# French loanwords in Vietnamese: the role of input language phonotactics and contrast in loanword adaptation<sup>\*</sup>

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#### 1 Introduction

Studies on loanword phonology show that the restrictions of native (L1) phonology play a crucial role in reshaping foreign words in adaptation. Studies have also found, however, that there are many aspects of loanword adaptation that are not explained by the requirements of native phonology alone (See Kang (2011) for a recent overview). A considerable body of work has accumulated to show that such unexpected adaptation patterns may be explained when the phonetic details of the source language (L2) and the native language (L1) sound structure are taken into account. Specifically, it has been proposed that adapters select the native language structure that is perceptually most similar to the borrowing language input as the optimal mapping. This selection may be achieved in the process of speech perception proper (Boersma & Hamann 2001; Peperkamp et al. 2008) or in the process of a mapping which is mediated by speakers' knowledge of relative phonetic similarity between strings of sounds (Kenstowicz 2007; Steriade 2008; Yun To appear).

Relatively less attention has been paid to the role of knowledge of the source language phonology that adapters bring to adaptation. LaCharité & Paradis (2005) proposed that the adapters are competent bilinguals with native-like knowledge of the input language phonology and the phonological structure of the source language serves as input to the adaptation process, rather than the surface phonetic forms of the source language. But, others assume a more nuanced view of the role of input language phonology and propose that the adapters' knowledge of source language phonology can be one of various factors that affect the outcome of adaptation and the adapters' knowledge may not be native-like (de Jong & Cho 2012; Ito 2014; Kang 2010; Smith 2009). Kang (2010) and de Jong and Cho (2012) in particular proposed that while phonetic similarity plays a primary role in shaping adaptation, the variability inherent in cross-language perception is modulated by speakers' knowledge of input language categories, exerting a regularizing pressure on the adaptation over time. In this paper, we provide two case studies of French-Vietnamese vowel adaptation where the Vietnamese adapters' knowledge of L2 (French) phonology seems to play a crucial role. The study also makes an empirical contribution by providing a detailed description of French-Vietnamese vowel adaptation.

# 2 Data

Data for the study consist of over 1,000 French loanwords in Vietnamese. The list is primarily drawn from three dictionaries (Lê et al. 1988; Nguyễn et al. 1998; Nguyễn 1986[1975]) and is supplemented with commonly used forms that the second author is aware of. Additional data were added from Huynh (2010)'s loanword list which is itself collected from various published sources and dictionaries and checked for usage and accuracy with Vietnamese informants from Saigon and Hanoi. The second author also elicited productions of around 30 commonly used loanwords using a picture naming method from 14 native speakers residing in Vietnam in the summer of 2013. The fieldwork data are not included in our analysis

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(1) E

Nasal vowels

а

шə

uə

iə

but they serve to confirm the general validity of the French-Vietnamese sound correspondences we observe in our written data sources. *Lexique* 3.80 (New et al. 2001)<sup>1</sup> is used as a source for French phonological transcription and the phonological transcription of the Vietnamese forms is aided by *vPhon*, a Python script that converts Vietnamese scripts to IPA transcriptions (Kirby 2008). Previous phonological descriptions of French loanwords in Vietnamese include Barker (1969), Huynh (2010) and Phillips (1975).

## **3** French and Vietnamese Phonology (Hanoi)

In this section, we provide background information on the phonology of Vietnamese (Emerich 2012; Hoa 1965; Hwa-Froelich et al. 2002; Kirby 2011; Phạm 2006; Phạm To appear; Tang & Barlow 2006; Thompson 1965) and French (Féry 2003; Fougeron & Smith 1999; Storme 2015; Strange et al. 2007; Tranel 1987; Walker 2001). The information on Vietnamese is based on the Northern (Hanoi) dialect.<sup>2</sup> The inventories of vowels and consonants of the two languages are presented in (1)-(4).

(1) French conse	onant inven	tory					
	Labial	Dental	Post-alveolar	Palatal	Labial-palatal	Velar	Uvular
Plosive	рb	t d				kg	
Nasal	m	n		ր		(ŋ)	
Fricative	f v	S Z	∫ 3				R
Approximant	W	1		j	Ч		

(2) Vietnamese	onset cor	nsonant inve	ntory						
	Labial	Dental/	Alveolar	Palatal	Velar	Glotta	1		
Plosive	(p) 6	th	t ɗ	tç	k	3			
Nasal	m	1	n	ր	ŋ				
Fricative	f v	S	Z		хγ	h			
Approximant	W	1	(r)						
(3) French vow	el invento	ory		(4)	Vietnam	lese vow	el invento	ory <sup>3</sup>	
	Front	Central	Back				Front	Central	Back
Oral vowels	i y		u	Ν	lonophtl	iongs	i	ш	u
	еø	2	0				e	r	0
	εœ	Ð	Э				ε, (ε:)	ř	ə, (ə:)
		а	(a)					ă	

