The Role of Phonetics in Loanword Adaptation: a Case Study from Chinese Loanwords in Bai

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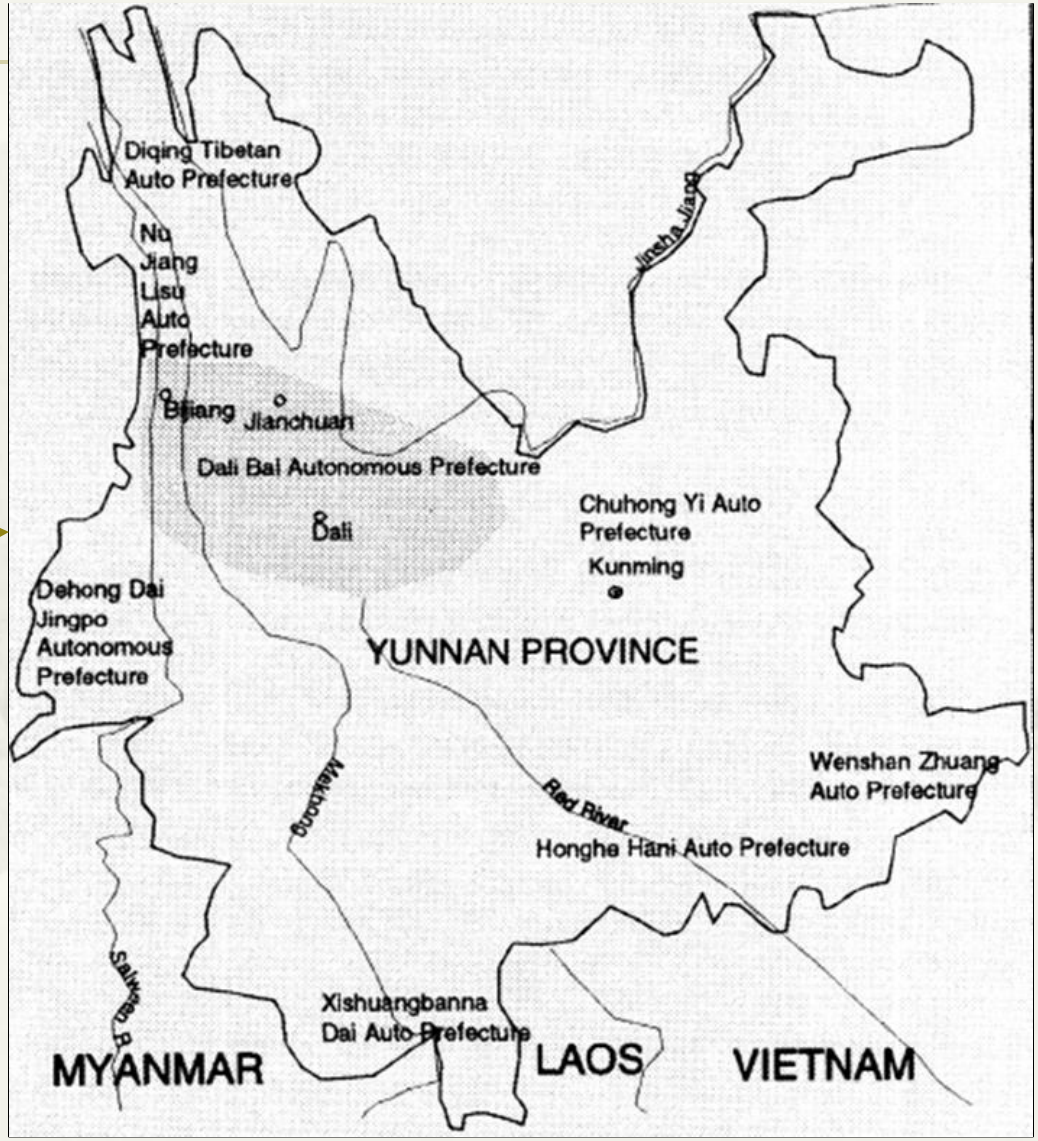
The Recipient Language

- Bai (a.k.a. *Baip*)
- Spoken in Dali Bai Autonomous Prefecture, Yunnan Province, China
- Linguistic classification: Sino-Tibetan----------→ Tibeto-Berman? Sinitic? or an independent branch?
- Three major dialects: Central, Northern, Southern→ Mutually Unintelligible
- No standard variety, but the Central dialect from Jianchuan County is known as the representative variety

Locate the language of Bai



Models account for loanword phonology

- Loanword adaptation is overwhelmingly phonological, in which the first stage of adaptation was carried out by competent bilingual speakers, whose attention have been paid to majorly the phonology of L2 (donor language), instead of that of L1 (recipient language) (LaCharite and Paradis 2005).
- The phonetic output of the donor language is taken into the borrower's perception, and this acoustic input, which carries the surface representations of the donor language, into the recipient language is faced with a conflicting set of faithfulness and markedness constraints, as well as other factors such influences from the orthography (Peperkamp et al. 2008; Yip 2006).

