

Articulatory Differences in the Voiced and Voiceless Pharyngeal Fricatives /ʕ/ and /ħ/ in Gulf and Levantine Arabic: A Real-Time Magnetic Resonance Imaging Study

The Arabic pharyngeal fricatives /ʕ/ and /ħ/ are typically defined as voiced and voiceless cognates, sharing the same place and manner of articulation and differing in voicing (Heselwood, 2007). Laufer (1996) and Heselwood (2007), however, propose that /ʕ/ be described as a pharyngeal approximant rather than a fricative, suggesting that /ʕ/ and /ħ/ differ in manner, but not place, of articulation. Descriptions of the articulatory configurations associated with /ʕ/ further differ on specifying its articulatory target and, consequently, on which of the gestures implicated in articulating /ʕ/ are voluntary or “intended”, and which are “epiphenomenal” (Heselwood, 2007).

In this study, we use real-time Magnetic Resonance Imaging (rtMRI; Fu et. al., 2015 and Carignan et. al., 2015) to examine and compare the articulation of both /ʕ/ and /ħ/ in two varieties of spoken Arabic. Four male Arabic speakers participated in this study: two native speakers of Gulf Arabic (both from Saudi Arabia), and two native speakers of Levantine Arabic (one from Lebanon, and one from Jordan).

The rtMR images provide midsagittal views of the vocal tract including the pharynx, as well as an axial view of the hyperpharynx (upper pharynx) and another axial view of the hypopharynx (lower pharynx). We observe and quantify narrower pharyngeal constrictions during the articulation of /ħ/ in both dialects by measuring the cross-sectional pharyngeal areas throughout the articulation of both speech sounds. Ongoing analysis will further compare the midsagittal shape of the tongue associated with the articulation of both speech sounds, including the contour of the body of the tongue as well as the back of the tongue, implicated in the posterior pharyngeal constriction.

Findings from this study will provide compelling descriptions of the articulatory configuration associated with /ʕ/ and /ħ/ and will conclude whether both speech sounds share place and manner for these speakers of these dialects. Furthermore, vowels adjacent to /ʕ/ and /ħ/ are reported to acoustically exhibit a lower F2, the classic correlate of pharyngealization (Heselwood & Al-Tamimi, 2011). Findings from this study will offer a phonetic explanation of the degree and extent of spread of the pharyngeal quality to those segments adjacent to /ʕ/ and those adjacent to /ħ/ as a result of coarticulation.

References

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