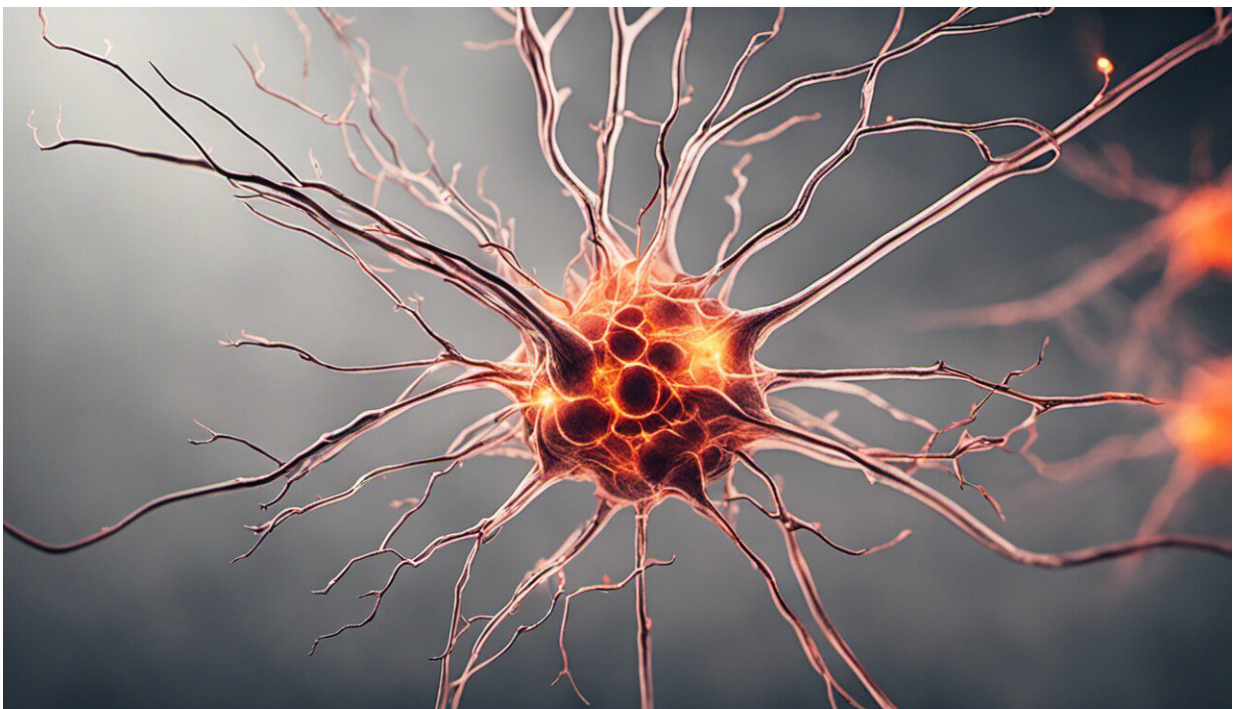


These neurons are the reason you yawn when you see others do it

March 30 2023, by Laura Trujillo Estrada and Agustina María Torres Prioris



Credit: AI-generated image ([disclaimer](#))

Have you ever wondered why when we see someone yawn, we yawn almost immediately? Or how newborns imitate facial gestures like sticking out their tongue? And what about how we learn to use scissors or to color?

It all has a lot to do with a particular type of neuron called "mirror neurons."

What are mirror neurons?

Mirror neurons are amazing neurons that participate in important processes such as learning, empathy and imitation.

They were discovered by chance by the Italian neurobiologist [Giacomo Rizzolatti in 1996](#). Looking at the brain of a macaque, Rizzolatti and his team recorded neurons that were activated not only when the animal carried out an action, but also when it observed another animal doing the same activity. What's more, in both cases the [premotor cortex](#) was activated in an identical way.

It was soon found that exactly the same thing happens in humans. For example, when we watch someone climb stairs, the [motor neurons](#) that correspond to those movements are activated without us taking a single step. When we observe another individual performing an action, without even having to speak, our mirror neurons can put us [in the same situation](#), simulating the action mentally as if it were happening to us.

This type of nerve cell even enables us to understand the intention with which an action is carried out.

Another of mirror neurons' properties is that they are activated by the sound associated with an action. For example, when they hear paper being torn, they mentally emulate that action—even if we do not actually see it taking place.

Where are they?

Mirror neurons are located in [four brain regions that communicate with each other](#): the premotor area, the inferior frontal gyrus, the parietal lobe, and the superior temporal sulcus. Each of these is responsible for a different function:

- The premotor area manages movements and controls muscles
- The [inferior frontal gyrus](#) is involved in executive control processes, the management of social and affective behaviors and decision making
- The [parietal lobe](#) analyses visual sensory information
- The superior temporal sulcus is involved in auditory processing and language.

Learning and empathy

The existence of mirror neurons is [essential for our species](#). That's mainly because of the role they play in learning by imitation and observation but also because they participate in language acquisition and are essential in the development of [empathy](#) and social behavior—they allow us to understand the actions of other people and their emotions.

Mirror neurons are implicated in numerous clinical conditions. They are affected by autism, schizophrenia, apraxia (an inability to perform [motor tasks](#)) and neurodegenerative diseases, [among others](#).

For example, in autism, there are motor, language and social problems that coexist. It is no coincidence that all these functions are related to brain areas where mirror neurons are located.

Harnessing mirror neurons in the classroom

We can consider observational learning to be any moment in which an action is observed and something new is learned or previous knowledge is modified. We must not confuse imitation (for example, copying an individual's gestures) with [observational learning](#). The latter is a change that lasts in the individual and produces a response.

By observing a process, mirror neurons prepare us to imitate the action being observed. If, while teaching, we combine [observational learning](#) with student creativity, we will obtain more efficient learning. The lesson will be internalized and will last over time.

All of this leads us to highlight the important role that educators play in the classroom. The students observe all the actions carried out by their [teacher](#). For this reason, we should look beyond traditional teaching (which is merely expository and static in nature) and carry out more activities that allow for observation skills to be developed.

Another aspect to highlight is the attitude that teachers have in the classroom. Mirror neurons allow us to understand the intentions and [emotions being transmitted](#). Those passionate teachers who teach their subjects with enthusiasm and joy achieve a greater level of concentration and observation from the student, capturing their attention for a longer amounts of time and infecting them with their emotion.

For all these reasons, there are different educational methodologies that allow us to combine this knowledge about [mirror neurons](#) with useful tools that fit into the classroom context. In any case, it is essential to incorporate new strategies to encourage motivation, as well as to use [manipulative tasks](#) (laboratory sessions, practical cases, etc.) that allow the contents being learned to be used and internalized.

All the events that take place in the classroom, the dynamics of the classes and the emotional aspects that the teacher transmits to the students will condition the learning and experience that the students have in the classroom.

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