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Tone in Pichi

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1. Introduction

Pichi, the English-lexifier Creole of Bioko (Equatorial Guinea) features a mixed prosodic system similar to the ones identified for other Atlantic Creoles (see e.g. Alleyne 1980, Berry 1971, Devonish 1998, 2002; Faraclas 1997; Good 2004, 2006; Rivera Castillo 1998; Rivera Castillo and Faraclas 2005; Rountree 1972a). The language exhibits a stratified lexicon with a majority of roots characterised by pitch accent and a minority characterised by tone. On the following pages, I present a brief summary of the suprasegmental system of Pichi. I refer the reader interested in a more detailed description to my dissertation entitled "A grammar of Pichi" currently in preparation under the supervision of Pieter Muysken and Norval Smith at the University of Nijmegen. In the following, I use the term 'accent class' for words with a single specified high tone while 'tone class' designates words fully specified for high and low tones. Members of these classes are 'accented' and 'tonal' words respectively. The neutral term 'pitch class' subsumes both accented and tonal words.

I employ a shallow system of tonal notation with as few tone-marks as possible (see Bird 1998). Unmarked monosyllables and penultimate syllables of polysyllabic words always bear a H-Tone. When a low occurs elsewhere in the word it is marked so by an acute accent [ó]. Conversely, a low-toned mono- or penultimate syllable always bears a grave accent [ò]. Unmarked syllables not covered by these notation rules are always low. The analysis was done from connected speech and from words pronounced in isolation contained in my field data using the Praat 5.0 software. In the following figures, the vertical axis provides pitch in Hertz (Hz). The horizontal axis provides the time elapsed (1.0 = 1 second).

2. Distinctive tones

The tone-bearing unit in Pichi is the syllable. Pichi contrasts two level tones, a high tone (H) and a low tone (L). Toneless syllables (X) are unspecified for tone and bear a phonetic L by default. Contour tones do not constitute tonemes in their own right. Figure 1 and Figure 2 below present the pitch trace and segmentation of the two pitch-accented words *dɔ̀tí* (X.H) 'be dirty', *asis* (X.H) 'ashes'. The transcription in the segmentation is phonetic. Like all words belonging to an accent class these words bear a single H over the accented syllable, while the other syllable is unspecified for tone:

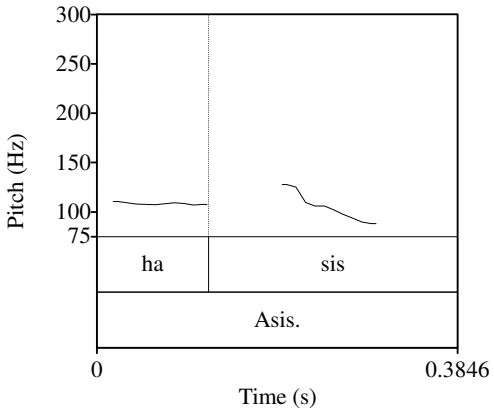

Figure 1: H.X pattern

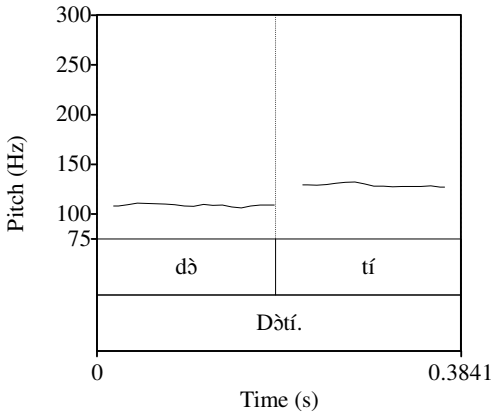

Figure 2: X.H pattern

Words fully specified for tone, hence belonging to one of the tone classes (see Table 1) may bear more than one H-Tone, or no H-Tone at all. With this class of words, one usually does not find downstepped H-Tones within the word boundary (see 5.3). Compare the pitch traces of the utterance-final tonal words *nyɔní* 'ant' and *Bàta* 'Fang'. These words are presented in the collocations *lèk nyɔní* 'like ants' and *tɔk Bàta* 'speak Fang'. Equally, the final syllables of tonal words are not usually followed by an utterance-final boundary tone (see 7):

