

The background of the slide features a bright, glowing sun in the upper right corner against a clear blue sky. Below the sky, there are several layers of soft, rolling green hills, creating a peaceful, natural landscape. The overall aesthetic is clean and modern.

Learn about EEG

By the Snedeker Lab

Hi! I'm Ron the Neuron, and today, I am going to tell you all about **EEG**!

We neurons are teeny tiny cells that make up your brain.

There are millions and millions of us in your head.

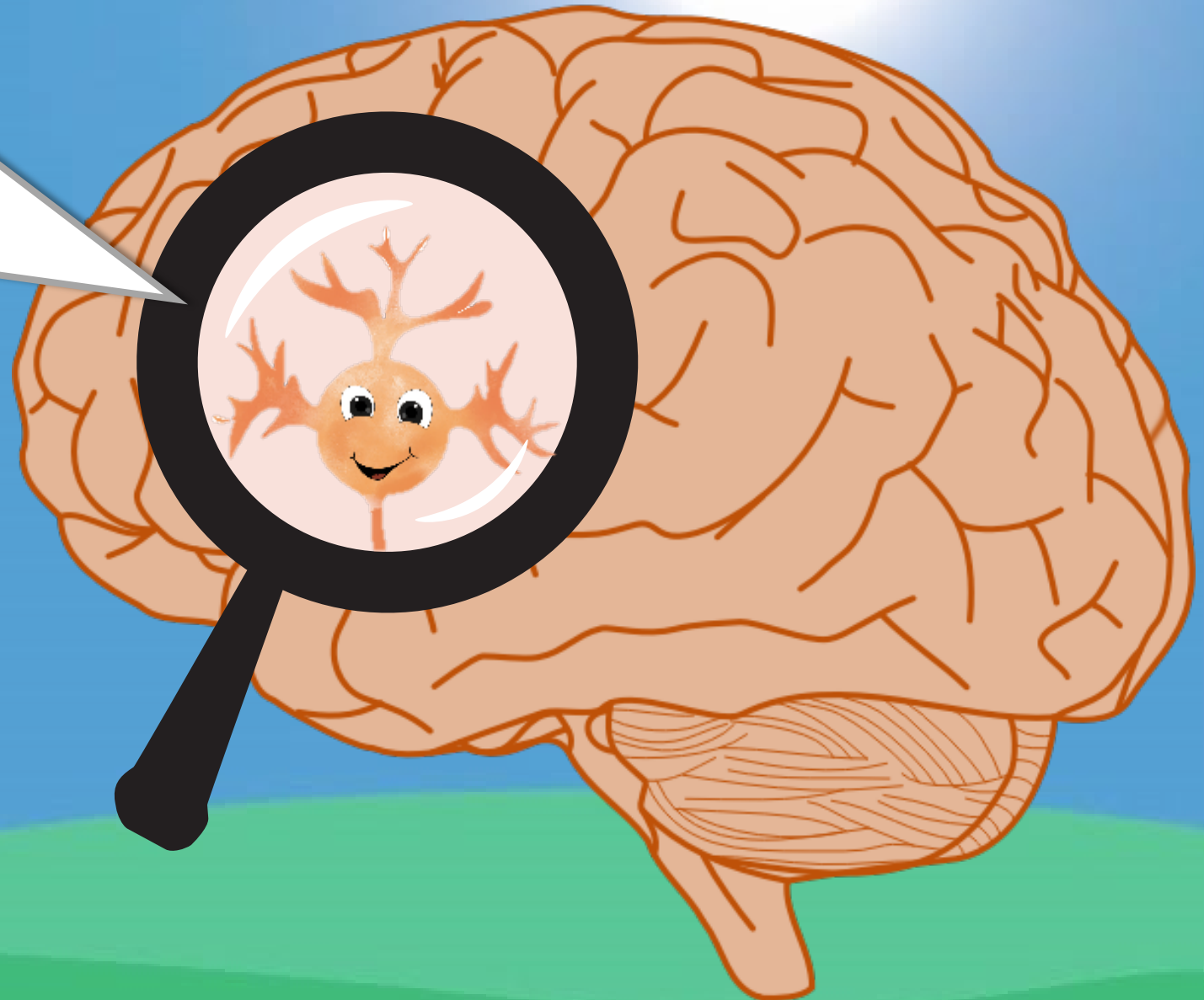
Fun Fact:

