French loanwords in Vietnamese: the role of input language phonotactics and contrast in loanword adaptation*

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September 20, 2014
Annual Meeting on Phonology 2014, MIT

1. Introduction

(1) The goals of today's presentation
- Examine vowel adaptation in French loanwords in Vietnamese
- Examine the types of knowledge adapters bring:
  - Native phonology
  - Phonetic/perceptual similarity between source and native language sounds (Steriade 1999, Kenstowicz 2001, Boersma and Hamann 2001, Peperkamp and Dupoux 2008, Yun 2014)
  - Input language (L2) phonology (Kang 2010, de Jong and Cho 2012)
    - when phonetic similarity underdetermines the adaptation pattern
    - regularization of phonetically motivated correspondences based on L2 categories

2. Data

(2) Data and sources
- A list of over 1,000 loanwords from French
- Primary list
  - Dictionaries: Nguyễn et al. (1986, 1998), Lê et al. (1988)
  - supplemented with commonly used forms that the second author is aware of
- Loanword list in Huynh (2010)
  - collected from various published sources and dictionaries
  - checked for common usage and pronunciation with Vietnamese informants from Saigon and Hanoi
- Fieldwork (2013)
  - around 30 commonly used loanwords elicited from 14 native speakers residing in Vietnam using a picture naming method
  - General validity of French-Vietnamese sound correspondences in the written data verified

(3) French transcription
- *Lexique* 3.80 (New, et al. in press; http://www.lexique.org/)

(4) Vietnamese transcription
- *vPhon* (Kirby 2008, http://www.lel.ed.ac.uk/~jkirby/vphon.html)[1]

* Thanks to the abstract reviewers, the audience at *the CRC-Sponsored Summer Phonetics/Phonology Workshop* at the University of Toronto (June 2014), and James Kirby, for helpful comments and suggestions.

[1] The Vietnamese transcription presented below 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. Due to time constraints, we will not discuss the dialectal variation in this presentation.

3. Background: French and Vietnamese Phonology (Hanoi)

(Tranel 1987, Walker 2001, Féry 2003, Fougeron Smith 1999, Thompson 1965, Phạm 2006, 2012, Kirby 2011, Emerich 2012)

(5) French consonant inventory

	Labial	Dental	Post-alveolar	Palatal	Labial-palatal	Velar	Uvular
Plosive	p b	t d				k g	
Nasal	m	n		ɲ		(ŋ)	
Fricative	f v	s z	ʃ ʒ				ʁ
Approximant	w	l		j	ɥ		

(6) Vietnamese onset consonant inventory

	Labial	Dental/Alveolar	Palatal	Velar	Glottal
Plosive	(p) ɓ	tʰ t ɗ	tç	k	ʔ
Nasal	m	n	ɲ	ŋ	
Fricative	f v	s z		x ɣ	h
Approximant	w	l (r)			

(7) Vietnamese coda restrictions

- voiceless stops [p, t, c, k, k͡p], nasals [m, n, ɲ, ŋ, ŋ͡m], and glides [j, w] only

(8) French vowel inventory

	Front	Central	Back
Oral vowels	i y		u
	e ø	ə	o
	ɛ œ		ɔ
		a	(ɑ)
Nasal vowels	ɛ̃ (œ̃)		ɔ̃
			ɑ̃

(9) Vietnamese vowel inventory[2]

	Front	Central	Back
Monophthongs	i	ɯ	u
	e	ɤ	o
	ɛ, (ɛː)	ɤ̆	ɔ, (ɔː)
		ă	
		a	
Diphthongs	iə	ɯə	uə

- Length contrast in central vowels, /ɤ, ɤ̆/ and /a, ă/, accompanied by quality difference.
- /ă/ and /ɤ̆/ only occurs in closed syllables.
- /ɛː/ and /ɔː/ only occur in syllables closed with a velar coda.

