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Nonesuch phonemes in loanwords

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Abstract: Loanwords may or may not affect the phonological system of a language. Much of the loanword literature has focused on the adaptation of "foreign" contrasts to native systems; however, there are certain cases where languages appear to have borrowed new phonemes. We argue that loanwords alone cannot introduce a new phoneme into a language unless there are special circumstances. We examine three case studies of apparently borrowed "unusual" phonemic contrasts: Swiss German initial geminates, Bengali retroflex stops, and English voiced fricatives. In each case, we find that rather than the loanwords introducing brand-new phonemes, an existing allophonic alternation has become phonemic due to a large influx of loanwords. Thus, the phonology rather than the phonetics alone – marked or otherwise – dominates the absorption of loans.

Keywords: phonology, loanwords, Bengali, English, Swiss German

1 Introduction

Borrowed words alone should not introduce new phonemes – this is the central claim of this paper. However, at first glance, this claim does not seem to be incontrovertible. Phonological features which contribute to allophonic alternations may become contrastive, but no new phonological feature should be introduced merely via loans. If words in the donor language contain a feature that does not exist in the phonological system of the recipient language, when these words are borrowed, that feature will be adapted to an existing feature in the recipient language. This will become apparent as we discuss individual cases. Recent discussion of loanword phonology has considered the following issues: (i) the degree to which perceptual salience influences adaptation; (ii) the way in which conflicting production and comprehension systems constrain the adaptation of loans; (iii) whether or not the borrowing language eventually

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gains a separate phonology for loanwords; and (iv) the extent to which non-native aspects of the phonology present in Universal Grammar are accessible to adults. Phonological adaptation has been discussed extensively, for example, in Uffmann (2015) and Eckmann and Iverson (2015).[1] Although researchers may disagree as to the precise way in which loans are adapted, it is implicitly assumed that the loans are nativized; that is, incorporated into the native phonological system, which then should not involve the introduction of new phonological contrasts. Our definition of contrast refers to phonological features which play a role in minimally contrasting two phonemes in any given language (cf. Dresher 2009; Compton and Dresher 2011). Under these assumptions, acoustically similar phonemes may not necessarily have identical features. Taking, for example, stop consonants in English and Bengali: if aspiration is thought to be the contrastive feature in English distinguishing the stop consonants in *pin* and *bin* (rather than voice), then [SPREAD GLOTTIS] is contrastive in both English and Bengali, the latter having a four way opposition such as /p pʰ b bʰ/ (cf. Iverson and Salmons 2008). If, on the other hand, voicing is considered to be the crucial feature distinguishing English *pin-bin*, then [SPREAD GLOTTIS] is contrastive only in Bengali and not in English. Acoustically similar vowels may also have different contrastive features; for example, /ɔ/ exists in both Bengali [gɔ̰t̪] 'musical note'[2] and German, but it is characterized by the feature [LOW] in Bengali because it patterns in the phonology with other low vowels while in German it is a mid vowel, and the feature [LOW] is not contrastive for this sound. Dutch and English both have the sounds [s ʃ], but while they are contrastive in English, in Dutch they are not. In a system which uses the features [HIGH] to distinguish these sibilants, English /ʃ/ would be contrastively [HIGH] distinguishing it from /s/ while in Dutch this feature is not contrastive since [ʃ] is entirely predictable and only occurs in the context of the palato-alveolar glide/j/.

We would like to defend the hypothesis that a brand new phoneme cannot be borrowed. However, nativization may involve complex adjustments possibly creating a new phonological opposition from existing allophonic alternations. For example, all Indo-Aryan languages which have a dental versus retroflex opposition in stops replace the English voiceless interdental fricative /θ/ with an aspirated dental stop /t̪ʰ/ and the alveolar stop /t/ with a retroflex stop /ʈ/; e. g. Bengali [t̪ʰɪŋk], [ʈaim] for English *think, time*. No new phoneme has been borrowed. To give another example, in Fon, a Niger-Congo language of Benin,

1 See also references therein. Crucial works include: Silverman (1992), Paradis and LaCharité (1997), Kenstowicz and Suchato (2006), Yip (2006), Kenstowicz (2007), Calabrese and Wetzels (2009).

2 Bengali gl̀.

French /ʁ/ is translated prevocalically as /l/ and word-initially as /ʁl/, where both /ʁ/ and /l/ are phonemes of Fon (data and analysis from Gbéto 2000 as reviewed in Kenstowicz 2003). Gbéto suggests that the dorsal feature of French /ʁ/ is translated into /ʁ/, which is an obstruent, and the sonorant component of /ʁ/ is satisfied by /l/.

Despite the literature on phonological adaptation, descriptions of language change often allude to the emergence of new phonemes as a direct consequence of borrowing. For instance, scholars working on the history of English such as McColl Millar (2015) or Algeo and Pyles (2014 [1964]) ascribe the introduction of a new phoneme /v/ in Middle English, such as in ***v**ine, **v**ery, **v**eil,* etc., to enormous numbers of French loans. Similarly, Indo-Aryan retroflex obstruents have been attributed to Dravidian loans (Emeneau 1956). Another example comes from Lahiri and Kraehenmann (2004) who show that in a High-Alemannic dialect of Switzerland geminate labial and dorsal stops in word-initial position are found only in loans and not in inherited words. Finally, the most unusual example is the introduction of Khoisan clicks into Bantu languages as reported by Herbert (1990b). Retroflex obstruents, word-initial geminate stops, and clicks are highly marked sounds. How can we reconcile these examples with our claim that loanword introduction by adult speakers does not affect the native system and that the borrowing language always accommodates lexical items within its existing phonological system?

Our focus is specifically on *nonesuch* phonemes: their emergence as well as their retention and extension. By *nonesuch* we refer to unusual phonemes which are typologically infrequent in the languages of the world. We will refrain from using the term *marked* since we are not referring to a marked vs. unmarked opposition, but rather to uncommon and less frequent phonemes. We will argue that almost all putative cases of the creation of new oppositions involving uncommon and sometimes obscure phonemes are instances where the process of accommodating loans has led to the phonemicization of existing allophonic alternations. While an increase in the number of words with an infrequent phoneme through loans is feasible if the contrast is well entrenched in the language, the rise of this new contrast has its underpinning in the native language itself. We discuss a number of case studies illustrating *nonesuch* phoneme contrasts in some detail to uphold this claim: the development of Swiss German geminates, Bengali retroflex consonants, and English initial voiced fricatives. The Bantu situation falls into an entirely different category and has an unusual explanation, as we will show in Section 5. We discuss examples of loan-induced new phonemes, demonstrating how native phonological systems adapt to the pressure of loans. Marked phonemes or marked quantity systems, which look as if they are the result of borrowing, are shown

to be only a by-product of other pre-existing phonological conditions, and we argue that the adult native speaker is very conservative and is very reluctant to change his/her phonological system.

