

An ultrasound and electroglottograph study of voicing in gemination in Eastern Oromo

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This study investigates the roles of tongue root and voicing in geminate stop contrasts of Eastern Oromo (Cushitic, Ethiopia). Phonetically, its stops may be grouped by voicing with voiceless stops being [t^h, t', tt^h, tt'] and voiced stops being [d, d', dd, dd'], but phonologically, the implosives pattern with voiceless stops (Lloret 1994). The present study uses ultrasound and electroglottography (EGG) to examine voicing in the singleton and geminate stops with three goals: 1. To describe the laryngeal activity during the production of geminate vs. singleton stops; 2. To describe the lingual articulation during the production of geminate vs. singleton stops; and 3. To determine if there is a correlation between phonetic or phonological voicing and the position of the tongue root in geminate vs. singleton stops. Advanced tongue root is known to be an enhancement strategy to voicing (Ladefoged & Maddieson 1996), but Ahn (2017) suggests that in certain languages this may be tied to phonological not phonetic voicing.

Simultaneous ultrasound and EGG data were collected from 5 native speakers of Eastern Oromo (3 male, 2 female). 6 repetitions per speaker of /t^h, t', d, d', tt^h, tt', dd, dd'/ were recorded with an Echo B ultrasound in Articulate Assistant Advanced and with a Glottal Enterprises EGG in Audacity. For ultrasound analysis, tongue splines at the point of maximum constriction during the closure of each stop were traced. Statistics consisted of linear mixed effects models. For EGG analysis, the same tokens will be submitted to EGGWorks and VoiceSauce and measures will be made to determine the voice quality. Results from the two analyses will then be correlated.

Ultrasound results found that geminate stops were produced with a more fronted tongue than singletons, which, given that the stops are dental, suggests they better reach their targeted place of articulation. This supports the findings of other articulatory studies which liken gemination to fortition, such as Payne (2006), who found greater linguopalatal contact in geminates. Another finding was that voiced stops had advanced tongue root, but that implosives' were variable—some geminates for some speakers showed advancement, while singletons and other geminates did not.

An acoustic pilot study suggests that voiced singletons were voiced throughout but geminates were more variable—either voiced, semi-voiced, or voiceless. EGG results will corroborate and add to these findings. Other studies have also found voicing to be variable in geminates with languages such as Japanese also displaying semi-devoiced geminates (Kawahara 2015). This is likely due to the aerodynamic difficulties in sustaining voicing over an extended period of time.

For the correlations between voicing and tongue root in the geminates, if EGG results confirm variable voicing in geminates, it is hypothesized that the tokens which display less tongue root advancement may also be those which display voiceless periods or fewer characteristics of modal voice in their closures. The difference between the geminate implosives which display advanced tongue root and those which do not may be due to different fortition strategies of gemination--sometimes phonetic voicing is strengthened, other times phonological [+constricted glottis] is.

References

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