[2] 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. (Vương and Hoàng 1994, Pham 2006)

(10) *Loi de position* effect in standard French

	Non-Final Syllable (≈unstressed)		**Final Syllable (≈stressed)**			
	Open	Closed	Open	Closed others	Closed /z/	Closed /ʁ/ /ɲ/ /g/
o/ø	✓		✓	✓	✓	
ɔ/œ		✓		✓		✓
e	✓		✓			
ɛ		✓	✓	✓	✓	✓

- Lax mid vowels occur in closed syllables and tense mid vowels occur in open syllables.
- Systematic in non-final (unstressed) syllables but less systematic in final (stressed) syllables.
- Before /ʁ/, only lax vowels occur.
- Dialectal variation: the restriction holds more systematically in some dialects of French.

(11) Rhyme co-occurrence restrictions for dorsal codas in Vietnamese

Vowel		**[c ɲ]**	**[k ŋ]**	**[k͡p ŋ͡m]**
Front	i	✓		
	e	✓		
	ă (< ɛ)	✓		
	ɛː		(✓)	
Central	ɯ		✓	
	ɤ			
	ɤ̆		✓	
	ă		✓	
	a		✓	
Back round	u			✓
	o			✓
	ɔ			✓
	ɔː		(✓)	

- Dorsal codas assimilate to the place of articulation of the preceding vowel, except for /ɛː ɔː/.

4. Correspondences between French and Vietnamese vowels

(12) Summary of overall correspondences

	French	**Vietnamese**
Oral vowels	/i/	/i/
	/u/	/u/
	/y/	/wi/, /u/, /i/
	/ə/, /ø/, /œ/	/ɤ/
	/o/	/o/, /ɔ/
	/ɔ/	/o/, /ɔ/, /ɔː/
	/e/	/e/, /ɛ/
	/ɛ/	/ɛ/, /e/
	/a/	/a/, /ă/, /ɛ/[ă]
Nasal vowels	/ɛ̃/	/ɛŋ/ [ăɲ]
	/ɑ̃/	/ăŋ/, /ăm/
	/ɔ̃/	/oŋ/, /ɔːŋ/, /ɔm/

- See appendix for examples of vowel correspondences.

4.1. Mid vowels /e ɛ/ and /o ɔ/

(13) Variation

- Both French and Vietnamese have tense vs. lax mid vowel contrasts and one may expect straightforward correspondences between French and Vietnamese mid vowels. But, a lot of variation is found.

(14) Before coda /ʁ/

- Only lax vowels occur before /ʁ/ in French and these vowels are always adapted as lax (and long) regardless of whether the coda /ʁ/ is deleted or retained as /k/ in the Vietnamese output.

a. Coda /ʁ/ deletes word-finally.

vert	/vɛʁ/	*ve*	/vɛ1/	'green'
maillechort	/majʃɔʁ/	*mai xo*	/maj1 sɔ1/	'nickel silver'

b. Coda /ʁ/ is adapted as /k/ not word-finally.

thermos	/tɛʁmɔs/	*téc mốt*	/tɛ:k5 mot5/	'thermostate'
corset	/kɔʁsɛ/	*coóc xê*	/kɔ:k5 se1/	'bra'

(15) *Loi de position* effect

- When pre-/ʁ/ contexts are excluded, 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.

a. Adaptation of /e/

closed σ: lax	*tennis*	/tenis/	*ten nít*	/tɛn1 nit5/	'tennis'
open σ: tense	*allez*	/ale/	*a lê*	/a1 le1/	'go!'

b. Adaptation of /ɛ/

closed σ: lax	*veste*	/vɛst/	*vét*	/vɛt5/	'blazer, suit'
open σ: tense	*corset*	/kɔʁsɛ/	*coóc xê*	/kɔ:k5 se1/	'bra'

