ON SOME FEATURES OF CONSONANTS IN INDIAN ENGLISH

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Abstract: The paper aims to show that although the inventory of consonantal phonemes in Indian English does not differ markedly from that of RP, there are some aspects related mainly to different articulations of the sounds discussed which make it sound very peculiar. Thus, the dental fricatives may often be substituted by the correspondent stops; the stops have may have different aspirations patterns and retroflex articulations; the lateral liquid phoneme does not have any allophones in this variety. The non-rhoticity of post-vocalic /r/ is a feature which brings it closer to RP, but this seems to be changing, at least in some parts of the country. This analysis is at the interface between phonetics and phonology, in the sense that phonetic evidence is provided in support of phonological assumptions.

Keywords: fricatives, stops, liquids, aspiration, retroflexion

1. Introduction

India fosters the second largest population in the world, and, not surprisingly, the largest number of ESL users. Actually, according to the figures provided by Crystal (2003: 107), there are about 200 million speakers who use English as L2 in India, this being outnumbered in L1 users only by the United States. Maxwell and Fletcher (2009: 53) write that English is taught throughout the Indian territory starting at the age of 6, or 10 in some states, and that during the acquisition period the learners do not interact with native speakers of standard varieties. According to the Eighth Schedule in the latest version of the Indian Constitution (2007: 330), India has 22 official languages, besides English which is a subsidiary official language, out of the almost 1600 languages spoken across the entire Indian subcontinent.[1] In the Indian Constitution, English is included among the 96 non-scheduled languages of the country. Despite the fact that Hindi is considered the first official language of India, English plays nonetheless a crucial role as a means of inter-ethnic communication and it functions as a national link language. Anecdotally, it may be worth mentioning that the Indian Constitution itself was originally written in English and an authorized Hindi translation was available only later (Sailaja 2009: 5).

Considering the complexity of the linguistic situation in India, the phonology of Indian English (henceforth IndE) will undoubtedly exhibit a substantial degree of variation within the territory. Gargesh (2008: 232-233) writes that such variation is mainly due to factors like: (i) the influence of Indian languages, out of which about 200 mainstream languages belong to four distinct language families (namely Indo-Aryan, Dravidian, Austro-Asiatic and Tibeto-Burman); (ii) the languages of the four major language families display a high degree of regional variation themselves; (iii) English is

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[1] The 1961 Indian census listed 1,652 mother tongues in India, while the 1991 Indian census recognized 1,576 languages (Census of India, online data).

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taught to Indians by Indians who pass on their English variety already influenced by the sound system of the local languages; (iv) from a sociological point of view, the IndE speech community is made of speakers who could be classified as ranging on a lectal continuum from near-native-like users to those who exhibit basilectal features. Similarly, Kachru (1983: 70) writes that there are three basic parameters which govern variation: region, ethnic group and proficiency. He argues that in the case of IndE the regional variation is shaped by the regional languages, whereas ethnic variation cuts across the regional languages or dialect boundaries. The issue of proficiency is explained with reference to the concept of "cline of bilingualism"[2], which for IndE ranges from educated IndE to pidginized varieties such as *Butler English*, *Bearer English* and *Kitchen English* (Kachru 1983: 70, Sailaja 2009: 14).

I focus in this paper only on the consonants, notably on those which display dissimilarities in IndE when compared to RP. The aim of this paper is to bring phonetic evidence in support of the phonological assumptions made regarding IndE, and, at the same time, to identify and highlight the dissimilarities between the IndE and RP inventories of consonantal phonemes.

The speech samples used for the spectral analyses are either from Speech Accent Archive (Weinberger 2010), referred to as SAA hereinafter, from the samples which accompany Sailaja (2009) or my personal recordings of a female subject. I have used a Lenovo Ideapad Y530 laptop with a built-in microphone for my recordings. The subject is a 55-year-old female holding a university degree, born and raised in India, who currently lives in New Delhi. I will refer to her throughout this paper as KT. In processing the sound files I have used the Praat software (Boersma and Weenink 2010).