2 Swiss German initial geminates (Thurgau dialect)

Initial geminates are relatively rare cross-linguistically, and their existence in certain dialects of Swiss German is therefore unusual.[3] The discussion here focuses on the High Alemannic dialect of Thurgau, described by Kraehenmann (2001, 2003), which has a singleton-geminate contrast in stops in all word positions. As Table 1 shows, the Thurgau dialect of Swiss German (henceforth SGT)[4] has a synchronic phonemic contrast between singleton and geminate stops in initial position, and it is particularly interesting to note that the geminate stops /pː/ and /kː/ are only found in loanwords, while the singleton stops and the geminate /tː/ are found in both loanwords and native words.

Table 1: Quantity contrasts in SGT. Data from Kraehenmann (2001) and Lahiri and Kraehenmann (2004).

Native words				Loanwords		
/p/	/poːnə/	'bean'	< OHG ***b***ōna	/piplə/	'bible'	< F ***b***ible
/t/	/tiŋ/	'thing'	< OHG ***d***ing	/tatːlə/	'date'	< OF ***d***ate
/k/	/kotː/	'god'	< OHG ***g***ot	/kalopː/	'gallop'	< F ***g***aloper
/pː/		–		/pːaːʀ/	'pair'	< F ***p***aire
/tː/	/tːaːk/	'day'	< OHG ***t***ag	/tːuʀtːə/	'layer cake'	< F ***t***ourte
/kː/		–		/kːomfi/	'jam'	< F ***c***onfiture

These data raise intriguing questions about the origins of initial geminate consonants in SGT. The geminate /tː/ occurs in inherited words (e. g. /tːaːk/) as well as in loans (e. g. /tːuʀtːə/). However, the labial and dorsal geminates /pː, kː/ were

3 For other work on (and surveys of) initial geminates, see, for example: Thurgood (1993), Muller (2001), Abramson (1987), Ridouane (2007), Kraehenmann (2011).

4 The following abbreviations are used: CD = closure duration; F = French; IE = Indo-European; MIA = Middle Indo-Aryan; OED = Oxford English Dictionary; OF = Old French; OHG = Old High German; OIA = Old Indo-Aryan; SCB = Standard Colloquial Bengali; SGT = Thurgau dialect of Swiss German; VOT = voice onset time.

not inherited from Old Alemannic (the Alemannic dialect of Old High German); rather, as Lahiri and Kraehenmann (2004) argue, they came about as a result of loanwords, from languages with a laryngeal distinction, not quantity.

That the initial opposition in SGT is really a contrast in quantity rather than voicing was investigated by Kraehenmann and Lahiri (2008). Since there is no laryngeal acoustic cue of pre-voicing in word initial position and since the closure duration for voiceless geminates is impossible to measure in utterance-initial position, the crucial test was to find an articulatory measure, namely the duration of the contact. They used electropalatography to investigate initial alveolar stops, and found that the closure duration of geminates was indeed longer than that of singletons. This was particularly true in initial position, in comparison to medial position.

To understand the development of initial geminates in SGT, we must begin by going back as far as pre-Old Alemannic, which developed its consonant system after the *Zweite Lautverschiebung*, or *Second Consonant Shift*, which separates the German dialects from the other West Germanic languages. In (1) we list the consonants which are crucial for our discussion.[5]

(1) Pre-Old Alemannic obstruents

*pf	*ts	*kx
*b	*d	*g
*-b:	*-d:	*-g:
	*θ	

We can see the effects of the Second Consonant Shift today in pairs of cognates such as English *pepper* and German *Pfeffer*, and it eliminated all laryngeal distinctions: the Pre-Old Alemannic affricates /pf, ts, kx/ developed from voiceless stops (which have been claimed to be phonetically aspirated; see Davis and Iverson 1995), leaving just one set of singleton stops in all word positions.

The synchronic system of Alemannic which developed from (1) is recorded in the work of Notker Labeo (or Notker der Deutsche), who was a scholarly monk from the monastery of St Gall in northeastern Switzerland, writing around the turn of the first millennium. His work is of particular interest to historical phonologists due to the system of spelling that he uses – in particular, the highly systematic use of the *Anlautgesetz* or 'law of initials'.[6] Although he uses letters which appear to reflect voicing (e. g. <p t k/c b d g>), in fact the voiced

5 The preceding hyphen, (e. g. /-p:/) indicates that the sound is not found in initial position.

6 Our focus in this paper is on the manuscript *Martianus Capella*.

and voiceless labials and dorsals alternate in different contexts. For the same lexical items beginning with a labial or a dorsal stop, Notker uses the letters <p > and <k/c> when the word is preceded by a word ending in an obstruent, but < b > and <g> when preceded by a word ending in a sonorant. This pattern is generally accepted to be a phonologically governed alternation of one phoneme series /p, k/, which indicates that there was no laryngeal contrast. As we see in Table 2, the word 'flower' has <p> following an obstruent, but <b> following a sonorant, while 'god' has <k> following an obstruent, and <g> following a sonorant.

Table 2: Spelling alternations in Notker's *Martianus Capella*.

Spelling	Following an obstruent	Following a sonorant
<p~b>	*mít plûomon* Nc16314 'with flowers'	*scôno blûomo* Nc15612 'beautiful flower'
<k~g>	*táz kót* Nc16318 'that god'	*dér gót* Nc03803 'the god'

However, Notker made a distinction between two kinds of initial coronal stop: the first he treated on a par with the labials and dorsals, that is, alternating <t, d> according to the *Anlautgesetz*, which suggests a single phoneme /t/. In contrast, *Anlautgesetz* is violated very often for the other <t>, which rarely alternates and occurred in obstruent as well as sonorant contexts (see Table 3).[7]

Table 3: Coronal spellings in Notker's *Martianus Capella*.