Vietnamese has nine monophthongal vowels and three diphthongal vowels. Two non-high central vowels, /a/ and /x/, show length contrast and these contrasts are also accompanied by spectral differences, with the differences attested more consistently for the /x/-/x/ pair than the /a/-/a/ pair (Emerich 2012; Kirby 2011). The short vowels /a/ and /x/ only occur in closed syllables. Also there is a marginal length contrast of / $\epsilon$ / vs. / $\epsilon$ :/ and / $\sigma$ / vs. / $\sigma$ :/; the long vowels / $\epsilon$ :/ and / $\sigma$ :/ only occur in syllables closed with a velar coda. Vietnamese coda consonants are limited to voiceless stops [p, t, c, k, kp], nasals [m, n, n, n, nm] and approximants [j, w]. Labial codas [m, p] can occur with all vowels, except for /uu/. In the Northern dialects, dental codas [t, n] can occur with all vowels although they are rare after /uu/. Palatal, velar, and labial-velar codas are in quasi complementary distribution, as summarized in (5). The overall pattern is that dorsal

Diphthongs

ĩ (ĩ)

õ

ã

<sup>&</sup>lt;sup>1</sup> This online dictionary is available at <u>http://www.lexique.org/</u>.

<sup>&</sup>lt;sup>2</sup> The Vietnamese transcription presented in this paper is based on the Hanoi dialect orthography-sound correspondences. But, the Southern dialects (e.g. Saigon) likely had substantial influence on the adaptation and development of French loanwords. We will not address the dialectal variation in this paper due to space limitation.

<sup>&</sup>lt;sup>3</sup> In Southern dialects, the lax vs. tense mid vowel contrast is marginal. This may have contributed to the variation in the mid vowel adaptation. Northern diphthongs correspond to long monophthongal vowels in the Southern dialects (Cao 1988; Pham 2006; Vuong & Hoàng 1994).

codas assimilate to the place of articulation of the preceding vowel, except for  $/\epsilon$ :/ and /5:/. Palatals ([c] and [n], or fronted velars [k] and [n]) are found following a front vowel, labial-velars ([kp] and [nm]) are found following back rounded vowels and velars ([k] and [n]) are found following central vowels. Velars are also attested following long mid vowels  $/\epsilon$ :/ and /5:/, as in *xėng* [sɛ:n] 'shovel' and *xoong* [so:n] 'saucepan'. The occurrence of palatals following a low central short vowel /a seems out of place and many analyze the vowel as underlying  $/\epsilon$ / which is centralized in a palatal context (See Pham to appear and references therein).<sup>4</sup>

(5) Rhym	(5) Rhyme restrictions in Northern Vietnamese				(6) Loi de position restrictions in standard French				ch		
Vowel		[c ɲ]	[k ŋ]	[kp ŋm]		Non	-Final		Fi	nal	
	i	$\checkmark$				Syl	lable		Syll	able	
Front	e	$\checkmark$				(≈uns	tressed)		(≈str	essed	)
Front	ă (< ε)	$\checkmark$				Open	Closed	Open		Clos	sed
	£:		(✔)						others	/z/	\r\ \b/ \d/
	ш		$\checkmark$		o/ø	✓		✓	✓	$\checkmark$	
	r				o/œ		$\checkmark$		$\checkmark$		$\checkmark$
Central	ř		$\checkmark$		e	✓		✓			
	ă		$\checkmark$		3		$\checkmark$	✓	✓	$\checkmark$	$\checkmark$
	а		$\checkmark$								
	u			$\checkmark$							
Back	0			$\checkmark$							
round	э			$\checkmark$							
	D:		(✓)								

French has twelve monophthongal oral vowels and four nasal vowels. The contrasts between /a/ and /a/ and between / $\tilde{\epsilon}$ / and / $\tilde{\alpha}$ / are marginal. Unlike Vietnamese, French has contrasts between front unrounded and front rounded vowels and also a series of nasal vowels. Similar to Vietnamese, French contrasts tense (=higher) and lax (=lower) mid vowels. These mid vowels of French are subject to a phonotactic restriction known as the *Loi de Position (LP)* (Féry 2003; Storme 2015); generally, the lax vowels / $\epsilon$ /, / $\alpha$ / and / $\sigma$ / are found in closed syllables and the tense vowels / $\epsilon$ /, / $\alpha$ / and / $\sigma$ / are found in open syllables. This restriction holds fairly systematically in non-final unstressed syllables.<sup>5</sup> But, in final stressed syllables, there are exceptions; / $\epsilon$ / and / $\epsilon$ / contrast in word-final (=stressed) open syllables while / $\sigma$ / and / $\sigma$ /, and / $\alpha$ / contrast in word-final closed syllables. But, even in final closed syllables, only / $\sigma$ / is found before / $\kappa$ /, /p/ or /g/. The pattern in the standard French is summarized in (6). It is noted that / $\sigma$ / is realized with a more centralized quality phonetically before / $\kappa$ / (Fougeron and Smith 1999). The *Loi de position* is also subject to dialectal variation (Féry 2003; Walker 2001).

