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Diffusion of Spirantization from Labial Plosives to Velar Plosives

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ABSTRACT: Various sociolinguists have reported on the diffusion of changes in geographic space, diffusion of innovation from one social group to another (Labov 2007, Trudgill 1974) or from one linguistic environment to another (Kroch 1989). This paper, reports on the diffusion of spirantization from one phoneme (labial plosives) to another phoneme (velar plosives) in Silchar Bengali spoken in south of Assam (India). Spirantization though originated in labial plosives, it gradually diffused to velar plosives. Grierson's survey in 1903 reported on spirantization of labials only. There is no mention of spirantization of velar plosives.

Spirantization was introduced into this region by the immigrants coming from the eastern Bengali dialect regions. However, not all dialects have spirantization. Therefore, the locally born generations and immigrants encountered a variable situation. They encountered those dialects which had spirantization and dialects which did not have spirantization. In current Silchar Bengali the voiceless labial plosive (p)/(ph) and voiceless velar plosive (k)/(kh) are variably realized as voiceless labiodental fricative [f] and voiceless velar fricative [x] respectively.

Results of quantitative analysis suggest that the process of spirantization affects the labials and velars differently and is conditioned by some shared and some by different constraints. Given the similarities and differences between labials and velars in Silchar Bengali, this paper explores the nature of relationship between spirantization in labials and spirantization in velars with respect to the internal and external constraints.

(a) Phonological constraints

Spirantization of labial and the velar plosives do not constitute a single phonological process in Silchar Bengali. Though labials and velars form a single class of non-coronal plosives, yet the two differ in their places of articulation. What is interesting is that even when the two share a single constraint, there are differences both in terms of the rate of application as well as differences in terms of internal hierarchy of factors within a factor group (figure 1).

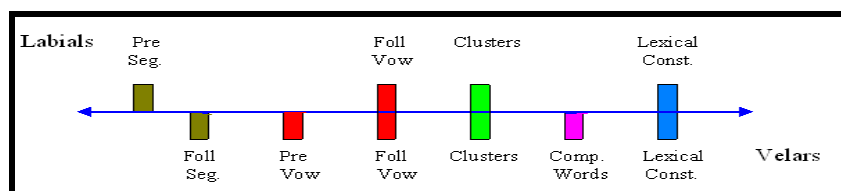


Figure 1 Significant constraints on spirantization

(b) External constraints

Though labials and velars seem to share a similar social profile in terms of social differentiation, the social factors are significant only for labials.

The process of spirantization though diffused from neighbouring Bengali regions, is not merely a continuation of the same earlier forms. It is the internal (phonological) developments which led to the subsequent development in Silchar. This paper focuses on the social and linguistic profile of a change of one phoneme to another phoneme over time.

KEYWORDS: Spirantization, Immigrants, Variation, Mirror image of constraints

I. INTRODUCTION

The term 'linguistic diffusion' generally implies the spread of linguistic or cultural practices or innovations within a community or from one community to another and is socially structured. Various sociolinguists have reported on the diffusion of linguistic changes in geographic space, diffusion of innovation from one social group to another (Labov 2007, Trudgill 1974) or from one linguistic environment to another (Kroch 1989). Different models and explanations have been developed by linguists about the principles that govern the spread of linguistic innovations and diffusion (Bloomfield 1933, Trudgill 1974, 1975. Bloomfield (1933) proposed the principle of local density, by which it means that diffusion of linguistic changes is a direct consequences involving face-to-face interaction among speakers. However, Trudgill (1974, 1975) used the gravity model to explain the principles of local density in explaining the diffusion of changes and that interaction is likely to be greater among places with larger population. The notion of gravity model is that linguistic diffusion takes places hierarchically, that is innovation takes place at a certain focal point and then it is diffused across. This process might be a downward movement from larger cities to smaller cities (Trudgill 1974) known as 'cascade diffusion'.

The Neogrammarians holds a view that sound change is phonetically gradual but lexically abrupt and that all words which contain the affected sound will be modified in the same way at the same time (Hock 1991). For the Neogrammarians, the unit of change is the sound, whereas for the diffusionists, the unit of change is the word.

Historical linguists, on the contrary, adapted new phenomena known as 'lexical diffusion' which refers to the way a sound change affects the lexicon. Lexical diffusion is a socially gradual process by which a form changes in a given context and the resulting form is markedly different to the original one. It is seen as a process of phonemic redistribution spreading rapidly through the vocabulary (Chen and Wang, 1975, 1977).