Spelling	Following an obstruent	Following a sonorant
<t~d>	síh tóh Nc00909 'herself nonetheless'	Unde dóh Nc05113 'and nonetheless'
<t>	des táges Nc07103 'of the day '	Dáz tír tág Nc11518 'that your day'

The lack of alternation leads Lahiri and Kraehenmann (2004) to conclude that invariant <t> represents a different phoneme from the alternating <t~d>, and

7 The *Martianus Capella* contains a total of 3930 occurrences of initial coronal stops, of which there are 68 distinct words. 44 of these alternate between <t> and <d>, and 24 show no pattern of alternation (Lahiri and Kraehenmann 2004: 14)

they hypothesize that the non-alternating sound is a geminate /t:/. Their conclusion is supported by internal evidence, but also by evidence from modern SGT: all words with these sounds that have survived from Notker correspond to /t/ and /t:/ respectively in the modern language, as Table 4 illustrates.

Table 4: Notker's initial stops and modern correspondences.

Notker's spelling	Modern SGT
<p> ~ <b>	/p/
<t> ~ <d>	/t/
<k>, <c>~<g>	/k/
<t>	/t:/

In addition to positing a new geminate phoneme /t:/, used in all word positions, Lahiri and Kraehenmann suggest that the alternation reflected in the *Anlautgesetz* also constituted an active process of gemination: if preceded by a sonorant sound, a word-initial singleton stop was geminated. Thus, very importantly, there was not only an initial coronal geminate phoneme /t:/ but also initial geminate allophones [p: t: k:] < /p t k/. The crucial assumption is thus that Notker did not have a laryngeal contrast, but only a quantity contrast, which was inherited in medial position, in addition to the fact that the Old Alemannic phonological inventory of that time additionally had one *initial* geminate stop: the coronal /t:/. They propose the inventory in Table 5, which is contrasted with the modern SGT inventory in Table 6.

Table 5: Notker's inventory of stops (Old Alemannic c. 1000 AD).

Word position	LABIAL	CORONAL	DORSAL
all	p	t	k
all		t:	
postvocalic	-p:		-k:

Table 6: Modern SGT inventory of stops.

Word position	LABIAL	CORONAL	DORSAL
all	p	t	k
all	p:	t:	k:

Thus, Notker expressed allophonic gemination by orthography. The underlying stops are singletons /p t k/ always written as [p t k] initially when an obstruent or a pause precedes. However, when a sonorant precedes, he writes them with a so-called voiced letter <b d g>. If the phoneme is invariant and does not alternate, it is a geminate and written always with the voiceless letter since voicing was not phonemic (see Table 7).

Table 7: Notker's inventory of stops (Old Alemannic c. 1000 AD) and spelling correspondences (word initial letters/sounds only).

Letter		Sound	Underlying form
Alternating	<p, t, k> <b, d, g>	[p, t, k] [pː, tː, kː]	/p, t, k/
Non-alternating	<t>	[tː]	/tː/

This leaves the question of how the initial coronal geminate first arose. Lahiri and Kraehenmann make a strong case for the argument that initial geminate /tː/ arose as a result of reorganization of the consonant inventory following the Second Consonant Shift. Lahiri and Kraehenmann propose that initial /tː/ is the result of "reshuffling" within the coronal obstruents. The pre-Old Alemannic /θ/ (cf. Table 1) lost its fricative status and became /t/. Since pre-Old Alemannic had only one series of stops with no laryngeal contrast, the stop series was not marked for voicing and could therefore be represented as /p, t, k, -pː, -tː, -kː/. Clearly there was potential conflict and the possibility of neutralization between /t/ < /θ/ and the "regular" stop /t/. However, the contrast was instead maintained: Old Alemannic speakers extended the medial and final quantity contrast for the coronals so that it also applied in word initial position, as in Table 8.

Table 8: Notker's system: extending a contrast, from Lahiri and Kraehenmann (2004).

Pre-Old Alemannic			Old Alemannic Stage I			Old Alemannic Stage II: After Defricativization			Old Alemannic Stage III: Extending contrast		
pf	ts	kx	pf	ts	kx	pf	ts	kx	pf	ts	kx
-bː	-dː	-gː	-pː	-tː	-kː	-pː	-tː	-kː	-pː	-tː	-kː
b	d	g	p	t	k	p	t	k	p	tː	k
	θ			θ			t			t	

Lahiri and Kraehenmann (2004) consider these facts as favorable and, at the same time, necessary conditions for the accommodation of initial labial and dorsal geminates in the generations of Alemannic speakers to come. However, these facts alone do not give an account of the mechanisms behind loanword incorporation that gives rise to new phonemes, in this case /p:/ and /k:/.

Many recent accounts of loanword adaptation have focused on how donor language sounds that are non-existent in the borrowing language are translated into sounds that do exist in the phonological system of the borrowing language. But what if the translation yields sounds which are not phonemic? In Old Alemannic, the geminates [p:] and [k:] were positional variants of the singletons /p/ and /k/. How, then, was it possible for the Old Alemannic speakers to adapt a *laryngeal* contrast in loanwords such that today there is a *quantity* contrast? The schema in (2) illustrates the adaptation pattern that is illustrated with the examples in Table 1 above.

(2) Adaptation of word-initial stops in SGT

Donor Language	**Modern SGT**
laryngeal voiceless/aspirated stop ➜	geminate stop
laryngeal pre-voiced/unaspirated stop ➜	singleton stop

It has been assumed (e. g. Silverman 1992) that loanwords are perceived as phonetic strings without any phonological structure and this acoustic input is mapped as closely as possible to native representations. However, this would lead us to expect different adaptation patterns, since languages with a laryngeal contrast may have different acoustic manifestations of the "voiced" consonant. For instance, in languages like French and Dutch the "voiced" counterpart exhibits prevoicing (lead VOT, short release; see Lisker and Abramson (1964) for the classic account), while in languages such as English or German it does not (no pre-voicing, long VOT with aspiration). Ultimately, as we will see, this distinction is not relevant for loanwords in SGT – both types of voiced stop are treated exactly the same. It is clear from the systematic pattern in the modern language that a distinction between the two types of stops is maintained. Regardless of how the laryngeal contrast was manifested, the Alemannic speakers adapted to their own established contrast, namely that of quantity. If we look at the adaptation process in terms of contrasts within the two systems (as opposed to attempts to map individual sounds) then the explanation is obvious.

