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Lung volume affects the decay of oscillations at the end of a vocal emission

DeJonckere P.H.[a] , Lebacq J.[b]

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[a] Federal Agency for Occupational Risks, Brussels, Belgium

[b] Institute of Neurosciences, University of Louvain, Brussels, Belgium

Abstract

At the end of a vocal emission, when the voicing is not interrupted by a laryngeal closure, a damped oscillatory motion of each vocal fold can be observed after the last contact phase of the two fold edges on the midline. It can be precisely analysed using a measure of transglottal light intensity (photoglottography). Actually, during modal phonation, the vocal oscillator mainly comprises two components: the vocal folds themselves and the vibrating air mass. A simple calculation suggests that the internal air mass set into vibration is larger than the vocal fold mass. In order to investigate the effect of the vibrating air mass, a voicing protocol was elaborated for validly measuring and comparing damping characteristics in two conditions: at high and at low lung volume, ceteris paribus. Glottal area, intraoral pressure, electroglottogram and sound were recorded simultaneously. Elaborated voicing protocol consisted in series of fast repetitions (3–4 s^{-1}) of the vowel /ɛ/, each vocalization being followed by an abrupt bilabial occlusion with complete airflow interruption. The average difference in lung volume between the two conditions is approximately 2410 mL. The results show that the decay of vocal fold oscillation is influenced by the amount of lung air that is set into oscillation. A reduction of the air volume leads to a significant increase in the rate of decay, thus voicing at low lung volume requires more energy, which is of importance for voice hygiene. © 2020 Elsevier Ltd

Author keywords

Damping; Fundamental frequency; Lung volume; Photoglottography; Vocal folds