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# Vietnamese (Hanoi Vietnamese)

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Vietnamese, the official language of Vietnam, is spoken natively by over seventy-five million people in Vietnam and greater Southeast Asia as well as by some two million overseas, predominantly in France, Australia, and the United States. The genetic affiliation of Vietnamese has been at times the subject of considerable debate (Diffloth 1992). Scholars such as Tabard (1838) maintained a relation to Chinese, while Maspero (1912), despite noting similarities to Mon-Khmer, argued for an affiliation with Tai. However, at least since the work of Haudricourt (1953), most scholars now agree that Vietnamese and related Vietic<sup>1</sup> languages belong to the Mon-Khmer branch of the Austroasiatic family.

It is important to make a distinction between ‘literary Vietnamese’, a prescriptive construct in which several orthographic distinctions are maintained in production, and the colloquial or standard speech of a given dialect region. This illustration describes the modern Hanoi dialect of Northern Vietnamese; segmental and tonal inventories, as well as lexicon, vary considerably between Vietnamese dialects, including those spoken in areas adjacent to Hanoi.

The earliest systematic account of Vietnamese phonology was given by de Rhodes (1651), whose analysis is reflected in the modern orthography. Other important descriptions include those of Maspero (1912), Lê Văn Lý (1948), Emeneau (1951), and Thompson (1965). Vietnamese historical phonology has played an important role in the broader study of Southeast Asian diachrony (Barker 1966; Barker & Barker 1970; Ferlus 1975, 1982, 1992, 1996, 1997; Gregerson & Thomas 1976; Thompson 1976; Diffloth 1992), and has proven central to our understanding of the process of tonogenesis (Haudricourt 1954; Matisoff 1973; Gage 1985; Diffloth 1989; Alves 1995; Ferlus 1998, 2004; Thurgood 2002, 2007; Stebbins 2010). Indeed, much of the synchronic phonetic and phonological research on Northern Vietnamese has similarly focused on its tonal system. The work of Vũ Thanh Phương (1981, 1982) provides a comprehensive overview, but experimental studies have also been undertaken by Andreev & Gordina (1957), Earle (1975), Han & Kim (1974), Hoàng Cao Cường (1986), Seitz (1986), Nguyễn Văn Lợi & Edmondson (1998), Brunelle (2003, 2009ab), Phạm (2001, 2003), Michaud (2004), Michaud, Vũ Ngọc Tuấn, Amelot & Roubeau (2006), Brunelle & Jannedy (2007), Brunelle, Nguyễn Duy Dương & Nguyễn Khắc Hùng (2010), and Kirby (2010). Other aspects of Vietnamese phonetics and phonology have been addressed by Nguyễn Bạt Tụy (1949, 1959), Gordina (1960a, b, 1961, 1964), Han (1966), Đoàn Thiện Thuật (1977), Gordina & Bystrov (1984), Ngô Thanh Nhân (1984), and Nguyễn

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<sup>1</sup> The Vietic branch is sometimes referred to as Việt-Mường, although this latter term is also used to refer exclusively to a sub-branch of Vietic containing Vietnamese and Mường. See Diffloth (1992) and Hayes (1992) for further discussion.

Đình Hoà (1997). Studies of Vietnamese dialectology include Cadière (1902), Thompson (1959, 1965), Gordina (1963), Cao Xuân Hạo (1978, 1986, 1988), Hoàng Thị Châu (1989), Ferlus (1991, 1995, 1997), Alves & Nguyễn Duy Hương (1998 [2007]), Alves (2002 [2007]), Phạm (2005), and Honda (2006).

The recordings accompanying this illustration are of a 32-year-old male native of Hanoi.

## Consonants

### Initials

	Labial	Labio-dental	Dental	Alveolar	Palatal	Velar	Glottal
Plosive	ɸ		t t <sup>h</sup>	ɖ	tɕ	k	ʔ
Nasal	m		n		ɲ	ŋ	
Fricative		f v		s z		x ɣ	h
Approximant	w						
Lateral approximant			l				

ba <sup>˧</sup>	<i>ba</i>	‘three’	ɖa <sup>˧</sup>	<i>ɖa</i>	‘banyan tree’	ka <sup>˧</sup>	<i>ca</i>	‘mug’
ma <sup>˧</sup>	<i>ma</i>	‘ghost’	na <sup>˧</sup>	<i>na</i>	‘custard apple’	ŋa <sup>˧</sup>	<i>Nga</i>	‘Russia’
ta <sup>˧</sup>	<i>ta</i>	‘we, our’	t <sup>h</sup> a <sup>˧</sup>	<i>tha</i>	‘to forgive’	la <sup>˧</sup>	<i>là</i>	(existential copula)
fa <sup>˧</sup>	<i>pha</i>	‘to brew’	va <sup>˧</sup>	<i>và</i>	‘and’	wan <sup>˧</sup>	<i>oan</i>	‘unjustly’
sa <sup>˧</sup>	<i>xa</i>	‘far’	za <sup>˧</sup>	<i>da</i>	‘skin’	ha <sup>˧</sup>	<i>hà</i>	‘river’
tɕa <sup>˧</sup>	<i>cha</i>	‘father’	ɲa <sup>˧</sup>	<i>nhà</i>	‘house’	h <sup>w</sup> a <sup>˧</sup>	<i>hoa</i>	‘flower’
xa <sup>˧</sup>	<i>khá</i>	‘rather’	ɣa <sup>˧</sup>	<i>gà</i>	‘chicken’	ʔa <sup>˧</sup>	<i>à</i>	(question particle)

The voiced plosives are canonically, but not consistently, realized as implosives. Initial /t t<sup>h</sup>/ are apico-dental [t̪ t̪<sup>h</sup>], lamino-alveolar [t̪̠ t̪̠<sup>h</sup>], or contiguous apico-dental lamino-alveolar (‘denti-alveolar’, Harris 2006), while /ɖ n l/ are apico-alveolar.

Some previous treatments such as that of Thompson (1965) recognize an unaspirated, unaffricated palatal stop /c/. However, in the speech of many younger Vietnamese native speakers from Hanoi, such as that of the present consultant, this segment is consistently realized as an affricate [tɕ], a well-attested areal feature (Harris 2006). The tongue body contacts the alveolar or post-alveolar region during the production of both the palatal nasal [ɲ] and the palatal affricate [tɕ] in initial position (Henderson 1965).