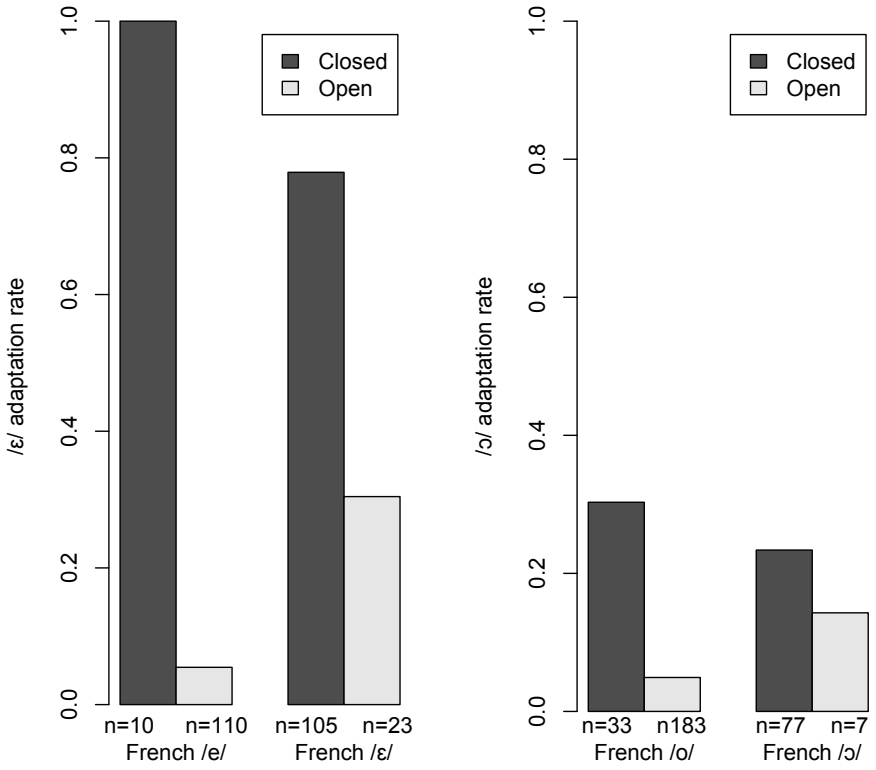
c. Adaptation of /o/

closed σ: lax	*neurone*	/nøʁon/	*nơ ron*	/nɤ1 zɔn1/	'nerve'
open σ: tense	*zéro*	/zeʁo/	*dê rô*	/ze1 ro1/	'zero'

d. Adaptation of /ɔ/

closed σ: lax	*pomme*	/pɔm/	*bom*	/ɓɔm1/	'apple'
open σ: tense	*oxygène*	/ɔksiʒɛn/	*ô xi*	/o1 si1/	'oxigen'

Adaptation of French mid vowels by Vietnamese output syllable structure



(16) *Loi de position* in **derived** closed syllables

- Particularly interesting are the adaptations where the syllable structure changes from French to Vietnamese and the vowel quality changes to adhere to *Loi de Position*.
- Adapters are not merely mimicking the French input vowels but seem to be extending the *Loi de Position* effect productively.
- Most of these examples involve orthographic geminates being pronounced as real geminates.
- Such geminate pronunciations are reported for French but restricted to particular words and speech styles (Tranel 1987) and are likely an emergent properties of Vietnamese.[3]

a. /e/ > /ɛ/ in closed syllable due orthographic germination

dessert	/d**e**sɛʁ/	*đét xe*	/d**ɛ**t5 sɛ1/	'dessert'
essence	/**e**sɑ̃s/	*ét xăng*	/**ɛ**t5 săŋ1/	'gasoline'
cresson	/kʁ**e**sɔ̃/	*két sông*	/k**ɛ**t5 soŋ1/	'watercress'
confetti	/kɔ̃f**e**ti/	*công phét ti*	/koŋ1 f**ɛ**t5 ti1/	'confetti'
marketing	/maʁk**e**tiŋ/	*ma két tinh*	/ma1 k**ɛ**t15 tiŋ1/	'marketing'
cellulose	/s**e**lyloz/	*xen lu lô*	/s**ɛ**n1 lu1 lo1/	'cellulose'
tennis	/t**e**nis/	*ten nít*	/t**ɛ**n1 nit5/	'tennis'

