

THE MYOELASTIC-AERODYNAMIC THEORY OF SOUND PRODUCTION IN HUMANS, MAMMALS, AND BIRDS

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Abstract

The myoelastic-aerodynamic (MEAD) theory of sound production was proposed over half a century ago, in order to explain how humans produce voice: via flow-induced self-sustained vocal fold oscillation: Once a proper pre-phonatory configuration is created, no further differentiated neural input is required in the larynx – the ensuing vocal fold vibration is a passive physical phenomenon.

The MEAD theory has widespread applications to animal sound production: It applies not only to humans, but also to most non-human mammals (from bats to elephants, including non-human primates), extending across a remarkably large range of fundamental frequencies and body sizes, spanning more than five orders of magnitude. A recent publication provides empirical evidence that the MEAD theory is even relevant for birds, who, unlike humans and non-human mammals, produce sounds with a specialized organ, the syrinx.

In this presentation the MEAD theory is reviewed, considering its overall relevance for human communication in relation to (other) mammals. In particular, the potential for common physiological control mechanisms of voice source characteristics across multiple species is discussed.

Short biography

Christian T. Herbst is an Austrian voice scientist. He studied voice pedagogy at Mozarteum University, Salzburg, Austria, and worked for several years as a voice pedagogue. Driven by his interest in the physics and the physiology of voice, he enrolled in a PhD programme in Biophysics at the University of Olomouc, Czech Republic, from which he graduated in 2012. He currently works on the project "Comparative Biomechanics of Mammalian Sound Production", funded by an APART grant from the Austrian Academy of Sciences. The focus of Christian's scientific work is both on singing voice physiology, and on the physics of voice production in mammals. He received several international scientific awards, and has published, among others, in the prestigious Science journal.