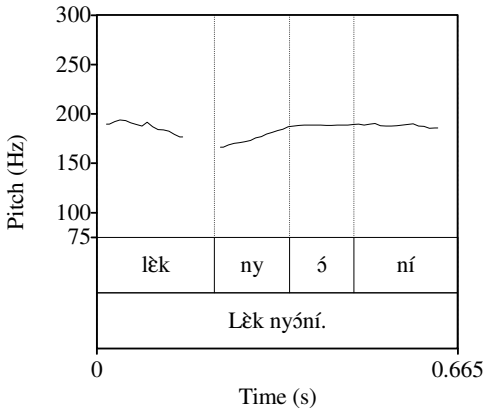

Figure 3: H.H pattern

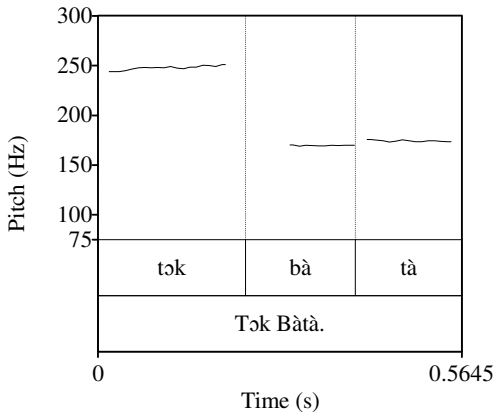

Figure 4: L.L pattern

3. Lexical and morphological tone

Pichi makes use of lexical tone in order to distinguish a small number of roots from each other. The list in (1) provides most words in the corpus to which this applies:

(1)	L-Tone		H-Tone	
	ày	'1SG.SBJ'	*ay*	'PCL'
	bày	'by'	*bay*	'buy'
	bɔ̀t	'but'	*bɔt*	'give a stroke with the head
	dè	'IPFV'	*de*	'day; there'
	dì	'ART'	*di*	'this'
	lɛ̀k	'like'	*lɛk*	'(to) like'
	sò	'so'	*so*	'sew; show'

Morphological tone is employed in the personal pronoun paradigm in order to distinguish lexically identical but morphologically different forms from one another (e.g. *mì* '1SG.POSS - *mi* '1SG.EMP', *dɛ̀n* '3PL' - *dɛn* '3PL.EMP'). Pichi also features a morphological tonal process. (see 5.4). Additionally, there are three morphologically different forms, which presumably derive from a common etymon and are distinguished by pitch alone are: *dè* 'IPFV' - *de* 'COP', *dì* 'ART' – *di* 'this', *gò* 'POT' – *go* 'go'). All low-toned monosyllabic roots are words with grammatical functions i.e. personal pronouns (e.g. *à* '1SG.SBJ'), determiners (e.g. *dì* 'ART'), TMA markers (e.g. *bìn* 'ANT', *kìn* 'HAB'), conjunctions (e.g. *ɛ̀f* 'if'), or prepositions (e.g. *pàn* 'on').

4. Pitch classes

Pichi exhibits a phonologically stratified lexicon. A total of 94% of entries contained in my lexical data-base are best characterised as accented words: A single H-Tone is assigned to a root, whereby a predictable tonal pattern over the word arises. All other words, including low-toned monosyllables are tonal. Every syllable is fully specified for tone. Many of these words (e.g. *nyɔní* 'ant' < Mende *yɔní* 'red ant') originate from African languages rather than English.

Table 1 below contains a classification according to pitch class of all simplex roots contained in the lexical data base of my corpus (see Faraclas 1996, Good 2004, 2006 for pitch classes in Nigerian Pidgin and Saramaccan respectively). Furthermore, I have subdivided the pitch classes by type into major and minor classes. Together, members of the major tone classes constitute 94% of roots. A few examples are provided for each pitch class. Words in the 'pitch class' column with a toneless (X) syllable are accented, others tonal:

Pitch class	Examples	No. of items	% of total
Major			
H	*bay* 'buy', *aks* 'ask', *kyɛr* 'carry, take'	413	54.1
H.X	*drɔngo* 'be dead drunk', *kɔmpin* 'friend'	178	23.3
X.H	*bɔ̀kú* '(be) much', *sàbí* 'know', *wàtá,* 'water'	107	14.0
L	*dè* 'IPFV', *gò* 'POT', *sɔ̀n* 'some, a', *fɔ̀* 'ASS'	19	2.5
Subtotal		**717**	**94.0**
Minor			
X.H.X	*ɔspitul* 'hospital', *wahala* 'trouble'	14	1.8
H.H	*nyɔní* 'ant', *soté* 'until', *sosó* 'only'	11	1.4
X.X.H	*ɔndàstán* 'understand', *prɔ̀patí* 'property'	10	1.3
H.X.X	*kápinta* 'carpenter', *méréɛsin* 'medicine'	6	0.8
L.H.H	*okobó* 'impotent man'	3	0.4
L.L	*bàta* 'buttocks'	2	0.3
Subtotal		**46**	**6.0**
Total		**763**	**100.0**

Table 1: Token distribution of pitch classes

Table 1 also points to other characteristics of the corpus. With 54.1%, about half the roots are H-toned monosyllables. Another 25.2% are polysyllabic roots with an H-Tone over the penultimate syllable (of which a mere 1.8% have more than two syllables). Together, these two groups constitute an overwhelming majority of 79.3% of all roots. An additional 15.3% bear H-Tone over the final syllable. Most roots in the corpus, namely 94,6 %, therefore carry an H-Tone over the only syllable, the penultimate syllable or the final syllable. In sum, the larger part of roots in my data are fairly uniform and forecastable in their pitch configuration.

5. Tonal processes

This section covers tonal changes that take place within a tonal domain. Tonal domains may be confined to the word, or they may cut across word boundaries in specific, phono-syntactic phrases (see Good 2006; Yip 2002). The tonal processes that take place within tonal domains are covered in sections 5.1 to 5.4:

5.1. Spreading

H-Tones may spread rightwards to adjacent toneless syllables of the word. Tone spreading typically occurs utterance-medially in two contexts. Firstly emphatic or lexical stress (6.1) may raise the pitch of an H-Tone which then spreads rightwards onto a toneless syllable. Secondly, H-Tone spreading may occur when a toneless syllable is hemmed in by two adjacent H-Tones within a verb phrase. This kind of spreading was identified when the final toneless syllable of a verb with an H.X pattern is immediately followed by the initial or only H of the ensuing object. In Figure 5 below, the toneless syllable of *finis* 'finish' followed by the object *skul* 'school' is raised in pitch to the level of an H-Tone. The pitch trace in Figure 6 exemplifies the same tonal process with *vɔmit* 'vomit' and the following object *chɔp* 'food':