Labov (1994:501) argued that lexical diffusion has a very limited role to play in change and that '*there is no evidence . . . that lexical diffusion is the fundamental mechanism of sound change. It happens but is only a complement--and a small one at that--to regular sound change. The most important factors in linguistic change appear to be long-standing trends in the language, internal variation, and social forces among speakers*'. Subsequent studies of lexical diffusion have supported a more constrained view of the process. For instance, Kiparsky (2003) has discussed that there is a systematic pattern of generalization from a categorical or near-categorical core through extension to new phonological contexts, which are then implemented in the vocabulary on a word-by-word basis as in English, the regular stress pattern extends to new lexical items as well.

While most of the researches on sound change are based on monolingual setup, sociolinguistic researches conducted on bilingual and multilingual speech communities on sound change have shown that it is a complex phenomenon involving both internal and external constraints as there are no clearly defined linguistic boundaries. In addition, the transition from one variant to another variant undergoes various stages of variability and show systematic constraints sensitive to various linguistic and social factors (Bailey 1973).

The present paper tries to understand the nature of spirantization and its diffusion from one phoneme (labial plosives) to another phoneme (velar plosives), in a complex speech community spoken in south of Assam (India). Silchar Bengali Vernacular (SBV) emerged in this region due to the movement of labour population initiated by the Tea Plantations which started coming up in the 19th century (Dey 2010). SBV is unique in the sense that:

- (1) It is deeply embedded in a Tibeto-Burman region and
 (2) The immigrants are speakers from Eastern Indo Aryan dialect regions from the provinces of erstwhile Bengal (present day Bangladesh) and adjoining regions of West Bengal, Bihar, Jharkhand and Orissa (Satyanath 1998).

Spirantization was introduced into this region by the immigrants coming from the eastern Bengali dialect regions. SBV shows an interesting tendency to variably spirantize some of its voiceless plosives, which is not shared by a majority of its Indo-Aryan neighbours. It is attested to some extent in varieties of Bengali spoken in erstwhile East Bengal (present day Bangladesh) and in Tibeto-Burman (in loan words of Indo-Aryan and English origin) and from the earlier linguistic texts in Grierson (1903). However, not all dialects have spirantization. Therefore, the locally born generations and immigrants encountered a variable situation. They encountered those dialects which had spirantization and dialects which did not have spirantization (Dey 2010). Although, Grierson (1903) observed a tendency to spirantize the labial plosives across East Bengali dialects, there is no mention of spirantization of velar plosives nor does his specimens corroborates.

Spirantization, though, diffused from numerous Bengali dialects into SBV, it is not merely a continuation of the same in its earlier forms. It underwent significant changes after arrival in Assam (Dey 2010). Spirantization though originated in labial plosives, it gradually diffused to velar plosives. In current Silchar Bengali the voiceless labial plosives (p)/(ph) and voiceless velar plosives (k)/(kh) are variably realized as voiceless labio-dental fricative [f] and voiceless velar fricative [x] respectively.

Results of quantitative analysis suggest that the process of spirantization affects the labials and velars differently and is conditioned by some shared and some by different constraints. Given the similarities and differences between labials and velars in Silchar Bengali, this paper explores the nature of relationship between spirantization in labials and spirantization in velars with respect to the internal and external constraints.

II. DATA AND METHODOLOGY

The data was essentially drawn from three neighbourhoods keeping in mind the history of residential settlements, socio-economic, linguistic and the ethnic composition of the areas. Silchar on the whole is semi-urban in character. While some of its areas can be considered as relatively urban, other areas can be considered as relatively rural. A total of twenty four speakers were included in present study representing four generations (such as, the immigrants, the first locally born, the third and the fourth refer to the subsequent generations), ethnicity and social class. They were all interviewed in local Bengali vernacular.

III. LABIAL PLOSIVES VS VELAR PLOSIVES: SIMILARITIES AND DISSIMILARITIES

The two variables under study are:

- (i) (p)/(ph) → voiceless labial plosives and
 (ii) (k)/(kh) → voiceless velar plosives

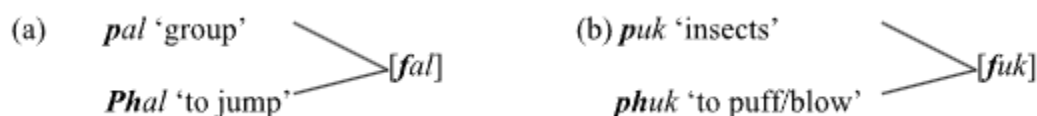
It is observed that the two variables (labial and velar) undergo spirantization in SBV (Dey 2010). Though the two forms a natural class of non-coronal plosives, the two are different in terms of its articulation. While, one is pronounced at the front of the oral cavity the other relatively back. Table 1 shows the similarities and dissimilarities between the two variables.

