

ACOUSTIC INTERPRETATION OF PHARYNGEAL ARTICULATIONS

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Introduction and Method

This investigation examines the acoustic contrasts present in pharyngeal articulations. Pharyngeal articulations include consonants found in Native North American, Caucasian and Semitic languages; and habitual postures such as pharyngeal voice quality settings in individual speakers. Our investigations, up until now have involved spectrographic examination focusing on behaviour of the first and second formants. It appears to be necessary to look at energy higher than the first two formants in order to distinguish between pharyngeal consonants. Currently, in this study spectral data is compared with videolaryngoscopic information obtained from a trained phonetician, focusing on viewing behind the epiglottis. This combination of examinations offers information that is helpful in defining place and manner categories that need to be distinguished phonetically (according to IPA standards) in this area of the vocal tract.

It appears that the pharyngeal mechanism used to produce pharyngeal consonants and to maintain a pharyngeal voice quality setting is the same [1]. That is, the epiglottis approximates the pharyngeal wall causing constriction. What happens to the cavity behind the epiglottis has been described videoscopically by Laufer and Condax [2], however, the acoustic details have not been addressed.

Given that pharyngeal articulations either in consonants or as voice quality settings involve the same 'place' of articulation, it is the aim of this study to distinguish the range 'manners' of pharyngeal articulations available from those used in language. The International Phonetic Alphabet (IPA) chart lists two pharyngeal fricatives and a series of epiglottal consonants. It has been proposed (Esling, this volume) that the epiglottal consonants are produced in the same place of articulation as the pharyngeal fricatives but involve varying manners of articulation.

In these investigations a trained phonetician has produced a series of pharyngeal articulations involving specific consonants [ʔ, ʕ, ʕ̣, ʕ̤, ʕ̥, ʕ̦, ʕ̧, ʕ̨]. Vowels have also been produced with a pharyngeal voice quality setting and recorded at eight pitch intervals. The data collected include video images of the pharyngeal consonants and spectrographic analysis of pharyngeal consonants and pharyngealized vowels.

As noted by Laufer and Condax [2] the video information for pharyngeal consonants suggests the larynx is raised and approximates the epiglottis. It is the assumption here that the degree of approximation can result in such manners as frication and trilling. Consequently, it is suggested that the epiglottal consonants occupy the same place as pharyngeal consonants but vary in manner. The result of this investigation may support the addition of the

epiglottals to the pharyngeal column in the IPA chart in a way that compares with the manners for uvular consonants.

According to past research the effects of raising the larynx and constricting at the pharynx, causes a raised F1 and a lowered F2 [1,3]. However, this does not fully describe the trilling, frication and variation in larynx height of the pharyngeal consonants that are observed in these investigations. The higher formants do not appear to be well described in the literature but seem to be significant from preliminary examinations. It is noted here that pharyngeal consonants produced intervocally in an /a/ environment both with raised and lowered larynx settings, have a dominance of energy in the region of the fifth formant. The /a/ vowel exhibits very similar first and second formant characteristics with pharyngeal consonants.

Summary

A trained phonetician has produced pharyngeal consonants and voice quality settings that provide extreme, or peripheral examples. These examples can then be compared cross linguistically or within individual voice quality settings. A video examination provides a means to describe these consonants by observing interaction of anatomical features and, spectrographic analysis can help to support these observations. The video data show the epiglottis separating the vocal tract in the region of the pharynx with varying degrees of constriction. It is also possible to see the arytenoid structures of the larynx raise up toward the epiglottis and at times, the aryepiglottic folds trill laterally. It is assumed the degree that the larynx approximates the epiglottis from below has an affect on the perceived pharyngeal consonant. The effect of voicing on pharyngeal postures is also considered. Closer examination of spectrograms and comparison with uvular consonants may reveal a pharyngeal category that compares with uvular consonants.

References

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