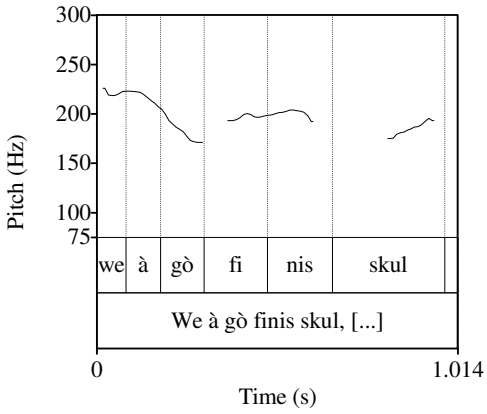

Figure 5: H-Tone spreading

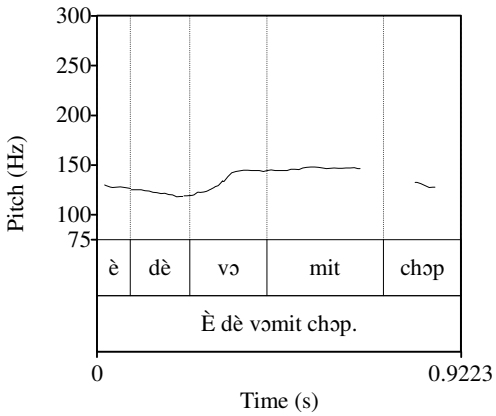

Figure 6: H-Tone spreading

(2) **H spreads to X followed by H**

We	à	gò	finis	skul.
H	L	L	H.X	H
SUB	1SG.SBJ	POT	finish	school

'When I finish school. →

We à gò **finís skul** […]
H L L **H.H H**

(3) **H spreads to X followed by H**

È	dè	vɔmit	chɔp.
L	L	H.X	H
3SG.SBJ	IPFV	vomit	food

'He is vomiting (the) food.' →

È dè **vɔmít chɔp**.
L L **H.H H**

5.2. Floating

Pichi makes extensive use of floating boundary tones for the purpose of intonation (see 7) Aside from that, a lexical tone may be set afloat when two adjoining vowels merge or one of two adjoining vowels is deleted. Tone floating is particularly likely to occur in the contact zone between a H-toned high frequency function word and a following L-toned vowel. In Figure 7, the final consonant /k/ of *mek* 'SBJV' is deleted. This creates a vowel hiatus, which in turn leads to the deletion of the first, higher /e/ of *mek* in favour of the second, lower vowel /à/. The rising-falling contour over *mâ (mek = à)* is clearly visible:

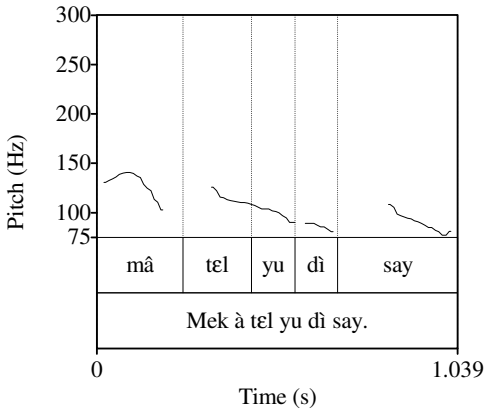

Figure 7: Vowel deletion sets tone afloat

(4) **Floating H forms HL contour**

Mek	à	tɛl	yu	dì	say.	→	**Mâ**	tɛl	yu	dì	say.
H	L	H	H	L	H		**HL**	H	H	L	H
SBJV	1SG.SBJ	tell	2SG.EMP	ART	side						

'Let me tell you the place

5.3. Downdrift and downstep

Downdrift and downstep contribute to a general downward cline of pitch in utterances. An utterance normally begins with a high pitch onset and declines progressively with every lexical tone. Downdrift (indicated by ↓H) causes an H to be lowered by a preceding L-Tone as in Figure 8. The overall effect of downdrift is visible by the roughly equal pitch over the initial L-toned *nà* 'FOC' and the final H-toned -*grɔn* 'ground':

