

## Asymmetries in tongue-palate contact during 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, e.g. that the amount of tongue contact with the palate is equal on the left- and right-hand sides. Nevertheless, 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. From a practical viewpoint, it could help learners of English as a foreign language to achieve a native pronunciation and could provide a reference for Speech and Language Therapists when treating speech deficiencies in which asymmetry plays a role (e.g. dysarthria).

Asymmetries in tongue posture during the articulation of speech sounds have only been systematically investigated in a very small number of electropalatography studies (Hamlet et al., 1986; Marchal et al., 1988; Marchal & Espesser, 1987; Farnetani, 1988). The general conclusion is that the vast majority of palatograms show asymmetrical tongue-palate contact, irrespective of the language involved. There was, however, little consistency in the direction of the asymmetry, which seems to differ depending on the individual speaker and/or the speech sound. Furthermore, these conclusions are based on the data of a very small number of speakers (i.e. a grand total of 15).

The objective of this study was to revisit this phenomenon and to document articulatory asymmetries on the basis of palatograms published in academic journals. Five academic journals were scrutinized for all articles on electropalatography published since 1970 which contained pictures of speech-sound palatograms. These journals were: *Journal of the International Phonetic Association*, *Language and Speech*, *Journal of the Acoustical Society of America*, *Journal of Phonetics* and *Phonetica*. The published palatograms were photocopied and information was recorded about the speech sound involved, the language, and the speaker (age, gender). For each palatogram, an index of asymmetry was calculated reflecting the degree and direction of asymmetry. In total, 1,502 palatograms were collected representing 10 different languages and 225 speakers.

83% of the published palatograms were found to show asymmetrical tongue-palate contact. Palatograms with more tongue-palate contact on the left (45%) outnumber those with more contact on the right (38%). As far as the direction of the asymmetry is concerned, it was found that in trills, taps and approximants there is more elaborate tongue-palate contact on the left, whereas in plosives and fricatives, contact is more elaborate on the right. Furthermore, there is a significant relationship between the direction of the asymmetry and the place of articulation, with more elaborate contact on the left for all places of articulation except for palatals. The results of this extensive review will be used to design an empirical electropalatography study in which the direction and amount of asymmetry in tongue-palate contact will be studied as a function of (a) the type of speech sound, (b) anatomical asymmetries in speakers' palates, and (c) speaker handedness.

### References

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