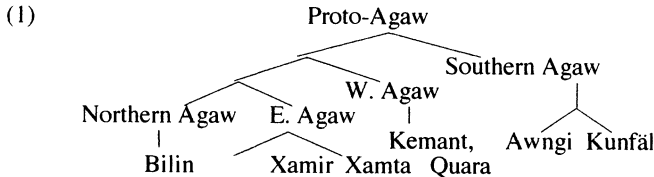


Some Phonological Processes in Bilin

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1. The language

Bilin is a Central Cushitic (or Agaw) language and is the only member of the Northern Agaw branch. According to Appleyard (1984:60), the Agaw languages are related as follows:



Bilin is known by the following names in the literature: Balen, Belen, Beleni, Bilayn, Bilein, Bilen, Bileninya (its name in Tigrinya), Bileno, Blin (favored by native speakers), Bogo, Bogos, and North(ern) Agaw (Agew). There are two reported dialects: Bet Taqwe and Bet Tarqe, but these are not always clearly defined or systematically distinguished.

The estimated number of speakers varies from a low of 70,000 (Grimes 1996), to a mid range of 90,000-120,000 (Sasse 1992, citing a 1986 report), to a high of 140,000 (Killion 1998, citing 1997 Eritrean government figures). Grimes (1996) reports that 60% of Bilin Christians are bilingual in Tigrinya, while 70% of Bilin Muslims are bilingual in Tigre. Grimes reports that the younger generation mixes speech with Arabic, and that there is some bilingualism in Nara or Kunama (Nilo-Saharan). In part because of the fairly high degree of intermarriage and bilingualism, Pateman has reported that the Bilin 'maintain a shrinking linguistic identity around the city of Keren,' the chief city of the Bilin-speaking region (1998:32, fn 27).

Bilin phonology was first described systematically through fieldwork by Leo Reinisch, the father of Cushitic studies, in several works, including a grammar, dictionary, and texts (1882, 1883, 1887a, 1887b). However, this work was pre-phonemic; for a modern assessment, see Appleyard (1987). F.R. Palmer conducted fieldwork with two speakers and wrote up his results in several papers, e.g. (1957, 1958, 1960). Palmer used a framework influenced by Firth, and was unfortunately fairly terse with his examples and glosses in an abstractly labelled grammar. More recently, Lamberti and Tonelli (1996, 1997) have produced a more user-friendly description, based on Lamberti's fieldwork. It is full of minimal pairs, but underlying representations are often unjustified, and seemingly

influenced by orthographic representation. A historical phonology was sketched by Appleyard (1984), while Zaborski (1976), using secondary sources, wrote on the complex consonantal apophony displayed in Bilin noun alternations.

2. The present study

The present study is a preliminary report on fieldwork conducted in the United States with two native speakers, both in their 30s. The first, Sult'an Michael, a male, is from Ashera, a village approximately 20 miles southwest of Keren. Bilin is his native language, spoken in the home. His mother is from the Bet Tark'e clan, and speaks Bilin and Tigre; his father is from the Neged clan, and spoke Tigre, Tigrinya, and Bilin. The male speaker also learned Amharic, English, and Tigrinya in school, and learned Tigre from neighbors.

The female speaker, Medhanit Tesfu, is from Musha, near Keren. Her father spoke primarily Bilin and Tigrinya, along with Italian and Tigre, while her mother spoke Bilin, Tigre, and some Italian, Arabic, and Tigrinya. Medhanit also learned Tigrinya, Tigre, Amharic, and English. Like Sult'an, she is Catholic.

The goal of this study is to set forth first the phonemic inventory of Bilin, and then describe some of the segmental phonological processes. Tonal or pitch accent phenomena have posed problems for many investigators and will not be described here. However, several of the segmental phenomena described here have not been described in other sources. And one, debuccalization, provides crucial new data to theories of feature geometry.

3. Bilin phoneme inventory

The consonant inventory is given below:

(2)	t	tʃ	k	k ^w	ʔ	
	b	d	dʒ	g	g ^w	
		t'	tʃ'	k'	k' ^w	ts' occurs in borrowings.
	f	s	ʃ	x	x ^w	h
		z				ʃ
	m	n	ŋ	ŋ ^w		
		l				
		r				
	w	j				

The phonemes /x, x^w, ŋ, ŋ^w/ do not occur word-initially.