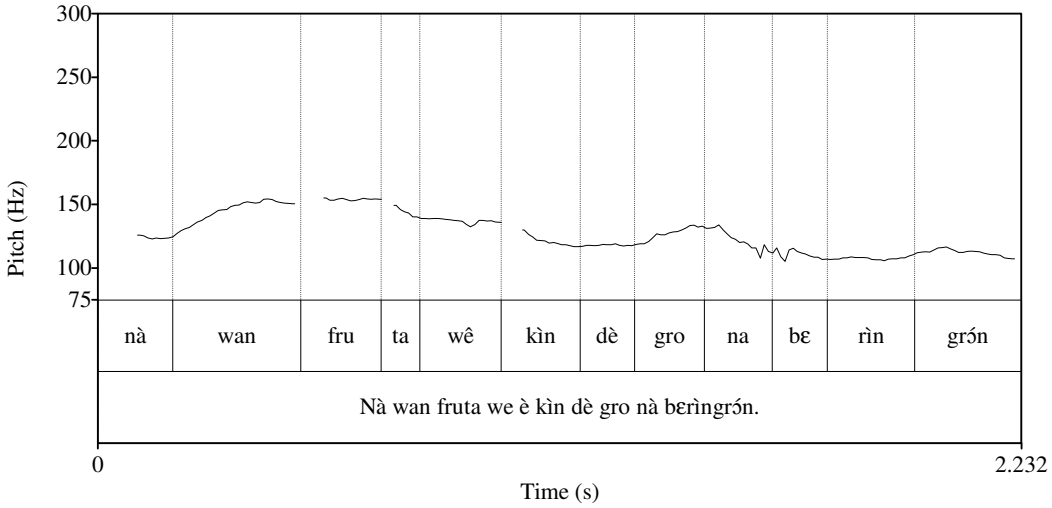

Figure 8: Downdrift

(5) **H is lowered by downdrift**

Nà	wan	fruta	we	è	kìn	dè	gro	nà	bɛrìn.grɔ́n.
L	H	H.X	H	L	L	L	H	L	X.X.H
FOC	one	fruit	SUB	3SG.SBJ	HAB	IPFV	grow	LOC	burial.ground

'It's a fruit that grows in the graveyard.' →

Nà	**wan**	fruta	**we**	è	kìn	dè	**gro**	nà	bɛrìn.**grɔ́n**.
L	**↓H**	H.L	**↓H**	L	L	L	**↓H**	L	L.L.**↓H**

The second phenomenon involving declination is downstep (indicated by –H). In a series of adjacent H-Tones, each tone may be lowered successively in relation to the preceding one. Downstep is exemplified below by the two successive homophones in Figure 9 and the iteration in Figure 10 below:

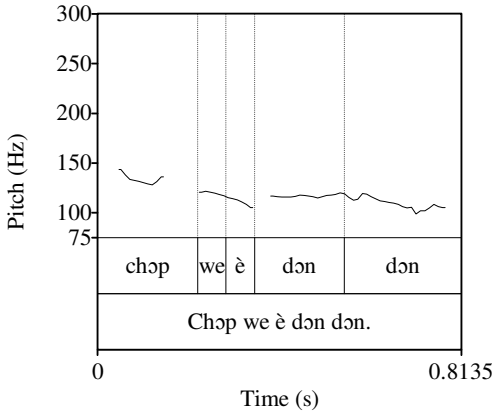

Figure 9: Downstep

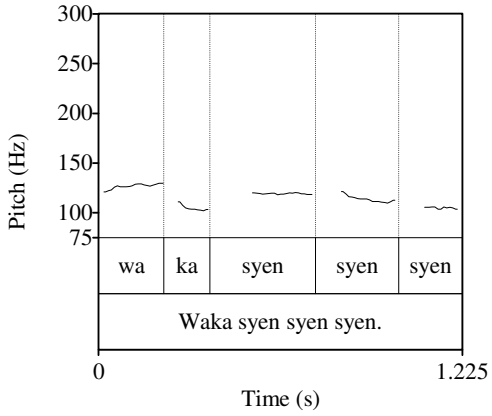

Figure 10: Downstep

(6) **H is lowered by downstep**

Chɔp	we	è	dɔn	dɔn.
H	H	L	H	H
food	SUB	3SG.SBJ	PRF	done

'Food that is done.' →

Chɔp	**we**	è	dɔn	**dɔn**.
H	**-H**	L	H	**-H**

(7) **H is lowered by downstep**

Waka	syen	syen	syen.
H.X	H	H	H
walk	same	same	same

'Walk exactly in one line.' →

Waka	syen	**syen**	**syen**.
H.L	H	**-H**	**-H**

5.4. Deletion

Tone deletion occurs in two contexts. In reduplicative and non-reduplicative compounds, all lexical tones over the first component – the reduplicant or the dependent - are deleted. Syllables whose tones have been deleted become toneless and are pronounced as L by default. The base or head retains its original tonal configuration:

(8) **Lexical tone is deleted in compounding**

fisin	human	→	**fisin**.human
H.X	H.X		**L.L**.H.X
'(to) fish'	'woman'		'(to)fish.woman'

(9) **Lexical tone is deleted in reduplication**

Dɛ̀n	dè	lɔk	dì	say.	→	Dɛ̀n	dè	**lɔ̀k.lɔ́k**	ɔl	say.
L	L	H	L	H		L	L	**L.H**	H	H
3PL	IPFV	lock	ART	side		3PL	IPFV	RED.lock	all	side

‘They’re closing the place.’ ‘They’re constantly closing every place.’

The second context in which tone deletion occurs is when boundary tones are employed for continuative question intonation (see 7.3).