[3] According to Fouché (1973), in contemporary French gemination tends to be found with sonorant consonants.

b. /o/ > /ɔ/ in closed syllable due orthographic germination

tonneau	/t**o**no/	*ton nô*	/t**ɔ**n1 no1/	'barrel'
		tô nô	/t**o**1 no1/	'barrel'
		tố nô	/t**o**5 no1/	'barrel'
baïonnette	/baj**o**nɛt/	*bay on nét*	/ɓăj1 **ɔ**n1 nɛt5/	'knife on a long gun'
commande	/k**o**mɑ̃d/	*com măng*	/k**ɔ**m1 măŋ1/	'order'
mayonnaise	/maj**o**nɛz/	*may on ne*	/măj1 **ɔ**n1 nɛ1/	'mayonnaise'
pommade	/p**o**mad/	*pom mát*	/p**ɔ**m1 mat5/	'skin cream'
sonnet	/s**o**nɛ/	*xon nê*	/s**ɔ**n1 ne1/	'sonnet'

- French open syllables may also end up closed syllables in Vietnamese due to truncation.

c. /e/ > /ɛ/ in closed syllable due to truncation

métrique	/m**e**tʁik/	*mét*	/m**ɛ**t5/	'metric'

d. /o/ > /ɔ/ in closed syllable due to truncation

copier	/k**o**pje/	*cóp*	/k**ɔ**p5/	'to copy'

4.2. Low vowel /a/

(17) /a/ > /a/ in open syllable

compas	/kɔ̃p**a**/	*com pa*	/kɔm1 p**a**1/	'bus'
cabine	/k**a**bin/	*ca bin*	/k**a**1 bin1/	'virus'
bar	/b**a**ʁ/	*ba*	/ɓ**a**1/	'bar'
phase	/f**a**z/	*pha*	/f**a**1/	'phase'
garage	/gaʁ**a**ʒ/	*ga ra*	/ɣ**a**1 ʐ**a**1/	'vegetable'

(18) Closed syllable

French input		Vietnamese output coda	[a]	[ă]	[ɤ̆]	proportion of [a] adaptation
labial	/b p f/	p	12	1		73.9%
	/m/	m	5	1	4	
dental	/d t z s/	t	37			81.5%
		c		8 (/ɛ/)		
		k	1			
	/n l/	n	38			
		ɲ		2		
		ŋ		6		
postalveolar	/ʒ ʃ/	t	8			100.0%
palatal	/ɲ/	ɲ		4 (/ɛ/)		**0.0%**
velar	/g k/	k	3	23 (/ă/)		**11.1%**
		c		1		
uvular	/ʁ/	k	34			**100.0%**
		t	2			

- French /a/ is mostly adapted as Vietnamese long [a], except before a French palatal or velar coda, where the vowel is adapted as short [ă].

- /a/ is adapted as [ă] (</ɛ/) before palatals due to a Vietnamese phonotactic restriction on palatals (cf. (11)).

pagne	/paɲ/	*banh*	/ɓɛɲ1/ [ɓ**ăɲ**]	'maximum security prison'
champagne	/ʃɑ̃paɲ/	*săm banh*	/săm1 ɓɛɲ1/[săm ɓ**ăɲ**]	'champagne'
		sâm banh	/sɤ̆m1 ɓɛɲ1/ [sɤ̆m ɓ**ăɲ**]	

(19) Velar vs. Uvular

- The adaptation before velar stops cannot be due to Vietnamese phonotactics.

