

Introduction

‘You are how you sound’! Yes, the sound of the human voice tells your listeners an enormous amount about your personality, emotions, confidence and feelings about yourselves, as well as what you are really thinking. Your voice divulges a great deal about your educational background, social status, health and mental alertness. The way in which you use your voice also has the power to make your teaching interesting or deadly dull, to make your students trust you or view you suspiciously, and to make students listen intently or nod off to sleep! Unless you have a major physical disability of the voice mechanism, everyone is capable of producing the type of voice that works well in teaching, one that helps to get your message across, is vibrant and engaging.

Fundamentals of voice production

The foundation for an effective voice is based on the coordination of three factors:

- **Breathing**
- **Phonation**
- **Resonance**

Breathing air out of the lungs produces the power supply for the voice. This airflow from the lungs makes the vocal folds (or vocal chords) in the larynx (or voice box) vibrate to make the basic sound of the voice; this process is called phonation. Because that sound made by the vocal folds is too weak to be heard, that basic sound is then modified into the sound we recognise as the human voice as it travels up from the larynx through the throat, mouth and nose; this transformation is known as resonance. Production of a natural, effective voice depends on how well we balance or coordinate these three fundamental components of breathing, phonation and resonance.

Breathing

Our intention to produce voice is signalled to the parts of the body involved by impulses from the brain. The first response of the body to these impulses is to breathe in so that there is enough air in the lungs to power the voice. The breath is taken in through the mouth and nose, passes down the trachea (or windpipe), and is inhaled into the lungs. For air to be inhaled into the lungs, the ribcage needs to expand and the dome-like diaphragm which forms the base of the chest, needs to flatten downwards. When we breathe in effectively, we feel most of this expansion in the area of the lower ribs. Once the air has been inhaled into the lungs and they reach capacity, the elastic tissue of the lung recoils and the air is exhaled or breathed out.

The exhaled air then returns up through the trachea and then through the larynx where it encounters the closing vocal folds.

Phonation

When we breathe in and out without speaking, the vocal folds in the larynx are open to allow the air to pass to and from the lungs easily. The impulses sent from the brain when we intend to speak, however, signal to the muscles of the larynx to close the vocal folds. When the air coming up from the lungs encounters the closed vocal folds, the pressure and flow of the air overcomes the resistance of the vocal folds and sets them into a pattern of rapid vibration. That is, the vocal folds open and close repeatedly, around 200 - 220 times per second for women and 100 - 120 times per second for men. This rapid vibration of the vocal folds produces the sound waves in the air which are the basic tones of our voices. The vocal folds are therefore the source of the human voice.

The larynx is located on the top of the trachea and is behind the Adam’s Apple. The two vocal folds in the larynx are approximately 20 mm in length and are stretched from just behind the Adam’s Apple in the front of your neck to the back of the larynx. These vocal folds are complex structures made up of four main layers. The outer layer is the mucous membrane (or epithelium). Directly under the mucous membrane is a soft, pliable layer filled with fluid; this layer is known as Reinke’s space. The mucous membrane and Reinke’s space are together known as the ‘cover’ of the vocal folds. This cover of the vocal folds must be kept moist and pliable so that it can move freely in a wave-like motion (the ‘mucosal wave’) over the deeper layers of the folds. If the cover of the vocal folds becomes dry or stiff, the voice will become rough and the person may experience throat discomfort.

Under the cover of the vocal folds is the vocal ligament. This ligament is made up of elastic tissue that allows the vocal folds to change shape easily when the deepest and least pliable layer of the vocal folds, the muscle, changes shape.

The basic tone of the voice can be varied in many different ways, depending on the way in which we use the vocal folds and other parts of the voice mechanism. The main aspects of the voice that can be varied are:

- pitch
- loudness
- quality

Pitch refers to how high or low the voice sounds. It is determined mainly by the speed of vibration of the vocal folds, the thickness of the edge of the folds, and the length of the folds. The higher the voice, the faster is the rate of vibration of the vocal folds. The more elongated and thinner the edges of the vocal folds become, the higher the pitch will be. On the other hand, if the vibrating edges of the vocal folds become thicker and shorter, and the vocal folds vibrate at a slower rate, the pitch will be lowered. We use variations in pitch during speech to signal meaning and emotion and this is referred to as intonation.

Loudness refers to how loud or soft a voice is. It is dependent on the amount of air pressure from the lungs and the muscle tension in the vocal folds. The greater the air pressure and the more tense the vocal folds, the louder the sound will be. The lower the air pressure from the lungs is and the slacker the vocal folds are, the softer the voice will be. We also use variations in loudness during speech to signal meaning and emotion and this is referred to as stress. To emphasise the importance of a particular word, for example, we increase the loudness of voice on that word.

Quality refers to how clear the voice sounds. Voice quality is determined by many complex factors including how relaxed the muscles of the larynx are, how moist the cover of the vocal folds is, how smoothly the vocal folds vibrate, and whether or not the vocal folds are able to close sufficiently during phonation. If the muscles of the larynx are excessively tense, the cover is dry, the folds move in an irregular way, and/or the folds cannot close together, the voice quality will sound rough, strained and/or breathy.

Resonance

The sound waves produced by the vocal folds in the larynx are too weak to be recognised as voice and so this basic tone must be amplified or resonated as it travels up through the spaces of the throat, mouth and nose. The shape, size and muscle tension of these spaces will determine the eventual sound of the voice we will hear. Because every person is built differently in the throat, mouth and nose, the basic voice tone is modified differently in each of us so that we will all have a recognisably unique timbre of voice. This process of resonance in our voices is similar to the way in which the shape and size of a musical instrument such as a trumpet gives the basic tone produced by the reed its unique sound. Just as the resonance process in a trumpet makes the sound of the trumpet carry throughout a concert hall, resonance in the human voice gives us the ability to control its carrying power or projection.

Other physical factors influencing voice

While breathing, phonation and resonance are the basic building blocks of the voice, the effectiveness of our voices is also affected by:

- body posture
- relaxation of the muscles of the body and the larynx

Because the parts of the body which contribute to voice production are connected to many other parts of the body's muscular and skeletal system, the way we align the whole body and the amount of muscle tension or relaxation in the body will influence the voice. Excess tension in the muscles of the larynx, for example, can lead to a strained, harsh voice. Similarly, standing with the knees braced and the pelvis pushed forwards can lead to difficulty in coordinating relaxed breathing with phonation.