The symmetrical, seven-vowel inventory is given below in (3):

(3)	i	i	u
	e	ə	o
	a		

The phoneme /i/ does not occur word-finally.

4. Phonological processes

4.1. Vowels

4.1.1. Laxing

The non-low vowels are often laxed, especially in closed syllables:

- | | | | |
|-----|-------------------------|-------------------------|----------------|
| (4) | /lībdi/ | [lībdi] | 'remember' |
| | /dédna/ | [dédna] | 'to disappear' |
| | /ferék ^w un/ | [ferék ^w un] | 'I go' |

On occasion, vowels, especially /e/, are realized as lax even in open syllables.

- | | | |
|-----|-------------|------------|
| (5) | [ʃerébna] | 'to carve' |
| | [wɛtérna] | 'to pull' |
| | [mɛʃeráfət] | 'fan' |

4.1.2. Fusion of diphthong

Though the diphthong /aw/ is rare, it appears to freely vary with a tense monophthongal equivalent, e.g. /kaw/ ~ [ko] 'people'. The fronting diphthong /aj/ does not fuse: /t'ajt'ara/ 'Bilin-style *injera* (bread)'.

4.1.3. Epenthesis

The typical syllable structure in Bilin does not tolerate branching onsets or codas (though see the discussion on syncope and rhotic fortition below). Three different morphophonemic contexts illustrate the insertion of the epenthetic vowel /i/:

- | | | | |
|-----|----|-------------------------|-------------------|
| (6) | a. | /ʃibka/ | 'hair (sg.)' |
| | | /ʃibk/ → [ʃibik] | 'hair (pl.)' |
| | b. | /alibd-i/ | 'remember! (sg.)' |
| | | /alibd-na/ → [alibdina] | 'to remember' |
| | c. | hanna | 'Hanna' |
| | | hannar | 'Hanna's' |
| | | medhanit | 'Medhanit' |
| | | medhanitir | 'Medhanit's' |

4.1.4. Syncope

Palmer (1960:110) stated that consonant clusters were possible 'only in syllable junction.' Yet the first exception to this generalization lies in the occurrence of consonant clusters within an onset. Most often, the vowel /i/ is syncopeated when it occurs between an initial stop and a liquid (7a), though it occasionally occurs medially (7b) and rarely involves other vowels (7c):

- | | | | | |
|-----|----|--------------------|-------------------|--------------|
| (7) | | <u>Lexical</u> | <u>Syncopated</u> | <u>Gloss</u> |
| | a. | bilin | blin | 'Bilin' |
| | | birax ^w | brax ^w | 'hot' |
| | | kiri | kri | 'die!' |
| | | giriḅ | griḅ | 'knee' |
| | | girim | grim | 'good' |
| | b. | ʃafira | ʃafra | 'foam' |
| | | leḡatiraḡin | leḡatraḡin | 'seventy' |
| | c. | mənadaq | māndaq | 'wall' |
| | | mɛʃeráfət | mɛʃráfət | 'fan' |

Sometimes syncope creates morphophonemic alternations, making it difficult to determine the underlying representation, given the competing rule of epenthesis:

- | | | | | |
|-----|---------------|---------|------|----------|
| (8) | kirŋa | 'stone' | kriŋ | 'stones' |
| | girwa ~ gruwa | 'man' | gru | 'men' |

The underlying form for 'stones' is probably /kirŋ/, which undergoes epenthesis to [kiriŋ] because of a constraint against sonorant clusters in the coda. This is followed by syncope, yielding [kriŋ]. The form 'stone' /kirŋ-a/ is subject to neither syncope nor epenthesis. For the form 'man', syncope vocalizes the glide, while another glide is inserted as a transition between the high back vowel and the low vowel.

4.2. CV Interaction

4.2.1. Labial Spreading

A labialized dorsal consonant optionally rounds an adjacent vowel through [labial] spreading. At this point in the study, it is not clear when the labialization is tautosyllabic (the typical case, as in (9a)), and when it is heterosyllabic (9b).