While some varieties of Vietnamese maintain a distinction in the phonetic realizations of orthographic (tr-) and (ch-), these onsets are completely merged in modern Hanoi Vietnamese. The highly salient (and socially stigmatized) merger of /l/ and /n/ > /l/, characteristic of the speech of many lower- and working-class Vietnamese in the Red River Delta, is sometimes consciously manipulated to humorous and/or pejorative effect in colloquial Hanoi speech, as in e.g. /n̤w̤˧/ *nâu* ‘brown’ + /no̤ŋ̤˧/ *nóng* ‘hot’ = ‘hot coffee with milk’ > [l̤w̤˧ lo̤ŋ̤˧].

In syllable-initial position /p j r/ occur in a small number of foreign (mainly French) loans, e.g. [pan<sup>˧</sup>] < *panne* ‘breakdown’, [ya<sup>˧</sup> ra<sup>˧</sup>] < *garage*, [bi<sup>˧</sup> ja<sup>˧</sup>] < *billiard*. For many speakers, however, /p/ is realized as [b/ɸ] and /r/ as [z].

## Finals

Hanoi Vietnamese licenses eight segments in coda position: three unreleased voiceless obstruents /p t k/ ([p̚ t̚ k̚]), three nasals /m n ŋ/, and two approximants /j w/.<sup>2</sup> In final position /t n/ are canonically alveolar, though it is not clear if they are chiefly laminal or apical. While the EGG study of Michaud (2004) found no evidence of glottalization accompanying unreleased final stops /p t k/, the laryngoscopic study of Edmondson et al. (2010) suggests that glottal reinforcement (in the sense of Esling, Fraser & Harris 2005) may not always be absent in this context.

## Velar fronting

Although the phonetic realization of the stops /ŋ k/ following /i e ε/ have sometimes been described as palatal [ɲ c], they are actually pre-velar [ŋ̟] and [k̟], with no point of alveolar contact (Henderson 1965). The conditioning vowels tend to be shortened and centralized, and may be produced with a noticeable palatal offglide.

kiŋ̟	<i>Kinh</i>	‘Vietnamese’
keŋ̟	<i>kênh</i>	‘channel’
keŋ̟	<i>canh</i>	‘broth’
sik̟	<i>xích</i>	‘chain’
sek̟	<i>xêch</i>	‘slanting’
sek̟	<i>sách</i>	‘book’

There do exist a few instances of true velars following /ε/, e.g. [sɛ:ŋ̟] *xẻng* ‘shovel’.

## Labial-velar finals

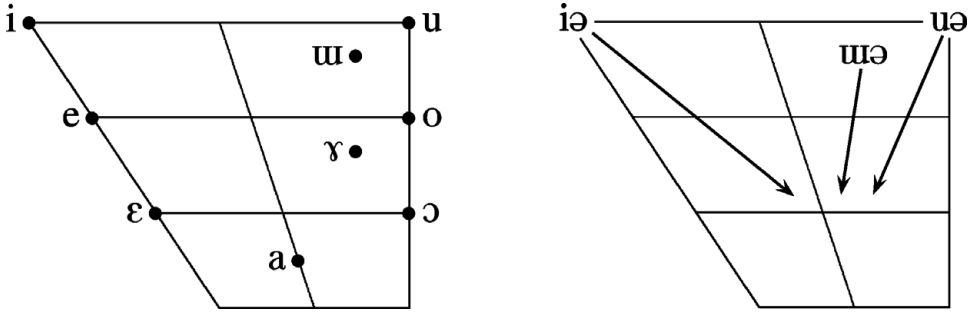
Following back rounded vowels /u o ɔ/, the velar stops /k ŋ/ are produced as doubly articulated labial-velars [k̟p̟ ŋ̟m̟]. This articulation is sometimes accompanied by a visible puffing of the cheeks as air becomes trapped in the oral cavity.

uŋ̟m̟	<i>ung</i>	‘tumor’
oŋ̟m̟	<i>ông</i>	‘grandfather’
ɔŋ̟m̟	<i>ong</i>	‘bee’
ukp̟	<i>Úc</i>	‘Australia’
okp̟	<i>ốc</i>	‘snail’
ɔkp̟	<i>óc</i>	‘mind, brain’

Note the differences between the doubly articulated labial-velars and plain final bilabials:

sukp̟	<i>xúc</i>	‘to scoop’
sup̟	<i>súp</i>	‘soup’
hoŋ̟m̟	<i>hông</i>	‘hip’
hom̟	<i>hôm</i>	‘day’
hɔkp̟	<i>học</i>	‘to study’
hɔp̟	<i>họp</i>	‘to meet’
sɔŋ̟m̟	<i>sóng</i>	‘wave’
sɔm̟	<i>xóm</i>	‘hamlet’

<sup>2</sup> Whether these segments are transcribed as final approximants /j w/ or as semivowels /ɿ ʷ/ is largely a matter of analytic perspective. From a phonological standpoint, these segments may be regarded as approximants (consonants) on the grounds that they may not be followed by another consonant. However, these segments are articulated somewhat differently from the initial approximants, with a lesser degree of closure.



**Figure 1** Location of monophthong and diphthong centroids in a schematic F1-F2 space, based on acoustic analysis of the accompanying sound files.

As with velar fronting, there are rare exceptions to the realization of final velars as labial-velar after back rounded vowels: compare e.g. [bɔŋm̄ɿ] *bong* ‘to come loose’ with [bɔ:ŋɿ] *boong* ‘deck (of ship)’ (< French *pont*; Nguyễn Bạt Tụy 1949; Haudricourt 1952; Sampson 1969).