Phonology of Standard Mandarin

- Mandarin Consonants

	Bilabial	Labio-Dental	Alveolar	Retroflex	Palatal	Velar
Plosive	p p^h		t t^h			k k^h
Fricative		f	s	ʂ ʐ	ɕ	x
Affricate			ts ts^h	ʈʂ $ʈʂ^h$	tɕ $tɕ^h$	
Nasal	m	n				ŋ
Glide	(w)				(j)	
Lateral			l			

Phonology of Standard Mandarin

- Mandarin vowels (Cheng 1973, Duanmu 2007)

i y	(ɨ)	u
(e)	(ə)	(o) ɤ
(ɛ)		
(a)	(A)	ɑ

Diphthongs: [ai] [ɑu] [ei] [ou] and they never appear with nasal coda

Pre-nucleus glides [i] [u] [y] are not considered as part of a diphthong, and thus complex vowels like [iɛ] [ia] exist but are not perceived as diphthongs in Mandarin (and they do appear with nasals)

Phonology of Jianchuan Bai

- Jianchuan Bai consonants

	Bilabial	Labio-Dental	Alveolar	Palatal	Velar
Plosive	p p^h		t t^h		k k^h
Fricative		f v	s	ɕ	x ɣ
Affricate			ts ts^h	tɕ $tɕ^h$	
Nasal	m	n			ŋ
Glide	(w)			(j)	
Lateral			l		

Phonology of Jianchuan Bai

8 Phonemic Monophthongs (oral vowels):

(There is one additional syllable nucleus, which is a syllabic /v/)

i y		u ɯ
e		o
ɛ		
	a	

8 “diphthongs”: [iɛ] [iɑ] [io] [iɯ] [ue] [uɛ] [uɑ] [ou]

All oral vowels except for [u] have corresponding nasal reflexes
(i.e. 15 nasal vowels)
Coda is never found in native Bai words

Database description

Data largely drawn from three sources:

(a) ZHOU Jin-guo's *Vocabulary Variation in Bai-Ethnic Speech in Contemporary Speech Context* (2008)

(b) Bryan ALLEN's *Bai Dialect Survey* (2007)

(c) Original audio recordings from a native Jianchuan Bai speaker

(d) Wordlist of Science, Technology, and Politics from *Bai Yu Jian Zhi [Brief description of the Bai language].*

Adaptations on initial consonants

- Maximally faithful, except for the retroflex category
- Strategy on retroflexes: replaced with the alveolar counterparts:

✱[ʈʂ]→[ts] (e.g. [tɕʰi ɕiɑŋ ʈʂan]→[tɕʰi ɕiɑ̃ tsɛ̃] ‘weather station’)

✱[ʈʂʰ]→[tsʰ] (e.g. [ʈʂʰou tɕin]→[tsʰou tɕɯ̃] ‘muscle cramp’)

✱[ʂ]→[s] (e.g. [tɕiɛ ʂɤŋ]→[tɕiɛ sɯ̃] ‘to deliver (a baby)’)

✱[ʐ]→[s] (e.g. [kuɤŋ ʐən]→[kõ sɯ̃] ‘worker’)

Adaptation on the Non-Nasal Rimes

- Rimes with exactly the same phonetic correspondence in Chinese and Bai (i.e. [ɑu] [uɑ] [iɛ] [ou] [o] [i] [ɨ] [u]) are kept 100% faithful to the surface representations.
- However, if we categorize them by the phonemes in the donor language, we find these allophones interesting in particular:

✱/ɑ/: [A]→[ɑ] (e.g. [fA ɕiɛn]→[fɑ ɕĩ] ‘convenient’)

[ɑ]→[ɑ] (e.g. [kuɑ niɛn]→[kuɑ nĩ] ‘to miss and concern’)

[a]→[ɛ] (e.g. [tsai xuɑŋ]→[tsɛ xuɑ̃] ‘natural disaster’)

✱/ɤ/: [ɤ]→[ɯ] (e.g. [kʰɤ po]→[kʰɯ po] ‘acerbic’)

[e]→[e] (e.g. [ʂuei]→[sue] ‘water’)

[ɛ]→[ɛ] (e.g. [tɕiɛ]→[tɕiɛ] ‘to borrow’)

