

Why Does Your Voice Change As You Get Older?



In the mid-16th century, Italians were captivated by a type of male singer whose incredible range contained notes previously thought impossible for adult men. However, this gift came at a high price. To prevent their voices from breaking, these singers had been castrated before puberty, halting the hormonal processes that would deepen their voices. Known as castrati, their light, angelic voices were renowned throughout Europe, until the cruel procedure that created them was outlawed in the 1800s. Though stunting vocal growth can produce an extraordinary musical range, naturally developing voices are already capable of incredible variety. And as we age, our bodies undergo two major changes which explore that range.

So how exactly does our voice box work, and what causes these shifts in speech?

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The specific sound of a speaking voice is the result of many anatomical variables, but it's mostly determined by the age and health of our vocal cords and the size of our larynxes. The larynx is a complex system of muscle and cartilage that supports and moves the vocal cords, or, as they're more accurately known, the vocal folds. Strung between the thyroid and arytenoid cartilages, these two muscles form an elastic curtain that opens and shuts across the trachea, the tube that carries air through the throat. The folds are apart when we're breathing, but when we speak, they slam shut. Our lungs push air against the closed folds, blowing them open and vibrating the tissue to produce sound. Unlike the deliberate focus required for playing an external instrument, we effortlessly change notes as we speak. By pushing air faster or slower, we change the frequency and amplitude of these vibrations, which respectively translate to the pitch and volume of our voices. Rapid and small vibrations create high-pitched, quiet tones, while slow, large vibrations produce deep, bellowing rumbles. Finally, by moving the laryngeal muscles between the cartilages, we can stretch and contract those folds to intuitively play our internal instruments. This process is the same from your first words to your last, but as you age, your larynx ages too.

During puberty, the first major shift starts, as your voice begins to deepen. This happens when your larynx grows in size, elongating the vocal folds and opening up more room for them to vibrate. These longer folds have slower, larger vibrations, which result in a lower baseline pitch. This growth is especially dramatic in many males, whose high testosterone levels lead first to voice cracks, and then to deeper, more booming voices, and laryngeal protrusions called Adam's apples. Another vocal development during puberty occurs when the homogenous tissue covering the folds specializes into three distinct functional layers: a central muscle, a layer of stiff collagen wrapped in stretchy elastin fibers, and an outer layer of mucus membrane. These layers add nuance and depth to the voice, giving it a distinct timbre that sets it apart from its pre-pubescent tones.

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After puberty, most people's voices remain more or less the same for about 50 years. But we all use our voices differently, and eventually we experience the symptoms associated with aging larynxes, known as presbyphonia. First, the collagen in our folds stiffens and the surrounding elastin fibers atrophy and decay. This decreased flexibility increases the pitch of older voices. But for people who have experienced the hormonal effects of menopause, the higher pitch is countered and outweighed by swollen vocal folds. The folds' increased mass slows their vibrations, resulting in deeper voices. All these symptoms are further complicated by having fewer healthy laryngeal nerve endings, which reduces precise muscle control and causes breathy or rough voices.

Ultimately, these anatomical changes are just a few of the factors that can affect your voice. But when kept in good condition, your voice box is a finely tuned instrument, capable of operatic arias, moody monologues, and stirring speeches.