Studying asymmetries in tongue-palate contact in speech

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In speech-production studies, it is often implicitly assumed that articulation is symmetrical in the transverse plane of the vocal tract, i.e., that the amount of tongue contact with the palate is equal on the left- and right-hand sides. However, published palatograms visualising tongue-palate contact patterns generally show left-right asymmetry, although this finding is rarely mentioned. Characterisation of articulation asymmetry in native speakers would improve understanding of the process of speech production and its relationship with both neural organisation and the anatomy of the organs of speech.

The overall goal of this research is to conduct an empirical electropalatography study with 20 subjects in which the direction and amount of asymmetry in tongue-palate contact are studied as a function of (a) the type of speech sound, (b) anatomical asymmetries in speakers' palates, and (c) speaker handedness. The current study describes preliminary work in which an automated method for calculating a variety of asymmetry metrics from a time-series of palatograms was developed. The algorithm was applied to publicly available palatograms (Mocha-Timit) from two speakers performing a sentence production task. Asymmetry metrics were examined as a function of the place and manner of articulation. Most speech sound realisations were found to be asymmetrical with some clear differences between the speakers.