Taylor & Francis
healthsciences

Vocal fold vibration and voice source aperiodicity in 'dist' tones: a study of a timbral ornament in rock singing

D. Zangger Borch[1], J. Sundberg[2], P.-Å. Lindestad[3] and M. Thalén[1]

From the [1]University College of Music Education in Stockholm (SMI), Sweden, [2]KTH Voice Research Centre, Department of Speech Music Hearing, KTH, Sweden, and [3]Department of Logopedics and Phoniatrics, Karolinska Institutet, Huddinge University Hospital, Sweden

Received 17 October 2003. Accepted 17 May 2004.

Logoped Phoniatr Vocol 2004; 29: 147–153

The acoustic characteristics of so-called 'dist' tones, commonly used in singing rock music, are analyzed in a case study. In an initial experiment a professional rock singer produced examples of 'dist' tones. The tones were found to contain aperiodicity, SPL at 0.3 m varied between 90 and 96 dB, and subglottal pressure varied in the range of 20–43 cm H_2O, a doubling yielding, on average, an SPL increase of 2.3 dB. In a second experiment, the associated vocal fold vibration patterns were recorded by digital high-speed imaging of the same singer. Inverse filtering of the simultaneously recorded audio signal showed that the aperiodicity was caused by a low frequency modulation of the flow glottogram pulse amplitude. This modulation was produced by an aperiodic or periodic vibration of the supraglottic mucosa. This vibration reduced the pulse amplitude by obstructing the airway for some of the pulses produced by the apparently periodically vibrating vocal folds. The supraglottic mucosa vibration can be assumed to be driven by the high airflow produced by the elevated subglottal pressure.