2. The analysis

The differences which occur between IndE and RP consonantal systems can be accounted for in terms of the characteristics of the substrate languages of the former. Considering the great variety and complexity of linguistic setting in which IndE has emerged and developed, a great amount of regional variation is to be expected in the case of consonants as well.

2.1 Fricatives

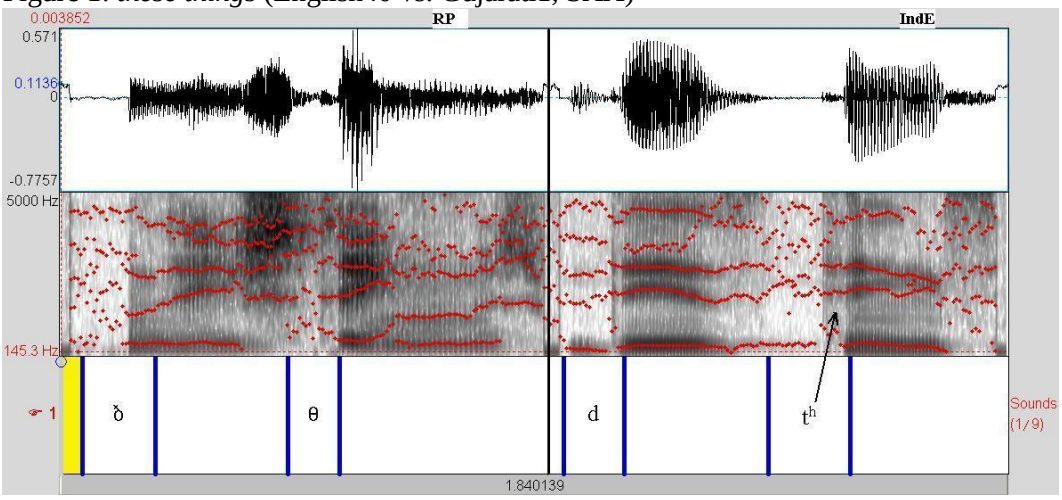
The dental fricatives are hardly ever heard in IndE, so one could safely assume that they are absent from its phonemic inventory. At times, [θ] may be articulated but [ð] is almost completely missing (Sailaja 2009: 21). Whenever they are produced, they must surely be the result of a prolonged training and practice, and, hence, they cannot be treated as genuine instances of ESL. They are usually replaced by the dental stops /t̪/ or /t̪^{h}/ and /d̪/.

[2] The concept is also presented in Kachru (1965: 393-396).

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Consider next a comparison of the same IndE and RP sequence of the SAA samples English40 and Gujarati1 in figure 1, which have been cut from the corresponding sound files and they have been pasted onto the same spectrogram for a contrastive analysis. The samples compared belong to the male subjects English40 for RP and Gujarati1 for IndE. The two corresponding samples are delimited by the vertical black line on the spectrogram, with IndE represented on the right side and RP on the left side. A text-grid tier has been used to delimit the sounds at issue.

Figure 1: *these things* (English40 vs. Gujarati1, SAA)



If one takes a look at the right half of the spectrogram first, one can see that the two IndE sounds are stops. As is well known, plosives involve an explosive burst of acoustic energy following a short period of silence; because of the silence during which the vocal tract is completely blocked, these phonemes are also called stops (Ladefoged 2001: 47). The signature of plosives is an almost instantaneous passage from little or no acoustic energy (indicated by the lack of activity on the spectra) to a short burst of high-energy in a wide frequency band. Now, the formant frequencies on the right half of the spectrogram indicate that I cannot be dealing with the same type of sounds. Moreover, a short period of aspiration is clearly visible in the IndE voiceless stop, which is indicated by the black arrow on the spectrogram. Now, the formant frequencies on the RP part of the spectrogram indicate that the corresponding sounds on the left are fricatives. The signature of fricatives is in their high-frequency regions, which are random in their energy distribution (Ladefoged 2001: 54). Fricatives do not necessarily involve any voicing, although the voiced fricatives may have a low voice bar as we can see in the RP [ð]. In the Southern part of India, e.g. in the speech of Tamil users, the voiceless fricative of the pair is substituted by the correspondent dental stop as aspiration is absent in their mother tongue (Gargesh 2008: 238, Sailaja 2009: 21).

