

PHARYNGEALS IN TIGRINYA

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INTRODUCTION

This paper focuses on the phonology and phonetics of /ʕ/, a voiced pharyngeal approximant. While the Tigrinya pharyngeal is like pharyngeals in other language families in which they occur (Afro-Asiatic, Caucasian, and Salishan) in their effect on vowel formants, they differ in that they are realized as a break in the formant patterns of an adjacent vowel segment.

Tigrinya is a South Semitic language spoken in Eritrea. It has the following phonemic inventory:

Consonants

	t t'		k k'		ʔ
b	d		g		
f	s s'	ʃ		ħ	h
	z			ʕ	
		tʃ tʃ'			
		dʒ			
m	n	ɲ			
	l, r				
w		j			

Vowels

i		u
e	ə	o
ä		a

The phonemes /k/ and /k'/ are fricated to the uvular [χ] and [χ'] (sometimes [ʁ]) after vowels.

The speaker for this study is a 27-year old graduate student at the University of Toronto.

BREAKING

The results of this study are for the most part consistent with the findings reported in the literature and are given below. However, this study uncovered a remarkable feature of Tigrinya that is not reported in detail elsewhere. When, phonologically,

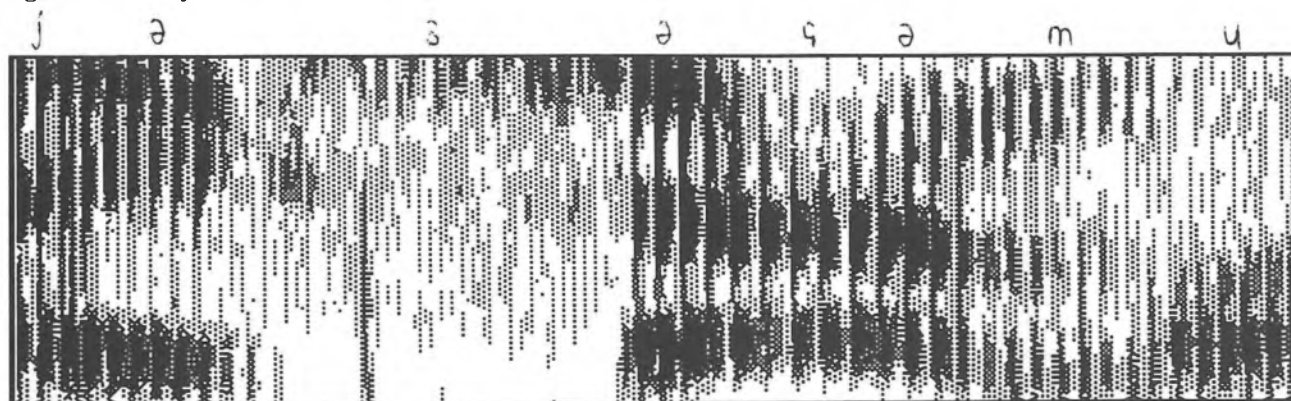
the voiced pharyngeal consonant is followed by another consonant, the pharyngeal is not realized where one expects, but instead in the middle of the adjacent vowel segment. Consider the example 'they kiss' shown in the spectrogram in Figure 1. The phonological representation /jəsəʕm/ is phonetically manifested as [jəsəʕəmu]. Vowel formants are clearly present on both sides of the pharyngeal [ʕ]. Bessell (1992) mentions that [ʕa, əʕ] sequences in Salishan are difficult to distinguish phonetically, but does not go into detail. Perhaps her observation is a result of the same phenomenon noted here.

VERB STRUCTURE

Evidence that the pharyngeal is phonologically at a syllable edge is available from Tigrinya nouns and verbs. In Tigrinya, as with other Semitic languages, the basic verb consists typically of three consonants (e.g. /nbɔ/ 'to read'). Inflected forms are formed by inserting vowels between these consonants and by prefixation and suffixation. Leslau (1939) states that the imperfect of a verb has the template form /CäCCä/; when a suffix is added the second vowel is deleted. The informant for this experiment pronounced the first vowel in the form as /ə/ rather than /ä/. The third plural is formed by the discontinuous affix /jə...u/ or /jä...u/, depending on the verb. The third plural form of the root /fkʔ/ 'love' is /jäfəkʔu/ 'they love'. For the verb root /shk/ 'laugh', there is /jəsəħkʔu/ 'they laugh'. For /sɛm/ 'kiss', the phonological representation is /jəsəʕm/ 'they kiss'; phonetically, however, this is realized as [jəsəʕəmu], with the voiced pharyngeal consonant being realized in the middle of the adjacent vowel.

