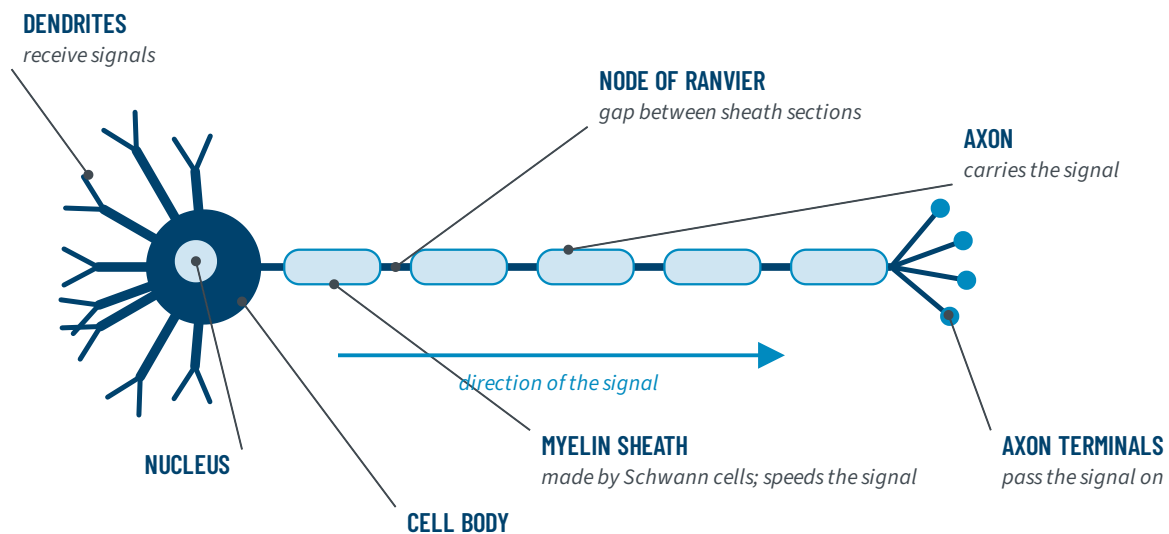
- **The fast road** goes straight from the thalamus to the amygdala. It takes a split second. The amygdala does not stop to check the facts. If something looks like a past hurt or a threat, it sounds the alarm, and the body gets ready to **fight, flight or freeze**.
- **The slow road** goes to the thinking brain first. It takes longer, but it can ask, “Is this really a threat? What else could be going on?”

**This is where trigger thoughts come from.** They arrive on the fast road, before the thinking brain has had its say. That is why the **pause** works: a few slow breaths give the slow road time to arrive, and the thinking brain can calm the alarm and choose a response.

The alarm can be set off by an emotional threat (being disrespected, blamed or ignored) just as easily as by a physical one. After a frightening or traumatic experience, the amygdala can become “conditioned,” so that even a small reminder sets off the whole reaction.

## NEURONS: THE BRAIN’S MESSENGERS

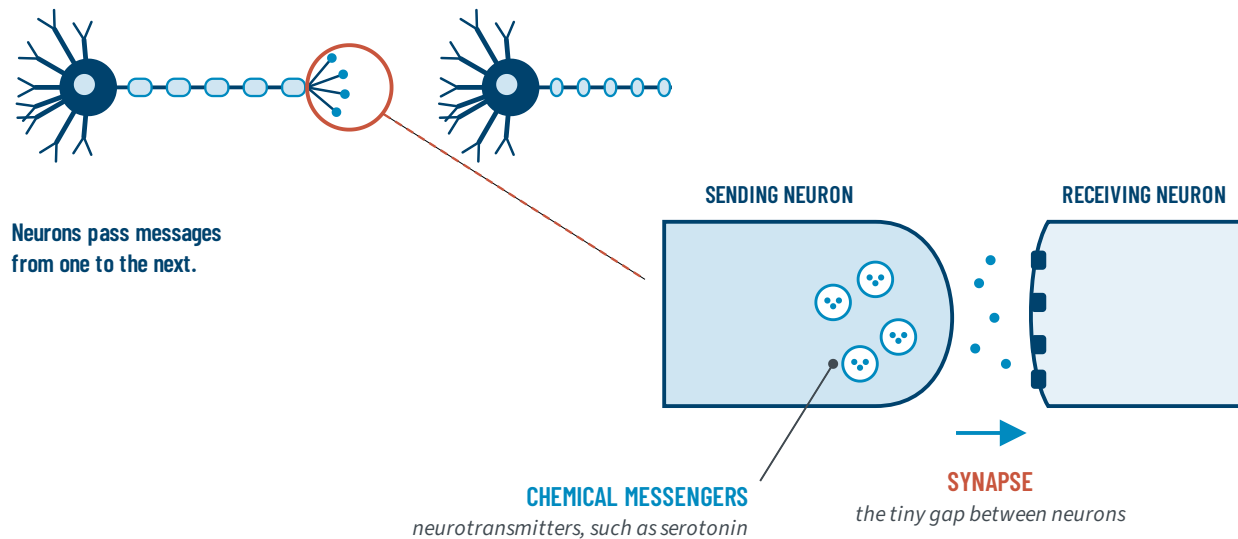
The brain is made of about 86 billion nerve cells called **neurons**. Each one passes messages to others, and together they form the pathways for everything we think, feel and do.