- | | | | | |
|-----|----------------------|---|----------------------|-------------------------------------|
| (9) | <u>Underlying</u> | ~ | <u>Surface</u> | <u>Gloss</u> |
| a. | ʃirax ^w | | ʃiroχ ^w | 'far' |
| | g ^w id-na | | gud-na | 'to lift' |
| | ʃək ^w əm | | ʃəkom | 'area of face around chin and lips' |
| | k ^w i-dan | | kudæn | 'your (sg.) brother' |
| | k ^w i-na | | k'una | 'to eat' |
| b. | ʔix ^w ina | | ʔux ^w ina | 'women' |

In the plural, where the high central vowel occurs or is inserted by epenthesis, the vowel changes to a high back vowel due to [labial] spread.

- | | | | | |
|------|------------------------------------|----------|-----------------------------------|-----------|
| (10) | k ^w ax ^w ira | 'crow' | k ^v ax ^w ur | 'crows' |
| | ʔuŋk ^w á | 'ear' | ʔuŋk'úk ^w | 'ears' |
| | ʔiŋg ^w i | 'breast' | ʔiŋg ^w uk ^w | 'breasts' |
| | luk ^w | 'foot' | lukuk ^w | 'feet' |

4.2.2. Other vocalic processes

Other processes such as fronting of the low vowel after the voiceless pharyngeal have been observed sporadically, but these are still being worked out. Palmer (1957) has reported a type of vowel harmony, but this has been questioned by Appleyard (1991). It is still under investigation and a definitive analysis is in progress.

4.3. Consonants

4.3.1. Realization of the velar

In syllable-final position (11a), the velar stops are often realized as uvulars after back vowels in syllable-final position (11a), the most common environment, but also in syllable-initial position before back vowels (11b); the uvulars are often affricated. Note they are also subject to debuccalization (§4.3.8).

- | | | | |
|------|----|--|---------|
| (11) | a. | ʃamak' ~ ʃamaq' | 'dirt' |
| | | ʃawq ^w ~ ʃawqχ ^w | 'water' |
| | b. | k'af ~ q'af | 'bark' |
| | | k'uʃa ~ q'uʃa | 'sand' |

4.3.2. Realization of the pharyngeals

The voiceless pharyngeal fricative /ħ/ is often realized as the glottal [h]:

- (12) ħakim ~ hakim 'doctor'
 medħanit ~ medhanit personal name

Many Bilin speakers also speak Tigre, and as reported in Raz (1983) for Tigre, Bilin also shows alternation between glottal stop and the voiced pharyngeal approximant in final position (13a), but also sometimes in initial position (13b):

- (13) a. /k^wálʕa/ 'child' vs.
 /k^wáleʕ/ → [k^wáleʔ] 'children'
 kaséʔ ~ kaseʕ 'guts'
 b. ʔafra ~ ʕafira 'foam'
 ʔakk'anna ~ ʕakk'anna 'to measure'

This was more common for the speaker from Ashera than for the one from Musha.

4.3.3. Rhotic fortition

When the liquid /r/ is adjacent to an alveolar sonorant /l, r, n/, it undergoes fortition to become the voiced stop /d/. This occurs in several morphemes. The possessive marker, for example, is /-r/, as shown in (14a) below. When the stem ends in an alveolar sonorant, however, the /r/ undergoes fortition (14b). The fact that not just any sonorant induces this change is shown by the forms in (14c).