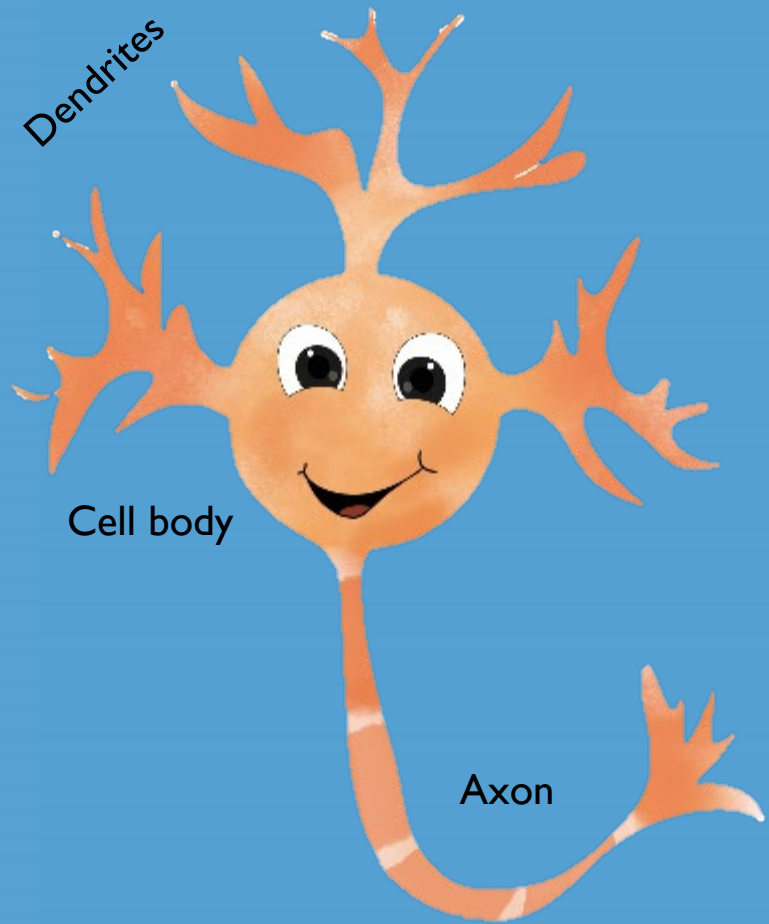
Brains have around 86 billion neurons!

EEG stands for a long word

Electroencephalography

and it's a way to look at the electrical activity in the brain.



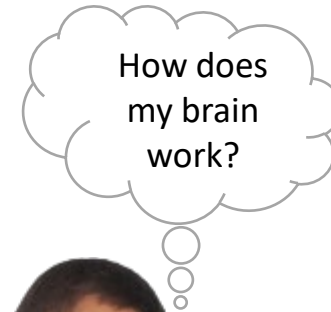


A neuron cell is made up of 3 main parts:

- The **cell body** is at the center of the cell
- **Dendrites** receive messages from other cells
- The **axon** sends messages to other cells

Our job is simple - every time you have a thought, we pass each other signals. I like to think of them as secret messages.

Your brain sends many, many messages all the time!