I will turn now to the behaviour of some other fricative sounds. The labio-dental /f/ displays some variation: for speakers with a Gujarati or Marathi background, [p^h] or [ɸ]

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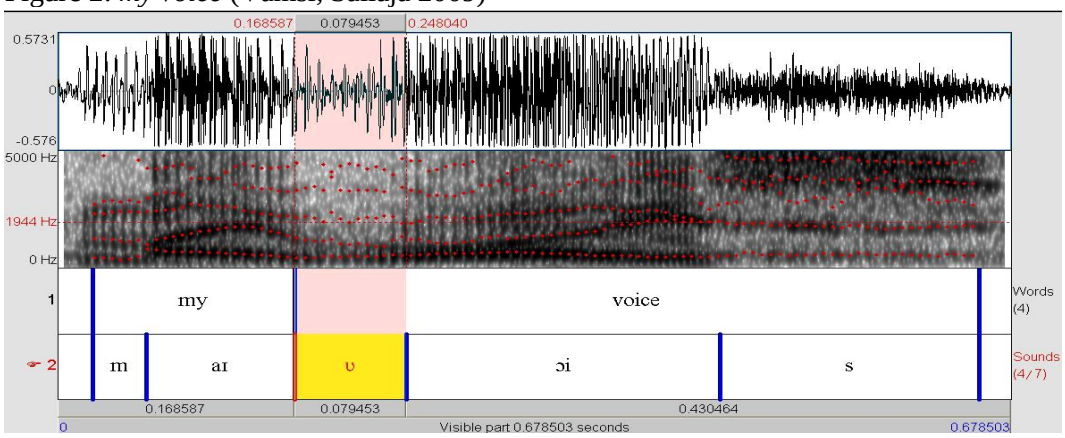
can be heard instead of [f]. Speakers with a Bengali, Oriya or Assamese background find it hard to pronounce [v] or [w] so that they replace these sounds with [b^h]. Also, Marathi speakers use [v□] for [v] (Bansal 1990: 225, Gargesh 2008: 238, Sailaja 2009: 22). A special emphasis should be placed on the alternation between [v] and [w], the difference between them to being largely absent in the speech of most IndE speakers. Both sounds tend to be realized even by acrolectal speakers as the labio-dental approximant [Π], and hence the contrast between the two is neutralized. The examples in (1) reinforce this hypothesis: the series in (1a) is obviously meant to be alliterative, and the spelling mistake for the word *volley* in (1b) is illustrative of the tendency to interchange the two sounds freely if the respective word has never been seen in writing.

(1) a. *villager, visionary, winner*
b. *They are playing with the wolly ball*.

(Sailaja 2009: 20)

I propose the spectrogram below as an instantiation of the labio-dental voiced fricative [v] being realized as the labio-dental approximant [Π]. I have cut the sequence *my voice* of the male speaker Vamsi from the online audio files meant to accompany Sailaja's (2009) volume[3]. The labio-dental approximant has less friction energy in the higher frequencies of the spectrum (as we would expect in the fricative), and the formant transitions are smoother than they would be in the labio-velar.

Figure 2: *my voice* (Vamsi, Sailaja 2009)



Wiltshire (2005: 284) writes that Tibeto-Burman speakers seem to preserve the distinction between [w] and [v], using [w] for most words which have in their <w> in the spelling, and [v]/[Π] for words spelled with <v>. See the relevant results in table 1 below:

[3] The files are available online at: http://www.lel.ed.ac.uk/dialects/india.html.