6. Stress

In Pichi, H-Tone is the only consistent indicator of prominence. The data does not reveal any systematic appearance of other phonetic features like lengthening or increased loudness on syllables bearing an H-Tone. However, there are two uses of pitch which I here refer to as ‘stress’. For one, an extra high tone may be optionally exploited to signal focus or emphasis (see 6.1). Secondly, Pichi has lexical stress. Certain types of words with grammatical and pragmatic functions almost exclusively occur with a higher-than-usual pitch (see 6.2).

6.1. Emphatic stress

Emphatic stress is controlled by speakers in order to focus and emphasise constituents and entire sentences. Eligible constituents are nouns including pre- and post nominal modifiers; verbs, either alone or as part of serial verb constructions, including verb modifiers like adverbs and ideophones, verbs and their complements as well as adverbial phrases. Emphatic stress is produced in two ways. If the focused or emphasised constituents are non-final, they bear a higher than usual pitch, an extra high tone on H-toned syllables. The extra high tone may spread rightwards onto following toneless syllables until the word boundary is reached (see 5.1). Figure 11 features the clefted predicate *drɔngo* ‘be dead drunk’. In the pitch trace, the emphatic character of the predicate cleft construction is evident in two ways. The H-toned syllable of *drɔngo* bears an extra high tone and the /r/ is lengthened for emphasis. The utterance in Figure 11 shades off into a chuckle from the fifth syllable onwards, hence the wavering pitch trace:

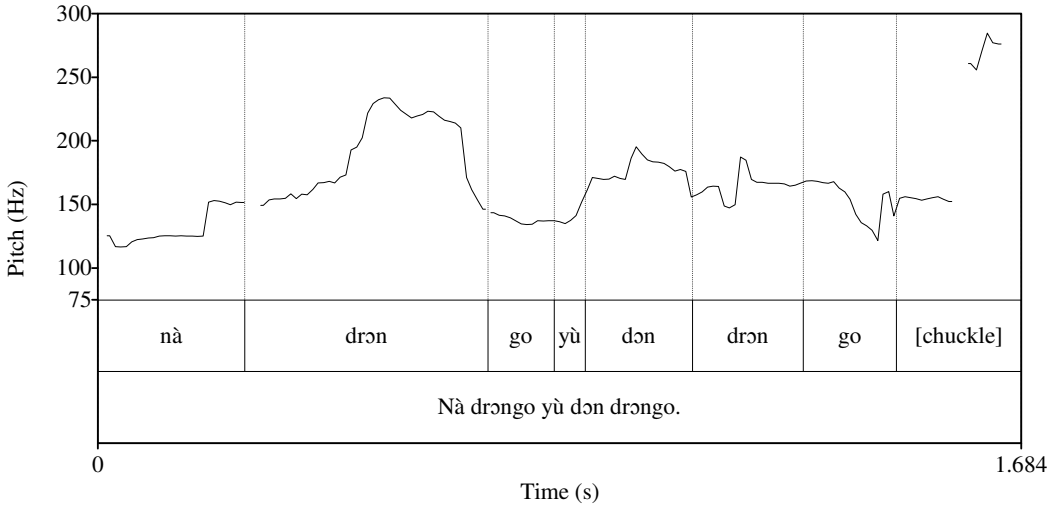

Figure 11: Predicate cleft and emphatic stress

(10) **Predicate cleft + emphatic stress**

Nà	drɔngo	yù	dɔn	drɔngo.	→	Nà	[**drrrɔngo**]	yù	dɔn	drɔngo.
L	H.X	L	H	H.X		L	**+H**.L	L	H	H.L
FOC	be.dead.drunk	2SG	PRF	be.dead.drunk						

'You're absolutely dead drunk.'

6.2. Lexical stress

Most function words lexically determined in their stressability in one of two ways: A small number of H-toned (e.g. *dɔn* 'PRF', *kan* 'PFV') and all L-toned function words never receive stress at all. A second group of function words almost exclusively with an extra high tone over their H-toned syllable, even in non-emphatic contexts. With these words, extra high tone appears to be lexically assigned. Lexically stressed items are key elements in pragmatically marked contexts, e.g. the question elements *haw* 'how', *wetin* 'what', *udat* 'who', *ustin* 'what'; the subjunctive marker *mek* which also marks directive clauses; negators; and modifications of degree via reduplication like *big big* 'very big' or the degree adverb *bad* 'extremely').

