

Q

## How do we laugh? Is it the same as speaking or coughing?

*Adrienne, a high school student from California*

A

Laughing, speaking, and coughing all originate at our larynx, or “voice box,” which serves as our primary sound producer. It contains paired vocal cords that vibrate when air passes over them. When we’re quietly breathing, our vocal cords are completely open. Completely closed vocal cords stop airflow. Slightly open vocal cords cause exhaled air to pass through very quickly, which makes a vibration that we shape with our mouth and tongue to create speech. By adjusting the tension on the vocal cords, we can adjust our pitch. Stretching out vocal cords creates a higher pitch—like tightening the string of a violin.

Speaking is a voluntary act. We choose what we say (although we are capable of making “involuntary” sounds, such as when we are startled). Coughing and laughing can also be voluntary, if we choose to clear our throat or want to fake laughter, but are more typically involuntary.

Coughing occurs in response to stimulation of the airway and is designed to clear out something unwanted, like mucous or a piece of popcorn. This action protects the airway from getting clogged. Of course, this reflex is not perfect—sometimes we cough when our larynx is stimulated by spicy foods or irritated by a virus.

When we cough, the vocal cords first close completely. The diaphragm and other respiratory muscles build up air pressure below them. Then the vocal cords release, allowing air to

suddenly rush outward. This rush of air is a cough.

Another, less-well-understood reflex is the hiccup; the respiratory muscles pull in air, but the vocal cords slam closed, resulting in the “hic” sound.

Laughter is probably the least understood airway-related reflex. The mechanics are simple, but *why* we laugh is more mysterious. The sound of laughter happens when we are exhaling and the vocal cords periodically close. As they get close together, laughing occurs. Periodic activation of the respiratory muscles produces the rhythmic airflow that helps make the sound.

Everybody has a unique laugh, and there is evidence for a laughter “pace-maker” that controls how fast or slow the beats of our natural laugh occur. This action is similar to hiccups, which also occur at a frequency that tends to be constant within individuals.

In the brain, laughter involves many regions—those needed to understand and process the humorous stimuli (a joke or situation) and those that tell the larynx and respiratory muscles what to do. This system is distinct from that used to control voluntary speech. In fact, some patients with speech production disorders related to the larynx can still produce involuntary sounds like laughter.

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