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Table 1: The use of [w], [v] and [Π] in Tibeto-Burman Englishes vs. Gujarati English[4]

Spelling	**Tibeto-Burman**			**Indo-Aryan**
	Angami L1 speakers	Ao L1 speakers	Mizo L1 speakers	Gujarati L1 speakers
<w>	[w] = 30/30	[w] = 28; [Π] = 2	[w] = 29; [Π] = 1	[w] = 7; [Π] = 23
<v>	[v] = 26; [Π] = 4	[v] = 18; [Π] = 12	[v] = 21; [Π] = 8	[v] = 6; [Π] = 24

The findings in Wiltshire (2005) on Gujarati accord with the later findings on Gujarati and Tamil in Wiltshire and Harnsberger (2006: 100), where almost 70% of the tokens which orthographically contained a <v> or a <w> were realized as [Π]. As a separate, but somehow related issue, it should be mentioned that the palatal and labio-velar glide, /j/ and /w/ respectively, are optional in word initial position in Dravidian languages (Gargesh 2008: 239, Sailaja 2009: 24). Hence, a word beginning with a front unrounded or a back rounded vowel may receive additionally one of the two glides. Consider some examples from Telugu in (2a-b), and how the phenomenon got transferred to IndE words produced by speakers who have a Dravidian background in (2c-e):

(2) a. Telugu: [oka∝i] / [woka∝i] ‘one’
b. Telugu: [idi] / [jidi] ‘this’
c. IndE (Dravidians): [wonlɪ] *only*
d. IndE (Dravidians): [jes] *s*
e. IndE (Dravidians): [es] *yes*

Sailaja (2009: 24)

2.2 Stops

Let me now turn to the behaviour of stops in IndE. First of all, voiceless stops tend not to be aspirated in syllable-initial position (Bansal 1990: 225, Gargesh 2008: 237), which may be in part accounted for by the fact that aspiration is phonemic in North Indian languages. This is consistent with the findings in Wiltshire and Harnsberger (2006), who measure the voicing onset time (VOT) for the stops produced by speakers with Gujarati and Tamil backgrounds:

Table 2: Mean VOT for voiceless stops of Gujarati and Tamil speakers[5]

Subvariety	**VOT for [p]**	**VOT for [t]**	**VOT for [k]**
Gujarati English	20ms	16 ms	36 ms
Tamil English	49 ms	38 ms	74 ms

As can be seen from the data in table 2, there is a significant difference in aspiration between Gujarati and Tamil speakers. This is understandable as Gujarati has a two-way

[4] Adapted from Wiltshire (2005: 284). Note that the study does not focus on the characteristics displayed by speakers with a Gujarati background, but these data were included for a contrastive analysis.
[5] From Wiltshire and Harnsberger (2006: 100).

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distinction based on both voicing and aspiration, which is absent in Tamil[6]. The data in Wiltshire (2005) for Tibeto-Burman speakers use sometimes aspiration contrastively in dental stops to replace the dental fricatives, as shown in examples (3). However, this may also be an instance of spelling pronunciation.

(3)		**Word**	**Angami**	**Ao**	**Mizo**
	a.	*taught*	[t̪^{h}Ot̪]	[t̪$^{(h)}$Ot̪]	[t̪Ot̪]
	b.	*thought*	[t̪^{h}Ot̪]	[t̪^{h}Ot̪]	[t̪^{h}Ot̪]

(Wiltshire 2005: 285)

IndE has been thought to be retroflex in the articulation of the sounds at the beginning of words like *today*, *terrific* or *demand*, but this is mainly true in sub-standard varieties, as formal situations reveal the use of alveolar sounds (Sailaja 2009: 21-22). However, many speakers, under the influence of their first language, still use retroflex [∝] and [□] for [t] and [d] respectively:

(4)		**Word**	**RP**	**IndE**
	a.	*certificate*	[sətɪfɪkət]	[sər∝ifike:∝]
	b.	*London*	[lʌndən]	[lən□ən]