### Vowels

Hanoi Vietnamese distinguishes nine vowel qualities /i e ɛ a ɯ ɤ u o ɔ/ and three falling diphthongs /iə ɯə uə/. Length is normally distinctive only in closed syllables and then only for the vowels /a/ and /ɤ/, although there do exist a small number of lexical pairs which provide evidence for a length distinction between the vowels /ɛ ɔ/ such as [sɛ:ŋɿ] *xẻng* ‘shovel’ and [sɛŋɿ] *xanh* ‘green’ or [sɔ:ŋɿ] *xoong* ‘saucepan’ and [sɔŋm̄ɿ] *xong* ‘to finish’. Although these differences are phonetically robust, the fact that such pairs are also distinguished by differences in the articulation of the coda segment has led to some debate on the proper phonological treatment of the vowel system (Nguyễn Bạt Tụy 1949, 1959; Haudricourt 1952; Đoàn Thiện Thuật 1977).

While acoustic analysis of the accompanying audio files reveals small but consistent spectral differences between long and short /ɤ/, it has not been established that these differences are perceptually or psychoacoustically salient; therefore, they are transcribed here as instances of the same vowel quality, i.e. [ɤ ɤ̃]. /u/ is frequently realized as mid-centralized [ũ], leading some authors to transcribe it as [i] (Han 1966; Brunelle 2003). /ɯ ɯə/ neutralize to [iɯ] in colloquial Hanoi speech, although speakers who control a formal register may still be able to produce a difference based on the spelling, as can be heard by comparing the accompanying recordings of [ziwɿ] *dịu* ‘to soften’ and [ziɯəwɿ] *rượu* ‘liquor’.

### Monophthongs

tʰiɿ	<i>thi</i>	‘test’	tuɿ	<i>từ</i>	‘word’	tuɿ	<i>tù</i>	‘prison’
timɿ	<i>tim</i>	‘heart’				tumɿ	<i>tum</i>	(placename)
zipɿ	<i>dịp</i>	‘occasion’				zupɿ	<i>giúp</i>	‘to help’
tinɿ	<i>tin</i>	‘news’				lunɿ	<i>lùn</i>	‘short’
mitɿ	<i>mít</i>	‘jackfruit’	mutɿ	<i>mít</i>	‘jam’	butɿ	<i>bút</i>	‘pen’
siŋɿ	<i>xinh</i>	‘pretty’	suŋɿ	<i>sung</i>	‘to swell’	suŋm̄ɿ	<i>súng</i>	‘gun’
tʰikɿ	<i>thích</i>	‘to like’	sukɿ	<i>súc</i>	‘energy’	sukpɿ	<i>xúc</i>	‘to scoop’
			ŋujɿ	<i>ngửi</i>	‘to smell’	mujɿ	<i>mùi</i>	‘smell, taste’
ziwɿ	<i>dịu</i>	‘to soften’	kuiwɿ	<i>cứu</i>	‘to rescue’			

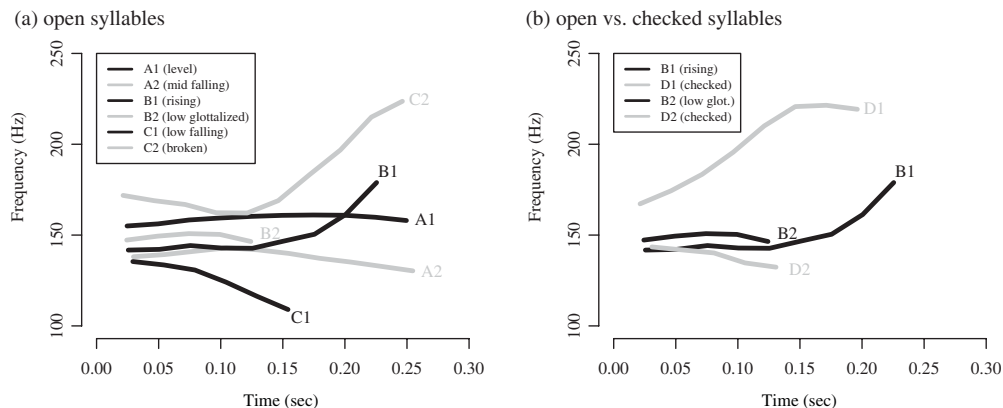
t <sup>h</sup> eɿ	<i>thê</i>	‘so’	txɿ	<i>tờ</i>	‘sheet’	toɿ	<i>tô</i>	‘to fill’
dɛmɿ	<i>đêm</i>	‘night’	t <sup>h</sup> ɿmɿ	<i>thơm</i>	‘fragrant’	tomɿ	<i>tôm</i>	‘shrimp’
sepɿ	<i>xếp</i>	‘to sort’	lypɿ	<i>lớp</i>	‘class’	hopɿ	<i>hộp</i>	‘box’
lenɿ	<i>lên</i>	‘go up’	lynɿ	<i>lớn</i>	‘big’	nonɿ	<i>nôn</i>	‘to vomit’
metɿ	<i>mệt</i>	‘tired’	ɬɿtɿ	<i>bớt</i>	‘to reduce’	ɬotɿ	<i>bột</i>	‘powder’
keŋɿ	<i>kênh</i>	‘channel’				soŋɿ	<i>sông</i>	‘river’
sekɿ	<i>xêch</i>	‘slanting’				sokpɿ	<i>sốc</i>	‘shock’
			mɿjɿ	<i>mới</i>	‘new’	mojɿ	<i>môi</i>	‘lip’
newɿ	<i>nếu</i>	‘if’						
t <sup>h</sup> ɛɿ	<i>thẻ</i>	‘card’	t <sup>h</sup> ɿmɿ	<i>tâm</i>	‘center’	toɿ	<i>to</i>	‘large’
tɛmɿ	<i>tem</i>	‘stamp’	lypɿ	<i>lấp</i>	‘to fill in’	tomɿ	<i>tom</i>	(onmptc.)
zɛpɿ	<i>dép</i>	‘sandals’	lyŋɿ	<i>lần</i>	‘time, turn’	hɔpɿ	<i>hợp</i>	‘to meet’
xɛnɿ	<i>khen</i>	‘to praise’	ɬɿtɿ	<i>bất</i>	‘no, none’	lonɿ	<i>lon</i>	‘can’
metɿ	<i>mét</i>	‘meter’	t <sup>h</sup> ɿŋɿ	<i>tầng</i>	‘floor, storey’	ɬotɿ	<i>bọt</i>	‘foam’
sɛŋɿ	<i>xanh</i>	‘green’	ɱɿkɿ	<i>nhấc</i>	‘take up, lift’	soŋɿ	<i>xong</i>	‘to finish’
sɛkɿ	<i>sách</i>	‘book’	mɿjɿ	<i>mấy</i>	‘how many’	sokpɿ	<i>sóc</i>	‘squirrel’
			zɿwɿ	<i>râu</i>	‘beard’	mojɿ	<i>mọi</i>	‘every’
zɛwɿ	<i>gieo</i>	‘to plant’						
t <sup>h</sup> aɿ	<i>tha</i>	‘to forgive’	tɔmɿ	<i>tắm</i>	‘to bathe’			
tamɿ	<i>tám</i>	‘eight’	sɔpɿ	<i>sắp</i>	‘soon’			
sapɿ	<i>sáp</i>	‘wax’	lɔnɿ	<i>lăn</i>	‘to roll’			
lanɿ	<i>lan</i>	‘orchid’	ɬɿtɿ	<i>bắt</i>	‘to catch’			
ɬatɿ	<i>bát</i>	‘bowl’	sɔŋɿ	<i>xăng</i>	‘petrol’			
sajɿ	<i>sang</i>	‘to cross’	sɔkɿ	<i>sắc</i>	‘sharp’			
sakɿ	<i>xác</i>	‘corpse’	mɿjɿ	<i>may</i>	‘lucky’			
majɿ	<i>mai</i>	‘tomorrow’	zɿwɿ	<i>rau</i>	‘vegetable’			
zawɿ	<i>dao</i>	‘knife’						