The most important phonetic cue that distinguishes a singleton from a geminate is the duration of the closure (Lahiri and Hankamer 1988; Ridouane 2007; Kraehenmann 2011). Singletons consistently have a shorter closure dura-

tion (CD) than geminates, while VOT is rarely relevant. A similar pattern can be found in stops where the phonological contrast is laryngeal, namely, the CD of "voiced" stops is generally shorter than the CD of "voiceless" stops. This fact has been established in a number of languages (e. g. Kohler 1977; Ladefoged and Maddieson 1996; Braunschweiler 1997; Kent and Read 2002; Mikuteit and Reetz 2007). Of course, the CD difference within a laryngeal contrast is less obvious than within a quantity contrast (cf. Mikuteit and Reetz (2007) on the geminate vs. laryngeal contrast in East Bengali), but it is still discernable, particularly if it is the main cue a listener is paying attention to.

Notker's writings give us some clues as to how an Old Alemannic listener/speaker must have incorporated loans with initial stops. The established quantity contrast in the coronals served as the crucial model for the "foreign" contrast to be maintained. As illustrated in Table 9, a coronal geminate /t:/ has invariant spelling <t>, reflecting the invariant surface representation [t:] after both an obstruent-final and a sonorant-final word, while a coronal single /t/ has variable spelling <t>~d>, reflecting variant surface representations [t]~[t:]. Thus, the underlying contrast within the coronals surfaces only in the obstruent context; after sonorants both geminates and singletons have long closure durations, and are indistinguishable.

Table 9: The existing word-initial quantity contrast /t:/ vs. /t/ in Old Alemannic.

Context in writing	Example	Surface value	Underlying contrast
obstruent # <t>	*manig tag* 'many days' (Nc06122)	[t:]	invariant long CD ➔ /t:/
sonorant # <t>	*dér tág* 'the day' (Nc10421)	[t:]	
obstruent # <t>	*íst tánne* 'is then' (Nc04712)	[t]	variant short/long CD ➔ /t/
sonorant # <d>	*sie dánne* 'she then' (Nc16902)	[t:]	

If this is extended to loanwords with initial /t/ and /d/, we expect that the longer CD of the voiceless /t/ was interpreted as an Old Alemannic geminate /t:/, while /d/ should have been treated as a singleton /t/. This means that we also expect that Notker would have written borrowed /t/ with invariant <t> spelling, which is exactly what we find. Example (3) shows that the Latin /t/ is treated in these loans as an underlying geminate /t:/, since the spelling does not alternate: Notker uses <t> following both sonorants and obstruents.

(3) Loanwords in Notker's writings: /t/ ➔ /t:/
   a. *Fóne dero témparâtum*
      'from the mixture'
      (Nc03001)
   b. *éin únuuartesalig sálb témperota*
      'a mixture of ointment to make immortal'
      (Nc09922)

All borrowed /t/-initial words have an underlying geminate /t:/ in SGT, while all borrowed /d/-initial words have a singleton. It would be fascinating to see how Notker adapts loanwords with original initial /d/, but unfortunately, there are very few loanwords to be found in the corpus. Rather than borrowing a word, Notker, who was of course entirely literate in Latin, preferred to code-switch, and included a whole phrase or sentence in Latin. A direct comparison is therefore impossible. However, we can speculate to some extent how later generations of Old Alemannic speakers could have adapted loanwords with voiced stops, since we know that in the modern language, these have become singleton stops.

Since there is no evidence that Notker extended the geminate-singleton contrast to the labial and dorsal stops, this conversion of the allophonic alternation into a phonemic contrast must have come later, as a result of loanwords, particularly from Romance, that entered Old Alemannic over the following centuries. We believe that it is in this period that the voiceless stops /p/ and /k/ began to be borrowed as /p:/ and /k:/ respectively, on the model of loanword /t/ being borrowed as /t:/. This resulted in an unpredictable opposition: some words alternated between a singleton and a geminate, while some did not. This unpredictability in turn led to reanalysis by following generations of speakers. They reanalyzed the system with a new phonemic contrast – without knowing, of course, that it was "new". In the process, the allophonic existing process applicable to native phonemes, gemination, was lost.

That this must have been the diachronic scenario is clear from the loans involving Latin /t/. All borrowed /t/-initial words have an underlying geminate in modern SGT, while all borrowed /d/-words have a singleton. For the coronals, there was no voicing contrast in the language but the existing opposition was that of quantity. We know that adult speakers are able to discriminate foreign laryngeal contrasts, but that does not necessarily mean that they can borrow them without adaptation. For the language learner in the generations following Notker the choice is obvious: the stops that seem geminate all the time are treated as underlying geminates, and the others as singletons. The principal

change is the loss of the allophonic alternation, gemination following sonorants, for the labial and dorsal consonants. Thus, an originally allophonic alternation is transformed into a phonemic contrast.

Looking at how this story might fit into discussions of loan phonology, we are led to the conclusion, like Paradis and LaCharité (2011), that these loanwords were adapted by speakers with some sort of access to the structures of the donor language, since a phonological opposition in dorsal and labial stops in initial position was recognized by adult speakers. The opposition did not fit into the native system, but was translated by *not* applying an allophonic phrasal phonological rule. That is, the allophonic alternation was translated into a phonemic contrast. The contrast that emerged on reanalysis following the loans was perhaps neither simple nor obvious in terms of production or perception. Nevertheless, once the quantity contrast was established for one stop, it could be extended to the other places of articulation. The alternative would have been to introduce a brand new contrast in voicing, which was not preferred (see Table 10).

Table 10: Extending contrasts in word initial position.

Notker's system			**Reconstructed Medieval Alemannic system**			***not***		
p	t	k	p	t	k	p	t	k
	t:		p:	t:	k:		t:	
						b	d	g

Thus, loans added no new contrast but extended the existing quantity contrast to both labials and dorsals. Furthermore, it is not necessary to assume a special loan phonology.