(Gargesh 2008: 237)

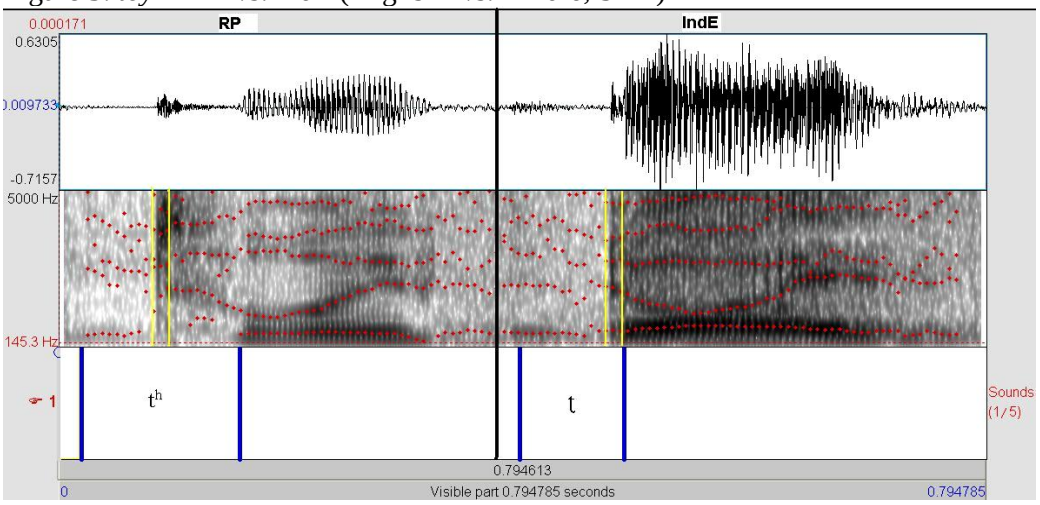
Consider next a contrastive analysis of the same IndE and RP sequence of the SAA samples Hindi6 and English2 in figure 3. Acoustically, a retroflex consonant is expected to show a lowered F3. Retroflex articulations in general are described as being strongly context-dependent and showing large variability due to vowel co-articulation. Following Verma and Chawla (2003), I have measured the mean burst frequencies of the stops at the beginning of the word *toy* and I have used as a standard of comparison their mean values for the same retroflex stop in the context of a following mid back rounded vowel. The samples compared have been cut from the corresponding sound files and they have been pasted onto the same spectrogram for a contrastive analysis. The samples compared belong to two female subjects. The two samples are delimited by the vertical black line on the spectrogram, with IndE represented on the right side and RP on the left side. In the RP sample, on the left half of the spectrogram, one can see a strong burst followed by a significant period of aspiration. The formant transitions can be seen in this spectrogram to commence in the aspiration phase and to continue into the vowel. These transitions begin at about 1800 Hz (which is what is predicted for the F2 onset following an alveolar)[7]. The bursts of the two stops are delimited on the two halves of the spectrogram by the two bars on the formant band. The mean value of the second formant during the burst is somewhere around 2600 Hz in the RP sample, whereas the third formant is at about 3300-3400 Hz. The sound on the right half of the spectrogram has a mean value of about 1850

[6] For the phonemic inventories of Gujarati and Tamil, see Wiltshire and Harnsberger (2006: 95).
[7] Jos Pacilly (p.c.).

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Hz for its F2 and somewhere around 2700 Hz for its F3[8]. Clearly then, the almost 700-Hertz window alone indicates that the quality of the two sounds is not the same.