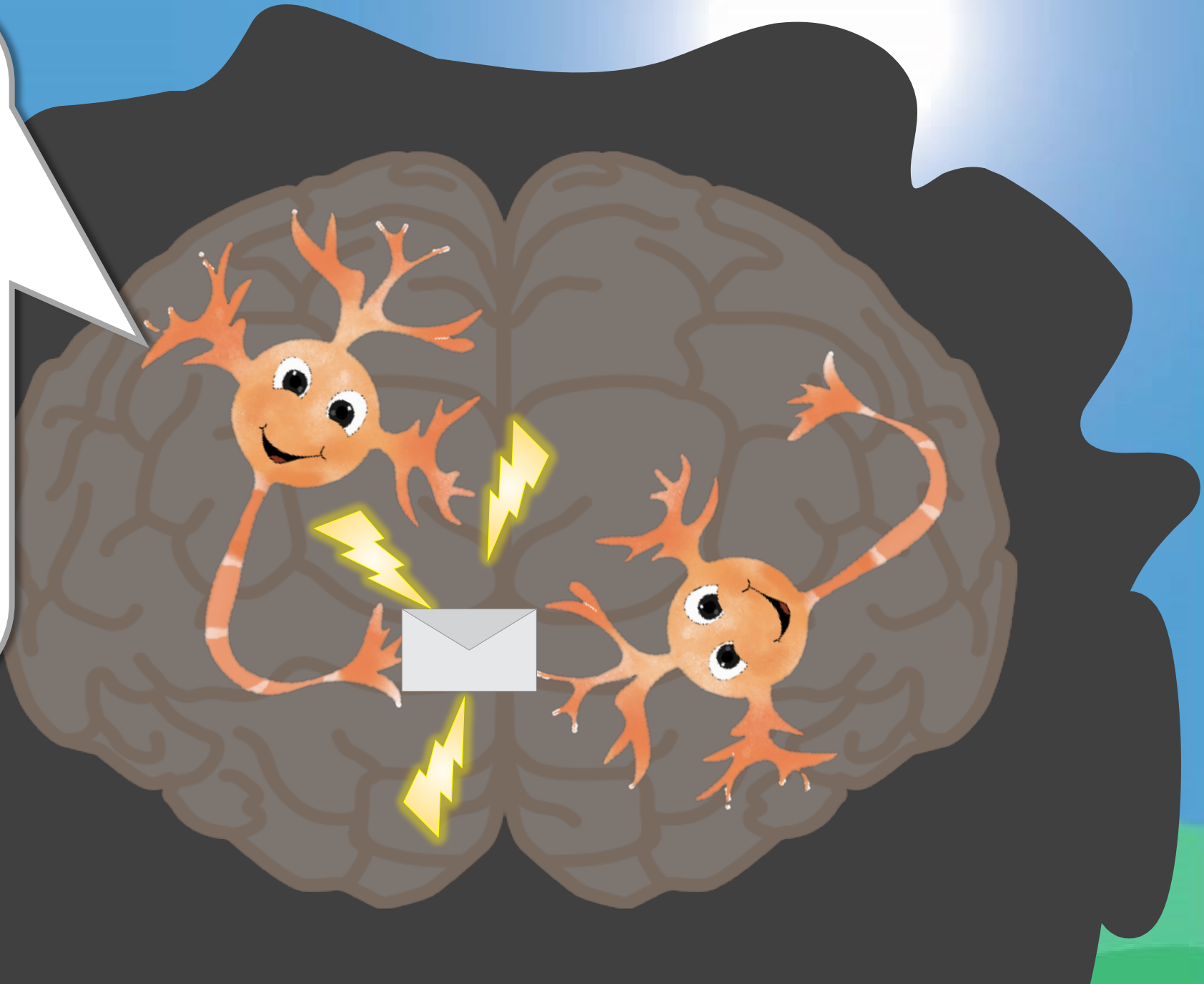
All those thoughts you are having are really us neurons chatting away!

One funny thing about us...

When we pass each other messages, we create a very tiny amount of electricity!