### Diphthongs

t <sup>h</sup> iəɿ	<i>thìa</i>	‘spoon’	t <sup>h</sup> uəɿ	<i>thua</i>	‘to lose’	t <sup>h</sup> uəɿ	<i>thưa</i>	(polite part.)
tiəmɿ	<i>tiêm</i>	‘to inject’	ɬuəmɿ	<i>buồm</i>	‘sail’	tuəmɿ	<i>tươm</i>	‘torn’
tiəpɿ	<i>tiếp</i>	‘continue’				tuəpɿ	<i>tước</i>	‘rent, torn’
liənɿ	<i>liên</i>	‘to link’	luənɿ	<i>luôn</i>	‘often’	luənɿ	<i>lươn</i>	‘eel’
ɬiətɿ	<i>biết</i>	‘to know’	ɬuətɿ	<i>buốt</i>	‘sharp pain’	uətɿ	<i>ướt</i>	‘wet’
tiəŋɿ	<i>tiếng</i>	‘sound’	suəŋɿ	<i>xuống</i>	‘go down’	suəŋɿ	<i>xương</i>	‘bone’
t <sup>h</sup> iəkɿ	<i>thiếc</i>	‘tin’	t <sup>h</sup> uəkɿ	<i>thuốc</i>	‘medicine’	t <sup>h</sup> uəkɿ	<i>thước</i>	‘ruler’
			ɬuəjɿ	<i>buổi</i>	‘time period’	ɬuəjɿ	<i>buổi</i>	‘pomelo’
ɱiəwɿ	<i>nhieu</i>	‘many’				zuəwɿ	<i>rượu</i>	‘liquor’

### Tones

Hanoi Vietnamese distinguishes eight tones: a six-tone paradigm in open or sonorant-final syllables and a two-tone paradigm in syllables ending in an unreleased oral stop. For convenience, the traditional Vietnamese names of the tones are provided here along with an alphanumeric code indicative of the tones’ historical origins (Michaud 2004).



**Figure 2** F0 tracks of tones for a male speaker of Hanoi Vietnamese. Panel (a) shows the six tones found in open sonorant-final syllables; panel (b) compares the pitch of rising and low glottalized tones in open or sonorant-final syllables (black lines) with their checked counterparts (gray lines).

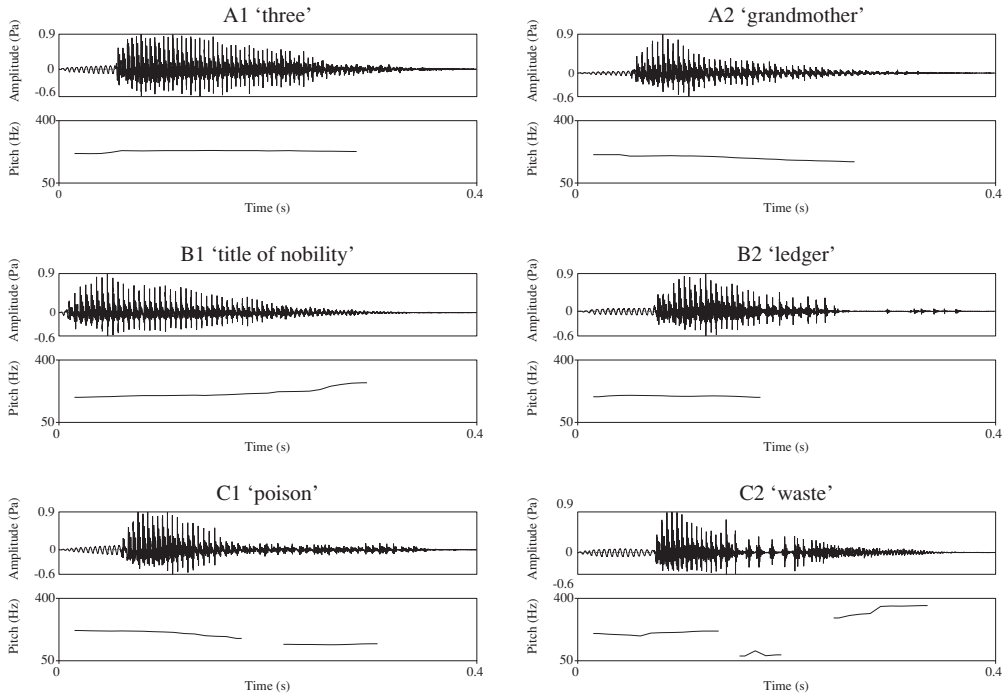
<i>ngang</i>	A1	↗ (level)	<i>ma</i>	<i>ma</i>	‘ghost’
<i>huyền</i>	A2	↘ (mid falling)	<i>ma</i>	<i>mà</i>	‘but, yet’
<i>sắc</i>	B1	↗ (rising)	<i>ma</i>	<i>má</i>	‘cheek’
	D1	↗ (rising checked)	<i>ma</i>	<i>mát</i>	‘cool’
<i>nặng</i>	B2	↘ (low glottalized)	<i>ma</i>	<i>mạ</i>	‘rice seedling’
	D2	↘ (low checked)	<i>ma</i>	<i>mạt</i>	‘louse, bug’
<i>hỏi</i>	C1	↘ (low falling)	<i>ma</i>	<i>mả</i>	‘tomb’
<i>ngã</i>	C2	↘ (broken)	<i>ma</i>	<i>mã</i>	‘code’

