Fortition in Marked on Marked Contexts: Velar Stopping in Sylheti

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Abstract

This paper presents a harmonic grammar analysis of the alternation of the velar voiceless fricative /x/ and the corresponding stop /k/ in the environment of high vowels /i/ and /u/ in Sylheti. This process occurs in several different environments: tautosyllabically [CVC], heterosyllabically [CV.C,] and the geminate [VC.CV]. I argue that the fricative undergoes fortition to a stop only when sonority requirements (*M1) become apparent in marked contexts (such as in the geminate condition (*M2), or in conjunction with *fricative and *dorsal) leading to fortition in special environments where constraints "gang up", i.e., when the cumulative weight of markedness constraints outweigh the weight of the faithfulness constraints.

1 Introduction

Sylheti is a dialect of Bengali spoken in the Sylhet district of Bangladesh, as well as in adjoining parts of India including the Tripura region and the Barak Valley of Assam. According to Gope & Mahanta (2015), the basic sound system of the Sylheti spoken in Barak Valley, Assam consists of a seven-way contrast in vowels, though they claim that the system is being reduced to a five vowel system (Table 1). The consonant set is given in Table (2).

Height	front	center	back
high	i	-	u
mid	e	-	o
mid low	ɛ	-	ɔ
low	-	a	-

Table 1: Sylheti Vowels (Das, 2017)

While Gope & Mahanta (2015) claim that the phoneme /k/ is not present in the speech of Sylheti speakers, native speakers do produce /k/ in some environments, while other descriptive works on Sylheti (Das, 2017) have also attested to the presence of the /k/ phoneme.

Manner of Articulation	labial	dental	alveolar	retroflex	palatal	velar	glottal
-voice stop		t		ʈ		k	
+voice stop	b	d		ɖ			g
nasal	m		n			ŋ	
flaps			r				
lateral			r				
-voice fricative	ɸ		s		ʃ	x	h
+voice fricative			z			ɣ	

Table 2: Sylheti Consonants (Gope & Mahanta, 2015)

Goswami (2016) claims that Sylheti has undergone a diachronic process of lenition, with several processes such as spirantisation, debuccalisation, deaspiration, and coda devoicing taking place. Gope & Mahanta (2015) claim that these processes of obstruent weakening have led to reduced contrasts in the Sylheti consonant inventory when compared to standard Bangla, leading to tonogenesis (Gope, 2016). However, the velar stop /k/ is still present in the language in certain environments. I argue that the velar stop /k/ and the velar fricative /x/ show a pattern of synchronic alternation that is conditioned by the presence of the high vowels /i/ and /u/, with these vowels triggering obstruent strengthening to satisfy syllabic well-formedness conditions. This pattern of fricative-stop alternation has been observed cross-linguistically (Kaisse, 1992; Mobaraki, 2013), and previous authors like Nemer (1984) have argued that the alternation is caused by fortition in 'strong' syllabic positions like onset.

2 Distribution of /k/ and /x/ in Sylheti

While /k/ and /x/ appear to be phonemic in Sylheti as shown in (1), the data in (2)-(7) shows that the distribution of /x/ is actually limited to certain environments:

(1) akkanɔ 'now' ɔxanɔ 'there'

(2) ki 'what' xe 'who'

(3) biakkɔl 'dumb' axɔl 'intelligence'

(4) kin 'buy' xase 'near'

(5) hɔkɔl 'all' adaxan 'half'

(6) sikna 'thin' baxʃo 'box'

(7) aʃik 'lover' dex 'see'

The interrogative pronouns in (2) show that /k/ appears when followed by a high vowel, while /x/ appears in the context on non-high vowels. (3) shows that when /x/ becomes a geminate, it undergoes fortition to the stop. (4) –(7) show that the distribution of /k/ and /x/ is not restricted by syllable position as both appear in word initial and word medial onsets, as well as in word medial and word final coda. The only restriction appears to be

on /x/ appearing with high vowels as (5) shows that /k/ can also appear in the environment of a non-high vowel.

3 Characterising the Alternation

The restricted distribution of /k/ and /x/ in Sylheti can be generalized using the two possible rules given below:

(8) LENITION RULE: K → X /(V [−HIGH]) (V[-HIGH])

(9) FORTITION RULE: X → K/(V[+HIGH]) (V[+HIGH])

The distribution of /k/ and /x/ that we see in Sylheti is not a clear case of complimentary or contrastive distribution. Instead, there are some environments where the distribution of the sounds overlap, as /k/ can occur in any environment. Hence, rule (8) does not seem to apply in all cases and would have to deal with more exceptions such as the word /hɔkol/ in (5). On the other hand, there are no exceptions to rule (9). Hence, I posit that rule (9) is the rule that applies in this case, which causes underlying /x/'s in the context of high vowels to undergo fortition and be realised as /k/'s. The next issue that needs to be addressed is the queston of why the environment of high vowels is marked and why only the velar fricative undergoes fortition.