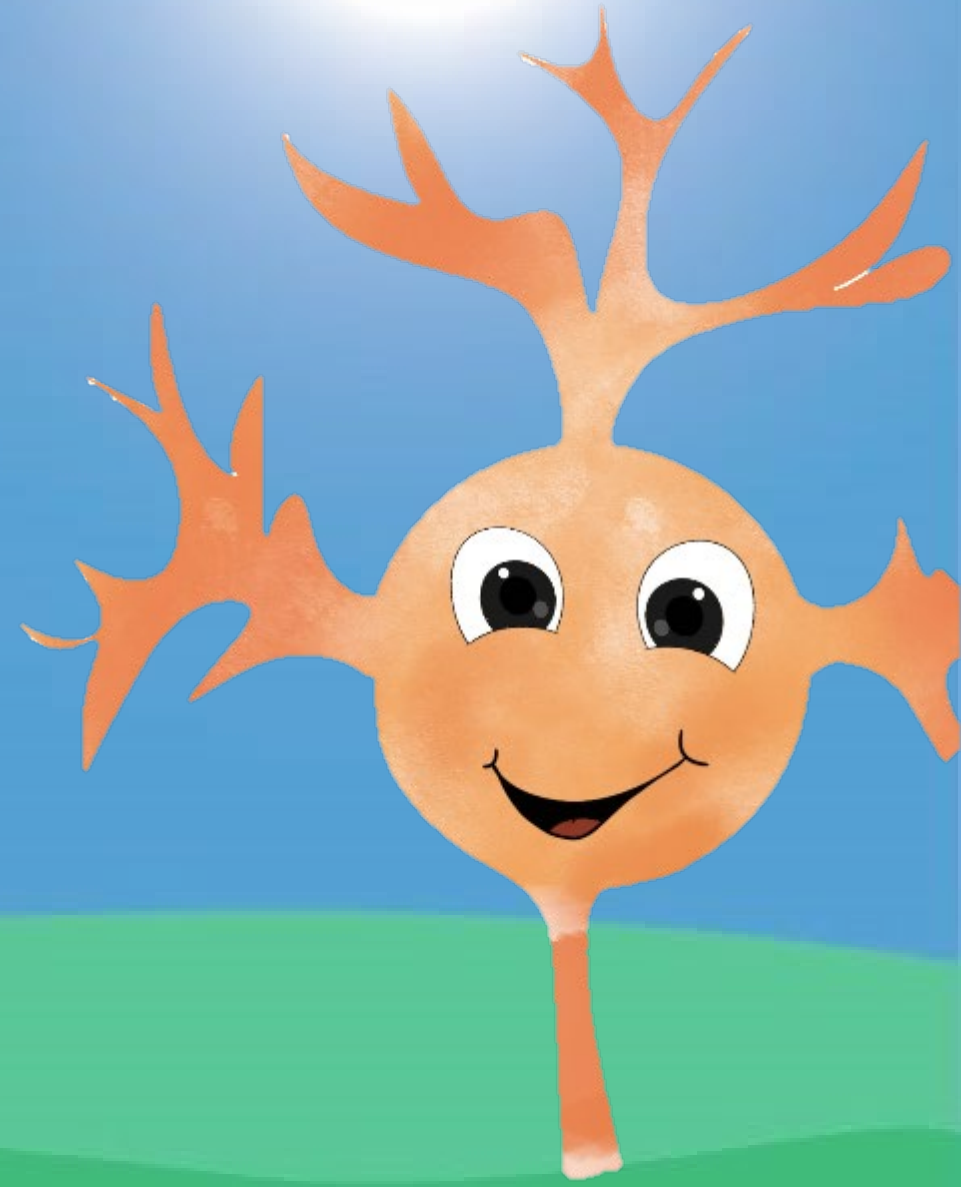
Just one little neuron makes only a tiny bit of electricity, but when enough of us send a message at the same time, we can make enough electricity that brain scientists can sense it all the way at the top of your head.

It's amazing what neurons can do when we work as a team!



Brain scientists are very interested in seeing how and when we neurons send each other messages. Studying this helps them understand how the brain works!

One way that they can study these messages is by using an **EEG machine**.