Like many languages of mainland Southeast Asia, pitch is not the only or even primary cue to tone in Hanoi Vietnamese. Instead, tones are realized by a complex of pitch and voice quality features (Nguyễn Văn Lợi & Edmondson 1998; Phạm 2001, 2003), which serve as crucial perceptual cues for native speakers (Brunelle 2009b). In particular, glottalization plays an important role in the production and perception of the broken (C2) and glottalized (B2) tones. The falling tones (A2, C1) have been described by some researchers as accompanied by a breathy voice quality (Thompson 1965; Phạm 2001, 2003); the low falling tone (C1) has also been described as accompanied by light final laryngealization (Nguyễn Văn Lợi & Edmondson 1998; Michaud 2004; Kirby 2010). However, in a laryngoscopic and laryngographic study of Northern Vietnamese tones, Brunelle et al. (2010) found that tone production did not systematically involve visually detectable constrictions other than glottal constriction.

Although duration has not been shown to be a salient perceptual cue to Vietnamese tone, syllables bearing tones B2 [↘] and C1 [↘] are often shorter than syllables bearing other tones due to the effects of final glottalization. Tone C1 [↘], sometimes pronounced with a falling–rising contour in conservative or careful speech, is colloquially realized as a low fall.

### Coda-tone restriction

Syllables with obstruent codas are subject to a tonal co-occurrence restriction. Citation tones D1 and D2 [↗] occur only on syllables ending in a voiceless oral stop (‘checked syllables’), and these are the only tones which occur on these syllables. While the D tones may be



**Figure 3** Waveforms and F0 tracks for the production of six Hanoi Vietnamese tones on the carrier syllable /6a/ uttered by a female speaker.

analyzed as allophones of the B tones, they are phonetically quite distinct. Tone B1 [˨˨] differs from D1 [˨˨] both in pitch onset as well as trajectory (see Figure 2b), and while tone B2 [˨˨] is characterized by strong final glottalization, tone D2 [˨˨] is produced with modal voice quality (Michaud 2004).

### Voice quality

Differences in the realization of voice quality in Hanoi Vietnamese tones can be seen in Figure 3, which shows waveforms and pitch tracks for the production of six tones on the carrier syllable /6a/ uttered by a female native speaker. Irregular glottal pulses are clearly visible in the waveforms of the B2 and C2 tokens, although in different locations: tone B2 [˨˨] is characterized by initial periodicity followed by strong glottalization, whereas tone C2 [˨˨] is interrupted by a strong medial glottal constriction. Some aperiodicity is also visible in the second half of the low falling token C1 [˨˨].

Despite its central role in the production and perception of Vietnamese tone, voice quality is not transcribed in the present illustration for three reasons. First, as emphasized by Phạm (2001, 2003), voice quality is an intrinsic property of the TONE, not of the vocalic nucleus, and at present the IPA transcription provides no way to reflect this important difference. Second, the existing system of IPA diacritics cannot impart the relevant details of the temporal alignment between voice quality and pitch. As illustrated in Figure 3, glottal constriction can literally interrupt the realization of the vocalic nucleus during production of the broken tone (C2), while nonmodal voicing is restricted to the final portion of the glottalized tone (B2); conversely, syllabic rimes bearing a low falling tone (C1) may be laryngealized or breathy throughout. This is consistent with the findings of Nguyễn Văn



Lợi & Edmondson (1998), who used airflow data to show changes of different degrees in the glottal stricture settings over the course of production of these three tones. Finally, as has been noted in all previous phonetic accounts, there exists considerable variation in the realization and magnitude of voice quality features between speakers and even within the speech of a single speaker, further complicating the issue of how such phonetically complex tones are best represented.

### Tonal coarticulation

Although Vietnamese tones are not subject to phonological tone sandhi (i.e. the realization of a tone is not affected by the surrounding tonal environment), tonal realization in connected speech is subject to phonetic coarticulation effects. Although tonal height coarticulation is bidirectional, progressive tonal coarticulation is much stronger than anticipatory coarticulation in Hanoi Vietnamese; dissimilatory coarticulation is completely absent (Han & Kim 1974; Brunelle 2003, 2009a).

## Conventions

### Syllable structure

A Vietnamese syllable consists of three obligatory elements: an onset, a tone and a vowel. The syllable may optionally contain an obstruent, nasal, or approximant coda. The initial consonant may be accompanied by a secondary labial articulation, as in [h<sup>w</sup>aː] *hoa* ‘flower’. This articulation never follows labial onsets except in loanwords, e.g. [tiən˨ ɓ<sup>w</sup>aː] *tiền boa* ‘tip’ (< French *pourboire*). The approximant /j/ never follows the front vowels /i iə e ɛ/, while /w/ never follows rounded vowels /u uə o ɔ/.