3 Bengali retroflex consonants

Retroflex consonants constitute another set of *nonesuch* sounds, particularly in word initial position, like the initial geminates in Alemannic dialect of SGT. They are found in sixty languages (of a total of 451) in the UPSID database; for comparison, bilabial consonants are found in 449 languages. However, retroflex consonants are completely normal in Standard Colloquial Bengali, (as spoken in Calcutta), and form a significant part of the phonemic inventory of the language, as in (4).

(4) Standard Colloquial Bengali: consonant inventory (obstruent plosives)

p	p^h	b	b^h	m
t̪	$t̪^h$	d̪	$d̪^h$	n̪
ʈ	$ʈ^h$	ɖ	$ɖ^h$	
k	k^h	g	g^h	ŋ
tʃ	$tʃ^h$	dʒ	$dʒ^h$	

(Chatterji 1975 [1926])

Retroflex consonants can appear in all positions in Bengali, including initial position, and all laryngeal contrasts, such as voicing and aspiration, are maintained with retroflexes. Retroflexes also appear in grammatical morphemes like the specifier /ʈɑ/ 'this', and one type of phrasal reduplication also uses an initial retroflex /ʈ/ replacing the initial consonant of the target word.

(5) Bengali retroflexes

a. Word initially
[ʈɑk] 'bald'; [ʈ^{h}õʈ] 'lip'; [ɖɑl] 'lentils'; [ɖ^{h}ɑk] 'drum'

b. Specifier /ʈɑ/
[boi-ʈɑ] book-SPEC 'this book'

c. Reduplication
[boi] 'book' [boi-ʈoi] 'book-and-such'
[mɑdur] 'mat' [mɑdur-ʈɑdur] 'mat-and-such'
[ʃɑri] 'sari' [ʃɑri-ʈɑri] 'sari-and-such'

Our focus is on initial retroflexes, the origin of which is to some extent obscure. As Chatterji in his seminal work on Bengali states, a large number of retroflex sounds are "*dēśī* in origin" (Chatterji 1975 [1926]: 489); that is, these sounds existed in the speech of the native community before they became Indo-Aryan speakers, which might have been Dravidian, Kōl or Munda (Hock 1975; Thomason and Kaufman 1988).[8] Other sources of initial retroflexes include (i) dental /t/ becoming retroflex following /r, l/ and glides in Old Indo-Aryan, (ii) "spontaneous cerebralisation" (Chatterji 1975 [1926]: 490), (iii) metathesis, where medial retroflex consonants had an influence on replacing initial ones and (iv) assimilation. Examples of each are given below.[9]

8 It is noteworthy that *modern* Dravidian languages do not have initial retroflex consonants.

9 In the examples that follow, forms from modern languages are given in the IPA (e. g. Bengali [ʈɔk]), while earlier forms are given according to the notation in the source (e. g. MIA *buḍḍai*).

(6) Sources of initial retroflex consonants
   a. In the context of /r, l/
      Bengali [ʈɔk] 'sour'; cf. MIA *takra*;
      Bengali [ʈaʈ] 'plate or metal'; cf. MIA *trātra* 'plate'
      (Chatterji 1975 [1926]: 490)
   b. Spontaneous cerebralization
      Bengali [ʈɑn] 'pull, make tight'; cf. OIA *tānayati* 'to pull'[10]
      (Chatterji 1975 [1926]: 490).
   c. Metathesis
      Bengali [ɖubɑ] 'sink, drown'; cf. OIA **buḍyati* > MIA *buḍḍai*
      (Turner 1966: 313, Sec. 5561)
   d. Assimilation
      Bengali [ɖanɖa] 'large stick'; cf. MIA *daṇḍa* 'stick'
      (Schwarzschild 1973: 484)

A glance at Turner's (1966) etymological dictionary clearly supports the obscure origins of the retroflexes. Only a handful of Bengali words with initial retroflex phonemes have established OIA etymologies; the vast majority do not. For the latter, the head words (usually intended to be the oldest form of Indo Aryan), are almost always hypothetical forms, and frequently the oldest attested form is Prakrit, or Middle Indo Aryan (MIA). Turner generally comments that the source is unknown, or the etymology is uncertain, and as examples in (7) show, the proposed roots are not attested, and the relationship with OIA is difficult to ascertain. We provide some examples of initial retroflexes.

(7) Obscure origin of initial retroflex consonants in Turner (1966)[11]
   a. Bengali [ʈikɑ] 'vaccination': etymology unknown; cf. OIA *ṭikkikā* 'white mark on forehead of a horse'; cf. Prakrit *ṭikka* 'caste mark', *ṭikkida-* 'marked with one' (from Varāhamihira's *Bṛhatsaṁhitā*)
      (Turner 1966: 303, Sec. 5458)
   b. Bengali [ʈʰɑkur] 'deity'; cf. OIA *ṭhakkura* 'idol, deity'
      "Probable origin a tribal name... which Wüst considers non-Aryan borrowing of śākvará: very doubtful."
      (Turner 1966: 306, Sec. 5488)
   c. Bengali [ʈɑk] 'bald'; cf. OIA **ṭakka-* 'bald'
      (Turner 1966: 300, Sec. 5422)

10 Turner (1966: 301) notes that "the relationship [between these two forms] is obscure".
11 In examples from Turner (1966) dictionary entry numbers given (e. g. Sec. 5466).

d. Bengali [ɖãʈɑ] ‘stem, stalk’; cf. OIA **ḍaṇṭha* ‘stem’
“The group, if it includes danoa and δενοδ(ε)ον is probably non-Indo-European in origin... and the Indo-Aryan forms have been influenced by Dravidian and Mundari words and speech habits”
(Turner 1966: 310, Sec. 5527)

Other words from Turner clearly show that similar forms exist in non Indo-Aryan languages or from the Dardic family, which although Indo-Aryan, are geographically distant.