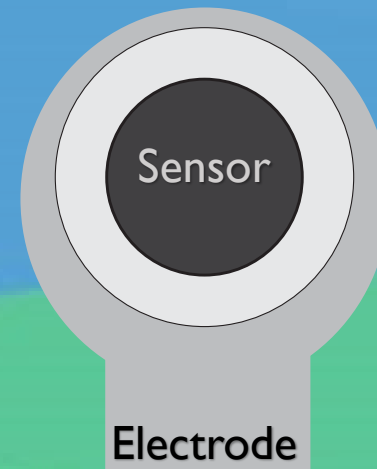
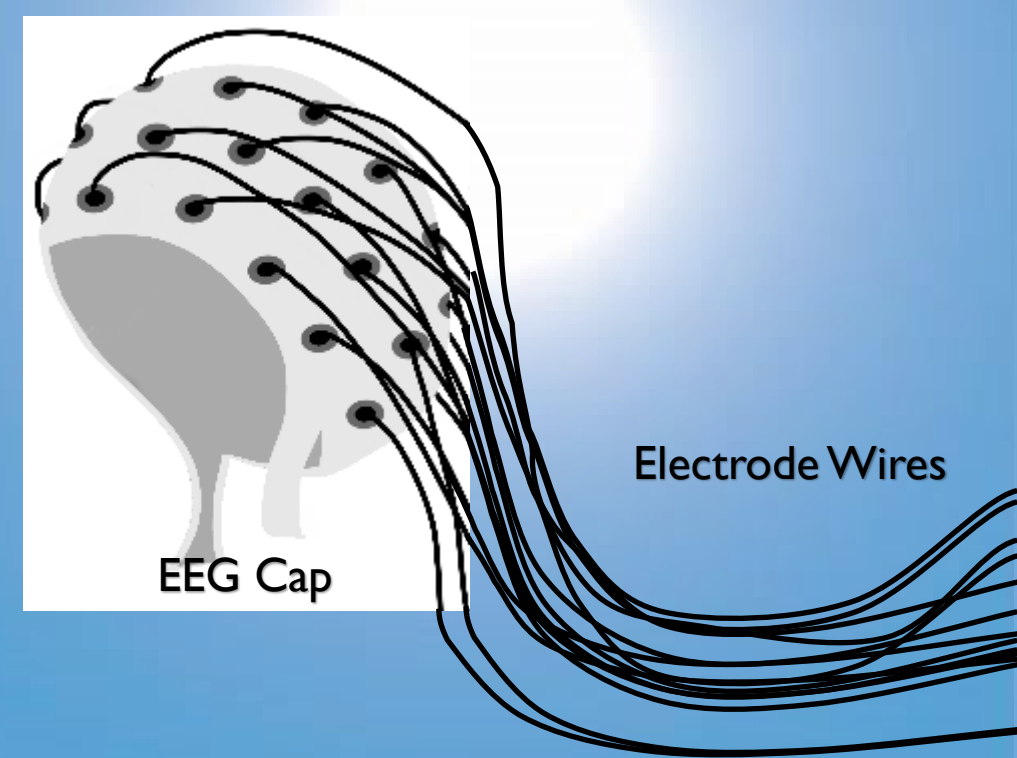
An EEG machine is made up of three pieces.

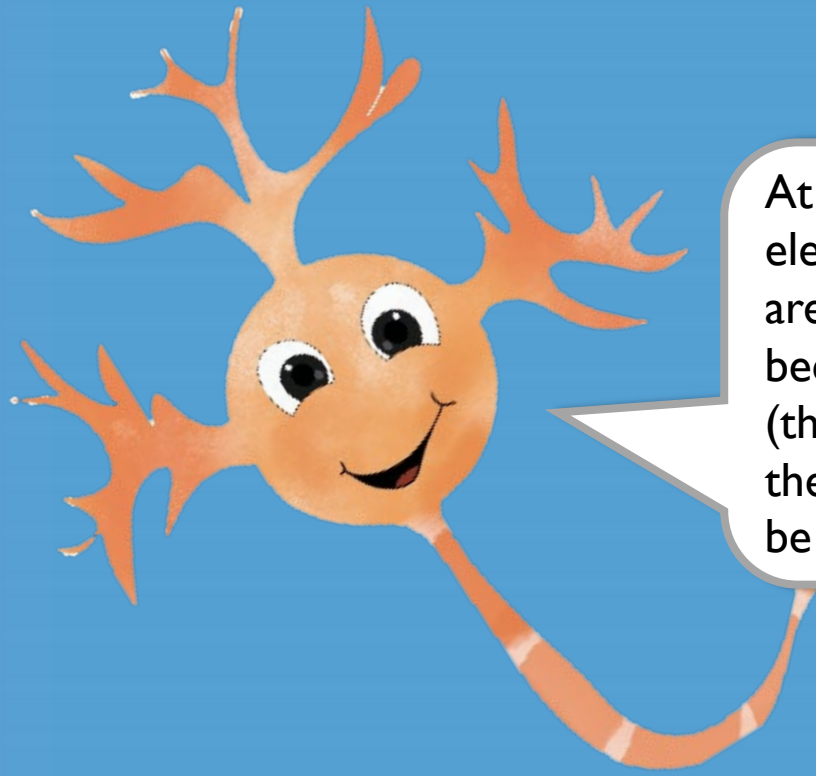
- 1) An EEG cap
- 2) A set of wires, called **electrodes**
- 3) A recording device called an **amplifier**

Here's how it works:

The scientists attach wires to the EEG cap and place it on a person's head.

