The Curious Absence of Aspiration in Indian English: The Role of Phonetics in Adaptation

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1. Introduction

Indic (also known as Indo-Aryan) languages are reported to have a loanword adaptation pattern whereby English aspirated stops are adapted as unaspirated, even though Indic languages have phonological aspirates (Iverson & Salmons, 2008; Paradis & LaCharité, 1997). This pattern is also observed in Indian varieties of English (Sailaja, 2009). This paper explores the possibility of this adaptation pattern having a perceptual explanation by using Indian English as a proxy for loanword adaptation. Even though a considerable number of Indian English speakers speak their variety of English natively, I assume that historically, Indian speakers acquired English as a second language primarily through contact with British varieties of English in colonial India. Therefore, models of non-native perception such as the Perceptual Assimilation Model or PAM (Best, 1995) and second language acquisition such as the Speech Learning Model (Flege, 1995) and PAM-L2 (Best & Tyler, 2007) are relevant to the discussion of this adaptation pattern.

An interesting case of loanword adaptation is seen in languages like Japanese (Dupoux et al., 1999), among others, in the form of illusory vowels. When Japanese speakers encounter consonant clusters that violate the phonotactics of their language, they "illusorily" perceive an epenthetic vowel which derives a licit structure. Much has been written about such adaptation patterns in which phonological behavior takes precedence over phonetic cues (Davidson, 2007; Davidson & Shaw, 2012; Durvasula & Kahng, 2015; Kabak & Idsardi, 2007). However, the opposite case, where phonology is unable to explain an adaptation pattern, but sheer phonetic cues are, is rarely observed since phonetic cues typically align with phonological behavior. The Indian English and Indic loanword adaptation pattern is such an example whereby English long-lag stops are adapted as short-lag. For example, the English word *taxi* ([t^{h}æksi]) is adapted in Hindi as [t̪æksi] even though *[t̪^{h}æksi] which preserves aspiration is licit in the language (Arsenault, 2009). The Indic languages are a sub-branch of the Indo-European family, spoken today mainly in India, Pakistan, Bangladesh, Nepal, Sri Lanka, and the Maldives (Masica, 1993). Several Indic languages have a four-way laryngeal distinction between long-lag, short-lag, lead-lag, and breathy stops (e.g. [k^h, k, g, g^ɦ]). This four-way contrast is found in the stop consonants of Bengali , Gujarati, Hindi/Urdu, Konkani, Marathi, Nepali, Oriya, and Pahari (Masica, 1993). There are no restrictions on the occurrence of any of these stops word-initially.

Throughout this paper, the term *short-lag stop* is used to refer to phonetically voiceless and unaspirated stops for which glottal pulsing starts shortly after the release, namely /p, t, k/. The term *long-lag stop* is used to refer to phonetically voiceless and aspirated stops which have a relatively long lag between the release of the consonant and the onset of glottal pulsing, namely /p^h, t^h, k^h/. The term *Indian English* (henceforth, IE) is used here to refer to the variety of English spoken by native speakers of Indic languages. This includes Indic speakers from other countries in the Indian subcontinent. Hoffmann et al. (2011) shows that being the dominant variety of English in the subcontinent, Indian English is shaping norms in standardizing the language in neighboring countries. I therefore use *Indian English* as a general term to describe the variety of South Asian English spoken by native speakers of Indic languages across different countries in South Asia. The term *de-aspiration* is used to refer to the adaptation of English long-lag stops as short-lag in Indic loanwords and Indian English.

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* Wayne State University, jahnavi.narkar@wayne.edu. I would like to thank Peter Staroverov and audiences at the 24th Annual Midphon Conference, the 28th Conference of the Student Organisation of Linguistics in Europe, and the 17th Old-World Conference in Phonology where parts of this work were presented for comments and feedback.

 Proceedings of the 37th West Coast Conference on Formal Linguistics, ed. D. K. E. Reisinger and Marianne Huijsmans, 189-196. Somerville, MA: Cascadilla Proceedings Project.

