

AUDITORY CHANGE WITH PITCH AND FIBREOPTIC FILMING OF ARYEPIGLOTTIC ARTICULATIONS

John H. Esling

Department of Linguistics, University of Victoria, P.O. Box 3045, Victoria, B.C. V8W 3P4

1. Introduction and Method

At issue is the distinction between "pharyngeal," "epiglottal" and "glottal" places of articulation, and the phonetic description of manners of articulation produced in the pharynx. Pharyngeals are characterized by a retraction of the tongue, bringing the epiglottis in close proximity to the back of the pharynx [1,2], but it is often difficult to discern visual details of manner of articulation to correlate with auditory and acoustic measures, because a deeper view is obscured by the epiglottis. The question remains: if pharyngeal stops are possible, how are they distinct from epiglottals and glottals; and is their production similar to the mechanism for producing fricatives and approximants?

Laryngoscopic images of the pharynx and larynx were obtained using a Kay Elemetrics Rhino-Laryngeal Stroboscope 9100 -- a computer-controlled system including a dual halogen (fixed) and xenon (strobe) light source, a Panasonic KS152 camera, a Mitsubishi S-VHS video cassette recorder BV-2000 and printer. In order to investigate the extent of view possible of the laryngeal and pharyngeal mechanisms behind the apex of the epiglottis during pharyngeal articulations, an Olympus ENF-P3 fibroscope was attached to the Kay system, using nasal insertion and a 28mm lens for wide-angle view. The subject in all nasendoscopic observations was the author, producing maximally contrastive phonetically controlled speech data. The view from the naso-pharynx was adjusted to peer behind the apex of the epiglottis as far as possible, filming each articulation in the environment of an [i] vowel (see [3,4]).

2. Pharyngeal Articulatory Categories

It appears under fibreoptic observation of the pharyngeal mechanism that the aryepiglottic folds and their related cartilages are the main, active "articulator" in the production of speech sounds in the category "pharyngeal," i.e., that "epiglottal" articulations can be treated as a category of pharyngeal manners of articulation. Evidence of trilling accompanying friction is presented; and the nature of the pharyngeal (epiglottal) stop is described. It is suggested that pharyngeal stop, fricative, approximant and trill share a common place of articulation, differing in manner of articulation; that "epiglottals" are not separate from pharyngeals in place of articulation; and that the behaviour of pharyngeals parallels the uvular series; as in Table 1.

Furthermore, all of these articulations may be produced with a raised or lowered larynx. Major differences in auditory/acoustic quality are achieved when the larynx as a whole is raised or lowered during the production of pharyngeals. Most salient differences in auditory quality are realized when pitch varies between high and low register.

These distinctions help to explain the phonetic variation in pharyngeal quality that occurs in Northwest Coast

languages, /ʕ,ʕʷ/ and their "glottalized" counterparts /ʕ',ʕʷ'/ [5]; in Caucasian languages where the more constricted sound is labelled [ɣ] in contrast to [h] [6,7]; and in Mon-Khmer register tones involving larynx raising vs. lowering [7]. These larynx height settings, with their consequent acoustic effects, have been shown to be pitch-dependent [8].

Table 1. Pharyngeal Consonantal Distinctions (Place/Manner/Voiceless-Voiced)

[ʔ]	Glottal plosive
[h]	Voiceless glottal fricative
[ʔ̠]	Pharyngeal ("epiglottal") plosive ("massive glottal stop")
[ħ]	Voiceless pharyngeal approximant (not audible)
[ʕ]	Voiced pharyngeal ("epiglottal") approximant (the common value of /ʕ/)
[ħ]	Voiceless pharyngeal ("epiglottal") fricative
[ɣ]	Voiceless fricative with aryepiglottic trilling
[ʕ]	Voiced pharyngeal fricative ([ʕ, ʕ̠] more common)
[ɣ̠]	Voiced fricative with aryepiglottic trilling

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