ACOUSTICS2008/810
Computer simulations of intraoral pressure patterns during voiced stop consonant production

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Several past studies have used laryngeal and/or upper vocal tract models to explore aerodynamic control during production of obstruent consonants, yet many aspects of such control remain unclear. Of particular interest in this work is how varying laryngeal and vocal tract dimensions such as occur among men, women, and children influence phonatory behavior and the time course of intraoral pressure (Pio) increase during voiced stop consonant production. To maintain phonation during a voiced stop closure, Pio must remain below the subglottal pressure. Physiological and modeling studies indicate that adult speakers actively increase supraglottal volumes during voiced stops, which slows the rate of Pio increase. Speakers with smaller vocal tracts may either be less successful in slowing the rate of Pio buildup, or else may perform more extreme volumetric changes to achieve similar end results. The current study uses data recently collected on voicing and Pio during stop production in men, women, and children. We use a modified two-mass model of the vocal folds coupled to a model of the upper vocal tract to reproduce the observed Pio patterns, and explore how the behavior of the system reflects differences in anatomical and physiological dimensions. [Work supported by MCT/CNPq-Brazil]