2. Cross-language perception and loanword adaptation

Phonetic detail is known to influence cross-language speech perception and the early stages of second language acquisition (Best, 1995; Best & Tyler, 2007; Flege et al., 1995; Flege, 2003). According to some approaches, perceptual assimilation, via acoustic cues, plays the central role in loanword adaptation as well (Boersma & Hamann, 2009; Peperkamp, 2005; Peperkamp et al., 2008; Silverman, 1992). That is, when borrowing loans, borrowers map non-native sounds (or structures) onto native sounds that are the most perceptually similar, and not necessarily phonologically similar. The opposing view claims that loanword adaptation is phonological in nature with phonetic details being unimportant (LaCharité & Paradis, 2000, 2005; Paradis & LaCharité, 1997). That is, borrowers attend to phonological similarity, rather than psychoacoustic similarity between phones. Under this view, proficient bilinguals who have access to the phonology of both the source and borrowing languages are responsible for adapting loanwords. Given that de-aspiration is found in both Indian English and Indic loanwords, and the likelihood of perceptual assimilation having an influence on the former, I assume the position held by Peperkamp (2005) and others. I hypothesize that non-native perceptual assimilation of English phones by Indic speakers is the driving force behind de-aspiration.

According to Best's (1995) Perceptual Assimilation Model (PAM) of cross-language speech perception, linguistic experience influences how a listener interprets an acoustic speech signal depending on the phonetic detail associated with their native phonological categories. In PAM terminology, de-aspiration is an example of Single Category (SC) assimilation or possibly a weak Category Goodness (CG) difference. Given two non-native contrasting phones, SC assimilation is characterized by assimilation of both non-native contrasting segments to the same native category, equally discrepant from the "ideal." CG difference, on the other hand, is characterized by assimilation of the non-native segments to the same native category, but they differ from the native "ideal." In the case of IE, both native English phones, [p^h] and [p] are assimilated to the native [-voice, -spread] category, namely /p/ with either both non-native segments being equally discrepant from the native category ideal (SC type), or one more discrepant ([p^h]) than the other (CG type).

While listeners are typically, although not always, unable to discriminate speech contrasts that do not occur in their native languages, some contrasts are more difficult to perceive than others. According to Polka (1991), the difficulty of discriminating non-native contrasts depends on three factors: phonemic status, phonetic familiarity, and acoustic salience. Indian English, which is influenced by Indic phonology, adapts not only English short-lag stops as unaspirated, but also maps English long-lag stops onto the unaspirated category. Korean also contrasts short-lag and long-lag stops like Indic, but adapts the long-lag and short-lag stops in English words like *tie* and *stick* respectively as long-lag ([t^hai] and [sɨt^hik]) (Oh, 1996). The same adaptation pattern is observed in Mandarin Chinese which also has phonological aspirated stops (Paradis & Tremblay, 2009). By the phonological similarity account, the allophonic variation in the source language is ignored by Korean and Mandarin borrowers because differentiating between the allophones is inconsequential in the source language as opposed to the phonemic contrast in their native phonology. Cantonese also contrasts short-lag and long-lag stops. In loanwords from English, Cantonese speakers are able to faithfully produce the appropriate English allophone in the appropriate contexts (Yip, 1993). For example, *pie* is adapted as [˥p^hay] in Cantonese while *spare* is adapted as [˧si˥pe]. A similar adaptation pattern is also observed in Thai loanwords (Kenstowicz & Suchato, 2006). Therefore, Cantonese and Thai speakers exploit subphonemic information in the source language and are able to faithfully produce the allophonic English contrast.

Given that Indic languages also have contrastive short-lag and long-lag stops, we might expect them to follow similar adaptation patterns – either produce the appropriate English allophone in the appropriate context like Cantonese and Thai, or produce the long-lag stop in all contexts like Korean and Mandarin Chinese. However, we do not find that to be the case. Indic and Indian English speakers consistently produce the marked English allophone, the short-lag stop, in all contexts despite being exposed to phonemic (and phonetic) tokens of short-lag and long-lag stops since they are contrastive in their native language. Therefore, I hypothesize that, if de-aspiration has a perceptual origin, it is likely to be influenced by the difference in acoustic properties of English and Indic long-lag stops.

