

Title: The Science Behind Semi-Occluded Vocal Tract Exercises

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Semi-occluded vocal tract exercises have a long history, especially in Europe. They include lip trills, tongue trills, straw or tube phonation, bilabial fricatives, nasals, and relatively closed vowels like /o/ and /u/. For many years it has been known that phonation with a nearly closed mouth facilitates vocal fold vibration, but the science behind this facilitation has been a mystery. It cannot be explained with the classical linear source-filter theory that has been the flagship of voice and speech science for about a century. A nonlinear theory, with feedback between the source and the filter, has been successful in elucidating several phenomena regarding phonation with a semi-occluded vocal tract. First, a steady oral pressure helps to posture the vocal folds in an optimum position. Second, the increased inertance of the supraglottal vocal tract lowers the phonation threshold pressure, thereby making it easier for the vocal folds to self-oscillate. Third, vocal fold collision is reduced and a mixed registration is facilitated. Fourth, the small oscillation allows fundamental frequency to be taken very high in pitch glides to stretch the vocal ligament. Fifth, increase in lung pressure, which normally tends to produce a greater closed quotient, automatically spreads the vocal folds apart to maintain register balance. This presentation provides basic science explanations underlying these five phenomena.