## 4 Vowel adaptation

**4.1** *French-Vietnamese vowel correspondences* We first present an overview of the correspondences between French and Vietnamese vowels in our loanword data. The correspondences are summarized in (7) and some representative examples are provided in (8). The vowels inside the double-lined box are the focus of this paper and will be discussed in later sections.

The two high corner vowels /i/ and /u/ are mapped straightforwardly to their corresponding Vietnamese vowels but all other vowels show variation or require some explanation. French front rounded vowels have no corresponding vowels in Vietnamese and French /y/ is adapted as /wi/, /u/, or /i/. The /wi/ form is the most common adaptation pattern and it is the form that retains both the rounding and the front feature of input /y/, while /u/ and /i/ only retain one of the two features although the latter are more faithful to the input in that they retain the mono-segmental structure of the input. The mid front rounded vowels /ø/

*déstabiliser* retains the tense [e] of the prefix *dé*-, even though it occurs in a closed syllable.

<sup>&</sup>lt;sup>4</sup> In the Southern dialects, the coda palatals have shifted to dental and the coda dentals have shifted to velar place in most vowel contexts, resulting in a different co-occurrence restriction patterns (Thompson 1987; Pham 2006, 2012). <sup>5</sup> Even in non-final unstressed syllables, we find morpho-phonologically conditioned exceptions. For example,

and /œ/, on the other hand, are adapted as /x/. An adaptation parallel to the high front rounded vowel would predict /ø œ/ to be adapted as /we/ or /wɛ/. It is notable that unlike the high front rounded vowel, the mid front rounded vowels do not retain rounding or the front feature in their adaptation, although there is no apparent native phonotactic restriction against such adaptation. French schwa /ə/, which is realized similar to front rounded vowels, is also adapted as Vietnamese /x/. Nasal vowels, /ã/, /ɛ̃/ and /ɔ̃/, are adapted as a sequence of a vowel and a coda nasal. There is no instance of /œ̃/ in our data. When the nasal vowel is followed by a labial consonant in the French input, the final nasal is realized as /m/ while when the following consonant is velar or coronal, the adaptation is /ŋ/ or /p/. The palatal /p/ is found when the vowel is a front vowel /ɛ̃/.

#### (7) Summary of vowel correspondences

	French	Vietnamese
Oral	/i/	/i/
	/u/	/u/
	/y/	/wi/, /u/, /i/
	/ə/, /ø/, /œ/	/x/
	/o/	/0/, /3/
	/ɔ/	/0/, /ɔ/, /ɔː/
	/e/	/e/, /ε/, /ε:/
	/ɛ/	/ε/, /e/
	/a/	/a/, /ă/, /ε/[ă]
Nasal	/ẽ/	/ɛŋ/ [ăɲ]
	/ã/	/ăŋ/, /ăm/
	/3/	/oŋ/, /ɔːŋ/, /ɔm/

#### (8) French-Vietnamese vowel correspondences

(-)		French		Vietnamese		
a. ,	i/i > i/i/	litre	/lits/	lít	/lit1/	'liter'
b	/u/ > /u/	coupe	/kup/	си́р	/kup1/	'trophy'
c. /	/y/ > /wi/, /u/, /i/	(auto)bus	/bys/	buýt	/6wit1/	'bus'
		virus	/visys/	vi rút	/vi1 zut1/	'virus'
		légume	/legym/	la ghim	/la1 yim1/	'vegetable'
		0		lê ghim	/le1 yim1/	-
d.	$\langle \mathfrak{g} /, / \mathfrak{g} /, / \mathfrak{g} / \rangle / \mathfrak{g} / \rangle$	bleu	/blø/	lo	/1x1/	'blue'
		docteur	/doktœr/	đốc tơ	/dok1 tr1/	'doctor'
		chemise	/ʃəmiz/	sơ mi	/sv1 mi1/	'shirt'
e. ,	$ \tilde{a}  >  \check{a}\eta ,  an ,  a\eta $	satan	/satã/	xa tăng	/sa1 tăŋ1/	'satan'
		cantine	/kãtin/	căng tin	/kăŋ1 tin1/	'canteen'
		brancard	/prgrar/	băng ca	/6ăŋ1 ka1/	'stretcher'
	> /ăm/ (before /p, b/)	jambon	/ʒãbɔ̃/	giăm bông	/zăm1 60ŋ1/	'ham'
			-	dăm bông	/zăm1 60ŋ1/	
				dăm bon	/zăm1 6ɔn1/	
f. /	'ẽ/ > /εŋ/ [ăɲ], /εːŋ/	satin	/satẽ/	xa tanh, sa tanh	/sa1 tɛŋ1/	'satin'
					[sal tăn1]	
				xa teng	/sa1 te:ŋ1/	
	$> /\epsilon m / (before /p, b/)$	timbre	/tɛ̃pr∕	tem	/tɛm1/	'stamp, label'
g	/ɔ̃/ > /oŋ/, /ɔːŋ/, /ɔŋ/	savon	/sav3/	xà ông	/sal oŋ1/	'soap'
				xà phòng	/sal fogl/	
				sà bong, xà bong	/sal 6og1/	
				xà vông	/sal voŋ1/	
		pont	/põ/	boong	/6ɔːŋ1/	'deck of a ship'
	> /om/, /om/ (before /p b/)	trompette	/trobet/	tom bét	/təm1 6ɛt1/	'trumpet'
			_	trôm pét	/com1 pɛt1/	
				trom pét	/com1 pet1/	