Figure 3: *toy* in RP vs. IndE (English2 vs. Hindi6, SAA)



2.3 Liquids

Sailaja (2009: 19) writes that standard IndE is non-rhotic, resembling RP in this way. This feature is sometimes transferred even to Indian names or words in which the post-vocalic /r/ should be pronounced:

(5) **Hindi names**

a. *Sharma* [ʃɜ:mə] instead of [ʃarma:]

b. *Verma* [Πɜːmə] instead of [Πarma:]

(Sailaja 2009: 19)

As the subject of my recordings (KT) displayed a strong non-rhotic accent[9], I will analyze acoustically one of her samples in contrast with a rhotic sample of a New York female sample. In figure 4 the two corresponding samples are delimited by a vertical black line on the spectrogram, New York English (NYE) being represented on the left side and IndE on the right side. The presence of the [r] sound in NYE is characterized by

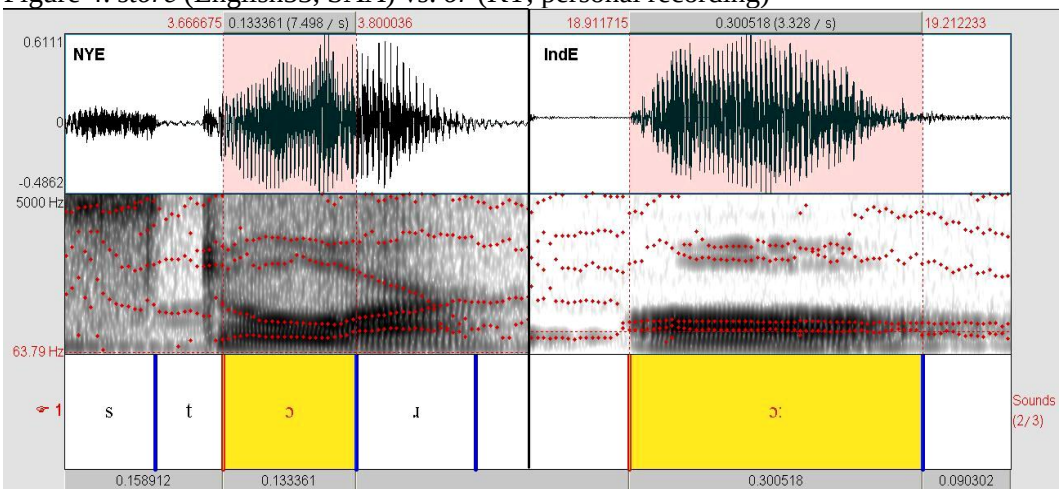
[8] The value in my sample is slightly higher for the third formant, but it should be noted that the vowel in the diphthong is more open than the monophthong the authors analyzed, which can explain the difference in the formant value of the preceding stop.

[9] During the recordings, I failed to understand the phrase *sharp thing*, and I figured out later on a closer Praat analysis that this was because besides the non-rhoticity of the first word, the second had a dental stop instead of dental fricative, and the vowel had been nasalized and the nasal dropped. The subject repeated the phrase louder and at a lower speech rate, but I still failed to understand. In the end, the disambiguation was performed by a person who was familiar with the subject's pronunciation.

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the low frequency of the third formant. Ladefoged (2001: 53) writes that whenever an [r] sound occurs in a word, the third formant will drop below 2000 Hz.

Figure 4: *store* (English53, SAA) vs. *or* (KT, personal recording)



Note that the left side of the spectrogram shows a drop of the third formant below 2000 Hz towards the end of the word which indicates the presence of a rhotic approximant (actually the F3 of the rhotic sound comes very close to its F2), whereas on the right side of the spectrogram the formants are quite stable throughout the word, which shows that there is nothing there but a prolonged vowel.