### Transcription of recorded passage

zɔː ɓ̥k̚ ʋaː mət̚ t̚ɛːj̚ kəj̚ ɲaw˨ sɛm˨ aːj̚ mɛŋ˨ hɯn˨ || t̚ɛːŋ̃m̃ luk̚p̚ ɔː  
 | mot̚ zu˨ xɛk̚ mək̚ mot̚ aw˨ x<sup>w</sup>ak̚ ɯm̚ di˨ k<sup>w</sup>aː || hɔː zaw˨ kɛw˨ vɯj̚  
 ɲaw˨ z̥ɲ̃ | ʔaj̚ la˨ ŋwəj̚ ɔ̃w˨ tiən˨ ma˨ kɔ˨ t<sup>h</sup>e˨ ɓ̥t̚ ŋwəj̚ zu˨ xɛk̚ kiə˨  
 | kɯj̚ ʔaw˨ | t<sup>h</sup>i˨ sɛ˨ | ɔ̃wək̚ kɔj̚ la˨ mɛŋ˨ hɯn˨ || səw˨ ɔː zɔː ɓ̥k̚ ɓ̥t̚  
 ɔ̃w˨ t<sup>h</sup>ɔj̚ mɛŋ˨ hɛt̚ suk̚ kɔ˨ t<sup>h</sup>e˨ | ɲaw̃ kəŋ˨ t<sup>h</sup>ɔj̚ | t<sup>h</sup>i˨ ŋwəj̚ zu˨ xɛk̚  
 kəŋ˨ zu˨ t̚ɛ̃t̚ ʔaw˨ x<sup>w</sup>ak̚ | ʋaː kuj̚ kuŋ̃˨ | zɔː ɓ̥k̚ ɔː fəj̚ tu˨ ɔː ||  
 səw˨ ɔː | mət̚ t̚ɛːj̚ suəj̚ ʔɯm̚ | ʋaː ŋwəj̚ zu˨ xɛk̚ liən˨ kɯj̚ ʔaw˨ x<sup>w</sup>ak̚  
 || kɛt̚ kuk̚p̚ la˨ | zɔː ɓ̥k̚ fəj̚ t<sup>h</sup>uə˨ ɲɯn˨ z̥ɲ̃ | mət̚ t̚ɛːj̚ la˨ ŋwəj̚ mɛŋ˨  
 hɯn˨ t̚ɛːŋ̃m̃ haːj̚ ŋwəj̚

### Orthographic version

Gió bắc và mặt trời cãi nhau xem ai mạnh hơn, trong lúc đó một du khách mặc một áo khoác ấm đi qua. Họ giao kèo với nhau rằng ai là người đầu tiên mà có thể bắt người du khách kia cởi áo thì sẽ được coi là mạnh hơn. Sau đó gió bắc

bắt đầu thổi mạnh hết sức có thể, nhưng càng thổi thì người du khách càng giữ chặt áo khoác và cuối cùng gió bắc đã phải từ bỏ. Sau đó mặt trời sưởi ấm và người du khách liền cởi áo khoác. Kết cục là gió bắc phải thừa nhận rằng mặt trời là người mạnh hơn trong hai người.

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## References

- Alves, Mark. 1995. Tonal features and the development of Vietnamese tones. *University of Hawaii Working Papers in Linguistics* 27, 1–14.
- Alves, Mark. 2002 [2007]. A look at North-Central Vietnamese. In Ratreé Wayland, John Hartmann & Paul Sidwell (eds.), *SEALS XII: Papers from the 12th Annual Meeting of the Southeast Asian Linguistics Society (2002)*, 1–10. Canberra: Pacific Linguistics.
- Alves, Mark & Nguyễn Duy Hương. 1998 [2007]. Notes on Thanh-Chương Vietnamese in Nghệ-An province. In Mark Alves, Paul Sidwell & David Gil (eds.), *SEALS VIII: Papers from the 8th Annual Meeting of the Southeast Asian Linguistics Society (1998)*, 1–10. Canberra: Pacific Linguistics.
- Andreev, Nikolai D. & Mirra V. Gordina. 1957. Sistema tonov v’etnamskogo iazyka (po eksperimental’nym dannym) [The system of tones in the Vietnamese language (according to experimental data)]. *Vestnik Leningradskogo gosudarstvennogo Universiteta* 8, 132–148.
- Barker, Milton E. 1966. Vietnamese–Muong tone correspondences. In Norman Zide (ed.), *Studies in comparative Austroasiatic linguistics*, 9–25. The Hague: Mouton.
- Barker, Muriel A. & Milton E. Barker. 1970. Proto-Vietnamuong (Annamuong) final consonants and vowels. *Lingua* 24(3), 268–285.
- Brunelle, Marc. 2003. Tonal coarticulation effects in Northern Vietnamese. In Maria-Josep Solé, Daniel Recasens & Joaquín Romero (eds.), *15th International Congress of Phonetic Sciences (ICPhS 15)*, 2673–2676. Barcelona: Futurgraphic.
- Brunelle, Marc. 2009a. Northern and Southern Vietnamese tone coarticulation: A comparative case study. *Journal of Southeast Asian Linguistics* 1, 49–62.
- Brunelle, Marc. 2009b. Tone perception in Northern and Southern Vietnamese. *Journal of Phonetics* 37(1), 79–96.
- Brunelle, Marc & Stefanie Jannedy. 2007. Social effects on the perception of Vietnamese tones. In Jürgen Trouvain & William J. Barry (eds.), *16th International Congress of Phonetic Sciences (ICPhS 16)*, 1461–1464. Saarbrücken: Universität des Saarlandes.
- Brunelle, Marc, Duy Dương Nguyễn & Khắc Hùng Nguyễn. 2010. A laryngographic and laryngoscopic study of Northern Vietnamese tones. *Phonetica* 67, 147–169.
- Cadière, Léopold M. 1902. *Phonétique annamite (dialecte du Haut-Annam)* (Publications de l’École française d’Extrême-Orient III). Paris: E. Leroux.
- Cao Xuân Hạo. 1978. Số phận các vần có nguyên âm hẹp qua các phương ngữ lớn của Việt Nam [The fate of syllables containing close vowels in the major dialects of Vietnam]. In *Thông báo ngữ âm học*. TP Hồ Chí Minh: Viện Khoa học Xã hội.
- Cao Xuân Hạo. 1986. Nhận xét về các nguyên âm của một phương ngữ ở tỉnh Quảng Nam [Remarks on the vowels in the dialect of Quảng Nam province]. *Ngôn ngữ* 1986 2, 22–29.