**4.2** Loi de position and the adaptation of mid vowels In this section, we examine the emergence of LP in the Vietnamese adaptation of French mid vowels, where the adaptation shows effects above and beyond what might be expected based on the input language properties or the native phonotactics alone. Both French and Vietnamese have a contrast between mid tense vowels, /e/ and /o/, and mid lax vowels, / $\epsilon$ / and /o/, and one may expect straightforward correspondences between French and Vietnamese mid vowels. But, a lot of variation is found. One context where no variation is found is before French coda / $\mu$ /. / $\mu$ / itself is deleted word-finally and is adapted as /k/ word-medially. The mid vowel that precedes coda / $\mu$ / is always adapted as a Vietnamese lax (and long) vowel regardless of whether the coda / $\mu$ / is deleted, as in (9a), or retained, as /k/ as in (9b), in the Vietnamese output.

(9) Before French coda /ʁ/

a. Coda /ʁ/ deletes word-finally

••••	count of actives	mora mang.			
	vert	NER $ $	ve	/vɛ1/	'green'
	maillechort	/maj∫ɔʁ/	mai xo	/maj1 sɔ1/	'nickel silver'
b.	Coda /ʁ/ is adap	ted as /k/ word	-medially.		
	thermos	/tɛʁməs/	téc mốt	/tɛːk1 mot1/	'thermos'
	corset	korse/	coóc xê	/kɔːk1 se1/	'bra'

In all other contexts, the adaptation of the mid vowels is variable but one finds a tendency of LP effect. Some illustrative examples are provided in (10). The graph in (11) shows the proportion of French mid vowels adapted to Vietnamese lax and tense vowels depending on the French source vowel and the Vietnamese output syllable structure. Other things being equal, lax vowel adaptation is more likely if the vowel ends up in a closed syllable than in an open syllable in the Vietnamese output.

#### (10) Loi de position effect in mid vowel adaptation

a.	Adaptation of /e/	closed $\sigma$ : lax	tennis	/tenis/	ten nít	/tɛn¹ nit1/	'tennis'
		open $\sigma$ : tense	allez	/ale/	a lê	/a1 le1/	'go!'
b.	Adaptation of $/\epsilon/$	closed $\sigma$ : lax	veste	/vɛst/	vét	/vet1/	'blazer, suit'
		open $\sigma$ : tense	corset	/korse/	coóc xê	/ko:k1 se1/	'bra'
c.	Adaptation of /o/	closed $\sigma$ : lax	neurone	/nørou/	no ron	/nx1 zon1/	'nerve'
		open $\sigma$ : tense	zéro	\zero\	dê rô	/ze1 ro1/	'zero'
d.	Adaptation of /5/	closed $\sigma$ : lax	pomme	/pom/	bom	/6om1/	'apple'
		open $\sigma$ : tense	oxygène	/əksizen/	ô xi	/o1 si1/	'oxygen'

## (11) The effect of Vietnamese syllable structure on French mid vowel adaptation



Given the dialectal variation of LP effect within French, the syllable structure effect observed in our data may be simply due to the fact that in the input dialects that Vietnamese was in contact with, the LP effect was more consistently upheld and the adapters are merely mimicking the French input vowels without any knowledge of the LP effect. But, there is evidence that the adapters seem to be extending the LP effect productively beyond what is observable from the French input. The evidence comes from those cases of adaptation where the syllable structure changes from French to Vietnamese and the vowel quality is in turn modified to respect LP. Most of these examples involve orthographic geminates being pronounced as geminates and tense vowels of French open syllable being realized as lax vowels in the derived closed syllable of Vietnamese output, as shown in (12).<sup>6</sup> French open syllables may also end up as closed syllables in Vietnamese due to truncation (13).