Chand (2010) investigates the behaviour of postvocalic /r/ in urban IndE (namely in Delhi). It has been claimed that in Delhi IndE, rhotic behaviour is a strong socially diagnostic variable for age and gender (Sahgal and Agnihotri 1988). The data included in Chand (2010) were collected from both male and female subjects, their age ranging between 18 and 87 years. The variants of the variable /r/ were coded as null, trilled or approximant on the basis of both aural and acoustic analyses. The overall distribution of is shown in the table below:

Table 3: Postvocalic /r/ in Delhi IndE[10]

Null realization [Ø]		**Approximant realization [ɹ]**		**Trilled realization [ɾ]**	
%	N	%	N	%	N
37.6	1435	54.6	2082	7.8	296
Total N		**3813**			

Clearly, postvocalic /r/ in Delhi IndE is a variable which exhibits variation, with more than half of the tokens (54.6%) realized as an approximant, and only less than half realized as null (37.6%). A minority of less than 10% of the speakers (7.8%) realize the analyzed variable as a trill. Overall, almost two thirds (62.4%) of the total number of

[10] From Chand (2010: 18).

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realizations were rhotic in postvocalic position when compared with only 37.6% were non-rhotic. Interestingly, the most significant factor influencing rhotic behaviour was gender. Women (factor weight = .58) were far less rhotic than men (factor weight = .40), and these results were comparable with the results depending on the formality of the situation. The variants which were usually found in both women's speech and formal speech have been interpreted as the prestige form. Traditionally, a rhotic pronunciation has been stigmatized by IndE speakers (Chand 2010: 22), and this may also explain the linguistic behaviour of female speakers, who usually converge towards the forms which have more prestige. Hence, in an Indian context, the postvocalic /r/ will be, most likely, realized not by women, and certainly not in more formal situations. However, the study shows that the IndE dialect in Delhi is evolving towards a semi-rhotic accent.

The data in Wiltshire (2005) show that Tibeto-Burman subvarieties of IndE are also rhotic, as shown in table 4. Note that in these subvarieties a flap or trill is rarely used, or not used at all.

Table 4: Postvocalic /r/ in Tibeto-Burman IndE[11]

	Angami	**Ao**	**Mizo**
Postvocalic /r/ (%)	86%	91%	83%
Allophonic realizations	[ɹ] = 100%	[ɹ] = 98% [ɹ⇓] = 2%	[ɹ] = 95% [4] = 3% [4⇓] = 1% [ɹ⇓] = 1% [r] = 1%

The analysis of Gujarati and Tamil subvarieties of IndE in Wiltshire and Harnsberger (2006) yields different results. As can be seen in table 5, only a minority of tokens were realized as a rhotic post-vocalically. Gujarati speakers tend to realize it mostly as a tap, while speakers with Tamil background prefer approximants, although taps may commonly occur.

Table 5: Postvocalic /r/ in Gujarati and Tamil IndE[12]

	Gujarati English	**Tamil English**
Postvocalic /r/ (%)	17%	15%
Allophonic realizations	[4] = 39% [4⇓] = 33% [ɹ] = 14% [r] = 8% [r⇓] = 6%	[ɹ] = 63% [4] = 17% [4⇓] = 20%

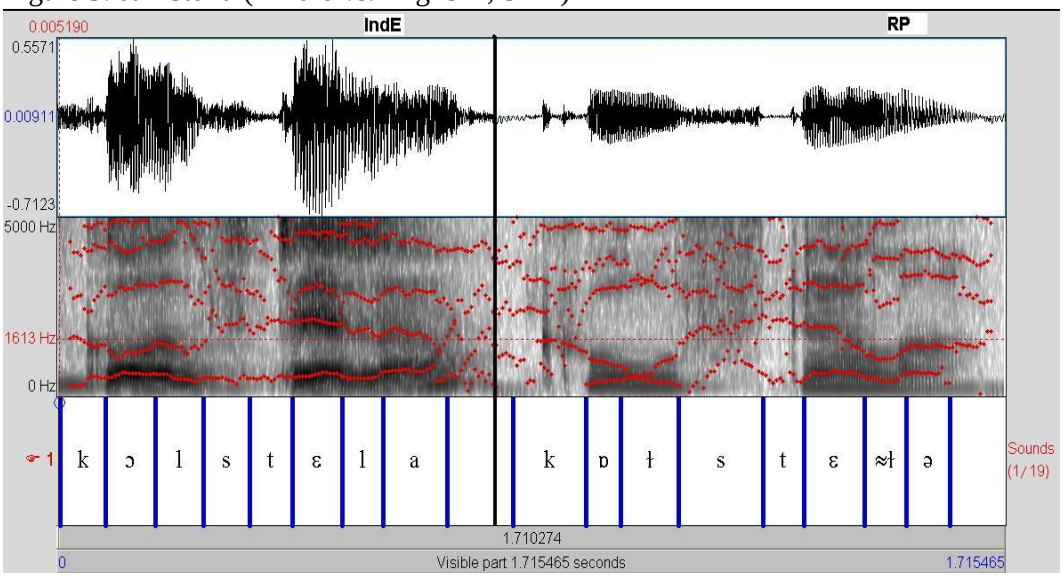
Finally, IndE differs in part from RP in the nature of the lateral liquid. Regardless of context IndE has only clear [l]. Consider next an acoustic analysis of two words containing lateral liquids from some SAA samples of two female subjects (Hindi6 and