English is an aspirating language (Iverson & Salmons, 2008; Vaux & Samuels, 2005) with an aspiration rather than voicing contrast. In spite of the unmarked aspirated phoneme occurring in the most prominent contexts in English, Indic languages consistently adapt them as unaspirated. Voice Onset Time (VOT), the phonetic cue for aspiration which denotes the time interval between the beginning of the release burst and the onset of quasi-periodicity, is longer for aspirated stops in Indic languages like Marathi and Hindi and shorter in English (Lisker & Abramson, 1964). While VOT alone can distinguish English long-lag and short-lag stops, this cue is not sufficient to distinguish the four-way laryngeal contrast in Indic (Cho & Ladefoged, 1999; Lisker & Abramson, 1964). The fundamental frequency at the beginning of voicing immediately following consonants, or onset f0 is a possible primary cue for distinguishing such contrasts. Dmitrieva & Dutta (2020) found that onset f0 in Marathi velar stops is lowered with aspiration, with vowels following the breathy voiced stop having the lowest f0 and vowels following the short-lag stop having the highest f0. Onset f0 in vowels following stops was found to follow the order $g^{ɦ}<g<k^{h}<k$. Moreover, while aspiration lowers f0 in Marathi and Hindi, it raises f0 in English (Dmitrieva & Dutta, 2018), among other languages. Against this background, I hypothesize that acoustic differences between English and Indic languages, namely shorter VOT of English stops and the opposite effect of aspiration on onset f0, are responsible for the adaptation pattern seen in Indic loanwords and Indian English.

3. Method

3.1. Participants and materials

Language	*Number of speakers*
Bengali	14
Gujarati	11
Hindi	28
Konkani	3
Marathi	8
Nepali	14
Oriya	2
Pahari	2
Urdu	13
Total	95

Table 1: Indic languages and number of native speakers in the study

Speech samples of native speakers of Indic languages reading a passage in English from The Speech Accent Archive (Weinberger, 2015) were used in this study. This archive hosts a large set of speech samples from native and non-native speakers of English. All the speakers read the same passage out loud in English. Speech samples from adult speakers of IE who were native speakers of one of nine Indic languages that contrast long-lag, short-lag, lead lag, and breathy stops were analyzed. These languages and the number of speakers of each language are shown in Table 1.[1] Samples produced by individuals who spent their childhood and adolescence (anytime under the age of eighteen years) in a primarily English-speaking country were excluded. This resulted in a total of 95 speakers. Six adult speakers of British English (BE) functioned as the comparison group.

3.2. Procedure

3.2.1. Voice Onset Time

The VOT of stops from the speech samples for the words *peas* and *kids* as examples of English long-lag stops, and the words *spoons* and *scoop* as examples of English short-lag stops, was measured in Praat (Boersma & Weenink, 2019) as the interval between the beginning of the release burst and the onset of quasi-periodicity. These words were chosen since they were all content words occurring in prominent contexts and were least likely to be reduced. All but one target were nouns (there were no

[1] Hindi and Urdu are listed as separate languages on The Speech Accent Archive and are therefore analyzed as such.

words other than the verb *scoop* in the passage that contained the short-lag velar stop /k/ in the context s_). All instances of errors made by the speakers were discounted (for example, one speaker produced *swoop* instead of *scoop*). These measurements were done for each of the 95 IE speakers and 6 BE speakers. Table 2 shows the total number of resulting tokens of each word produced by BE and IE speakers. All VOT measurements were normalized by dividing each VOT by the corresponding length of the following vowel to account for differences in speech rate. The normalized VOTs, measured for the same words from the speech samples of the BE and IE speakers, were compared. The mean VOT of BE stops was also compared to the mean VOT weighted by number of speakers reported for Hindi long-lag and short-lag stops in previous studies (Lisker & Abramson, 1964; Benguerel & Bhatia, 1980; Shimizu, 1989) shown in Table 3.