(12)	Derived	geminates	and lax	vowel a	adaptatio	n
а	$ e  >  \varepsilon $ i	n closed s	vllable (	due orth	ographic	gemination

u.	101 -	/c/ III closed by I	iuoio uuo ortinogit	apine Semmation		
		dessert	/desɛr/	đét xe	/dɛt1 sɛ1/	'dessert'
		essence	/esãs/	ét xăng	/ɛt1 săŋ1/	'gasoline'
		cresson	/kĸesɔ̃/	két sông	/kɛt1 soŋ1/	'watercress'
		confetti	/kõfeti/	công phét ti	/koŋ1 fɛt1 ti1/	'confetti'
		marketing	/marketin/	ma két tinh	/ma1 kɛt1 tiŋ1/	'marketing'
		cellulose	/selyloz/	xen lu lô	/sɛn1 lu1 lo1/	'cellulose'
		tennis	/tenis/	ten nít	/tɛn1 nit1/	'tennis'
b.	/0/>	/o/ in closed syl	llable due orthogra	aphic gemination		
		tonneau	/tono/	ton nô tô nô tố nô	/tən1 no1/ /to1 no1/ /to1 no1/	'barrel'
		baïonnette	/bajonɛt/	bay on nét	/6ăj1 ən1 nɛt1/	'knife on a long gun'
		commande	/komãd/	com măng	/kəm1 măŋ1/	'order'
		mayonnaise	/majonez/	may on ne	/măj1 on1 nɛ1/	'mayonnaise'
		pomade	/pomad/	pom mát	/pom1 mat1/	'skin cream'
		sonnet	/sonɛ/	xon nê	/son1 ne1/	'sonnet'
(13)	) Trun	ncation and lax v	owel adaptation			
		métrique	/metsik/	mét	/mɛt1/	'metric'
		copier	/kopje/	cóp	/kəp1/	'to copy'

In other words, it seems that the Vietnamese adapters adjust the vowel quality in the output to adhere to LP. Here, it is important to note that the knowledge possessed by the adapters is not native-like and the adaptation does not necessarily match the correct French input vowel or the syllable structure, as can be seen from the extensive variation in adaptation of these vowels and the orthography-based gemination of consonants. The emergent LP effect is one of the strategies the adapters may be using in their effort to approximate the correct French vowels, although they may not always be successful in doing so.

To verify that the Vietnamese syllable structure makes a contribution to predicting the choice of tense vs. lax in mid vowel adaptation, independent of the French input syllable structure and the French input vowel quality (in Standard French), various logistic regression models are compared in their AIC (Akaike Information Criterion) values. AIC is a measure of goodness of fit of the model with penalties for model complexity. In all models, the output vowel choice (tense vs. lax) is the dependent variable. The independent variables are all possible combinations of the following three factors—French input vowel

<sup>&</sup>lt;sup>6</sup> Such geminate pronunciations are also reported for French but restricted to particular words and speech styles (Tranel 1987). According to Fouché (1973), on the other hand, in contemporary French gemination tends to be found with sonorant consonants and so it is in fact possible that gemination in some of the data in (12) may be found in the French input itself.

AIC 205.71 207.55 188.53 207.55

187.88

176.81

177.33

(tense vs. lax), French input syllable structure (open vs. closed), and Vietnamese output syllable structure (open vs. closed). The table in (14) summarizes the AIC values of the models under comparison, where lower AIC values indicate a better model. The best models are highlighted in boldface. For both front and back vowel models, addition of the Vietnamese syllable structure factor improves the model (i.e. reduces the AIC value) the most compared to the other two factors. For the front vowels, all three factors make a positive contribution to the model fit while for the back vowels, the French input vowel quality does not improve the model fit enough to justify the added complexity. To summarize, we have statistical evidence that the LP effect in the loanword data cannot be explained by mere mimicking of the standard French input vowel quality or the French syllable structure. Rather, speakers seem to productively extend the LP effect to novel contexts where the Vietnamese output syllable structure diverges from the actual syllable structure of the French input.

(14) Would comparisons		
/e/ vs. /ε/ models	AIC	/o/ vs. /ɔ/ models
F. vowel	249.59	F. vowel
F. syllable	231.25	F. syllable
V. syllable	201.74	V. syllable
F. vowel + F. syllable	231.62	F. vowel + F. syllable

201.61

203.69

200.90

(14) Model comparisons

F. vowel + V. syllable

F. syllable + V. syllable

F. vowel + F. syllable + V. syllable

We also considered the possibility that this emergent LP effect is grounded in native phonotactic tendencies. In native words of Vietnamese, /e/, / $\epsilon$ /, /o/ and / $\sigma$ / can occur in both open and closed syllables without any categorical restriction but there could be a statistical tendency that favors tense vowels in open syllables and lax vowels in closed syllables, which may in turn affect loanword adaptation. In order to test this hypothesis, we examined the distribution of mid vowels in Ho Ngoc Duc's Vietnamese wordlist (39,000 words).<sup>7</sup> The table in (15) summarizes the proportion of lax vowels by syllable structure for the loanwords and for the Vietnamese lexicon.<sup>8</sup>

F. vowel + V. syllable

F. syllable + V. syllable

F. vowel + F. syllable + V. syllable

(15) Proportion of lax vs. tense mid vowels by syllable structure: loanwords and native words (n=total number of mid vowels by syllable structure)

	/ɛ/ v	s. /e/	/ə/ vs. /o/		
	Closed	Open	Closed	Open	
Loanwords	80% vs. 20%	10% vs. 90%	26% vs. 74%	5% vs. 95%	
	(n=115)	(n=133)	(n=110)	(n=190)	
Viet. lexicon	67% vs. 33%	35% vs. 65%	37% vs. 63%	33% vs. 67%	
	(n=5277)	(n=2617)	(n= 9897)	(n=3989)	