a. /aʁ/ > /ak/

garde	/gaʁd/	*gác*	/ɣ**ak**5/	'to guard'
carbone	/kaʁbɔn/	*các bon*	/k**ak**5 ɓɔn1/	'carbon'
carton	/kaʁtɔ̃/	*các tông*	/k**ak**5 toŋ1/	'carb board '
marque	/maʁk/	*mác*	/m**ak**5/	'label, brand'
marxiste	/maʁksist/	*mác xít*	/m**ak**5 sit5/	'marxist'
garde	/gaʁd/	*gác*	/ɣ**ak**5/	'to guard'

b. /ak/ > /ăk/

bac	/bak/	*bắc*	/ɓ**ăk**5/	'high school diploma'
facture	/faktyʁ/	*phắc tuya*	/f**ăk**5 twiə1/	'bill, receipt'
contact	/kɔ̃takt/	*công tắc*	/koŋ1 t**ăk**5/	'switch'
taxi	/taksi/	*tắc xi*	/t**ăk**5 si1/	'taxi'

- In French, vowels are longer and lower before /ʁ/ than before other coda consonants (Fougeron and Smith 1999, Montreuil 1995) but this cannot explain why /ak/ coda is singled out for a short vowel, while /at/ and /ap/ pattern with /aʁ/. (See the appendix)

c. /at/ > /at/

hydrate de carbone	/idʁat_də_kaʁbɔn/	*hi đờ rát các bon*	/hi1 ɗɤ2 z**at**5 kak5 ɓɔn1/	'hydrated carbon'
kilowatt	/kilowat/	*ki lô oát*	/ki1 lo1 w**at**5/	'kilowatt'

d. /ap/ > /ap/

abcès	/apsɛ/	*áp xe*	/**ap**5 sɛ1/	'abscess'
cap	/kap/	*cáp*	/k**ap**5/	'baseball cap (hat)'
kappa	/kapa/	*cáp ca*	/k**ap**5 ka1/	'kappa'

(20) Covert contrast

- The input language contrast between /ʁ/ vs. /k/ is neutralized to /k/ but the contrast is realized as length/quality difference on the preceding vowel.
- The underlying /k/ is made distinct from the derived /k/ (from /ʁ/), above and beyond what is expected from the patterning of other phonetically similar structure (/p/ and /t/ codas).

(21) Covert /ʁ/ vs. /k/ contrast effect in high vowels

a. $V_{[+high]}ʁ$ > /Vək/

course	/kuʁs/	*cuốc*	/k**uək**5/	'ride'

a. $V_{[+high]}k$ > /Vk/

acide sulfurique	/asid_sylfyʁik/	*a xít sun fu rích*	/a1 sit5 sun1 fu z**ik**5/	'acid sulfuric'

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

- In closed syllable, we generally expect preference for lax vowels in mid vowels, due to *loi de position* effect.
- The /ɛ/ and /ɔ/ before a coda /k/ seem to show preference toward tense /e/ and /o/ adaptation (higher and shorter) over lax /ɛ/ and /ɔ/ adaptation.
- which results in a better contrast from coda /ʁ/.

French /ɛ/ adaptation in closed syllables

	[ɛ]	[e]	lax ratio
before /ʁ/ > [k]	24	0	**100%**
before other consonants	78	20	80%
before /k/ > [k]	3	4	**43%**

French /ɔ/ adaptation in closed syllables

	[ɔ]	[o]	lax ratio
before /ʁ/ > [k]	23	0	**100%**
before other consonants	16	50	24%
before /k/ > [k]	2	10	**17%**

a. /ɛʁ/ > /**ɛ**:k/

berger	/bɛʁʒe/	*béc giê*	/ɓ**ɛ**:k5 ze1/	'breed of dogs'
fermeture	/fɛʁmətyʁ/	*phéc mơ tuya*	/f**ɛ**:k5 mɤ1 twiə1/	'zipper'

b. /ɛk/ > /**e**k/ [ec] (~ [ɛ:k])

bifteck	/biftɛk/	*bíp tếch*	/ɓip5 t**e**k5/	'beef steak'
telex	/telɛks/	*tê lếch*	/te1 l**e**k5/	'telex'