	peas	*spoons*	*kids*	*scoop*
British speakers	6	6	6	6
Indic speakers	93	92	94	90

Table 2: Tokens of each word measured

	[p^h]	[p]	[k^h]	[k]
Lisker & Abramson (1964) (N = 1)	63	12	84	16
Benguerel & Bhatia (1980) (N = 2)	119	15	142	52
Shimizu (1989) (N = 3)	75	12	119	34
Weighted Average	88	13	121	37

Table 3: VOT (ms) reported for Hindi in previous studies

3.2.2. Onset f0

Onset f0 of the first vowel in the words *peas*, *kids*, *spoons*, and *scoop* produced by each speaker was measured at the first point immediately at the onset of voicing in Praat (Boersma & Weenink, 2019) using a script by Katherine Crosswhite[2]. Speakers were categorized as male or female as self-reported on the Speech Accent Archive and the parameters were set as described in Crosswhite's script. F0 measurements for all participants were visualized as a scatterplot and checked for clear outliers that typically result from pitch-halving and pitch-doubling errors of Praat's auto-correlation algorithm. These were corrected manually by measuring the duration of a single glottal pulse as the duration of one cycle of the periodic waveform and taking its inverse, as done by Dmitrieva & Dutta (2020). All f0 measurements were normalized via conversion to semitones using the semitone conversion equation provided in the Praat internal users' manual (Boersma & Weenink, 2019).

F0 measurements were plotted against normalized VOT for each individual word. Since the speech samples consisted of participants reading a passage, the onset f0 was influenced by the changing intonational context which also varied between speakers. Intonational patterns are typically difficult to pin down in connected read speech (Umeda, 1981). Since a set of pre-recorded speech samples were used for measuring f0, the intonational context could not be controlled. Two of the four target words were phrase-final (*peas* and *kids*). The normalization of f0 to semitones enabled the comparison of the correlation between VOT and onset f0 across speakers. Therefore, comparisons were made for the same words produced by different speakers but not across words.

4. Results

4.1. Voice Onset Time

As expected for the BE samples, the normalized VOT for long-lag stops in the words *peas* and *kids* differed significantly, as shown in Table 4, from that of the short-lag stops in the words *spoons* and *scoop*. IE bilabial and velar stops did not show significant differences in VOT with laryngeal category. That is,

[2] The script is available at: http://phonetics.linguistics.ucla.edu/facilities/acoustic/formant_logging.txt

the bilabial stops in the words *peas* and *spoons* and the velar stops in the words *kids* and *scoop* were produced with VOTs that were not significantly different.

	Place	*t*	*df*	*p*
BE	Bilabial	*2.365*	*7*	*<.001*
	Velar	*2.306*	*8*	*<.001*
IE	Bilabial	*1.976*	*185*	*.794*
	Velar	*1.975*	*185*	*.304*