The native lexicon also shows a tendency of more lax stops in closed syllables than in open syllables but the tendency is much weaker in the native lexicon (67% vs. 35% for front vowels and 37% vs. 33% for back vowels) than in the loanwords (80% vs. 10% for front vowels and 26% vs. 5% for back vowels). The effect in the native lexicon is especially tenuous in back vowels. So, while the native phonotactics are not incompatible with the *LP* effect, the native tendency does not seem strong enough to explain the emergent effect observed in loanwords. Moreover, the fact that a lax vowel is consistently found in an open syllable derived from the deletion of French coda / $\mu$ / (see (9)) resulting in a structure that goes against the *LP* effect in Vietnamese output suggests that the phonotactic wellformedness of Vietnamese output is not likely to be responsible for the emergent *LP* effect in mid vowel adaptation. But, the analysis that attributes this pattern to the adapters' imperfect knowledge of L2 phonology provides a better explanation as the consistent lax

<sup>&</sup>lt;sup>7</sup> <u>http://www.informatik.uni-leipzig.de/~duc/software/misc/wordlist.html</u>

<sup>&</sup>lt;sup>8</sup> Note that the Vietnamese lexicon may also contain a number of loanwords and may not be a representation of the native lexicon proper.

adaptation in the pre-/ $\mu$ / context follows from the equally consistent L2 (French) phonotactic restriction on mid vowels in pre-/ $\mu$ / contexts.

**4.3** Adaptation of French /a/ In this section, we examine the adaptation of French low vowel /a/, which is adapted as [a] or [ $\check{a}$ ] mostly. When the low vowel ends up in an open syllable in the Vietnamese output, the vowel is adapted as /a/ without exception as shown in (16). Note that this adaptation is expected to hold regardless of whether the vowel is in an open syllable in the French input or occurs in a derived open syllable due to the deletion of illicit coda consonants such as / $\varkappa$ /, /z/ or /3/. The adaptation in closed syllables, on the other hand, shows variation as summarized in (17). The short low vowel / $\check{a}$ / only occurs in closed syllables in Vietnamese and therefore, only the long /a/ is a phonotactically possible option in open syllables.

(16)/a/>	/a/ in open syllables	
	(* *) (	

compas	/kõpa/	com pa	/kom1 pa1/	'compass'
cabine	/kabin/	ca bin	/ka1 bin1/	'cabin'
bar	/baĸ/	ba	/6a1/	'bar'
phase	/faz/	pha	/fa1/	'phase'
garage	/даказ/	ga ra	/ya1 za1/	'garage'

French inp	ut coda	Vietnamese output coda	[a]	[ă]	<b>[</b> x̆]	proportion of [a] adaptation
labial	/b p f/	р	12	1		73.9%
	/m/	m	5	1	4	
dental	/dtzs/	t	37			81.5%
		с		8 (/ε/)		
		k	1			
	/n l/	n	38			
		n		2 (/ɛ/)		
		ŋ		6		
postalveolar	/3 ∫ /	t	8			100.0%
palatal	/ɲ/	n		4 (/ɛ/)		0.0%
velar	/g k/	k	3	23		11.1%
		с		1 (/ɛ/)	-	
uvular	\ <b>R</b> \	k	34			100.0%

(17) Adaptation of /a/ in closed syllables

French /a/ is mostly adapted as Vietnamese long /a/ but there are a couple of contexts where [ă] adaptation is consistently found. One is when the coda consonant is a palatal, either from the French palatal or derived from French dentals and velars, as illustrated in (18a). The adaptation to [ă] (analyzed as underlying / $\epsilon$ / by many) before a palatal coda is expected based on the Vietnamese phonotactic restriction, as long /a/ cannot occur with a palatal coda in Vietnamese (see (5)). Another context where the short [ă] adaptation is found is before a French velar coda. Here in particular, we draw attention to the contrast between the coda [k] adaptation derived from French velar stops /g/ and /k/ and the coda [k] adaptation from the French uvular / $\mu$ /. When the coda is derived from the French velars, the low vowel is adapted as short [ă], as illustrated in (18b). But, when the coda is derived from the French uvular, the vowel is adapted as long [a], as shown in (18c). But, in closed syllables, there is no apparent phonotactic restriction against either vowel in Vietnamese. Moreover, both [ak] and [ăk] are possible in the Vietnamese output. So, as was the case with the *LP* effect discussed in the previous section, the choice of vowels in /a/ adaptation before uvular and velar codas cannot be attributed to Vietnamese phonotactic restrictions.