[o]→[o] (e.g. [kɑŋ kʰou]→[kɑ̃ kʰou] ‘port’)

Adaptations on the Nasal Rimes

- /ɑn/ [an]→[aⁿ]→[ɛ̃] (e.g. [tɕʰi ɕiɑŋ ʈʂan]→[tɕʰi ɕiɑ̃ tsɛ̃])
- /ɑŋ/ [ɑŋ]→[ɑⁿŋ]→[ɑ̃] (e.g. [fɑŋ piɛn]→[fɑ̃ pĩ])
- /iɑn/ [iɛn]→[iɛⁿ]→[ĩ] (e.g. [tiɛn tɤŋ]→[tĩ tʊ̃])
- /iɑŋ/ [iɑŋ]→[iɑⁿŋ]→[iɑ̃] (e.g. [liɑŋ]→[liɑ̃])
- /uɑn/ [uan]→[uaⁿ]→[uɛ̃] (e.g. [an suan]→[ɑ̃ suɛ̃])
- /uɑŋ/ [uɑŋ]→[uɑⁿŋ]→[uɑ̃] (e.g. [tsai xuɑŋ]→[tsɛ xuɑ̃])
- /yɑn/ [yan]→[yaⁿ]→[yɛ̃] (e.g. [wan tɕʰyan]→[wɛ̃ tɕʰyɛ̃])
- /ɤŋ/ [ɤŋ]→[ɤⁿŋ]→[ʊ̃] (e.g. [tiɛn tɤŋ]→[tĩ tʊ̃])
- /iɤn/ [iən]→[iəⁿ]→[ĩ] (e.g. [tɕiən tɕiən]→[tɕĩ tɕĩ])
- /iɤŋ/ [iɤŋ]→[iɤⁿŋ]→[ĩ] (e.g. [tɕʰiɤŋ tʰiɤŋ]→[tɕʰĩ tʰĩ])
- /uɤŋ/ [uɤŋ]→[uɤⁿŋ]→[õ] (e.g. [xuɤŋ]→[xõ])
- /yɤŋ/ [yɤŋ]→[yɤⁿŋ]→[ỹ] (e.g. [ɕyɤŋ]→[ɕỹ])

Identification of the nucleus head

1. [iɑŋ]→[iɑ̃] (*[ĩ], c.f. 5, 8 & 9)
2. [uɑŋ]→[uɑ̃] (*[ũ] nor [õ], c.f. 6)
3. [yan]→[yɛ̃] (*[ỹ])
4. [uan]→[uɛ̃] (*[ũ] nor [õ], c.f. 6)
5. [iɛn]→[ĩ]
6. [uɤŋ]→[õ]
7. [yɤŋ]→[ỹ]
8. [iɤŋ]→[ĩ]
9. [iən]→[ĩ]

Identification of the nucleus head

- Perceived post-nucleus glides get deleted with the nasal coda.
- [ɑ] and [a] as the nuclei for [iɑŋ] [uɑŋ] [yan] [uan], but [i] [u] [y] (which are typically pre-nucleus glides in Mandarin) for [iɛn] [uɤŋ] [yɤŋ] [iɤŋ] [iən]
- Sonority Scale: Low Vowels>Mid-Peripheral Vowels>High Peripheral Vowels>Mid Central Vowels>High Central Vowels (suggesting the deleted [ɛ] and [ɤ] are centralized to some degree and thus lost to high peripheral vowels in the nucleus head competition)

Adaptations on the identified nucleus head

After the post-nucleus glide and coda deletion, the remaining rimes take the process of nasalization while keeping all other features of the nucleus as faithful as possible. These rimes apparently take additional adaptations apart from it:

- [an]→[aɲ̶]→[ɛ̃] ([uan]→[uaɲ̶]→[uɛ̃] & [yan]→[yaɲ̶]→[yɛ̃])
- [ɤŋ]→[ɤŋ̶]→[ɯ̃]
- [uɤŋ]→[uɤŋ̶]→[õ]

suggesting Ident(round) is a higher ranked constraint than Ident(high): no vowel has changed the roundedness as an adaptation strategy when it is available (i.e. [ɤ]→[ɯ], but never [o] in any context, and [u]→[o], but never [ɯ]).

Adaptation on non-nasal rhymes: start with the simplest one

/mei/ ‘coal’	NO-Diphthong	IDENT-NUCLEUS	Max
mei	*!		
me			*
mi		*!	