Table 4: Summary of two-tailed t-test comparing BE and IE stop production

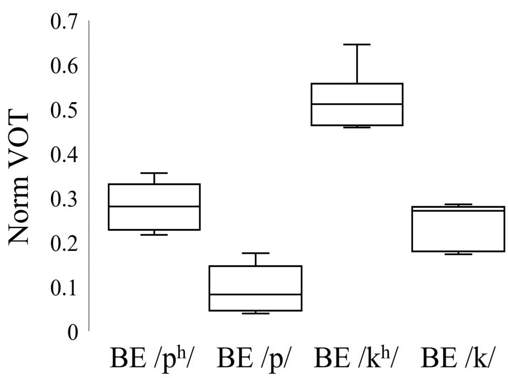


Figure 1: BE stop VOTs

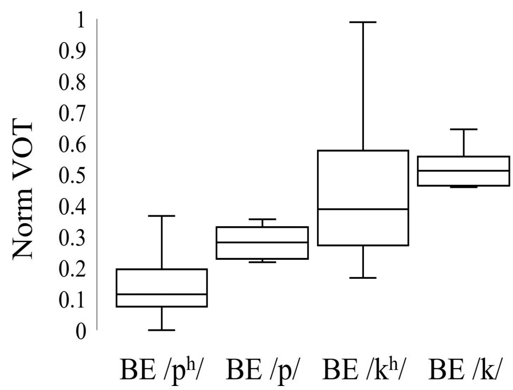


Figure 2: IE stop VOTs

Figure 1 shows that both bilabial and velar BE stops were differentiated in terms of VOT with laryngeal category. As shown in Figure 2, IE long-lag and short-lag stops were not differentiated in terms of VOT with laryngeal category like the BE stops were. There were no significant differences in VOT with laryngeal category for each place of articulation between the different IE speakers of the nine Indic languages. This, combined with the fact that a large number of speakers (41 out of 95) were native speakers of Hindi or Urdu, enabled the use of reported values of VOT for Hindi as a reasonable benchmark against which to compare BE and IE VOTs.

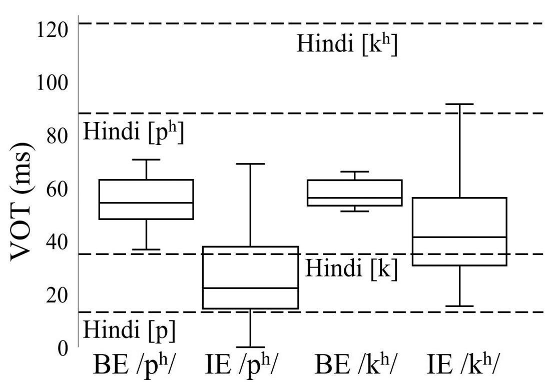


Figure 3: BE vs IE stop VOTs

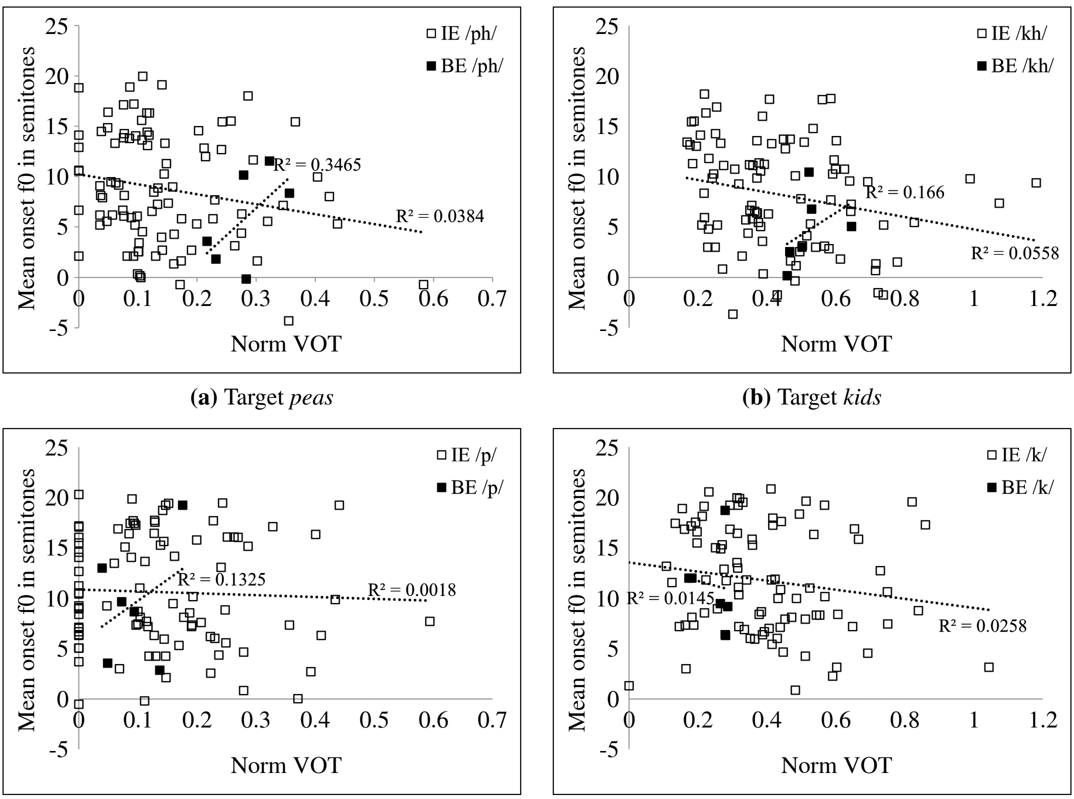
Figure 3 shows that the raw VOT of the stop consonants in *peas* and *kids* measured for the IE speakers was shorter than that for BE speakers.[3] More importantly, the VOT of the BE long-lag stops