(18) /a/ adaptation before palatal, velar, and uvular coda consonants

a.	Adaptation before	a French palat	tal coda: $/a/ > [\check{a}]$	]	
	pagne	/pan/	banh	/6ɛɲ1/ [6ăɲ]	'maximum security prison'
	champagne	/ʃãpaŋ/	săm banh sâm banh	/săm1 6ɛɲ1/[săm /sřm1 6ɛɲ1/ [sřm	бăŋ] 'champagne' бăŋ]
b.	Adaptation before	a French vela	$r \operatorname{coda}: /a / > [\check{a}]$		
	bac	/bak/	bắc	/6ăk1/	'high school diploma'
	facture	/faktyʁ/	phắc tuya	/făk1 twiə1/	'bill, receipt'
	contact	/kõtakt/	công tắc	/koŋ1 tăk1/	'switch'
	taxi	/taksi/	tắc xi	/tăk1 si1/	'taxi'
c. /	Adaptation before a	French uvular	coda: /a/ > [a]		
	garde	/gard/	gác	/yak1/	'to guard'
	carbone	/karpou/	các bon	/kak1 6ən1/	'carbon'
	carton	/kart2/	các tông	/kak1 toŋ1/	'cardboard'
	marque	/maʁk/	mác	/mak1/	'label, brand'
	marxiste	/maʁksist/	mác xít	/mak1 sit1/	'Marxist'

We first consider the possibility that the divergent adaptation of /a/ in pre-uvular vs. pre-velar contexts may be due to a phonetic difference in the French input. To examine the phonetic variation of French /a/ before different coda consonants, the third author, who is a native speaker of standard French, recorded six repetitions of nonsense words where /a/ occurs before coda /p/, /t/, /k/ and /k/. The mean F1, F2, and duration of the vowel in these contexts are summarized in (19).

(19) Phonetic variation of French /a/ before different coda consonants

French coda	Mean F1	Mean F2	Mean duration
/p/	546.0	1377.3	51.0
/t/	532.3	1402.8	57.8
/k/	541.0	1538.0	69.0
$\langle \mathbf{R} \rangle$	620.7	1360.3	72.2

(20)	/a/	adaptation	before /t/	and /p	/ coda
•	/ot	l > lat l			

a.	/at/ > /at/				
	hydrate de carbone	/idʁat_də_ kaʁbɔn/	hi đờ rát các bon	/hi1 drl zat1 kak1 6ən1/	'hydrated carbon'
	kilowatt	/kilowat/	ki lô oát	/ki1 lo1 wat1/	'kilowatt'
b.	/ap/ > /ap/				
	abcès	/apsɛ/	áp xe	/ap1 sɛ1/	'abscess'
	cap	/kap/	cáp	/kap1/	'baseball cap (hat)'
	kappa	/kapa/	cáp ca	/kap1 ka1/	'kappa'

To summarize the results so far, the input language contrast between /B/Vs. /k/Vs is neutralized to /k/Vs in the Vietnamese output but the contrast is retained as a length/quality difference on the preceding vowel. Here French /ak/Vs is made distinct from French /aB/Vs above and beyond what is expected from the patterning of other phonetically similar structure, namely /ap/Vs and /at/Vs. The effect of the uvular vs. velar contrast on the adaptation of preceding vowel is also attested with other vowels. When a coda /B/Vs occurs following a high vowel, a schwa off-glide is inserted in the adapted form, maintaining a contrast with a high vowel before an underlying /k/Vs, as examples in (21) show. The schwa glide adds a lower vowel quality and additional length to the high vowel.

#### (21) Covert / $\mu$ / vs. /k/ contrast in high vowels

a.	$V_{[+high]} \mathbf{k} > / V \Im \mathbf{k} /$				
	course	/kurs/	cuốc	/kuək1/	'ride'
	cirque	/siĸk/	xiếc	/siək1/	'circus'
b.	V <sub>[+high]</sub> k > /Vk/ acide sulfurique	/asid_sylfyʁik/	a xit sun fu rich	/a1 sit1 sun1 fu zik1/	'sulfuric acid'
				[ zic]	

We also observe the tendency to preserve covert uvular-velar contrast as quality/length difference on the preceding vowel in mid vowel adaptation as well, although the effect is more subtle given the pressure of the *LP* effect on mid vowels. The tables in (22) compare the adaptation of French mid lax vowels  $/\epsilon/$  and  $/\sigma/$  in closed syllables depending on the French input consonant. The "lax ratio" indicates the proportion mid vowels that are adapted as lax in the Vietnamese output for each condition. When the coda consonant is French / $\mu/$  realized as [k] in the Vietnamese output, the mid vowels are adapted as lax without exception, as discussed in (9b), and illustrated with additional examples below in (23a,b). When the vowels occur before other consonants, the adaptation is more variable and the rate of lax adaptation drops below 100%, as we observed in (11). But, here notably, the rate drops further for /k/ derived from French /k/ beyond the rate of lax adaptation for other consonants, resulting in a further differentiation from the French / $\mu/$  context. Examples of mid lax vowels adapted as tense before /k/ derived from French /k/ are provided in (23c,d) to illustrate the contrast with the / $\mu/$  context.<sup>9</sup>

