

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Correlation of phonatory behavior with vocal fold structure, observed in a physical model¹ MICHAEL KRANE, GAGE WALTERS, MICHAEL MCPHAIL, Penn State University — The effect of vocal fold shape and internal structure on phonation was studied experimentally using a physical model of the human airway. Model folds used a “M5” or a swept ellipse coronal cross-section shape. Models were molded in either 2 or three layers. Two-layer models included a more stiff “body” layer and a much softer “cover” layer, while the 3-layer models also incorporated an additional, thin, “ligament/conus” layer stiffer than the body layer. The elliptical section models were all molded in 3 such layers. Measurements of transglottal pressure, volume flow, mouth sound pressure, and high-speed imaging of vocal fold vibration were performed. These show that models with the “ligament” layer experienced much attenuated vertical deformation, that glottal closure was more likely, and that phonation was much easier to initiate. These findings suggest that the combination of the vocal ligament and the *conus elasticus* stabilize the vocal fold for efficient phonation by limiting vertical deformation, while allowing transverse deformations to occur.

¹Acknowledge support from NIH DC R01005642-11.

Michael Krane
Penn State University

Date submitted: 31 Jul 2017

Electronic form version 1.4