[11] Adapted from Wiltshire (2005: 286).
[12] Adapted from Wiltshire (2005: 286).

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English2). The back line delimits IndE on the left-hand side of the spectrogram and RP on the right-hand side. Now, Ogden (2009: 88) shows that usually "F2 during the lateral portion is just about visible at around 1600 Hz; this value is consistent with a relatively clear lateral". A dotted line was plotted in the spectrogram at about 1600 Hz to indicate how the second formants of the lateral liquids behave in one word or another. Both lateral sounds in IndE come very close to the 1600 Hz line, the F2 of the lateral liquid in the word *call* having a mean value of 1400 Hz, while the F2 of the [l] sound in the word *Stella* has a mean value of 1750 Hz. These values certainly indicate that the two IndE laterals are instances of clear [l]. Conversely, Ogden (2009: 88-89) argues that a velarized lateral implies a low F2, visible at about 1000 Hz. As can be seen on the right half of the spectrogram, the RP lateral in the word *call* goes much below 1600 Hz; it goes even lower than 1000 Hz, i.e. it is very close to F1 at a certain point (somewhere around 630 Hz) and its mean value is of 765 Hz, which clearly shows that it is a dark [ɬ].

Figure 5: *call Stella* (Hindi6 vs. English2, SAA)



Interestingly enough, even the F2 of the lateral in the word *Stella* goes much below 1600 Hz, in the RP sample. Its mean value is 1096 Hz. This can be explained by the nature of the following, word-final vowel *schwa*, which is weak and unstressed and, consequently, does not have the power to raise the F2 of the lateral so as to make it a clear [l]. So, it is not as if silence follows, but the quality of the final vowel accounts for the slight velarization of the preceding lateral. Sailaja (2009: 23) writes that a retroflex lateral may be heard at times in Southern IndE speech in words like *colour* or *play*, but this it is not a general feature of IndE and, hence, it is non-contrastive.

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3. Conclusions

In light of the findings above, one can safely conclude that the inventory of consonantal phonemes in IndE does not differ significantly from that of RP, as shown in table 6 below[13]:

Table 6: Chart of IndE consonants

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Stop	p b		t d	t̪ d̪			k g	
Affricate					ʧ ʤ			
Fricative		f (v)		s z	ʃ ʒ			h
Nasal	m			n			ŋ	
Approximant	w	ɹ		l r		j		

As can be seen, the interdental fricatives never occur in the speech of ESL users, and they are systematically replaced by dental stops, /t̪/ and /d̪/ respectively. Moreover, territorial variation may involve different degrees of retroflexion and aspiration in stops, depending on the L1 of the speakers. IndE is mainly non-rhotic but it has been shown that it may be evolving towards a rhotic pronunciation, at least in some areas (e.g. Delhi, see Chand 2010).

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[13] Cf. the inventory of consonantal phonemes of Standard Indian English in Sailaja (2009: 24).

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