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## A phonetic study of Iraqw ejectives consonants

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Iraqw a Cushitic language spoken in Tanzania has a set of ejectives consonants /tsʰ, tʰ, qʰ, qʰʷ/ in its phonological inventory (Mous, 1993). This study focuses on an instrumental description of these non-pulmonic consonants' features. Data were recorded by using various instrumental techniques: aerodynamic -oral airflow (oaf) and intraoral pressure (Po)-, EGG, Video, Palatography and acoustic. Recordings were made with 4 women and 5 men. Each ejective was recorded in a set of 5 words in different positions: C1, V\_V and in when possible in final position. Words were repeated 3 times during the recordings. Iraqw pulmonic consonants were also recorded using the same techniques and protocol.

A number of phonetic variants have been observed for the ejective consonants: [tsʰ ~ tʰ ~ sʰ; tʰ ~ tʰ̥; qʰ ~ qʰʷ; qʰʷ ~ qʰʷʷ]. Acoustic and aerodynamic data reveal several interesting features: as expected, Po is at least twice higher for ejective consonants when compared to pulmonic consonants. Po varies a lot across the position in words, it is higher in V\_V position. Particularly interesting are the phonetic realizations of the lateral affricate ejective consonant [tʰ] showing that frication duration can be greater than the stop part. The examination of the timing between acoustic, EGG and aerodynamic data reveal a complex process in the coordination between glottal configurations and oral constrictions. Video data also show a large amplitude of laryngeal vertical movements. Figure 1 shows Po values above 30 hPa (1 hPa = 1.2 cm H<sub>2</sub>O) and the gradual ballistic movement of the laryngeal elevation and descent with a closed glottis. An important point concerning the observed phonetic variations is that they likely reflect variations that could explain changes in diachronic process.

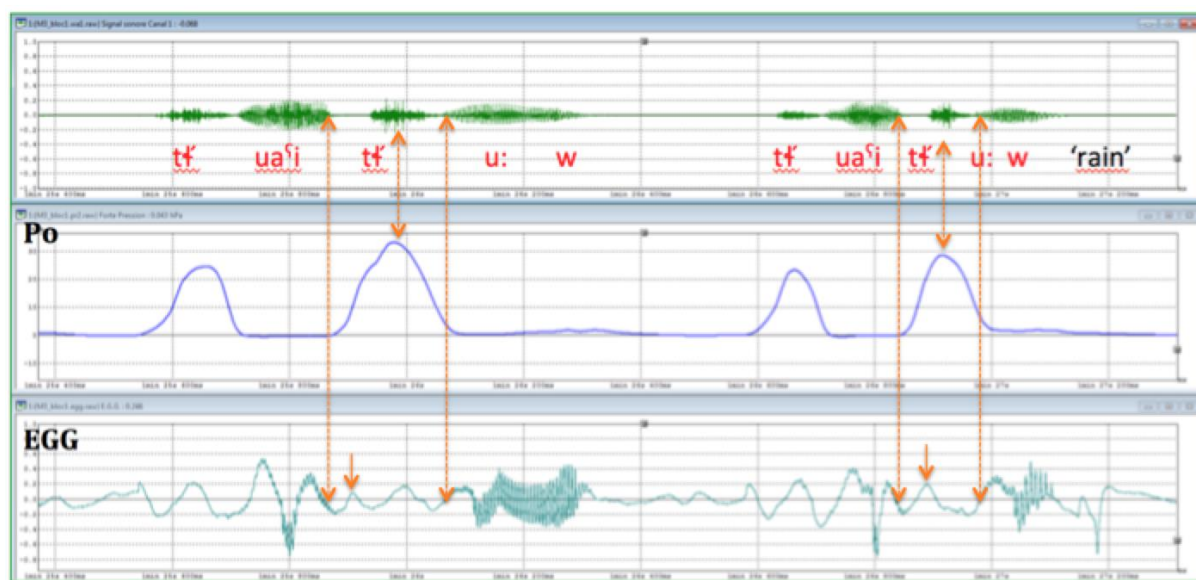


Figure 1. Two realizations of the word [tʰuaʰitʰu:w] 'rain' showing the audio waveform, Po and EGG data. EGG plot suggest an opening at the beginning of [tʰ] followed by a closure towards the start of [ʰ] frication. Po shows a gradual increase up to above 30 hPa for the intervocalic realizations. Po starts to decrease after the peak of frication noise on the audio waveform.

Mous, M. (1993). *A Grammar of Iraqw*, Kuschitische Sprachstudien 9, Hamburg, Hemut Buske Verlag.