	Phonemes	
	(p)/(ph)	(k)/(kh)
Similarities	[-continuant]	[-continuant]
	[-coronal]	[-coronal]
	[-voice]	[-voice]
Differences	[+anterior]	[-anterior]
	[-back]	[+back]
	[-high]	[+high]

Table 1

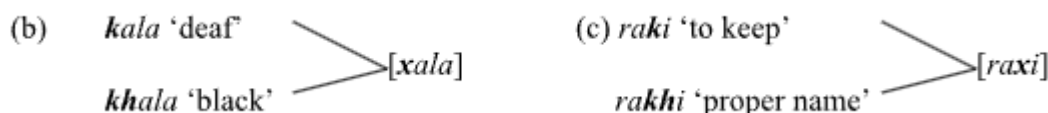
Despite the similarities and the dissimilarities, the two voiceless obstruents: labials and velars both aspirated and unaspirated participate in the process of spirantization. Spirantization primarily refers to the transformation of voiceless

plosives into its corresponding fricative. In SBV, /p/ and /ph/ constitute separate phonemes, the process of spirantization in many cases results in mergers. The process of merger in limited cases results in ambiguity due to the loss of contrasts as in:



The minimal pairs in the examples (a) and (b) show that spirantization causes the loss of phonemic contrast resulting in merger of /p/ and /ph/ distinction.

Similarly, the process of spirantization in the case of velars lead to similar consequences often results in homophony through the loss of phonemic contrast as in (c) and (d):



Unlike labials, the underlying aspirated plosive and the resulting fricative are not clearly differentiated as in the case of velars. The resulting velar aspirated plosive and the fricatives mutually merge into each other making it difficult to clearly separate the two. In SBV, some of the words with [x] are actually intermediate between the voiceless aspirated plosive [kh] and the voiceless fricative [x]. The examples in table 2 show lexical items where the consequence of shift in velars is a clear fricative [x] and those where it is closer to a fricative. Many of these may be slightly affricated [kh^x].

No.	Lexical items	
	[kh ^x] - [x]	[x]
1.	<i>kh^xarap</i> 'bad'	<i>jaxra</i> 'to shake'
2.	<i>kh^xub</i> 'plenty' / 'many'	<i>xoru</i> 'kind of dry curry'
3.	<i>tokh^xon</i> 'at that time'	<i>moxa</i> 'a kind of fish'
4.	<i>kh^xai.mu</i> 'will eat'	<i>xawar</i> 'food'
5.	<i>kh^xali</i> 'empty'	<i>xobor</i> 'news'

Table 2 List of lexical items with [kh^x] and [x]

Figure 1 and figure 2 below show the consequences of spirantization in labials and velars.

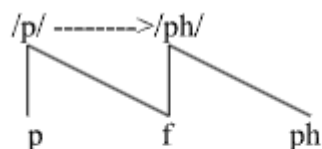


Figure 1 Consequences of spirantization in labials

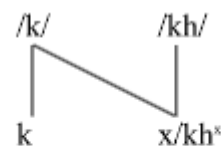


Figure 2 Consequences of spirantization in velars

It is to be noted that for the purpose of multivariate analysis, (p) and (ph) were combined and treated as a single labial variable (p). This is because the total number of tokens of the voiceless aspirated bilabial plosive (ph) is small and that it shows a much higher degree of spirantization compared to the voiceless unaspirated bilabial plosive (p). Despite the

differences in the frequency of spirantization, the two behave alike with respect to linguistic factors. Similarly, for the quantitative analysis of spirantization of velar plosives, only those tokens which are derived from underlying [k] are included and not [kh]¹. The derived tokens of [kh], [kh^x] and [x] were combined and treated as one single variable [k].

IV. ENVELOP OF VARIATION OF SPIRANTIZATION

The overall distribution of the two variables: (p) and (k) and their variants are shown in table 3.

