

# Speech and Voice Production

Speech and voice are the result of a complex interplay of physical and emotional events. The first event in the brain is the recognition of a **motivation** (a desire or need) to communicate. The formulation of ideas and feelings is translated by the brain into language and motor programs that operate speech muscles. Nerve impulses transmit the communication signals to muscles throughout the speech mechanism.

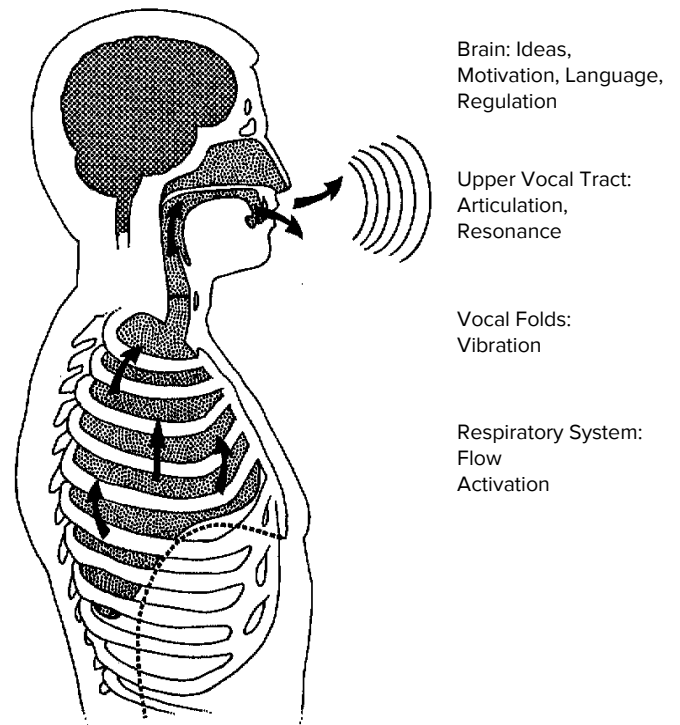
In the respiratory system, muscles contract to compress air in the lungs, thus forcing it to flow upward through the trachea (windpipe) and larynx (voice box). This action supplies the power source for vocal fold vibration and speech sounds during a spoken phrase. The voice-activating respiratory muscles then relax so breath can enter the lungs for the next phrase.

As the respiratory system is preparing to provide the airflow, the back portions of the two **vocal folds** (in the larynx) begin to approximate each other. (The front ends of the vocal folds are permanently attached to each other just behind the 'Adam's Apple'.) Once they are closed sufficiently, the airflow from the lungs sets them into vibration. The brain provides continually changing impulses to the muscles operating the vocal folds to allow for adjustments that create pitch and loudness inflections. This is regulated in part by information coming into the brain from our ears, since we tend to listen to ourselves as we speak. As long as the vocal folds are close enough together to provide some resistance to the breath stream, and relaxed enough to vibrate, tiny puffs of air will be released between the vocal folds as they alternately open and close. The succession of air pulses creates a **sound wave** in the vocal tract.

The sound wave passes through the upper vocal tract, including the throat and mouth. Depending on the shape of the throat and mouth cavities, certain aspects of the sound

wave will be amplified or suppressed. This phenomenon is known as **resonance**.

Sometimes, we may notice the sensation of resonance when we sing or speak.



Movements of the **articulators** of speech: the tongue, jaw and lips, alter the sound wave as it passes through the mouth. This contributes to the resonance characteristics, and shapes the flow of air and voice into speech sounds, that is, vowels and consonants.

The brain activity resulting from thoughts and feelings to be expressed should naturally regulate various activities in the vocal tract. For example, the amount of air that is being inhaled before speech is gauged by the complexity of the thought to be expressed, the intensity of the emotion, and the communication situation.