The Larynx as a Wind-Instrument

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The mode of vibration of the vocal folds and the way the vibrations are generated by the airstream have been investigated on many sorts of models.

Voice-model experiments can also be performed on living human beings, by observing the vibrations of the lips in musicians playing a brass instrument. The advantage is that this object is more easily accessible, and can be studied in close detail. Here, we have living tissue with an adjustable elasticity, by which periodic sound pulses are generated. The many contrasting features of the vocal folds and the lips as vibrators make a comparison interesting. It may help to solve the equation by which vocal fold vibration is determined and which has still several unknowns. The tube of the instrument, be it a trumpet or a trombone or any other brass instrument, is analogous with the oropharyngeal cavity.

One point of difference that is very instructive, is the control of the breath stream. A trombonist releases the airstream by removing the seal between the tip of the tongue and the lips, or between the back of the tongue and the palate. If this happens in quick succession like in staccato playing, he alternates the point of occlusion “tükütükütü” or “tüdeketü” 1.

In singing there is no such stop-valve before the sound generator. The airstream should be controlled by the diaphragm; a continuous inspiratory tension of the diaphragm keeps the expiratory activity of the abdominal wall and the intercostal muscles in check

1 Apart from this special mode of attacking the tone and interrupting the airstream, breath support is required for sustained tones. For singing, however, a more subtle breath control is necessary.

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and so provides the well balanced and minimal subglottic pressure that is a prerequisite for optimal voice production.

Any active participation of the glottis itself or of the surrounding structures, to take over the control of the airstream from the diaphragm, results in a bad tone and brings the risk of damage to the vocal folds.

Even if consonant articulation (which is a stop-valve after the soundgenerator) plays a role in stopping and releasing the vocal cord vibrations, the diaphragm is still the spring that lies continuously ready to keep any excessive airpressure away from the glottis.

The film shows the vibrations of the lips of a trombonist, taken with high-speed equipment. The trombone is fitted with a transparent mouthpiece. For comparison the scenes alternate with high-speed shots of vocal cord vibrations.