No	Variables		[p]	[ph]	[f]	Total
1.	(p)	%	38.4	--	61.6	
		N	439	--	705	1144
2.	(ph)	%	--	13.1	86.9	
		N	--	8	53	61
(p)+(ph)		Total	37.1% [447]		62.9% [758]	1205
No	Variables		[k]	[kh ^x]	[x]	Total
3.	(k)	%	59.7	17.6	22.7	
		N	847	250	322	1419
		Total	59.7% [847]	40.3% [572]		1419

Table 3 Spirantization of voiceless labial and velar plosives

The analysis of spirantization of labial plosive is based on a total of 1205 tokens. There are more instances of spirants than labial plosives as shown in table 3. The voiceless aspirated bilabial shows much higher degree of spirantization compared to the voiceless plosive. As far as the velar variable is concerned, out of 1419 tokens, we have more instances of plosives and less of spirants.

The labial and the velar variables though exhibit similar processes of spirantization the two do not necessarily constitute a single process. The two are differently affected by linguistic constraints. Therefore, the labial and velar variables were subjected to separate multivariate analysis.

It is proposed here that spirantization though originated in labials, it gradually diffused to velars. As far as the rate of spirantization is concerned it is clear that the rate of spirantization is much higher in the case of labial plosives as compared to the velar plosives. This suggests that the spirantization among velar plosives is lagging behind the labial plosives (see figure 3 and table 4).

¹ Considering the difficulty in separating many tokens of [kh] from [kh^x] and [x], the tokens that are derived from an underlying [kh] were not considered for quantitative analysis.

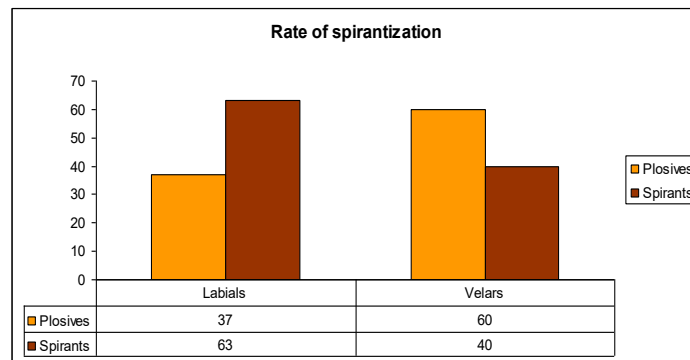


Figure 3 Overall rate of Spirantization in labials and velars

V. PHONOLOGICAL CONSTRAINTS: A COMPARISON

In SBV, the process of spirantization affects the labials and velars differently and is conditioned by some shared and some by different constraints. The labial and the velar plosives were subjected to separate runs of multivariate program. Of all the factor groups that were selected as significant, there are only three factor groups (table 4 in bold) that are common for both labials and velars. A majority of the constraints that turned out to be significant for velars are not significant for spirantization of labials (see table 4 and figure 4).

Constraints	Labial	Velar
Preceding consonants	Significant	Non-significant
Following consonants	Non-significant	Significant
Preceding vowels	Non-significant	Significant
Following vowels	Significant	Significant
Cluster and geminates	Significant	Significant
Compound words and phrases	Non-significant	Significant
Lexical constraints	Significant	Significant

Table 4 Summary of the significant constraints on spirantization

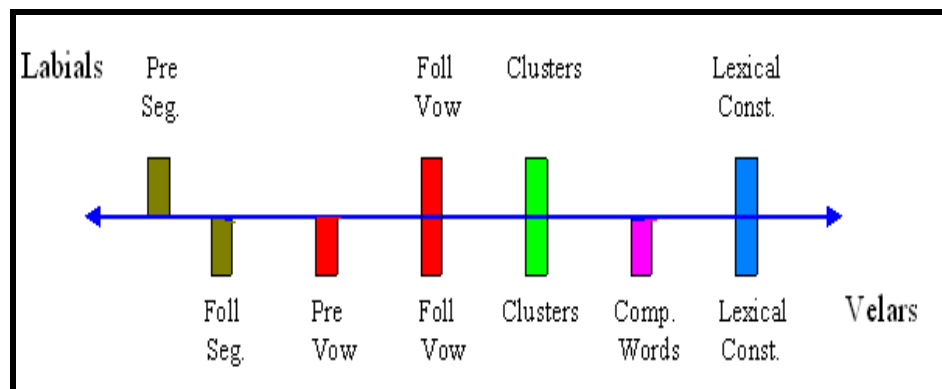


Figure 4 Significant constraints on spirantization

It is also observed that some of the factor groups which show a similar effect on both labials and velars, show differences in the rate of application of spirantization. This can be seen in:

(a) The overall rate of spirantization as shown in figure 3 above.

(b) Spirantization across word positions

Both labial and velar plosives show maximum spirantization in non-word final positions as shown in figure 5. The figure 5 seems to show that it is only the rate of spirantization which separates the two categories of plosives in different word positions.