Additional evidence is provided by possessive suffixes on nouns. The first person plural possessive suffix is /na/. The word for 'cow' is /lam/, and 'our cow' is /lamna/. The word for 'idea' is /ħasab/, and 'our idea' is /ħasabna/. For /səməmməʕ/ 'agreement', the phonological form is /səməmməʕna/ 'our agreement', but phonetically it is [səməmməʕəna].

Figure 1: 'they kiss'



VOWEL DURATION

The duration of a vowel not adjacent to a pharyngeal is an average of 116 ms. The pharyngeal in 'they kiss' is 33.1 ms, with a vowel of 55.2 ms preceding it and a vowel of 44.8 ms following it. When the duration of the two vowels preceding and following the pharyngeal are added together, the result is 100 ms. This suggests that the pharyngeal is realized in the middle of one vowel, as opposed to a second, epenthetic vowel being realized after the pharyngeal.

EXPERIMENT

The purpose of the experiment was to study the acoustics of pharyngeals compared to glottals, velars, and uvulars.

A total of 136 words were recorded from the speaker; these were elicited in a frame /ʔəndəgānə ... bəl/ 'say ... again' to control for rate and rhythm. Of these, 65 were real Tigrinya words and 71 were nonsense forms. The words were recorded four times, giving a total of 536 tokens. The forms were selected to illustrate pharyngeal consonants as well as velars, uvulars, and glottals. The forms were digitized and analyzed using the acoustic analysis program Signalize. Measurements were made of duration of the pharyngeal consonants and the adjacent vowels.

RESULTS

Pharyngeals

The voiced pharyngeal approximant /ʕ/ is realized as a pharyngealized segment of the preceding or following vowel. A vowel - voiced pharyngeal cluster is realized as a normal vowel portion which is slightly pharyngealized, followed by a strongly pharyngealized portion. The strongly pharyngealized portion (/ʕ/ in Figure 1) corresponds to the voiced pharyngeal.

Before /ʕ/, the formant transitions of vowels show a rise of the first formant and a fall of the third formant. The amount of rise and fall varies depending on which vowel is being affected.

When the measurements of the centres of the pharyngeals are compared to measurements of the centres of the steady state vowels, the following generalizations emerge. These findings are consistent with those reported in the literature (Alwan, 1986 (Arabic); Ghazeli, 1977 (Arabic); Butcher and Ahmad, 1987 (Arabic)).

Pharyngealized /i/ shows an average lowering of the third formant of 285 Hz and an average raising of the first formant of 122 Hz, when compared with steady state /i/. The forms with pharyngealized /u/ show an average lowering of the third formant of 184 Hz and an average raising of the first formant of 92 Hz. The forms with pharyngealized /a/ show an average lowering of the third formant of 265 Hz and an average raising of the first formant of 61 Hz.

The second formant lowers from steady state to pharyngealized for /i/ and /a/ and rises for /u/.

Uvulars

The uvular consonants (derived from velars) are usually fricatives, but sometimes they are approximants. Alwan (1986) found that the F1 transition for /i/ and /u/ falls from uvular to vowel, but that it rises for /a/. This study compares formants immediately preceding uvulars with steady state vowels, and finds that the differences in F1 are consistent with Alwan's findings. F2 lowers from vowel to uvular for /a/ and /i/, and remains steady for /u/, which is consistent with Alwan. F3 rises

from vowel to uvular for /a/ and /u/, and lowers for /i/, which is also consistent with Alwan.

Alwan (1989) found that F1 is the perceptual cue as to whether a sound is uvular or pharyngeal. Instances of the vowel [a] with a F1 that is at least as high or higher as that of a steady state vowel were perceived as following a pharyngeal. If F1 is 90 Hz less than a steady state F1, the vowel was perceived as following a uvular. If F1 was between these two values, the vowel was perceived as following a glottal.

The results of this study show F1 transitions for pharyngeals, uvulars, and glottals that support Alwan's 1989 findings, except for the fact that F1 for /u/ was shown to

The second and third formants come together at the edge of a velar. This is consistent with findings in the literature (Kent, 1992).

CONCLUSION

The findings in this experiment are for the most part consistent with the literature, except for the transposition effect, which has not been reported for any other languages.

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