- **Dendrites** receive signals from other neurons.
- The **cell body** keeps the neuron alive; the **nucleus** holds its genetic instructions.
- The **axon** carries the signal away from the cell body.
- The **myelin sheath**, made by **Schwann cells**, wraps the axon like insulation on a wire and speeds the signal along. The small gaps between its sections are the **nodes of Ranvier**.
- The **axon terminals** pass the signal on to the next neuron.

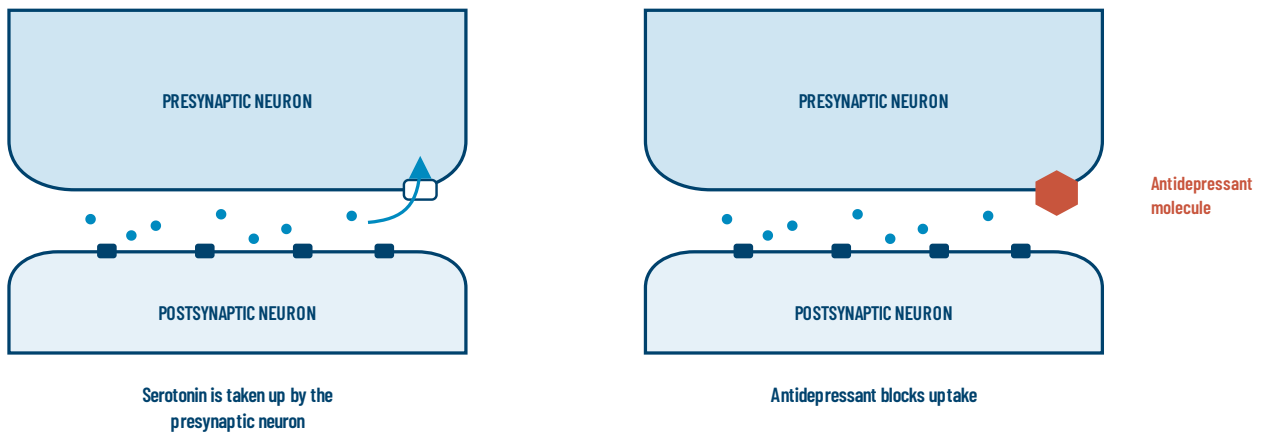
## HOW NEURONS TALK: THE SYNAPSE

Neurons do not quite touch. Between them is a tiny gap called a **synapse**. When a signal reaches the end of the axon, the sending neuron releases chemical messengers called **neurotransmitters**, such as serotonin and dopamine. They cross the gap and attach to the receiving neuron, which passes the message on.



Neurons send messages across a synapse.

*Serotonin and other neurotransmitter molecules cross the synapse*



## THE BRAIN CAN CHANGE

Every time a pathway is used, the connections along it grow stronger. Scientists sum it up as “neurons that fire together, wire together.” This is called **neuroplasticity**.

It means our habits of reacting, including the angry ones we learned when we were young, are pathways that have been used many times. It also means they can change. Each time you notice a trigger thought, pause and choose a different response, you strengthen a new pathway. With practice, the new response becomes easier and more automatic.

**In your journal:** see **Week 1: Understanding Anger**, especially Key Concept: Perception and Anger and the Brain.

*Adapted and redrawn from the original WHOA! Why Hang Onto Anger journal (2014), pp. 10–11. Aspasia Leadership, LLC DBA Break Through Learning Center.*