3.1 Velars as a Marked Context

Only the velar fricative is targeted for fortition while other fricatives maintain a faithful input-output mapping, as illustrated below with the coronal:

(10) suri 'knife' → *turi

One of the reasons why the velar is targeted for fortition and not the alveolar or any other fricative is that the number of stops in Sylheti is reduced, and not all fricatives have a corresponding stop. A more theoretical explanation for the restricted application of the fortition rule lies in the place of articulation (PoA) markedness hierarchy (De Lacy, 2006):

(11) DORSAL 〉 LABIAL 〉 CORONAL 〉 GLOTTAL

As we can see from (11), the velar (dorsal) is the most marked place of articulation in the POA hierarchy. This means that the markedness reduction constraint *DORSAL in Sylheti is ranked higher than *LABIAL, CORONAL, GLOTTAL, giving us the ranked pair of constraints in (12):

(12) *DORSAL»*LABIAL, CORONAL, GLOTTAL

3.2 High Vowels as a Marked Context

The first thing that we infer from the data is that syllables of the form in Figure 1 are marked:

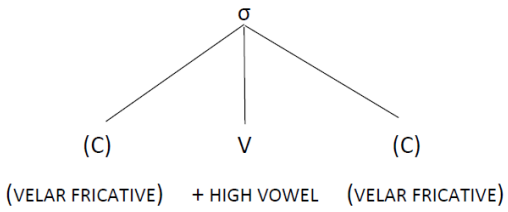

Figure 1

Such sequences trigger an IDENT violation of the fricative, with the velar stop replacing it as in Figure 2.

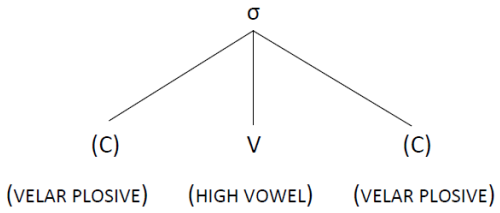

Figure 2

The syllable structure in Figure 2 is well-formed compared to Figure 1 because of certain well-formedness constraints that are universal. Languages impose two types of restrictions on the sonority requirements of a syllable peak. One is its absolute sonority in terms of the minimum requirement to be classified as a peak. The other is the segment's relative sonority compared to the margin, i.e. a syllable peak needs to be more sonorous than the segment preceding and/or following it (Zec, 1995). The sonority hierarchy of both consonants and vowels is given below with the relevant segments highlighted:

(13) **The Sonority Hierarchy** (Selkirk, 1984; Clements, 1990; De Lacy, 2006)

1. Vowel sonority: HIGH CENTRAL VOWELS 〉 MID HIGH CENTRAL VOWELS 〉 **HIGH PERIPHERAL VOWELS** 〉 MID-LOW PERIPHERAL VOWELS 〉 LOW PERIPHERAL VOWELS
2. Consonant sonority: **VOICELESS STOPS** 〉 VOICED STOPS 〉 **VOICELESS FRICATIVES** 〉 VOICED FRICATIVES 〉 NASALS 〉 LIQUIDS 〉 GLIDES 〉 GLOTTALS

The Sylheti inventory has no high or mid-high central vowels, hence the high peripheral vowels are the least sonorous peaks, while the voiceless stops are the least sonorous margins. This means that high vowels make for the most marked syllable peaks, while voiceless plosives are the least marked syllable margins. While Sylheti does allow high vowels to become the sonority peak of the syllable in most cases (thus, it satisfies the absolute sonority requirement) it does appear to place a restriction on the sonority difference between peak and margin, penalising high sonority margins like fricatives Figure 1.

The formal principle that governs this aspect of the well-formedness of syllables is the Sonority Sequencing Principle (Clements, 1990; Selkirk, 1984) that requires maximal sonority difference between peak and margin. Thus, we formulate the following sonority scale for Sylheti phonemes in Figure 3 which shows the grouping of segments into sonority classes with low and mid vowels being the highest in sonority and voiceless plosives the lowest. Languages need not make categorical distinctions between each and every class:

Figure 3

I also propose the following markedness constraint on the structure in Figure 1 following the SSP:

(14) Maximise Sonority Difference (*M): Assign n violation marks for every peak and margin that have sonority difference n less than maximal sonority distance on the sonority scale in Figure 3

Since the constraint in (14) is a gradient constraint, a syllable with a high vowel and fricative like Figure 1 will incur 3 violation marks; a syllable with a high vowel and voiceless plosive in Figure 2 will incur 1 violation mark; and a syllable with low vowel peak and voiceless plosive in the margin will incur 0 violation marks.

Thus, if there is a competition between two candidates /xin/ and /kin/, /xin/ will incur 3 violation marks for *M while a competing candidate /kin/ will incur 0 violation marks and emerge as the optimal candidate. However, since only velar fricatives are affected by this fortition process, we can assume that this is due to higher ranking faithfulness constraints for other candidates like /suri/ in (10) which are realised faithfully. The effects of *M can only be observed when other markedness constraints like *dorsal and *fricative come into play. Such situations of a "ganging up" effect of constraints have been observed cross-linguistically. They have been previously analysed using the device of constraint conjunction (Smolensky & Prince, 1993). Harmonic Grammar, which uses weights instead of constraint ranking has been proposed as a mechanism which can adequately capture the generalisation of ganging up effects without running into the problem of overgeneration which has been argued as a major drawback of constraint conjunction (Pater, 2009).