c. /ɔʁ/ > /**ɔ**:k/

bordeaux	/bɔʁdo/	*boóc đô*	/ɓ**ɔ**:k5 ɗo1/	'purple red'
morphine	/mɔʁfin/	*móoc phin*	/m**ɔ**:k5 fin1/	'morphin'
porte-bagages	/pɔʁtbaɡaʒ/	*boóc ba ga*	/ɓ**ɔ**:k5 ɓa1 ɣa1/	'carrier seat in the back of a bike'
short	/ʃɔʁt/	*soóc*	/s**ɔ**:k5/	'shorts'
corset	/kɔʁsɛ/	*coóc xê*	/k**ɔ**:k5 se1/	'bra'

d. /ɔk/ > /**o**k/ [**o**k͡p] (~ [ɔ:k])

bloc	/blɔk/	*bờ lốc*	/ɓɤ2 l**o**k5/	'calendar'
		lốc	/l**o**k5/	
boxe	/bɔks/	*bốc*	/ɓ**o**k5/	'boxing'
dock	/dɔk/	*đốc*	/ɗ**o**k5/	'port'
docteur	/dɔktœʁ/	*đốc tơ*	/ɗ**o**k5 tɤ1/	'medical doctor'
inox	/inɔks/	*i nốc*	/i1 n**o**k5/	'stainless steel'

5. Concluding remarks

- *Loi de position*
  - Vietnamese adapters seem to extend the French phonotactic tendencies in loan adaptation productively.
  - Such "intrusion" of L2 phonology knowledge seems possible because phonetics underdetermine the adaptation. The vowel qualities of French and Vietnamese vowels do not match up perfectly.

- At the same time, the L2 knowledge employed in adaptation is not native-like as can be seen in orthographic gemination.

- Covert contrast of /k/ and /ʁ/
  - The underlying contrast of the input language is realized as contrast on the preceding vowel.
  - There is a phonetic ground for this adaptation pattern but again phonetics underdetermine the pattern.
  - What is special about /k/ vs. /ʁ/? High frequency and saliency of the contrast?

Appendix I

/i/ > /i/				
litre	/**li**tʁ/	*lít*	/**li**t5/	'liter'
morphine	/mɔʁ**fi**n/	*móoc-phin*	/mɔːk **fi**n/	'morphine'
saphir	/safiʁ/	*xa phia*	/sa1 fiə1/	'saphir'
/u/ > /u/				
coupe	/k**u**p/	*cúp*	/k**u**p5/	'trouphy'
limousine	/lim**u**zin/	*li-mu-din*	/li1 m**u**1 zin1/	'limousine'
tour	/tuʁ/	*tua*	/tuə1/	'time, a round, match,'
/y/ > /wi/, /u/, /i/				
(auto)bus	/bys/	*buýt*	/ɓwit5/	'bus'
virus	/viʁys/	*vi rút*	/vi1 zut5/	'virus'
légume	/legym/	*la ghim* *lê ghim*	/la1 ɣim1/ /le1 ɣim1/	'vegetible'
turbine	/tyʁbin/	*tua bin* *tuyệt bin*	/tuə1 ɓin1/ /twiət6 ɓin1/	'grind'
/ø/ > /ɤ/				
bleu	/blø/	*lơ*	/lɤ1/	'blue'
tondeuse	/tɔ̃døz/	*tông đơ*	/toŋ1 ɗɤ1/	'tool for haircut'
/œ/ > /ɤ/				
docteur	/dɔktœʁ/	*đốc tơ*	/ɗok5 tɤ1/	'doctor'
fauteuil	/fotœj/	*phô tơi*	/fo1 tɤj1/	'seat'
/ə/ > /ɤ/, deletion				
chemise	/ʃəmiz/	*sơ mi*	/ʂɤ1 mi1/	'shirt'
matelot	/matəlo/	*mạch lô*	/mɛk6 lo1/	'salior'
/ɑ̃/ > /ăŋ/, /an/, /aŋ/				
satan	/satɑ̃/	*xa tăng*	/sa1 tăŋ1/	'satan'
cantine	/kɑ̃tin/	*căng tin*	/kăŋ1 tin1/	'cantin'
brancard	/bʁɑ̃kaʁ/	*băng ca*	/ɓăŋ1 ka1/	'stretcher'
/ɑ̃/ before /p b/ > /ăm/				
jambon	/ʒɑ̃bɔ̃/	*giăm bông* *dăm bông* *dăm bon*	/zăm1 ɓoŋ1/ /zăm1 ɓoŋ1/ /zăm1 ɓɔn1/	'ham'
/ɛ̃/ > /ɛŋ/ [ăŋ], /ɛːŋ/				
seringue	/səʁɛ̃g/	*xơ ranh*	/sɤ1 zɛŋ1/	'syringe'
satin	/satɛ̃/	*xa tanh* *sa tanh* *xa teng*	/sa1 tɛŋ1/ [sa1 tăŋ1] /sa1 tɛːŋ1/	'satin'
/ɛ̃/ before /p b/ > /ɛm/				