- Cao Xuân Hạo. 1988. Hai vấn đề âm vị học của phương ngữ Nam Bộ [Two phonological issues in the Southern Vietnamese dialect]. *Ngôn ngữ* 1988 1, 48–53.
- Diffloth, Gérard. 1989. Proto-Austroasiatic creaky voice. *Mon-Khmer Studies* 15, 139–154.
- Diffloth, Gérard. 1992. Vietnamese as a Mon-Khmer language. In Martha Ratliff & Eric Schiller (eds.), *SEALS I: Papers from the First Annual Meeting of the Southeast Asian Linguistics Society (1990)*, 125–139. Tempe, AZ: Arizona State University, Program for Southeast Asian Studies.
- Đoàn Thiện Thuật. 1977. *Ngữ âm tiếng Việt* [Vietnamese phonetics]. Hà Nội: Nhà Xuất Bản Đại Học Quốc Gia.
- Earle, Michael A. 1975. *An acoustic phonetic study of northern Vietnamese tones*. Santa Barbara, CA: Speech Communications Research Laboratory.
- Edmondson, Jerold, Yueh Chin Chang, Hui Chuan J. Huang, Feng Fan Hsieh & Yuren Peng. 2010. Bracing of voiceless stop codas in Taiwanese, Vietnamese, and other Southeast Asian languages: Laryngoscopic case studies. Poster presented at the 12th Conference on Laboratory Phonology, University of New Mexico, 8–10 July 2010.
- Emeneau, Murray B. 1951. *Studies in Vietnamese (Annamese) grammar* (University of California Publications in Linguistics). Berkeley, CA: University of California Press.
- Esling, John H., Katherine E. Fraser & Jimmy G. Harris. 2005. Glottal stop, glottalized resonants, and pharyngeals: A reinterpretation with evidence from a laryngoscopic study of Nuuchahnulth (Nootka). *Journal of Phonetics* 33, 383–410.
- Ferlus, Michel. 1975. Vietnamien et Proto-Viet-Muong. *Asie du sud-est et monde insulindien* 6(4), 21–55.
- Ferlus, Michel. 1982. Spirantisation des obstruantes médiales et formation du système consonantique du vietnamien. *Cahiers de linguistique – Asie Orientale* 11, 83–106.
- Ferlus, Michel. 1991. Le dialecte vietnamien de Vinh. Presented at the 24th International Conference on Sino-Tibetan Languages and Linguistics, Ramkhamhaeng University, Bangkok.
- Ferlus, Michel. 1992. Histoire abrégée de l'évolution des consonnes initiales du vietnamien et du sino-vietnamien. *Mon-Khmer Studies* 20, 111–125.
- Ferlus, Michel. 1995. Particularités du dialecte vietnamien de Cao La Ha (Quang Binh, Vietnam). Presented at the Dixièmes Journées de Linguistique de l'Asie Orientale, Ecole des Hautes Etudes en Sciences Sociales, Paris.
- Ferlus, Michel. 1996. Langues et peuples viet-muong. *Mon-Khmer Studies* 26, 55–66.
- Ferlus, Michel. 1997. Problèmes de la formation du système vocalique du vietnamien. *Cahiers de linguistique – Asie Orientale* 26, 37–51.
- Ferlus, Michel. 1998. Les systèmes de tons dans les langues viet-muong. *Diachronica* 15, 1–27.
- Ferlus, Michel. 2004. The origin of tones in Viet-Muong. In Somsong Burusphat (ed.), *SEALS XI: Papers from the 11th Annual Meeting of the Southeast Asian Linguistics Society (2001)*, 297–313. Tempe, AZ: Arizona State University, Program for Southeast Asian Studies.
- Gage, William W. 1985. Glottal stops and Vietnamese tonogenesis. *Oceanic Linguistics Special Publications* 20, 21–36.
- Gordina, Mirra V. 1960a. O nekotorykh spornykh voprosakh foneticheskogo stroia v'etnamskogo iazyka [On some debatable questions in Vietnamese phonetics]. *Uchenye zapiski Leningradskogo ordena Lenina gosudarstvennogo Universiteta im. A. A. Zhdanova* 237, 170–187.
- Gordina, Mirra V. 1960b. Osnovnye voprosy foneticheskogo stroia v'etnamskogo iazyka [Fundamental questions of the phonetic structure of Vietnamese]. Kandidat Nauk in Philological Sciences. Leningrad: Academy of Sciences, Institute of Language Study.
- Gordina, Mirra V. 1961. O fonologichskoi traktovke v'etnamskikh diftongov [On the phonological interpretation of Vietnamese diphthongs]. *Uchenye zapiski Leningradskogo ordena Lenina gosudarstvennogo Universiteta im. A. A. Zhdanova* 301, 29–36.
- Gordina, Mirra V. 1963. Sistema tonov danangskogo govora v'etnamskogo iazyka [The system of tones of the Danang dialect of Vietnamese]. In Georgii P. Serdiuchenko (ed.), *Iazyki Kitaia i Iugo-Vostochnoi Azii* [The languages of China and Southeast Asia], 13–23. Moscow: Nauka.
- Gordina, Mirra V. 1964. Dlitel'nost' glasnykh v'etnamskogo iazyka [Vowel length in Vietnamese]. *Uchenye zapiski Leningradskogo ordena Lenina gosudarstvennogo Universiteta im. A. A. Zhdanova* 325, 175–193.