3.3 Factorial Typology of Repairs

The factorial typology of repair strategies for in Parallel OT (McCarthy, 2011) for the markedness situation in Figure 1 is as follows:

(15) Factorial Typology of *M and Faithfulness Constraints

a. IDENT(PLACE), IDENT(HIGH), MAX SON CURVE » IDENT(CONT): Fricative Fortition

b. IDENT(PLACE), IDENT(CONT), MAX SON CURVE » IDENT(HIGH): Vowel Lowering

c. IDENT(CONT), IDENT(HIGH), MAX SON CURVE » IDENT(PLACE): Change POA

Sylheti uses the strategy in (15a) by changing a voiceless fricative into the least sonorous segment possible while retaining the place of articulation. However, other repair strategies are possible, as in (15b) and (15c). Since only fricatives adjacent to high vowels are targeted and fricatives appear in freely in the other positions, we also need a general markedness constraint against fricatives of the form *fricative.

4 Harmonic Grammar Analysis

Another principle regarding syllable well-formedness will also be involved in the analysis. This is the Sonority Dispersion Principle proposed by Clements (1990) that requires that the sonority of segments in a C1C2V sequence be maximally dispaersed. Thus, we posit that the SDP for Sylheti is 2.

*FRICATIVE(F) is ranked above *PLOSIVE(P). SDP (sonority distance principle) and *M are ranked very low. It's only when they combine with higher ranked constraints can they have an effect on the grammar. Table 3 shows input /xe/ being realised faithfully as /xe/, while /xi/ is realised as /ki/.

Table 3 shows that with these harmonic weights we get both the faithful candidate with an input like /xe/ as well as the non-faithful candidate /ki/ when the input is /xi/. This ranking also gives us the faithful output candidate with inputs that contain /k/ regardless of the environment.

The next table (4) shows faithful realization of alveolar fricative /si/ rather than /ti/ when it is the input. There is another related process which bans the velar fricative from appearing as a geminate. Thus, we posit a constraint against geminates based on the Syllable Contact Law (SCL) (Clements, 1990) in Table 4 that rules out sequences of coda and onset with the same sonority.

We assume that since geminates share features, an IDENT violation is counted as one violation, since geminates are said to share feature representation at the autosegmental level (Kirchner, 2000).

Input: xe weights	*F 250	*ID-M 225	* ID-P 200	*DOR 200	*P 100	*COR 80	SDP=2 15	*M 31	H
(a) ke		-1		-1	-1				-525
☞ (b) xe	-1			-1				-2	-512
(c) se	-1		-1			-1		-2	-592
Input: xi									
☞ (a) ki		-1		-1	-1			-1	-556
(b) xi	-1			-1			-1	-3	-558
(c) si	-1		-1			-1	-1	-3	-638
Input: ki									
☞ (a) ki				-1	-1			-1	-331
(b) xi	-1	-1		-1			-1	-3	-783
(c) ti	-1		-1			-1		-1	-561
Input: ke									
☞ (a) ke				-1	-1			0	-300
(b) xe	-1	-1		-1			-1	-2	-752

Table 3

Input: si Weights	*F 250	ID-M 225	ID-PL 200	*DOR 200	*P 100	*COR 80	SDP=2 10	*M 31	H
☞ (a) si	-1					-1	-1	3	438
(b) ti		-1			-1	-1		1	440

Table 4

Input: xx weights	*F 250	*ID-M 225	* ID-P 200	*DOR 200	*P 100	*COR 80	SCL 200	H
(a) xx	-2			-2			-1	-1100
☞ (b) kk		-1		-2	-2		-1	-1025
(c) ss	-2		-1			-2	-1	-1060

Table 5

5 Residual Problem: Directionality

In certain derivational paradigms (illustrated in (16)), fortition applies across syllable boundaries:

(16) gai.ox ga.yi.ka 'actor m/f.'

(17) sa.lax sa.la.ki 'clever adj./n.'

This is a problem for our analysis since both *M and SDP apply only within the syllable. There is a possible analysis for this phenomena, assuming standard Bengali and Sylheti have the same stress pattern where stress falls on the first syllable if heavy, and the second syllable otherwise. Stress and vowel height have been argued to be inversely related as high vowels are not a good host for stress (Hitchcock & Greenberg, 2001). Thus, while /xa/ itself is tolerated, it undergoes fortition when preceded by an open syllable with a high vowel giving us the ranking between two possible candidates:

(18) [-HIGH]V.xa > [+HIGH]V.xa

Thus, a constraint that penalizes high vowels bearing primary stress an be posited to rule ot the banned structure in (17). Since Sylheti has been argued to have lexical tone (Gope, 2016) it is possible that a co-occurrence restriction on high tone with high vowels may be responsible for fortition in such cases. The interaction of tones with vowel quality is hence a direction that future research on this topic can explore.

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