(8) Retroflex in *dēśī* words
a. Bengali [ʈuk] ‘particle denoting small quantity’, e.g., [ei ʈuku] ‘this little bit’; cf. Lahndā *ṭukkā* ‘cut in a canal’, Kumaunī *ṭūk* ‘twig, shoot’, Panjabi *ṭukk* ‘cut, piece’; Kati *ṭṛk-* ‘to tear’, Waigali *troka-ún* ‘to tear’
(Turner 1966: Sec. 5466)
b. Bengali [ɖabor] ‘small vessel’; cf. Lahndā *ḍabbar* ‘clayey hollow’, Assamese *ḍabar* ‘spitoon’, Ashkun *dabar* ‘clay’
(Turner 1966: Sec. 5530)
c. Bengali [ʈʰoka] ‘to knock’; cf. Kumaunī *ṭhokṇo* ‘wield’, Nepali *ṭhoknu* ‘to knock’, Ashkun *ṭoká* ‘nail, peg’
(Turner 1966: Sec. 5513)
d. Bengali [ɖʰal] ‘shield’; cf. Bashkarik *ḍāl*, Shina *ḍal*, Panjabi *ḍhāl* ‘shield’
(Turner 1966: Sec. 5583)

All the above words in Bengali are common and frequently used. As we have seen, their existence in OIA is often doubtful and as the last three examples indicate, any etymology is insecure. Furthermore, we find no IE cognates of any of the OIA sources in Monier-Williams (1979). In fact it is clear that OIA has very few words with initial retroflexes; for instance, Monier-Williams has fewer than six columns of entries for all of the retroflex oral stops /ʈ, ʈʰ, ɖ, ɖʰ/ put together, while in contrast for the stop /p/ alone there are 80 pages, each with three columns.

It might seem that the whole series of retroflexes, /ʈ, ʈʰ, ɖ, ɖʰ, ɳ, ʂ/[12] was simply borrowed wholesale into Indo-Aryan from Dravidian and other nearby languages such as Munda and Kōl. However an allophonic alternation already existed in Indo-Aryan, and loanwords enabled its extension to a real

12 Retroflex /ʂ/ is now alveolar-palatal /ʃ/ in Standard Colloquial Bengali; /ɳ/ has been lost.

phonological contrast (Hock 1975). Pre-Old-Indo-Aryan did not have retroflex phonemes, but it did have allophonic retroflexion processes. The most familiar assimilation rule has become known as the "*ruki* rule": a synchronic process whereby dental /s/ in pre-OIA becomes retroflex /ʂ/ when preceded by the vowels /i/ or /u/, or by /k/ or /r/, unless the /s/ is final, or is followed by /r/ (Whitney 1879; Kiparsky 1973; Hock 1975). This could have occurred stepwise, so that /s/ became /ʃ/ in Indo-Iranian and the retroflexion was an OIA phenomenon (Hock 1975; Chatterji 1975 [1926]). The clearest cases are sandhi rules across separate prefixes, as in Table 11, and in compounds such as /jud^{h}iʂṭ^{h}ir/ (<juḍ^{h}i + ʂṭ^{h}ir) 'one who stays calm in battle'.

Table 11: Sanskrit retroflexion – prefixes ending in /-i/ or /-u/ + roots beginning /s-/.[a]

Prefix	Root	Retroflexion	Gloss
abhi-	su-	abhiṣuṇoti	'to press out, extract'
adhi-	sthā-	adhitiṣṭhati	'to stand upon'
pari-	sev-	pariṣevate	'pursue, honor'
su-	sama-	suṣama	'very beautiful, splendid'
anu-	sthā-	anuṣṭha	'to bring about, accomplish'

[a]Glosses from MacDonell (1929) and Apte (1965).

In a word like /jud^{h}iʂṭ^{h}ir/ the retroflexion from /ʂ/ spreads to the dental stop /t^{h}/, which then becomes /ʈ^{h}/. These rules establish retroflex stops and fricatives derived from dentals in Indo-Aryan, although initially the opposition was probably not contrastive. Loanwords from sub-stratum languages then introduced retroflexes in unpredictable environments, such as following the vowel [ɑ], as well as unpredictable use of [s] where [ʂ] would normally be expected. This is the crucial moment in the development of Indo-Aryan retroflexes: their appearance is no longer predictable by phonological rules and this variability led to a new contrast being established. Successive generations consequently acquire retroflexes as phonemes in their own right, contrasting with dentals. Again, an allophonic alternation has been transformed into a phonological opposition.

4 English voiced initial fricatives

Voiceless fricatives such as /f, θ, s/ were inherited in Old English, and it is generally agreed that originally there was no true voicing (phonemic) contrast.

Voice variants could exist word initially or medially, but crucially, there was no voicing phonemic contrast in fricatives in any one dialect in early English.

The Modern English voiced labiodental fricative /v/ is the classic example of a phonological development that is said to be due to the influence of loanwords, and it has been widely discussed in the literature (e. g. Algeo and Pyles 2014 [1964]; McColl Millar 2015). The alveolar /z/ has received somewhat less attention, although its development followed a similar pattern. Although these facts are well accepted, Minkova's (2011) conclusions regarding the phonemicization of /v/ in word initial position are worth reiterating and we briefly revisit the role of loanwords in the emergence of phonemic voiced fricatives in initial position. In dialects with initial-[f] words, [v] originally existed only as an allophone of /f/ in intervocalic position and voiced fricatives in initial position are said to be due to the influx of French loans into English, particularly from 1200 to 1400 (e. g. Thomason and Kaufman 1988: 308).

Laker (2009) argues that the voicing contrast became phonemic much earlier in the history of English than might be supposed, and claims that this was due to substrate influence from Celtic: speakers of Celtic languages shifted to English, but in so doing introduced a phonemic voicing contrast in fricatives. However, Minkova (2011) investigates the early phonemicization of a voicing contrast in fricatives, and finds that the evidence for such a change in the Old English period is insufficient; ultimately she finds Laker's suggestion that the Celtic substrate is responsible to be unconvincing. Rather, she concludes that the emergence of phonemic voiced fricatives occurred in Middle English. Of course, the vast majority of /v/-initial words in modern English are loanwords from French or Latin: a search of the CELEX database (Baayen et al. 1995) gives 281 distinct non-derived lexemes beginning with /v/, of which only three, *vane*, *vat* and *vixen*, are not loans. Since Old English had no voicing contrast in fricatives in word initial position, one might expect that speakers would borrow initial [v] as /f/, the phoneme of which [v] is an allophone. As mentioned earlier, speakers often adapt loanwords into their own language by changing foreign phonemes into acoustically-similar native ones (Kenstowicz and Suchato 2006) and this is exactly what is thought to have occurred with very early loans into English from French and Latin: for example, the word *fann* an 'instrument for winnowing grain' is a borrowing of Latin *vannus*, and first appears in around 800 AD (Oxford English Dictionary 2015a).[13]

13 *Fann* is related to the French *van* 'winnowing basket', and, until the Middle English period, was generally found with initial /f/. *Van* does exist in modern English with this meaning, but it is a dialectal variant.