At the end of the wire is an electrode which holds a piece of metal (the **sensor**) that is very good at sensing electricity!





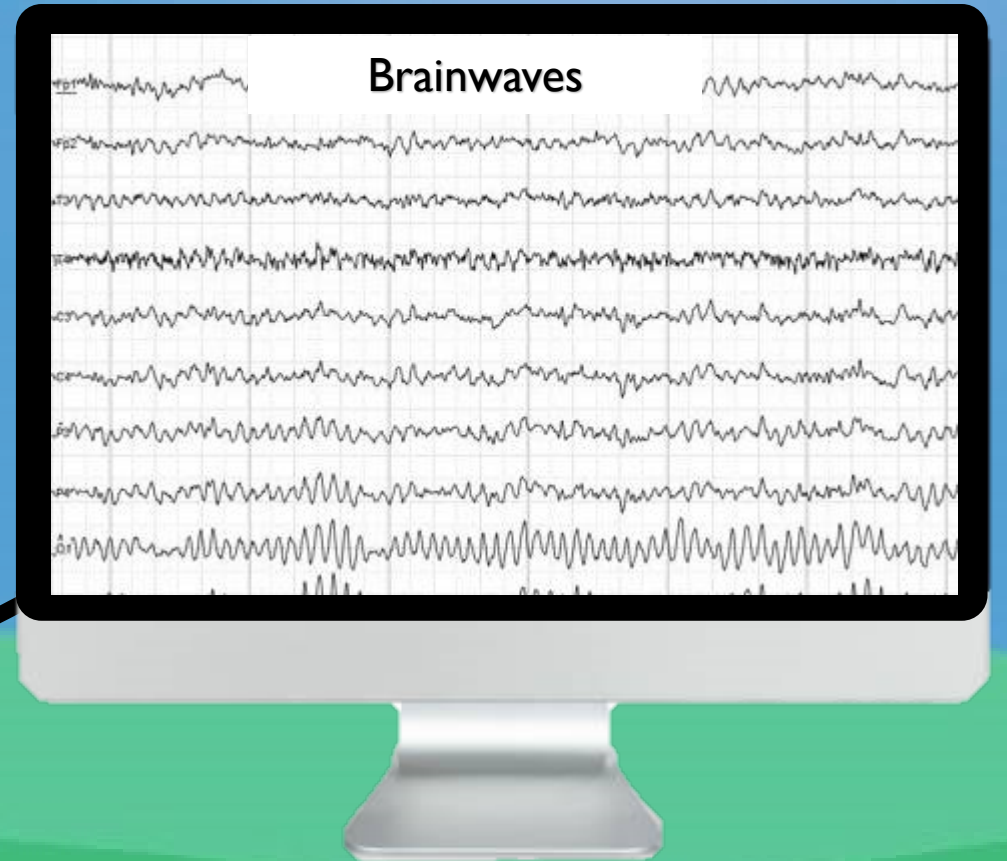
At the top of your head, it is hard to sense the electricity coming from your brain, even when we are all sending messages at the same time. This is because your brain is protected by your **skull** (the bone that makes up your head). In order for the wires to pick up the electricity, they need to be as close as possible to your head!