[3] Raw VOT values were used instead of normalized values to enable comparison with VOT values reported in previous studies since these reported values were not normalized.

was significantly shorter than the average VOT of aspirated stops reported for Hindi represented by the dotted lines.

4.2. Onset f0

Figure 4 shows the relationship between f0 and VOT for the words *peas*, *kids*, *spoons*, and *scoop*. The dotted lines represent the Ordinary Least Squares (OLS) regression lines. Figures 4(a) and 4(b) show that the stops in *peas* and *kids* produced by IE speakers showed weak but significant negative correlation between semitone-normalized onset f0 values and normalized VOT ($p = .046$ for /p^h/ and $p = .018$ for /k^h/). An increase in VOT was correlated with a decrease in onset f0. The stops in the same target words produced by BE speakers showed significant positive correlation between semitone-normalized onset f0 values and normalized VOT. That is, an increase in VOT was correlated with an increase in onset f0. The relationship between onset f0 and VOT was not found to be significant for the target words *spoons* and *scoop* for either group of speakers.



(a) Target *peas*

(b) Target *kids*

(c) Target *spoons*

(d) Target *scoop*

Figure 4: Semitone-normalized onset f0 as a function of VOT

5. Discussion

That the VOT of IE bilabial and velar stops does not vary with laryngeal category means IE speakers produce the same amount of aspiration in contexts where BE speakers produce distinct phonemes that are discriminable by VOT. The correlation between onset f0 and VOT for long-lag stops is negative in IE and positive in BE. VOT alone is sufficient to distinguish all the laryngeal categories in English, and onset f0 is a secondary cue for these contrasts (Keating, 1984; Maddieson et al., 1996). In Indic languages, on the other hand, VOT alone cannot distinguish all laryngeal categories, and onset f0 is a primary cue required to distinguish the four contrasts (Dmitrieva & Dutta, 2020). Indic speakers are therefore sensitive to the effect of VOT on onset f0 in English as well. When they hear English long-lag stops, in addition to their shorter VOT compared to Indic VOT for corresponding stops, they also notice the raising effect aspiration has on onset f0. For these speakers, the effect of aspiration on onset f0 is less pronounced for short-lag stops than for long-lag stops. Therefore, the adaptation of English long-lag stops as short-lag stops in IE is an attempt to more closely approximate the relationship between VOT and onset f0 found in the source language.

I propose the following explanation for the adaptation pattern found in Indic loanwords and Indian English. In the process of adaption, the input is the acoustic signal of the phonetic output in the source language. The mapping mechanism involves finding the optimal *acoustic* match for the input. Since the VOT of English long-lag stops is shorter than the VOT of Indic long-lag stops, English aspirated stops are likely perceived as being unaspirated by Indic native speakers. English long-lag stops are simply not aspirated enough to be categorized as [+spread] for Indic speakers. According to Iverson & Salmons (2008), Hindi speakers found "the English word-initial p "somehow softer" than the Hindi voiceless aspirate" (2008:270). The difference in VOT between English and Hindi could explain this intuition. In addition to the shorter VOT of English long-lag stops, the opposite effects of aspiration on onset f0 is also a potential contributing factor. For an Indic speaker, a short-lag stop is characterized by short VOT and slight lowering of onset f0 with VOT. A long-lag stop is characterized by long VOT and a significant lowering of onset f0. Therefore, an English long-lag stop, by Indic VOT benchmarks, has somewhat long VOT and a raising effect on onset f0. They map the English input onto the native category that is less dissimilar acoustically, i.e. shorter VOT with only a small effect on onset f0, rather than the more dissimilar alternative, longer VOT with the opposite, i.e. lowering effect on onset f0. Indic speakers employ an acoustic cue that is secondary in the source language but primary in the borrowing language to differentiate all four native laryngeal contrasts when borrowing loans.