The situation in modern English, where initial /v/ is a phoneme, appears to be a contradiction to the hypothesis we have been setting out here: it seems that the phoneme has been borrowed. However, there are two other factors which directly contributed to the development of initial voicing. First, inherited English words with a voiceless initial fricative were often pronounced with a voiced fricative in Southern dialects (Algeo and Pyles 2014 [1964]: 126), and this would have influenced neighboring dialects. Secondly, there was almost certainly free variation in English words with initial [f]~[v] in most dialects from quite an early stage. That Southern dialects of Middle English pronounced [f] as [v] can be observed from the development of words like *vixen*, *vat* and *vane*, all of which are southern variants of earlier /f/-initial words. Thomason and Kaufman write that the voicing of initial fricatives was one of several developments in some dialects of Old English (East Saxon, Kentish, West Saxon, West Mercian, possibly others) that seem originally to have come from the continent, probably before 950 AD (Thomason and Kaufman 1988). As Lass (1992) writes, the existence of these varieties which had undergone voicing of initial fricatives may have helped to enable the borrowing of initial /v/ (and /z/), since these dialects influenced varieties spoken further north, and dialect mixing may also have taken place (Hock 1991). Examples of the gradual shift from original initial /f/ to initial /v/ are given for *vixen* in (9).

(9) Modern English *vixen* < Old English *fyxen*
(Oxford English Dictionary 2015e)
a. *þe* ***fixene*** *of þe foxe* (c1425)
'the vixen of the fox'
b. ***Vixen*** *or* ***Fixen****, a Fox's Cub* (1706)
c. ***Vixen*** *… a she fox, who, when she has cubs, is remarkably fierce*. (1796)

Variation in the use of initial [f]~[v] was therefore widespread, and in some cases the [f] variant continued to be used until well after the Middle English period, as Example (9b) indicates. The same sort of variation can also be observed for French loans; we know this because there is a small number of /f/-initial loans which now have an initial /v/ in Modern English, including *vial* (<Middle French *fiole*, Latin *phiala*) and *vent*; see (10). Other /v/-initial French loanwords, such as *voice* (<Anglo-Norman *vois*) and *vetch* – see (11) – are attested with an initial <f> or <ph> in the Middle English period, even though today they have a voiced initial fricative.

(10) Modern English *vent* < French *fente* < *fendre* 'to split'
(Oxford English Dictionary 2015b, 2015c)
a. *The stroke vndre the* ***fent****, Queyntly al a-side it went*. (c1430)
b. *She hadde … drawen out hire con brest bi þe* ***vente*** *of hire cote*. (c1430)

(11) Modern English *vetch* < Old Northern French *veche, vecche, veiche, vesche*
(Oxford English Dictionary 2015d)
a. *This seid is by hem that be not worth two* ***fecchis***. (c1374)
b. *Among codware, … tilles &* ***vacches*** *beþ smalleste in quanitite*. (1398)

It is clear that variation in articulation already existed both in English native words, such as *vixen*, and in words borrowed from French – both /v/- and /f/-initial loans.[14] Thus, the loans themselves did not bring about a contrast, but rather fit in perfectly with the variation that already existed, and ultimately strengthened the appearance of /v/ in initial position.

While the development of English initial /v/ is well-documented, much less has been said about initial /z/. There are far fewer English words beginning with /z/ than with /v/: a similar CELEX search to that detailed for /v/ gives only 29 words beginning with /z/, of which four are written with initial <x>. In contrast to /v/-initial words, the /z/-initial words come from a wide range of languages – some from Latin and French, but also Greek, Hindi, German and Arabic, to name but a few. None of them are native English words. Additionally, there are only four borrowings that are first attested before the year 1500, namely *zeal* (1382), *zenith* (1387), *zodiac* (1389) and *zephyr* (Old English period), and so the pattern of borrowing is completely different from that of /v/.

That the development of /z/ should be so different is not really surprising. Although Greek had the grapheme <Z, ζ> corresponding to the Latin alphabet's <z>, Greek borrowings into Latin were commonly represented with <s> word-initially and <ss> word-finally, since Latin had only the voiceless /s/, which did not have a voiced allophone. The grapheme <z> was used in later borrowings, and might have led to a learned pronunciation [z] among educated speakers (Allen 1965). As a result, Greek loanwords that came into English via French and Latin in the Middle English period were generally not spelt with <z>. *Zeal*, *zephyr* and *zodiac* have always been spelt with <z> as far as we can tell; however, *zenith* has a

14 Sometimes later loans influenced earlier borrowings, one such example being *verse*: this is first attested as *fers* in 900 AD, and was borrowed into Germanic from Latin *versus*. The same form is found in other Germanic varieties, such as Old Frisian *fers*, Middle Dutch *vers*, and Old Norse *vers*. It was later influenced by the Anglo-Norman and Old French *vers*, from the same source, and ultimately gained a voiced fricative.

more interesting history, being derived from Old French *cenith* or *cenit*. Both English and French have transformed the initial sound to /z/. With so few words coming from so many sources, the phonemicization of initial /z/ is much more opaque: while [z] existed as an allophone of /s/ word-medially, it is still the case that initially it is only found in (relatively few) loanwords, and thus retains a somewhat "foreign" character. As Minkova (2011: 41) points out,<z>-initial personal names are "lexically odd" and /z/-initial words continue to be less frequent than words beginning with /v/.

As for the English voiceless dental fricatives /θ, ð/, they are crosslinguistically uncommon, (only 32 languages in the UPSID database (Maddieson and Precoda 1990) contain one or both of these sounds), and are missing from most of the modern Germanic languages due to subsequent sound changes, with the result that only English and Icelandic now have dental fricatives. In the Old English period, the two dental fricatives were in an allophonic relationship, with the voiced /ð/ found only intervocalically. This changed in Middle English (around the fourteenth century – see Lass 1992), when a group of function words, such as *thou*, *then*, *that*, *the*, began to be pronounced with the voiced fricative. It has been suggested that this development is connected to the borrowing of the third person plural pronouns *they, them* and *their* from Scandinavian, which gradually replaced the native Old English *hie*, *hiera*, *him* (Burrow and Turville-Petre 2005), or from the initial voicing of fricatives of the first Germanic settlers (Bennett 1955).

