

# New Insights into Production and Representation of Click Consonants

**Michael Proctor**

*Department of Linguistics  
ARC Centre of Excellence in Cognition and its Disorders  
Macquarie University*

michael.proctor@mq.edu.au

Click consonants – sounds produced by releasing an oral vacuum – are used in many African languages, some of which contrast up to 83 different click sounds (Miller 2011). Our understanding of these sounds has been limited in some important respects by the technologies available for phonetic research. New insights into click production are available through the use of real-time Magnetic Resonance Imaging, which offers dynamic information about the entire vocal tract, including the velum, tongue root, and larynx (Narayanan et al. 2004).

Aspects of click phonetics which have previously proven difficult to study are examined in Khoekhoegowab and siSwati, as well as in paralinguistic click production by a beatboxer. These data demonstrate the utility of real-time MRI for phonetic characterization of non-pulmonic consonants, as a method which provides global information about vocal tract configuration and coordination of laryngeal and supra-glottal articulation (Proctor et al. 2016). Implications for phonological theory and constituency in sound systems are discussed.

## References

Miller, A. L. (2011). *The representation of clicks*. In M. van Oostendorp, C. J. Ewen, E. Hume, & K. Rice (Eds.) The Blackwell Companion to Phonology, vol. 1, ch. 18, (pp. 416–439). Malden, MA: Wiley-Blackwell.

Narayanan, S., Nayak, K., Lee, S., Sethy, A., & Byrd, D. (2004). *An approach to real-time magnetic resonance imaging for speech production*. JASA, 115(4), 1771–1776.

Proctor, M., Zhu, Y., Lammert, A., Toutios, A., Sands, B., Hummel, U., & Narayanan, S. (2016). *Click consonant production in Khoekhoe: a real-time MRI study*. In S. Shah & M. Brenzinger (eds.) Khoisan Languages and Linguistics. Proc. 5th Intl. Symposium, Riezlern/Kleinwalsertal. (pp. 337–366). Cologne: Rüdiger Köppe.