- | | | | | |
|------|----|-------------|------------------------------|-------------------|
| (14) | a. | <u>Name</u> | <u>Possessive form</u> | <u>Gloss</u> |
| | | ħaile | ħailer gidij | 'Haile's dog' |
| | | ʔamine | ʔaminer gidij | 'Amine's dog' |
| | | tesfu | tesfur gidij | 'Tesfu's dog' |
| | | medħanit | medħanitir mets'ħaf | 'Medħanit's book' |
| | | zenəb | zenəbir gidij | 'Zeneb's dog' |
| | b. | mikiel | mikiel d gidij | 'Mikiel's dog' |
| | | samiel | samiel d gidij | 'Samiel's dog' |
| | | karar | karar d gidij | 'Karar's dog' |
| | | baʕir | baʕird gidij | 'Bashir's dog' |
| | | sult'an | sult'and gidij | 'Sult'an's dog' |
| | | temesgen | temesgend gidij | 'Temesgen's dog' |
| | c. | kibrom | kibromir ʔax ^w ar | 'Kibrom's head' |
| | | gajm | gajmir gidij | 'Gaim's dog' |
| | | mariam | mariamir k'omba | 'Mariam's nose' |

The possessive forms in (14b) above also illustrate an innovation in Bilin phonology which has not previously been reported: the toleration of branching codas. This parallels the introduction of branching onsets through syncope, described above, suggesting that the rules of syllable structure may be in flux. Expected forms such as *sult'anid or *sult'andi are ungrammatical. (Recall that the high central vowel /i/ does not occur finally.)

The second person singular present suffix /-rək^w/ also undergoes fortition to [-dək^w] in the same way as the possessive suffix after /l, r, n/:

- (15) a. ʔambabira-rək^w ‘you read’
 miharse-rək^w ‘you learn’
 wərəd-rək^w ‘you fetch water’
 b. enkel-dək^w ‘you love’
 k^wal-dək^w ‘you see’
 fər-dək^w ‘you go’
 ʔintir-dək^w ‘you laugh’
 tiʔan-dək^w ‘you grind’
 waran-dək^w ‘you separate wheat from chaff’

The second person past suffix /-rux^w/ also shows such alternations. Compare /gandʒarux^w/ ‘you slept’ with /enkeldux^w/ ‘you loved’ and /tiʔendux^w/ ‘you ground’. Likewise, the third person singular future suffix /-ro/ alternates with /-do/: /gandʒ-i-ro gin/ ‘he will sleep’ vs. /enkel-do gin/ ‘he will love’ and /tiʔendo gin/ ‘he will grind’, etc.

4.3.4. Lateral gemination

When the allative suffix /-lí/ concatenates with a stem ending in a rhotic, the rhotic may optionally undergo gemination with the lateral:

- (16) a. kidij ‘field’ kidijlí ‘to the field’
 b. baħar ‘sea’ baħallí ‘to the sea’
 k^wir ‘boys’ k^willí ‘to the boys/soldiers’
 maʃir ‘sickle’ maʃirlí ‘to the sickle’

In one instance, lateral gemination occurred with the velar nasal: /liŋij/ ‘house’ vs. /liŋillí/ ‘to the house.’ The exact scope of this rule requires further investigation.

4.3.5. Final devoicing

Voiced stops are occasionally realized as voiceless, in both final position, and in coda position before a voiceless consonant:

- (17) ʃib ~ ʃip ‘number’
 ʃibka ~ ʃipka ‘hair’

4.3.6. Ejective voicing

Although non-velar ejectives are usually robust, some ejectives are sporadically heard as voiced:

- (18) /kʰaratʃna/ → [kʰaradzna] ‘to cut’
 /atʃfár/ → [adzfár] ‘claws’
 /ħarfitʃna/ → [ħarfidʒna] ‘scratch’
 /k^wak^wito/ → [g^waʔ^wito] ‘he was afraid’

The last form for ‘to be afraid’ was usually pronounced with ejectives (or debuccalized) by the speaker from Ashera, while the speaker from Musha, and the dictionary by Kiflemariam and Paulos (1992) lexicalize it with the voiced labialized velar stop. This could be fruitful ground for further study of ejectives becoming voiced, a move required by the Glottalic Theory of Indo-European (Gamkrelidze and Ivanov 1995). For ejective voicing, see Fallon (1995, in press).

4.3.7. Miscellaneous, sporadic processes

The speaker from Ashera pronounced the word ‘tear (of the eye)’ as [ʔirum], while the speaker from Musha pronounced it with a final labialized velar nasal: [ʔiruŋ^w]; compare the form [ʔeruŋ^w] in Lamberti and Tonelli (1997:85). It is possible that in this dialect, a sort of fusion (or tier promotion in Clement and Hume 1995) has taken place, but further study is needed.