5 Clicks in Bantu languages

The strongest counter-example to the hypotheses explored above is the historical incorporation of clicks into the phonologies of Southern Bantu languages from the Khoisan languages. Herbert (1990b) provides an excellent review of the facts and summarizes the views regarding the reasons for this unusual level of borrowing. It has long been accepted that clicks in the Bantu languages are not reflexes of elements inherited from Proto-Bantu, but were borrowed after centuries of contact. For instance, Zulu and Xhosa have a three-way place contrast in clicks: dental /|/, palatal /!/ and lateral /||/ and about 15% of the words in their lexicon exhibit clicks (Herbert 1990b). Moreover, Lanham (1963) claims that 21 to 25 of the 55 consonants in Xhosa are not inherited and are exclusively confined to the borrowed vocabulary. The question arises as to why this overwhelming, pervasive phonological influence of one language group on another took place. There is no doubt that there have been several centuries of Bantu-Khoisan intermarriage and

trade. The relationship was not a hostile one, and the societies were culturally compatible. A familiar claim is that of bilingualism which led to the clicks being borrowed. A contributing factor is the distinctive acoustic quality of the clicks and the fact that the Bantu languages do not have any sounds that could match with these sounds. However, as Herbert points out, what is extraordinary is that not much else was borrowed. Why just the clicks? We summarize below Herbert's explanation of the peculiar nature of the phonological influence.

Herbert argues that *hlonipha* customs in Bantu society were responsible for the unusual restricted loans. *Hlonipha* customs are social avoidance strategies employed especially by married and engaged women; they may also be used by men, but generally to a lesser extent. The linguistic nature of *hlonipha* is a form of taboo by which speakers avoid pronouncing the names of their senior relatives, and is particularly applied to women avoiding the names of their male in-laws. This comprises not only their names but all the syllables in that name, whenever they appear.[15] Since a single woman has to avoid speaking many names, and therefore many syllables, the effect *hlonipha* has on her speech is substantial. One means of avoidance is to change the segments, for example /pa/ to /ka/; however, this creates the potential for confusion with other real words.[16] Herbert argues that the clicks from Khoisan, being so different from the native sounds, provided an excellent substitution for the consonants that had to be altered in order to avoid taboo syllables, since they excluded the possibility of the made-up word being homophonous with an existing lexical item. The clicks were available to these women as a result of loanwords as well as intermarriage – the women might themselves be native speakers of Khoisan languages. At some point, the altered forms began to replace the originals, as children acquired the novel forms with clicks. This account explains not only the presence of the clicks and no other strong linguistic influence, but also why the clicks replaced a seemingly random set of Bantu consonants. Herbert also mentions that there is a striking correspondence between the number of click types a Bantu language has and the extent to which *hlonipha* exists in that language. Thus, in Zulu and Xhosa *hlonipha* is most pervasive and these languages have the largest number of clicks; in contrast, *hlonipha* is not used as much in Swazi, and it has only one click.

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15 Herbert (1990a: 459) gives the example of Nguni women who avoid the syllables *si* and *swa* because their father-in-law is named *Siswani*: instead of *iswayi* 'salt' they say *itsiwa*.

16 Interestingly, Raum writes that in Zulu, substitution may favor certain sounds: 'women commonly prefer the *h* sound and the frontal click; men choose the lateral click' (Raum 1973: 79). Thus for those who must avoid it, *umbango* 'rivalry' is generally rendered *umhango* by women, but *umxango* by men.

The history of clicks in Southern Bantu exemplifies a highly unusual linguistic development in the light of a specialized sociolinguistic situation. Without the restrictive taboo of *hlonipha*, it is unlikely that such a specific feature as a set of consonants could have been borrowed on its own, with little other linguistic transfer. This is therefore in contrast to the other cases discussed in this paper, where limited contact led to loanwords and the extension of features *already present* in the language.

6 Conclusion

We have explored the way in which the phonological structure of a borrowing language overwhelmingly guides the way in which loanwords are absorbed, focusing on unusual or "nonesuch" phonemes. Within the four cases we examined across a variety of languages, in all but one instance the loanwords have extended an allophonic variation into a phonemic contrast, rather than adding a completely new phoneme. That is, either a contextual singleton-geminate alternation or a phonological feature involved in an allophonic alternation became contrastive. This is true even when the phonemic opposition is an unusual one: Swiss German (Thurgao) has extended allophonic initial geminates into phonemic ones by absorbing loans from languages with voicing contrast. They did so rather than introducing a new phonological feature VOICE.

Similar patterns of adaptation of another nonesuch phoneme /ʒ/ are found in English words such as *regime* or *beige*. The voiceless counterpart /ʃ/ already existed and medial voicing of fricatives was not unusual; when followed by suffixes like *-ion*, *-ual*, the strident alveolar fricatives led to a more palatoalveolar pronunciation such as *occasion, revision* (cf. *revise*). In early Middle English loans like *measure,* the modern pronunciation of [ʒ] does not come from French, but rather almost certainly from the glide in <-ure>. However, words ending in <-ual> are not in fact, always pronounced with a [ʒ]: *visual* can be pronounced with a [z]. The only real word-initial /ʒ/ used with any frequency is in *genre*. Despite the acceptance of this consonant, words which are now nativized can revert back to [dʒ], as is the case for *garage* in many dialects of English.

Once a marked "nonesuch" phoneme has developed via regular language change, it can be extended when loanwords are adapted to that contrast. An example is /θ/ which must have been part of all the Germanic languages but only survived in English, which in turn adapted Greek loans with this phoneme: English *orthography* [θ], but German *Orthographie* [t]. Equally Bengali /ʈ/ has been extended to English loans such as [ʈaim] *time*. The actual borrowing of

completely new phonemes is therefore very rare, and only occurs in very unusual contexts, which is what we have observed with the emergence of clicks in Bantu. Here, the particular socio-historical context provided the exceptional circumstances needed for phonemes to be borrowed, where this would normally be impossible.

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