This study only presents indirect evidence for this proposed perceptual account of de-aspiration. Perception experiments testing Indic speakers' ability to discriminate English long-lag and short-lag stops can test the prediction made here. Experiments probing how different acoustic cues are weighted in perception by Indic speakers could provide additional insight. This study shows that acoustic differences between the source and borrowing languages may lead to differential perceptual assimilation and suggests that adaptation patterns may be rooted in perception. When adapting English loanwords, Indic speakers must ignore the fact that stops are phonologically aspirated in the source language, only engaging in low-level perceptual adaptation. This does not necessarily mean that grammatical processing needs to do the same; indeed the acoustic detail associated with phonetic categories in the borrowing language is responsible for the mapping of aspirated stops to the unaspirated category. This study indicates that phonetics can play a role in loanword adaptation and suggests that many cases where phonetics and phonology match in this process may also have an entirely phonetic explanation.

References

Arsenault, Paul (2009). Coronal features and retroflexion in Dhivehi and other Indo-Aryan languages. *Toronto Working Papers in Linguistics* 30.

Benguerel, A.-P. & T.K. Bhatia (1980). Hindi stop consonants: an acoustic and fiberscopic study. *Phonetica* 37, 134–148.

Best, Catherine T (1995). A direct realist view of cross-language speech perception. *Speech perception and linguistic experience* 171–206.

Best, Catherine T & Michael Tyler (2007). Nonnative and second-language speech perception. *Language experience in second language speech learning: In honour of James Emil Flege* 13–34.

Boersma, Paul & Silke Hamann (2009). Loanword adaptation as first-language phonological perception. *Loanword phonology* 11–58.

Boersma, Paul & David Weenink (2019). Praat: doing phonetics by computer [computer program]. *Version 6.1.07, retrieved 26 November 2019 from http://www. praat. org/* .

Cho, Taehong & Peter Ladefoged (1999). Variation and universals in VOT: evidence from 18 languages. *Journal of Phonetics* 27:2, 207–229.

Davidson, Lisa (2007). The relationship between the perception of non-native phonotactics and loanword adaptation. *Phonology* 261–286.

Davidson, Lisa & Jason A Shaw (2012). Sources of illusion in consonant cluster perception. *Journal of Phonetics* 40:2, 234–248.

Dmitrieva, Olga & Indranil Dutta (2018). Acoustic correlates of the four-way laryngeal contrast in Marathi stops. *The Journal of the Acoustical Society of America* 143:3, 1756–1756.

Dmitrieva, Olga & Indranil Dutta (2020). Acoustic correlates of the four-way laryngeal contrast in Marathi. *Phonetica* 77:3, 209–237.

Dupoux, Emmanuel, Kazuhiko Kakehi, Yuki Hirose, Christophe Pallier & Jacques Mehler (1999). Epenthetic vowels in Japanese: A perceptual illusion? *Journal of experimental psychology: human perception and performance* 25:6, p. 1568–1578.

Durvasula, Karthik & Jimin Kahng (2015). Illusory vowels in perceptual epenthesis: The role of phonological alternations. *Phonology* 32:3, p. 385.

Flege, James E (1995). Second language speech learning: Theory, findings, and problems. *Speech perception and linguistic experience: Issues in cross-language research* 92, 233–277.

Flege, James E (2003). Assessing constraints on second-language segmental production and perception. *Phonetics and phonology in language comprehension and production: Differences and similarities* 6, 319–355.

Flege, James Emil, Murray J. Munro & Ian R. A. Mackay (1995). Effects of age of second-language learning on the production of English consonants. *Speech Communication* 16:1, 1–26.

Hoffmann, Sebastian, Marianne Hundt & Joybrato Mukherjee (2011). Indian English an emerging epicentre? A pilot study on light verbs in web-derived corpora of South Asian Englishes. *Anglia-Zeitschrift fr englische Philologie* 129:3-4, 258–280.