The word for ‘palm leaf’ /tidk’a/ was sometimes pronounced as [tit’k’a], indicating possible spread of ejection, but again, no other tokens could be found which contained this sequence.

4.3.8. Debuccalization

Debuccalization is the loss of oral articulation with the retention of (or replacement by) glottal laryngeal features, as in the North American pronunciation of *kitten* as [kiʔŋ]. In Bilin, debuccalization of velars, both voiceless and ejective, optionally takes place. For example, the plain velar (or uvular) ejective in word-medial or coda position may be pronounced as a glottal stop (also noted by Lamberti and Tonelli 1997:88-90):

- | | | | | | |
|------|----|------------------------|---|-----------------------|----------------------------------|
| (19) | a. | /tak’áx ^w / | → | [taʔáx ^w] | ‘heavy’ |
| | | /ʔenk’ak’/ | | [ʔɛŋk’aʔ] | ‘girl’ |
| | | fok’na ~ foʔna | | | ‘to have sex’(connotations vary) |
| | | lak’ ~ laʔ | | | ‘flour’ |
| | | ʕamaqa ~ ʕamaʔa | | | ‘dirt’ |
| | | tʃ’amaq’na ~ tʃ’amaʔna | | | ‘to squeeze’ |
| | | ʔaq’arna ~ ʔaʔarna | | | ‘to swell’ |
| | | dəbək’ ~ dəbaʔ | | | ‘forest’ |
| | | muq’aq’irna ~ | | | |
| | | muq’aʔirna ~ muʔaʔirna | | | ‘to tend flock’ |
| | b. | t’atak’i | | | ‘weave!’ |
| | | t’atak’na ~ t’ataʔna | | | ‘to weave’ |
| | c. | lak’éx ^w | | | ‘he vomits’ |
| | | laʔ- <i>na</i> | | | ‘to vomit’ |

The forms in (19b) and (19c) illustrate some of the morphophonemic variation created by debuccalization. When the root ending in a velar occurs prevocalically, it is in onset position, and thus the velar place is preserved. However, when it occurs preconsonantly, in coda position, debuccalization takes place.

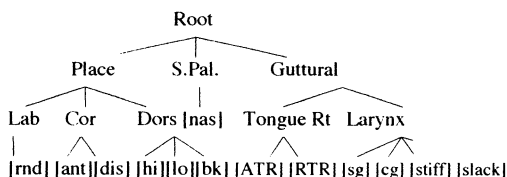
Of great theoretical significance, however, is debuccalization with preservation of secondary articulation. Normally, when primary place features are lost, one would expect secondary features to be lost as well. However, when the labialized velar is debuccalized, labialization is preserved. The underlying velar may be recovered from either morphophonemic alternations, as in (19b, c) or through different speech tempos, with slow speech preserving the velar articulation, and fast speech showing the debuccalized variant. In a few tokens, the debuccalized variant alternated with the voiced pharyngeal approximant, suggesting that debuccalization may feed the apparently free variation between glottal stop and the pharyngeal described in 4.3.2. Some representative examples are illustrated in (20):

- (20) juq^wərá ~ juʔ^wəra 'daughter'
 ʔenák^wira ~ ʔenáʔura 'this boy'
 k^wak^wito ~ k^waʔ^wito 'he was afraid' (Ashera speaker only)
 ʔuk^witu ~ ʔoʔotu 'few'
 boq^wtina ~ boʔ^wotina 'to flow'
 déreq^wa ~ déreʔ^wa 'type of mud for bricks'

The labialized glottal stops transcribed in (20) above have been confirmed instrumentally in spectrograms made by the author, which were omitted due to space. A more precise phonetic analysis is forthcoming.

Within the framework of feature geometry, there are two principal competing American models: the articulator-based geometry of Halle (1995), and the constriction-based model of Clements and Hume (1995). In Halle's model, shown in (21), secondary articulation is represented by the use of a dependent feature such as [round] for labialization, while primary articulation is represented with a primary articulator feature such as Dorsal, asterisked to indicate primary, not secondary articulation.