- Gordina, Mirra V. & Igor S. Bystrov. 1984. *Foneticheskii stroi v'etnamskogo iazyka* [Phonetic structure of the Vietnamese language]. Moscow: Nauka.
- Gregerson, Kenneth & David Thomas. 1976. Vietnamese hỏi and ngã tones and Mon-Khmer *-h* finals. *Mon-Khmer Studies* 5, 76–83.
- Han, Miekko S. 1966. *Vietnamese vowels* (Studies in the Phonology of Asian Languages 4). Los Angeles, CA: University of Southern California, Acoustic Phonetics Research Laboratory.
- Han, Miekko S. & Kong-On Kim. 1974. Phonetic variation of Vietnamese tones in disyllabic utterances. *Journal of Phonetics* 2, 223–232.
- Harris, Jimmy G. 2006. A palatographic study of places of articulation in Thai and some other Southeast Asian languages: Dentals, alveolars, and palatals. In James E. Harris (ed.), *Readings in articulatory phonetics 1: Consonants and phonation types*, 63–91. Bangkok: Ek Phim Thai Co.
- Haudricourt, André G. 1952. Les voyelles brèves du vietnamien. *Bulletin de la Société de Linguistique de Paris* 48(1), 90–93.
- Haudricourt, André G. 1953. La place du vietnamien dans les langues austroasiatiques. *Bulletin de la Société de Linguistique de Paris* 49(1), 122–128.
- Haudricourt, André G. 1954. De l'origine des tons en vietnamien. *Journal Asiatique* 242, 69–82.
- Hayes, La Vaughn H. 1992. Vietic and Việt-Mường: A new subgrouping in Mon-Khmer. *Mon-Khmer Studies* 21, 211–228.
- Henderson, Eugénie J. A. 1965. The articulation of final ‘-nh’ and ‘-ch’ in Vietnamese. In Eberhard Zwirner & Wolfgang Bethge (eds.), *5th International Congress of Phonetic Sciences (ICPhS 5)*, 348–352. Basel & New York: S. Karger.
- Hoàng Cao Cường. 1986. Suy nghĩ thêm về thanh điệu tiếng Việt [Further thoughts on Vietnamese tone]. *Ngôn ngữ* 3, 19–38.
- Hoàng Thị Châu. 1989. *Tiếng Việt trên các miền đất nước* [Vietnamese in all regions of the country]. Hà Nội: Nhà Xuất Bản Khoa Học Xã Hội.
- Honda, Koichi. 2006. F0 and phonation type in Nghe Tinh Vietnamese tones. In Paul Warren & Catherine I. Watson (eds.), *Proceedings of the 11th Australian International Conference on Speech Science & Technology*, 454–459. Canberra: Australasian Speech Science and Technology Association Inc.
- Kirby, James P. 2010. Dialect experience in Vietnamese tone perception. *Journal of the Acoustical Society of America* 127(4), 3749–3757.
- Lê Văn Lý. 1948. *Le parler vietnamien: essai d'une grammaire vietnamienne*. Paris: Hường Anh.
- Maspero, Henri. 1912. Études sur la phonétique historique de la langue annamite: Les initiales. *Bulletin de l'École Française d'Extrême Orient* 12, 114–116.
- Matisoff, James A. 1973. Tonogenesis in Southeast Asia. In Larry Hyman (ed.), *Consonant types and tone* (Southern California Occasional Papers in Linguistics 1), 71–95. Los Angeles, CA: University of Southern California.
- Michaud, Alexis. 2004. Final consonants and glottalization: New perspectives from Hanoi Vietnamese. *Phonetica* 61, 119–146.
- Michaud, Alexis, Vũ Ngọc Tuấn, Angélique Amelot & Bernard Roubeau. 2006. Nasal release, nasal finals and tonal contrasts in Hanoi Vietnamese: An aerodynamic experiment. *Mon-Khmer Studies* 36, 121–137.
- Ngô Thanh Nhân. 1984. *The syllabeme and patterns of word formation in Vietnamese* [Tiếng và các mẫu cấu tạo từ trong tiếng Việt]. Ph.D. dissertation, New York University.
- Nguyễn Bạt Tụy. 1949. *Chữ và vần Việt Nam khoa học* [Scientific study of Vietnamese letters and syllables]. Sài Gòn: Ngôn ngữ.
- Nguyễn Bạt Tụy. 1959. *Ngôn Ngữ học Việt Nam* [Vietnamese linguistics]. Sài Gòn: Ngôn ngữ.
- Nguyễn Văn Lợi & Jerold A. Edmondson. 1998. Tones and voice quality in modern northern Vietnamese: Instrumental case studies. *Mon-Khmer Studies* 28, 1–18.
- Nguyễn Đình Hoà. 1997. *Vietnamese: Tiếng Việt không son phấn* [Vietnamese without veneer]. Amsterdam: John Benjamins.
- Phạm, Hoa T. (Andrea). 2001. *Vietnamese tone: Tone is not pitch*. Ph.D. dissertation, University of Toronto.

- Phạm, Hoa T. (Andrea). 2003. *Vietnamese tone: A new analysis*. New York: Routledge.
- Phạm, Hoa T. (Andrea). 2005. Vietnamese tonal system in Nghi Loc: A preliminary report. In Chiara Frigeni, Manami Hirayama & Sara Mackenzie (eds.), *Toronto Working Papers in Linguistics* 24, 183–201.
- de Rhodes, Alexander. 1651. *Dictionarium annamiticum, lusitanum et latinum*. Rome: Congregation for the Propagation of the Faith.
- Sampson, Geoffrey. 1969. Hanoi dorsal finals. *Bulletin of the School of Oriental and African Studies, University of London* 32(1), 115–134.
- Seitz, Philip F. D. 1986. *Relationships between tones and segments in Vietnamese*. Ph.D. dissertation, University of Pennsylvania.
- Stebbins, Jeffrey R. 2010. *Usage frequency and articulatory reduction in Vietnamese tonogenesis*. Ph.D. dissertation, University of Colorado.
- Tabard, Jean-Louis. 1838. Introduction to: Pierre-Joseph Pigneau and Jean-Louis Tabard, *Dictionarium Anamitico-Latinum*. Serampore: J. Marshman.
- Thompson, Laurence C. 1959. Saigon phonemics. *Language* 35(3), 454–476.
- Thompson, Laurence C. 1965. *A Vietnamese grammar*. Seattle, WA: University of Washington.
- Thompson, Laurence C. 1976. Proto-Viet-Muong phonology. In Philip N. Jenner, Laurence C. Thompson & Stanley Starosta (eds.), *Austroasiatic studies*, 1113–1204. Honolulu, HI: The University of Hawaii Press.
- Thurgood, Graham. 2002. Vietnamese and tonogenesis: Revising the model and the analysis. *Diachronica* 19(2), 333–363.
- Thurgood, Graham. 2007. Tonogenesis revisited: Revising the model and the analysis. In Jimmy G. Harris, Somsong Burusphat & James E. Harris (eds.), *Studies in Tai and Southeast Asian linguistics*, 263–291. Bangkok: Ek Phim Thai Co.
- Vũ Thanh Phương. 1981. *The acoustic and perceptual nature of tone in Vietnamese*. Ph.D. dissertation, Australian National University, Canberra.
- Vũ Thanh Phương. 1982. Phonetic properties of Vietnamese tones across dialects. In David Bradley (ed.), *Papers in Southeast Asian Linguistics 8: Tonation* (Pacific Linguistics Series A – No. 62), 55–75. Canberra: Australian National University.