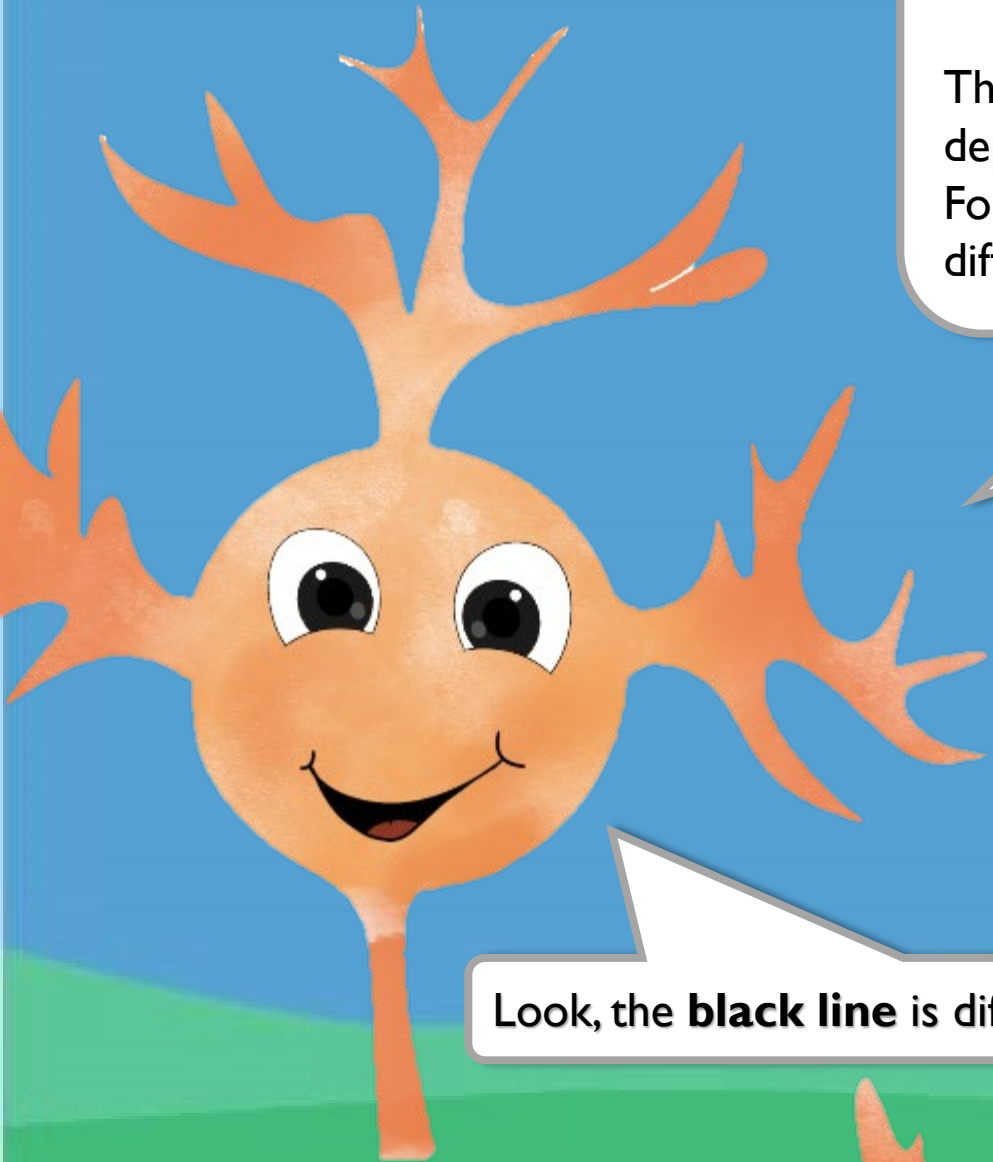
But you know what electricity loves to go through? Salty water! Salty water is a great **conductor**. Brain scientists fill the cap with salty water goop so that the electricity in your head can run right to the electrodes!

They do this using a tool that works kind of like a **gel pen** – it puts the goop in your hair right under each wire.



The electricity then runs all the way down the wire and to the amplifier machine. The amplifier machine works like a microphone. What does a microphone do? It takes quiet voices and makes them LOUD! That's what the amplifier does, but with electricity... it takes the electricity from the wires and makes it a bit louder so that we can record it on our computer! Those recordings are called **brainwaves**!