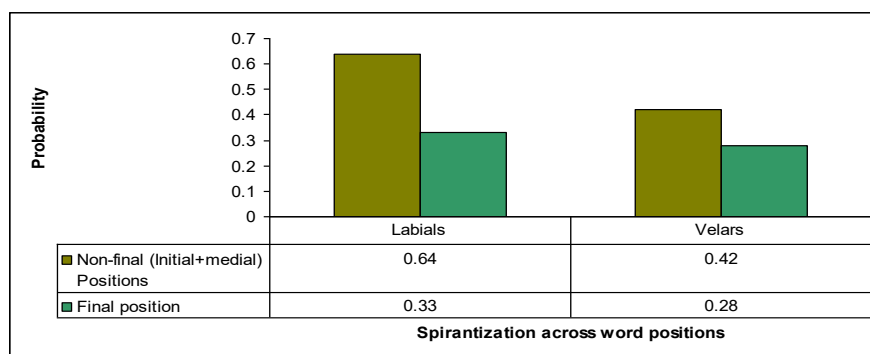


Figure 5 Spirantization across word positions

However, as illustrated in figure 6, there are further differences within this factor group.

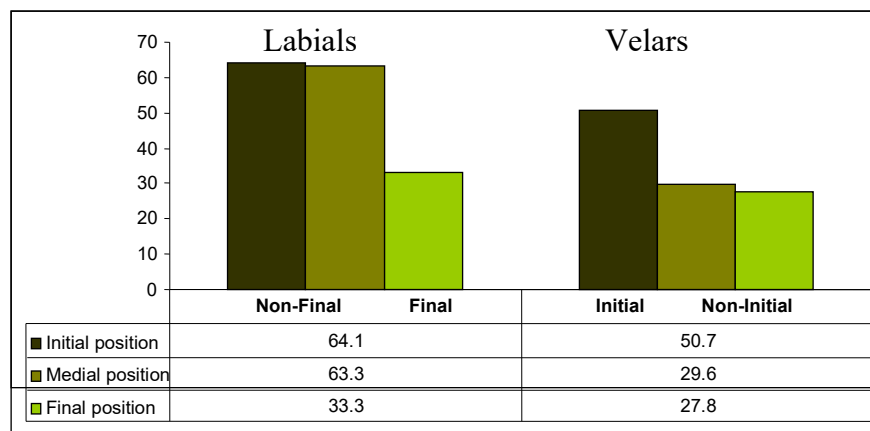


Figure 6 Spirantization in word positions

In the case of labials, spirantization is targeted at the non-final positions of a word (initial and medial combined), but in the case of velars plosives, it is the word initial position which triggers spirantization maximally.

(c) The role of clusters and geminates on spirantization.

It has been observed that though geminates and clusters significantly affect both labials and velars, there are differences in terms of the application of the constraints (see figure 7).

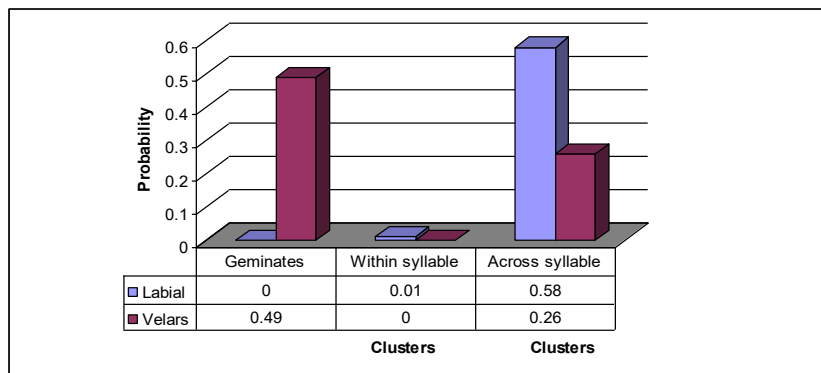


Figure 7 Clusters and geminates

Geminates block spirantization completely in the case of labials, whereas almost half of velar-velar sequences undergo spirantization as in figure 7. What it means is that while there are no permissible sequences of [pf] or [fp], there are as many instances of [kk] as there are of [kx] or [xk]. For instance:

(a) Across syllable boundary as in *fak.ka* ‘metalled road’; *bak.ka* ‘many’

(b) Across word boundary as in *ekh-kuish* ‘twenty-one’; *ekh-kan* ‘one-Cl’.