Adaptation on non-nasal rhymes: adaptation on features involved

/ai/ ‘love’	No-Diphthong	IDENT-NUCLEUS	MAX	IDENT-front	IDENT-low
ɑi	*!			*	
ɛi	*!				*
ɑ			*	*!	
i		*!	*		
ɛ			*		*

/a_1i_2/ ‘love’	NO-DIPHTHONG	IDENT-NUCLEUS	LIN	MAX	IDENT-front	IDENT-low	UNIF
$ɑ_1i_2$	*!				*		
$ɛ_1i_2$	*!					*	
$ɑ_1$				*!	*		*
i_2		*!		*			*
$ɛ_{1,2}$						*	*
$ɛ_1$				*!		*	
$i_2ɑ_1$			*!				
$i_2ɛ_1$			*!				

Adaptation on non-nasal rhymes: more specific on features

/kʰɤ/ ‘to carve’	IDENT-round	IDENT-back	IDENT-high
kʰɯ			*
kʰo	*!		
kʰe		*!	

Adaptation on nasal rhymes: starting from the simplest

/kɑŋ/ ‘port’	No Coda	Max	IDENT-nasal
kɑŋ	*!		
kɑ		*	*
kɑ̃		*	

No coda is ranked very high and never violated in the given set of data. For the purpose of simplicity, the candidates with coda will not be listed on the following slides

Adaptation on nasal rhymes: adaptations on features involved

/tɤŋ/ ‘lamp’	IDENT-front/back?	IDENT-high
tɯ̃		*
tõ	*!	
tẽ	*!	

Adaptation on nasal rhymes: when there are more candidates available

/nu$_1$ɤ$_2$ŋ/ ‘farming’	No-Diphthong	IDENT-NUCLEUS	IDENT-nasal	IDENT-round	IDENT-back	IDENT-high
nõ						*
nu			*!			
nỹ					*!	
nɯ̃$_1$				*!		
nuɯ̃	*!					
nɯ̃$_2$		*!				

Evidence for rankings on +/- features

/zn̩n/ people	IDENT-round	IDENT-front	IDENT-low	IDENT-back	IDENT-high
sẽ		*!			
sʉ̃				*	*
sõ	*!			*	
sɑ̃			*!	*	

A handful of examples that seem to contradict to each other

’(electric) lamp' /tiɛn tɤŋ/--> /t̃i tɯ̃/

but

'merit (point)' /jou tiɛn/--> /jo tiɛ̃/

'arrow' /tɕiɛn/--> /tɕi̇̃/

but

'suggestion, opinion' /ji tɕiɛn/--> /ji tɕɛ̃/ etc.

Different perceived input on homophonous lexicon

Input /tiɛn/ ‘electric’	No-Diphthong	IDENT-Nucleus	MAX
tiɛ̃	*!		*
t̃i			**
tɛ̃		*!	**
Input /tjɛn/ ‘point’	No-Diphthong	IDENT-Nucleus	MAX
tjɛ̃			*
tɛ̃			**!

Different perceived input on homophonous lexicon

Input /tɕiɛn/ ‘arrow’	No-Diphthong	IDENT-Nucleus	MAX
tɕiɛ̃	*!		*
tɕĩ			**
tɕɛ̃		*!	**
Input /tɕʲɛn/ ‘opinion’	No-Diphthong	IDENT-Nucleus	MAX
tɕʲɛ̃			*

(Those violated the highly ranked no coda and IDENT-nasal are ruled out first)

Overall Ranking of Constraints

No Coda, No-Diphthong, IDENT-nasal, IDENT-nucleus>>MAX>>IDENT-round>>IDENT-front>>IDENT-back>>IDENT-high

New loans among younger generation:

‘(electric) lamp' /tiɛn tɤŋ/--> ~~/t̃i tɯ̃/~~ /tiɛn tɯŋ/

Input: [tiɛn]	No Coda	No-Diphthong	IDENT-Nucleus	Max
tiɛn	*!			
t̃iɛ̃		*!		*
tɛ̃			*!	**
t̃i				**

Input [tiɛn]	Max	No Coda	No-Diphthong	IDENT-Nucleus
tiɛn		*		
t̃iɛ̃	*!		*	
tɛ̃	**!			*
t̃i	**!			

Conclusions

The adaptation of Mandarin words in Bai, shows very strong evidence that they are **not** overwhelmingly phonological, but instead phonetically triggered:

- Much attention is paid to the surface representation of the original acoustic output from the donor language;
- The phonology of Mandarin is ignored, especially in the adaptation pattern of three-segment nasal finals, where the nuclei of [yɤŋ] and [iɛn] are [ɤ] and [ɛ], but Bai took [y] and [i] as nuclei of the loanwords.
- Evidence on the constraint rankings based on the perceived input
- Possible influences from the orthography and historical factors, and the divergence of adaptations out of the same phonological environment

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Thanks!
[na ve no]!
谢谢!