

Freddie Mercury — acoustic voice analysis

Christian T. Herbst, Ph.D.

Department of Cognitive Biology, Faculty of Life Sciences,
University of Vienna, Austria

www.christian-herbst.org

Freddie Mercury was one of the twentieth century's best-known singers of commercial contemporary music. This study presents an acoustical analysis of his voice production and singing style, based on perceptual and quantitative analysis of publicly available sound recordings.

Analysis of six interviews revealed a median speaking fundamental frequency of 117.3 Hz, which is typically found for a baritone voice. Analysis of voice tracks isolated from full band recordings suggested that the singing voice range was 37 semitones within the pitch range of F#2 (about 92.2Hz) to G5 (about 784Hz). Evidence for higher phonations up to a fundamental frequency of 1,347 Hz was not deemed reliable.

Analysis of 240 sustained notes from 21 a-cappella recordings revealed a surprisingly high mean fundamental frequency modulation rate (vibrato) of 7.0 Hz, reaching the range of vocal tremor. Quantitative analysis utilizing a newly introduced parameter to assess the regularity of vocal vibrato corroborated its perceptually irregular nature, suggesting that vibrato (ir)regularity is a distinctive feature of the singing voice.

Imitation of subharmonic phonation samples by a professional rock singer, documented by endoscopic high-speed video at 4,132 frames per second, revealed a 3:1 frequency locked vibratory pattern of vocal folds and ventricular folds. These traits, in combination with the fast and irregular vibrato, might have helped create Freddie Mercury's eccentric and flamboyant stage persona.

Reference:

C. T. Herbst, S. Hertegard, D. Zangger-Borch, and P.-Å. Lindestad, "Freddie Mercury—acoustic analysis of speaking fundamental frequency, vibrato, and subharmonics," *Logop. Phoniatr. Vocology*, vol. 42, no. 1, pp. 29–38, Jan. 2017.