The reason for this may be the fact that the [p, f] sequences do not share the exactly the same place of articulation but contiguous places of articulation. In the case of velars despite the shared place of articulation assimilation does not necessarily take place.

Although, consonant clusters occurring within the boundaries of a syllable block spirantization of both labial and velar plosives, the rate of spirantization is much higher across syllable boundaries in the case of labials compared to the velars. However, in the case of labials greater spirantization results when the labial is the second segment in a cluster (as shown in table 5 and figure 8) whereas in velars, greater spirantization is triggered when a velar appears as the first segment within a cluster. The explanation for the differential effect on labials and velars lies in the mutually opposing effect of the adjacent phonological segment.

Variables	Clusters with preceding consonant [cp ck]		Clusters with following consonant [pc kc]	
	%	[N]	%	[N]
Labials	54%	(48/89)	22%	(31/139)
Velars	13%	(9/70)	30%	(67/296)
Total		57/159		98/435

Table 5 Clusters of preceding and following consonant in labials and velars

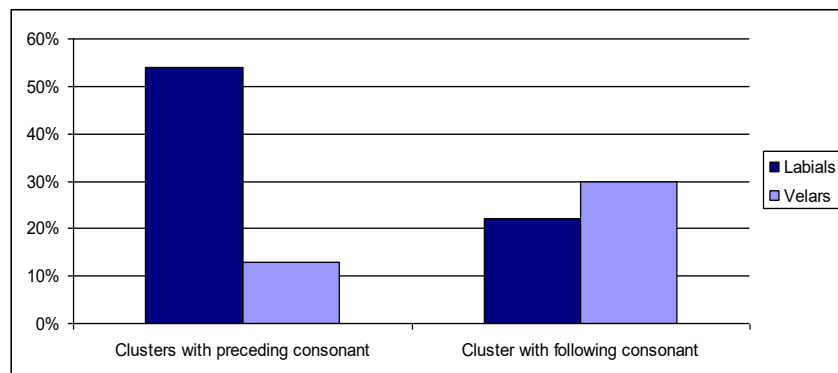


Figure 8 Clusters of preceding and following consonant in labials and velars

The preceding consonants turned out to be a significant factor for labials, while in the case of velar plosives, it is the effect of the following consonants that triggered spirantization (see table 6). However, it is to be noted that the internal hierarchy of the consonantal effect is different for labial and velar plosives as shown in figure 9. In the case of labials it is preceding liquids and sibilants that favour spirantization, but oral as well as nasal plosives disfavour spirantization of labials. In the case of velars, the following obstruents favour spirantization whereas the liquids disfavour spirantization.

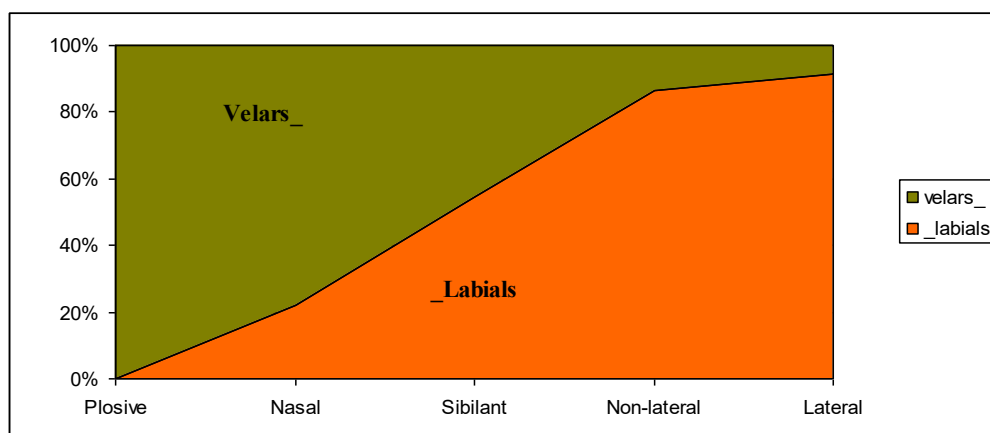


Figure 9 Effect of preceding consonants on labial and following consonants on velar plosives

Segments	Labials		Velars	
	Preceding segments		Following segments	
	Frequency		Frequency	
	%	N	%	N
Plosives	0	0	47.3	53
Sibilants	50	3	41.7	5
Nasals	14.3	2	50	1
Laterals	80	12	6.4	3
Non-laterals	68.8	33	9.4	5
Total		50		67

Table 6 The preceding segments of labials and following segment of velars

(d) Effect of vowels in the spirantization of labial and velar plosives

The multivariate analysis shows that the quality of the following vowels has a considerable significant effect on spirantization. The following vowels turned out to have a greater significant effect on spirantization of labials, whereas both the preceding and the following vowels contribute to the spirantization of velar plosives. Unlike consonants, the overall effect of the following vowels that are significant for both labials and velars show far greater similarities as shown in figure 10.