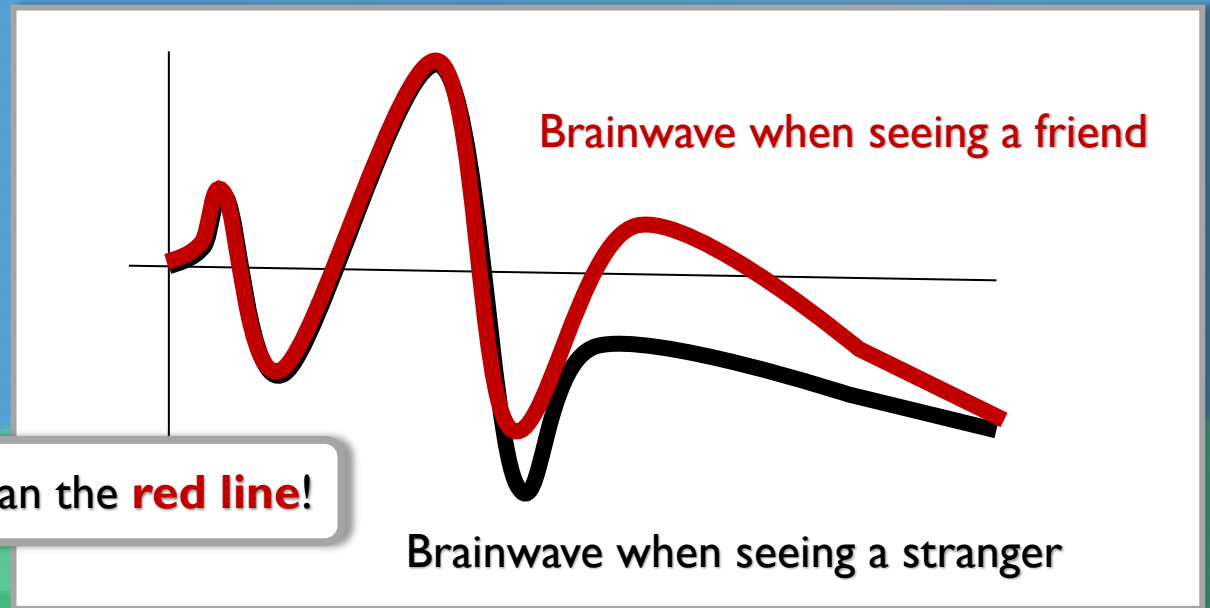




Scientists can use an EEG machine to record the brainwaves in your head (the messages your neurons are sending).

They mostly look like squiggles, but these squiggles change a little bit depending on what you are thinking about and what you are doing! For example, seeing a picture of someone you know makes a different squiggle than seeing a picture of a stranger.

Look, the **black line** is different than the **red line**!



Remember how neurons send a message and they make electricity?

Brainwaves can only sense the electricity, so they don't get to read the message at all. The scientists do not know what you are thinking, they can just see which team of neurons is currently chatty and which is quiet.



Fun Fact: There are as many neurons in the human brain as stars in the Milky Way



What happens when you come into our lab for an EEG?

- 1) First, you will meet the scientists and they will show you the cap, the wires, and the gel. You can look at and touch everything, and you can ask the scientists any questions.
- 2) A scientist will measure your head. This is just to make sure they can find an EEG cap that fits you perfectly!
- 3) You can play while scientists attach wires to the cap.



4) You will come into the EEG room and the scientists will place the cap on your head. This can look pretty cool – like wire hair! If you want, your grownup can take a picture so you can show your friends.

5) The scientists will place two wires behind your ears. They will clean the area behind your ears and attach a wire using a sticker and a little bit of gel.

6) Then it's time to add the saline gel to make our electrodes work! Scientist will use a little gel pen to put gel beneath each electrode. This will feel a little cold and wet.

7) You are ready to do the study! We will tell you all about the game and what you need to do before you start.

When you are all done with the experiment, we will take off the cap. You can wash all the gel away next time you take a shower!



Your EEG study will help scientists to better understand what happens in our brains. Thank you for your participation!

Trying new things is exciting, but it's okay to have questions or to be a little nervous!

Here are some questions you might have about your trip to our lab. If you have any other questions, you can ask your grownup or the scientist.

Will the scientists be able to see what I'm thinking?

No. Your brainwaves only show the electricity, not the message. We can't see what you're thinking, we can only see which teams of neurons are chatty and which are quiet.

Why will the scientists put stickers behind my ears?

Behind your ear is a special bone called a **mastoid bone** – this is thickest part of your skull! In fact, it is so thick that electricity from your brain can't get to the electrodes. However, those electrodes can pick up all sorts of other things - they still can sense the electricity in the air and in your muscles. These ear electrodes help us get a better sense of which electricity comes from outside of your head and which comes from inside your head!

What happens if I decide I don't want to play anymore?

If you decide you want to stop playing the games, you can just tell your grownup or the scientist, and we'll stop.

How will the gel come out of my hair?

After you leave our lab, you can wash out the gel at home when you shower or take a bath. You can use your normal shampoo to wash your hair. You might need to wash it twice, but all the gel will come out.