Iverson, Gregory K & Joseph C Salmons (2008). Germanic aspiration: Phonetic enhancement and language contact. *Sprachwissenschaft* 33:3, 257–278.

Kabak, Bariş & William J. Idsardi (2007). Perceptual distortions in the adaptation of English consonant clusters: Syllable structure or consonantal contact constraints? *Language and speech* 50:1, 23–52.

Keating, Patricia A (1984). Phonetic and phonological representation of stop consonant voicing. *Language* 286–319.

Kenstowicz, Michael & Atiwong Suchato (2006). Issues in loanword adaptation: A case study from Thai. *Lingua* 116:7, 921–949.

LaCharité, Darlene & Carole Paradis (2000). Phonological evidence for the bilingualism of borrowers. *Proceedings of the 2000 Annual Conference of the Canadian Linguistics Association*, Cahiers linguistiques d'Ottawa Ottawa, Ont., 221–232.

LaCharité, Darlene & Carole Paradis (2005). Category preservation and proximity versus phonetic approximation in loanword adaptation. *Linguistic inquiry* 36:2, 223–258.

Lisker, Leigh & Arthur Abramson (1964). A cross-language study of voicing in initial stops: Acoustical measurements. *Word* 20, 384–422.

Maddieson, Ian, William J Hardcastle & John Laver (1996). Phonetic universals. *UCLA Working Papers in Phonetics* 160–178.

Masica, Colin P (1993). *The Indo-Aryan languages*. Cambridge University Press.

Oh, Mira (1996). Linguistic input to loanword phonology. *Studies in Phonetics, and Morphology* 2, 117–126.

Paradis, Carole & Darlene LaCharité (1997). Preservation and minimality in loanword adaptation. *Journal of Linguistics* 33, 379–430.

Paradis, Carole & Antoine Tremblay (2009). Nondistinctive features in loanword adaptation. *C. a. Wetzels (Ed.), Loan Phonology. Current Issues in linguistics Theory* 307, 211–224.

Peperkamp, Sharon (2005). A psycholinguistic theory of loanword adaptations. *Annual Meeting of the Berkeley Linguistics Society*, vol. 30, 341–352.

Peperkamp, Sharon, Inga Vendelin & Kimihiro Nakamura (2008). On the perceptual origin of loanword adaptations: experimental evidence from Japanese. *Phonology* 25:1, 129–164.

Polka, Linda (1991). Cross-language speech perception in adults: Phonemic, phonetic, and acoustic contributions. *The Journal of the Acoustical Society of America* 89:6, 2961–2977.

Sailaja, Pinjali (2009). *Indian English*. Edinburgh University Press, Edinburgh.

Shimizu, Katsumasa (1989). A cross-language study of voicing contrasts of stops. *Studia Phonologica* 23, 1–12.

Silverman, Daniel (1992). Multiple scansions in loanword phonology: evidence from Cantonese. *Phonology* 9:2, 289–328.

Umeda, Noriko (1981). Influence of segmental factors on fundamental frequency in fluent speech. *The Journal of the Acoustical Society of America* 70:2, 350–355.

Vaux, Bert & Bridget Samuels (2005). Laryngeal markedness and aspiration. *Phonology* 22:3, 395–436.

Weinberger, Steven (2015). Speech accent archive. George Mason University. *Online: http://accent.gmu.edu* .

Yip, Moira (1993). Cantonese loanword phonology and optimality theory. *Journal of East Asian Linguistics* 2:3, 261–291.

Proceedings of the 37th West Coast Conference on Formal Linguistics

edited by D. K. E. Reisinger and Marianne Huijsmans

Cascadilla Proceedings Project Somerville, MA 2021

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ISBN 978-1-57473-477-5 hardback

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Narkar, Jahnavi. 2021. The Curious Absence of Aspiration in Indian English: The Role of Phonetics in Adaptation. In *Proceedings of the 37th West Coast Conference on Formal Linguistics*, ed. D. K. E. Reisinger and Marianne Huijsmans, 189-196. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #3529.