

Short Courses & Events / Archive

The Transient Theory of Human Voice Production with Dr. Julian Chen

Sunday 16th April 2023, 5:00 PM - 7:00 PM (London Time)

In 1957, French physiologist Philippe Fabre invented the electroglottograph, which can accurately determine the closing and opening instants of the glottis in vivo. In 1984, Donald Miller and Harm Schutte further placed two pressure sensors immediately above and below the glottis, measured the air pressures across the glottis.

This experimental evidence enabled a scientific understanding of human voice production.

And so, a refined version of the transient theory of human voice production, the timbron theory, initially proposed by Leonhard Euler in 1727, is established. In this short course, experimental outputs and the timbron theory of human voice production are presented in an easy-to-understand graphical format.

Content:

According to that theory, the time between two adjacent glottal closing instants accurately defines the pitch period, and the sound waveform in each pitch period contains full information on the timbre. A method of extracting glottal closing instants from sound waves and a graphical display, the pitch-synchronous spectrogram, are presented.

Among the samples of human voice, the sound recordings of Luciano Pavarotti are analyzed. Some characteristics of the master singer are shown, and hints of how to improve the quality and volume of voice are presented.

Finally, the theory and parametrization method for human voice developed in early 20th century, the source-filter theory and linear prediction coefficients (LPC), are outlined.

Comparing with the more accurate timbron theory and pitch-synchronous parametrization method, the deficiencies of the source-filter theory and the LPC method are discussed.