(22) Covert /B/ vs. /k/ contrast effect in mid vowels

a.	French /ɛ/	′ adapta	ation in closed syllables	b. F	rench /ɔ/	adaptat	tion in closed syllables
Coda	[ <b>ɛ</b> (ː)]	[e]	lax ratio	Coda	[ <b>ə(</b> :)]	[0]	lax ratio
\R\ > [k]	24	0	100%	/ <b>R</b> / > [ <b>k</b> ]	23	0	100%
others	78	20	80%	others	16	50	24%
/k/ > [k]	3	4	43%	/k/ > [k]	2	10	17%

(23) Covert /B/ vs. /k/ contrast effect in mid vowels

a.  $|\epsilon \mathbf{k}| > |\epsilon \mathbf{k}|$ 

	berger	\рєк36\	béc giê	/6ɛ:k1 ze1/	'breed of dogs'
	fermeture	/fɛĸmətyĸ/	phéc mơ tuya	/fɛːk1 mɤ1 twiə1/	'zipper'
b.	/эв/ > /э:k/ bordeaux	\pprqo\	boóc đô	/6ɔːk1 do1/	'purple red'
	short	\Jort∖	soóc	/sɔ:k1/	'shorts'
	corset	/korse/	coóc xê	/kɔːk1 se1/	'bra'

<sup>&</sup>lt;sup>9</sup> For high and mid vowels, the different choices of vowel quality/length come with different consonant places of articulation of the coda dorsals due to vowel-coda co-occurrence restrictions discussed in (5). With French / $\mu$ /, the vowel is lengthened or a schwa glide is inserted and the coda dorsal is realized as velar without coarticulation with the vowel while with French /k/, the short front or back vowel induces palatalization or labialization of dorsals.

c.	/ek/ >	/ek/
c.	$ \epsilon k  >$	/ek/

	bifteck	/biftɛk/	bíp tếch	/6ip1 tek1/	'beef steak'
	telex	/telɛks/	tê lếch	/te1 lek1/	'telex'
d.	/ok/ > /ok/				
	bloc	/blok/	bờ lốc lốc	/6x1 lok1/ /lok1/	'calendar'
	boxe	/boks/	bốc	/60k1/	'boxing'
	docteur	/doktœr/	đốc tơ	/dok1 tr1/	'medical doctor'

To summarize, French uvular and velar codas are neutralized to dorsal stops in surface Vietnamese forms; however, the contrast is maintained as a difference in vowel quality/length The pattern is summarized in (24). Phonetic properties of the French input, while relevant, do not provide a complete explanation for this pattern. But, the neutralized input language contrast is actively retained in the vowel quality difference. Kenstowicz & Suchato (2006) observe a similar phenomena in Thai, where the contrast between sonorant coda vs. sonorant-obstruent coda cluster is neutralized due to cluster simplification but the input contrast is systematically retained as different tones on the syllable; H tone on the cluster and M tone on the sonorant coda. A follow-up experiment demonstrated that the correspondence pattern is psychologically real—speakers assign the tones in line with the tendency of loanwords in experimental tasks—even though there is no phonetic basis in the f0 contour of the English inputs to explain the adaptation pattern.

(24) Summary of French /ʁ/ vs. /k/ contrast and Vietnamese vowel length/quality

Franch yowal	Vietnamese Adaptation				
French vower	French coda / $\mathbf{k}$ / > / $\mathbf{k}$ /	French coda $/k/ > /k/$			
high: /i/ /u/	/iə/ /uə/	/i/ /u/			
mid: /ɛ/ /ə/	/ɛː/ /ɔː/	/e/~/ɛː/ /ɔ/~/ɔː/			
low: /a/	/a/	/ă/			

## 5 Conclusion

In this study we examined the adaptation of French vowels in Vietnamese focusing on adaptation patterns that seem to defy a straightforward analysis based on native phonotactic restrictions or comparison of phonetic input-output similarity. A proper analysis seems to require reference to knowledge of the input language phonology. First we observed that Vietnamese adapters seem to extend the French phonotactic tendencies, i.e., *Loi de Position*, to loan adaptation productively. Such "intrusion" of L2 phonology knowledge may arise when phonetics underdetermines the adaptation and the adapters look to their knowledge of L2 phonology to arrive at adaptation. It is also notable that the L2 knowledge employed in adaptation is not native-like as the adaptation is not always isomorphic to the French input. In the second case study, the contrast of L2 phonology (/ $\nu$ / vs. /k/) is neutralized due to an L1 phonological restriction (i.e., no / $\nu$ / in Vietnamese coda) but the Vietnamese adaptation systematically retains the contrast in the quality and length difference in the preceding vowel. There is plausible phonetic motivation for this adaptation pattern, but phonetically faithful mapping underdetermines the attested adaptation pattern, and reference to knowledge of L2 phonological contrasts is necessary. These findings illustrate the complexity of the loanword adaptation process, where a variety of different factors including L1 phonological restrictions, phonetic similarity, and L2 phonological knowledge, interact to affect adaptation.

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