- (21) Halle's Articulator-based Geometry (irrelevant features omitted)



Halle has claimed that 'formally debuccalization renders the part of the feature tree that is dominated by the Place node invisible' (1995:14); in other words, Place is delinked, and features dominated by Place are delinked also. With this basic conception of debuccalization, no labialized velar can preserve its labialization, since both the primary place feature Dorsal, and the secondary place feature [round] (dependent under Labial) are dominated by Place, which is delinked. With the addition of Halle's redundancy and repair rules, the output of this operation would be a plain glottal stop, as shown in (22), with irrelevant structure omitted:

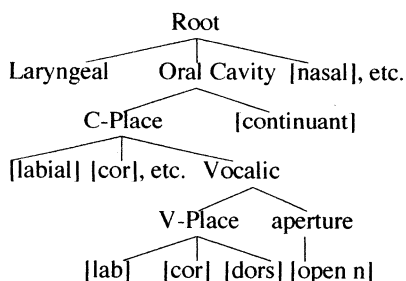
- (22)
-

Halle could, of course, define debuccalization differently, or specify the delinking of primary but not secondary features, though this also poses definitional problems for his model (see Fallon 1999a, 1999b, in press).

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The Clements and Hume (1995) model of feature geometry does not subsume secondary articulation features under primary place features, as does Halle's model. Instead, the Consonant-Place node dominates both primary place of articulation features, and the Vocalic node, which in turn dominates an Aperture (vowel height) node, and the vocalic (secondary articulation) features.

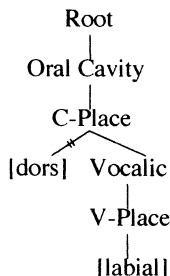
(23) The Clements-Hume (1995) model (partial)



The model in (23) predicts that loss of primary articulation does not necessarily entail loss of secondary articulation; for both to be lost, the node dominating them both, C-place (or the Oral Cavity node) would need to be deleted.

In the Clements and Hume model, debuccalization in Bilin may be described as the delinking of [dorsal] under C-place; the labialization feature, [labial] under the V-Place node, is simply left intact. This is formalized in (24):

(24) Bilin debuccalization of a labialized velar



Thus Bilin is another case in the literature that documents the independence of primary and secondary articulation features; see also Clements (1989, 1991), Herzallah (1990), Odden (1991), Hume (1992), Ní Chiosáin (1994), Clements and Hume (1995), and Fallon (1999a, 1999b).

In addition, Bilin provides the only clear case thus far of synchronic debuccalization with preservation of secondary articulation for glottal stop. Other cases have involved historical changes through reconstruction or comparisons of dialects. Irish shows synchronic debuccalization to the glottal fricative /h/, with preservation of palatalization. A summary of other cases of debuccalization with preservation of secondary articulation is provided in Fallon (1999a, 1999b).

4.4. Phrasal processes

Nasal place assimilation occurs across word boundaries, with both alveolar and bilabial nasals assimilating to a following velar stop, as the following data show:

- (25) /jin gin/ → [jɪŋgin] 'we are'
 /k^wira girim gin/ → [k^wira grɪŋ gin] 'he is a good boy'

Other phrase-level and fast-speech phenomena are still under study.

5. Conclusion

This paper has two main contributions. First, although Bilin has been described previously, there is as yet no detailed, systematic description that approaches descriptive adequacy. This paper is a step in that direction. In describing Bilin phonology, we have also seen new phenomena that have not been described before—the creation of onset clusters through syncope, and the presence of coda clusters through morpheme concatenation in the possessive forms. Such apparent innovations have interesting repercussions for syllable structure, and for the syllabary which has been devised for the language (see Kiflemariam 1996). In addition, although debuccalization has been noted, debuccalization with preservation of labialization has not. This phenomenon forms the basis of the second main contribution, support for the independence of primary from secondary articulation, and for support of the constriction-based model of feature geometry of Clements and Hume (1995). Although this study has described some of the more important segmental phenomena, the role of purported vowel harmony, and the status of tone in the phonological component await further study.

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