timbre	/tɛ̃bʁ/	*tem*	/tɛm1/	'stamp, label'
/ɔ̃/ > /oŋ/, /ɔːŋ/, /ɔŋ/				
savon	/savɔ̃/	*xà ông*	/sa2 oŋ1/	'soap'
		xà phòng	/sa2 fɔŋ2/	
		sà bong, xà bong	/sa2 ɓɔŋ1/	
		xà vông	/sa2 voŋ1/	
pont	/pɔ̃/	*boong*	/ɓɔŋ1/	'deck of a ship'
/ɔ̃/ before /p b/ > /ɔm/, /om/				
bombe	/bɔ̃b/	*bom*	/ɓɔm1/	'bomb'
trompette	/tʁɔ̃pɛt/	*tom bét*	/tɔm1 ɓɛt5/	'trumpet'
		trôm pét	/com1 pɛt5/	
		trom pét	/cɔm1 pɛt5/	

Appendix II : Phonetics of French vowels

- French vowels /a/ before coda /p, t, k/ and /ʁ/
- Nonsense words, 6 repetitions

	a		
Coda consonant	**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
R	**620.7**	1360.3	**72.2**

- /a/ before /k/ have substantially higher F2 in French.
- But, this does not explain the adaptation in Vietnamese.
- Long /a/ is described as more front (higher F2) than /ă/. (Thompson 1967, Emerich 2012)

Appendix III : Role of Vietnamese syllable structure

- To verify the contribution of Vietnamese syllable structure in predicting the mid vowel choice, independent of French syllable structure and French input vowel quality (in Standard French), various logistic regression models are compared in their AIC values.
- Logistic regression models
    - Dependent variable: tense vs. lax vowel adaptaiton
    - Independent variables: all possible combination of
        - French input vowel quality (tense vs. lax)
        - French input syllable structure (open vs. closed)
        - Vietnamese output syllable structure (open vs. closed)

/e/ vs. /ɛ/	AIC	/o/ vs. /ɔ/	AIC
F. vowel	249.59	F. vowel	205.71
F. syllable	231.25	F. syllable	207.55
V. syllable	201.74	V. syllable	188.53
F. vowel + F. syllable	231.62	F. vowel + F. syllable	207.55
F. vowel + V. syllable	201.61	F. vowel + V. syllable	187.88
F. syllable + V. syllable	203.69	**F. syllable + V. syllable**	**176.81**
F. vowel + F. syllable + V. syllable	**200.90**	F. vowel + F. syllabel + V. syllable	177.33

- Addition of the Vietnamese syllable structure improves the model (=reduces the AIC values) the most compared to the other two factors.
- After French and Vietnamese syllable structures are taken into account, French input vowel quality makes almost no additional improvement.