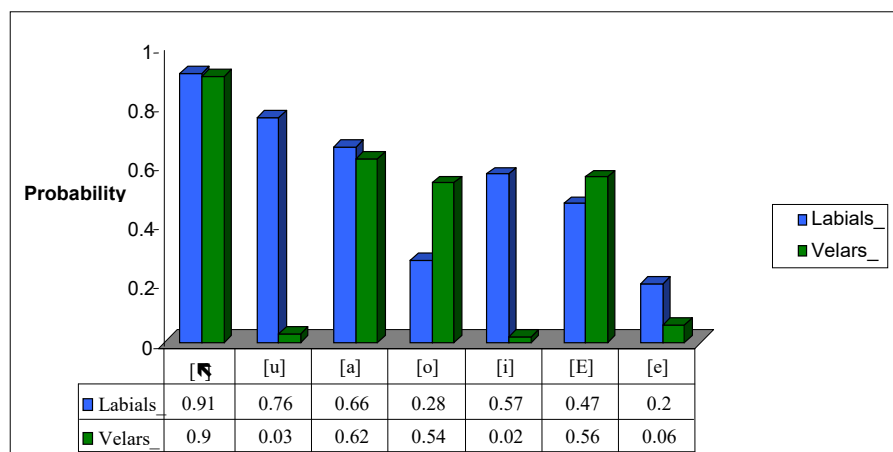


Figure 10 The effect of the following vowels on labials and velars

The following low vowels [ɸ, a, E] favour spirantization and constitute a more similar effect on both labials and velars. The major differences in the effect of following vowels are with reference to [u, i, e, o]. The high vowels favour spirantization of labials but disfavour spirantization of velars. The mid vowels, especially [o] favours spirantization of velars but disfavour spirantization of labial plosives as shown in figure 10 and 11. Moreover, it is the lower checked vowels [ɸ, E] favour spirantization more compared to their higher counterparts [o, e]. Similarly [o] has a greater effect compared to [e] on both labials and velars.

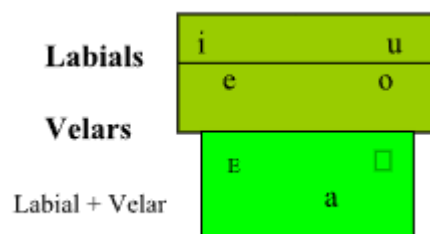


Figure 11 The internal differences of vowels between labials and velars

A majority of the linguistic constraints that turned out to be significant for velars are not significant for spirantization of labials. This would suggest that spirantization of velars and labials do not necessarily constitute a single phonological process as it affects the two classes of plosives differently.

VI. SOCIOLOGICAL CONSTRAINTS: A COMPARISON

In any sociolinguistic research of speech communities, the effect of the social factors should be considered together with the linguistic factors (c.f. Cedergren and Sankoff 1974). That is to say, when linguistic and social factors are subjected to multivariate analysis together, it allows us to get a better understanding of the maximum effect of the intersecting social factors and their relationship with the nature of linguistic differentiation (Labov 2001). Therefore, to understand the role of external (social) factors on the variability of spirantization, multivariate analysis was carried out on internal and external factors together (Dey 2010).

In SBV, as far as labial and velar plosives are concerned, they were tested for a number of social factors such as: social class, age, gender, linguistic ethnicity, religion, education, occupation, generation and individual speakers. It is observed that though labials and velars seem to share a similar social profile in terms of social differentiation, the social factors turned out to be significant only for labials and not for velar plosives.

In the present study the individual speakers as a factor group was not selected as significant, instead four social factors (gender, generation, linguistic descent and occupation) were selected. Moreover, these factors help group individuals into social dialects and allow us to see the social embedding of spirantization. The early sociolinguistic surveys of Creole communities advocated the model of continuum and emphasized on the importance of lectal variation (Rickford 1986). However, subsequent studies (Satyanath 1991) clearly established the superiority of social grouping of individual lects.

