TWANG: WHAT'S THE ROLE OF THE VOCAL TRACT?

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Among different types of phoniation in different singing styles, the twangy phonation is considered typical for a resonant, though also perceptually somehow unpleasant voice quality[1].

Twang phonation is known to involve shortening and narrowing of the Pharynx. It was shown that perception of twang could be increased by modifying those two parameters in a modelling approach but even more so my changing the vocal tract impedance[2].

Also, it is known that the vibration mode of the glottis exhibits distinct characteristics during twang, e.g. an increased closed quotient, an higher subglottal pressure and faster glottal flow acceleration[3].

Based on these considerations the intention of this study is to clarify the role of the vocal tract in twang. By what means does the vocal tract affect the acoustical outcome during voice production?

A trained Jazz-Rock-Pop singer, who also co-authored the study, was examined during different vocal task involving sustained sounds on two different pitches in neutral, resonant and twangy phonation by means of electroglottography, highspeedlaryngoscopy, stroboscopy and static magnetic resonance imaging (MRI) with consecutive 3D reconstruction of full vocal tract models.

Based on finite element models the vocal tract transfer function was computed and subsequently substracted from the denoised audio signal which were recorded within the MRI during the vocal tasks. The resulting glottal source spectra an increase of the amplitude in the 2kHz region in the twang condition at least for the higher pitch matching the characteristics in long term average spectra as published by Sundberg[3].

Interestingly, despite huge differences in the lower vocal tract the transfer function showed no significant differences in twang compared to neutral or resonant phonation.

Our interpretation based on the evaluated single subject is that vocal tract adjustments favor twangy phonation by means of adaptation of the matching impedance of the vocal tract rather than by altering the acoustical filter characteristics of the vocal tract.

LITERATURE:

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