6.1. Spirantization in labial and velar plosives across individual speakers

There is a considerable variation across individuals within the speech community as shown in figure 12. Though no social factors were selected as significant for velars, nevertheless, a comparison of spirantization of velars with labials allows us to make the following observations.

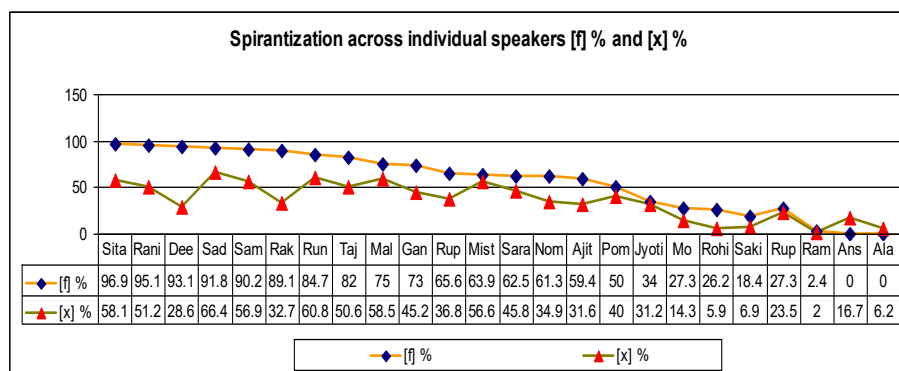


Figure 12 Spirantization in labial and velar plosives across individual speakers

In the SBV speech community, the rate of spirantization is considerably lower in the velars compared to labials. As a consequence, spirantization has affected only 40% of the eligible velar plosives as opposed to 60% of labial plosives. A comparison of social factors of labial and velar plosives shows there are no individual speakers who show greater spirantization of velars than labials. With the exception of two non-Bengali speakers (Alam and Ansari), for every individual speakers included in the sample, there is more spirantization in labial plosives than velar plosives as in figure 12.

6.2. Spirantization in labial and velar plosives across social factors

As for the social factors that turned out to be significant for labials, a comparison with velars as in figure 13 shows that velars pretty much rally behind labials closely following the pattern displayed by labials.

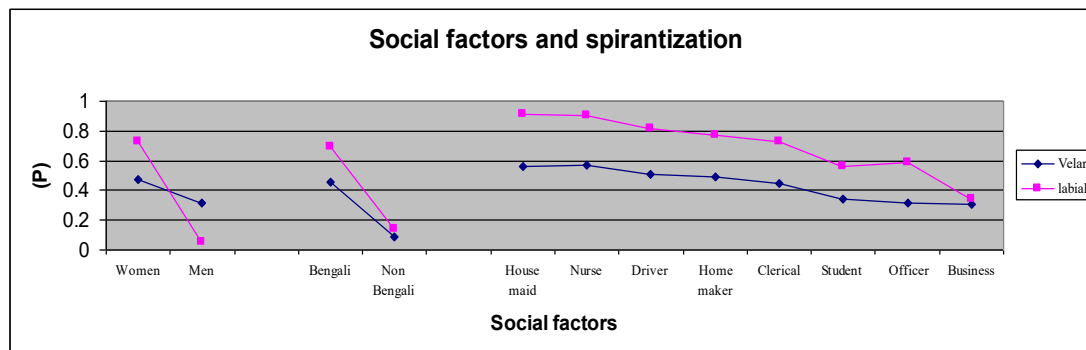


Figure 13 Spirantization in labial and velar plosives across social factors

In the SBV speech community, gender plays an important role in social differentiation of spirantization. Women use more of spirants compared to men. One of the most interesting differences is that the gender difference is less sharp in the case of velars as compared to the labials.

Similarly, in terms of linguistic ethnicity, use of velar spirants is higher among Bengalis than non-Bengalis. This suggests that in spite of several generations after the two groups arrived on Tea Plantation in Assam, they behave differently with respect to spirantization.

Among the indicators of socio-economic differentiation, occupation which turned out to be a significant constraint also shows similar differentiation. Although Silchar is not a highly stratified society, it shows that those holding lower ranking jobs participate in spirantization much more.

VII. CONCLUSION

To conclude a comparison of the constraints suggests that many of the constraints on spirantization are shared across unrelated languages. Even though we compare the generality of the linguistic constraints that operate on spirantization in SBV with the constraints reported in other languages as shown in table 7, we find that a number of phonological segments seem to favour spirantization across languages but what makes them different is their internal organization and embedding within a linguistic system. Thus, though spirantization is attested across languages, the structural constraints and how these operate on spirantization vary across languages.

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