The following example presents the occurrence of lexical stress in modifications of degree. Modifiers of degree are often lexically stressed, whether they occur in simplex forms or in intensifying reduplications. Both reduplicants in the intensifying reduplication *big big* 'be huge' in Figure 12 below carry an extra high tone. There is no sign of downstep in the reduplicated sequence:

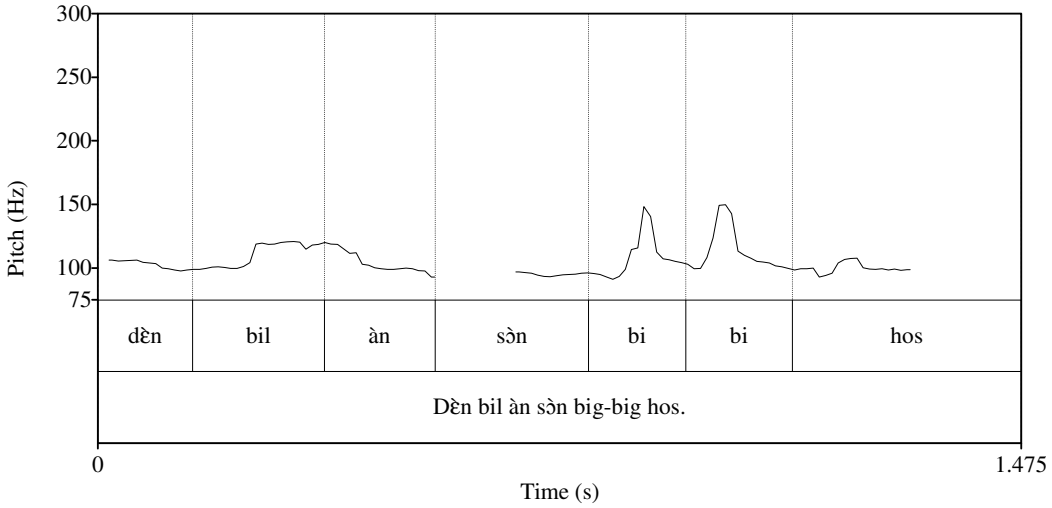

Figure 12: Lexical stress

(11) **Lexical stress over intensifying reduplication**

Dɛ̀n	bil	àn	sɔ̀n	**big big**	hos.
H	H	L	H	**+H+H**	H
3PL	build	3SG.OBJ	some	big big	house

'They built him a huge house.'

7. Intonational tone

Stress (see 6), particles (e.g. *sɛ́f* 'EMP', *syenwe* 'EMP', *naw* 'now' *ò* 'SP', *nɔ̀* 'Q; right' *èn* 'Q', and boundary tones interact in Pichi in order to fulfil pragmatic and grammatical functions associated mainly with intonation in stress-accent languages like English (see Pierrehumbert 1980). Boundary tones are floating tones that are inserted at the right edge of an utterance. In Pichi, boundary tones serve pragmatic functions by differentiating sentence types like declaratives from questions. They also fulfil grammatical functions by linking clauses. Utterance-final tonal words generally do not occur with intonational boundary tones (see 7.5). Four boundary tones (in the following represented by %; see Pierrehumbert 1980) were identified in the corpus. Their functions with the two major utterance types are summarised in Table 2 below:

Boundary tone	Declaratives	Questions
L%	Non-emphatic	Content
H% (EMP)	Emphatic	Emphatic
Ø%	Continuative	—
H% (Q)	—	Yes-no

Table 2: Boundary tones and utterance type

7.1. Declarative intonation

Non-emphatic declaratives feature an L% boundary tone, which is also found on the right edge of citation forms or any phonologically independent utterance followed by a pause. L% causes an utterance-final fall to the bottom of the pitch register. Compare the word-final, toneless (hence L) syllable of *kɔntri* 'country' in Figure 13 below:

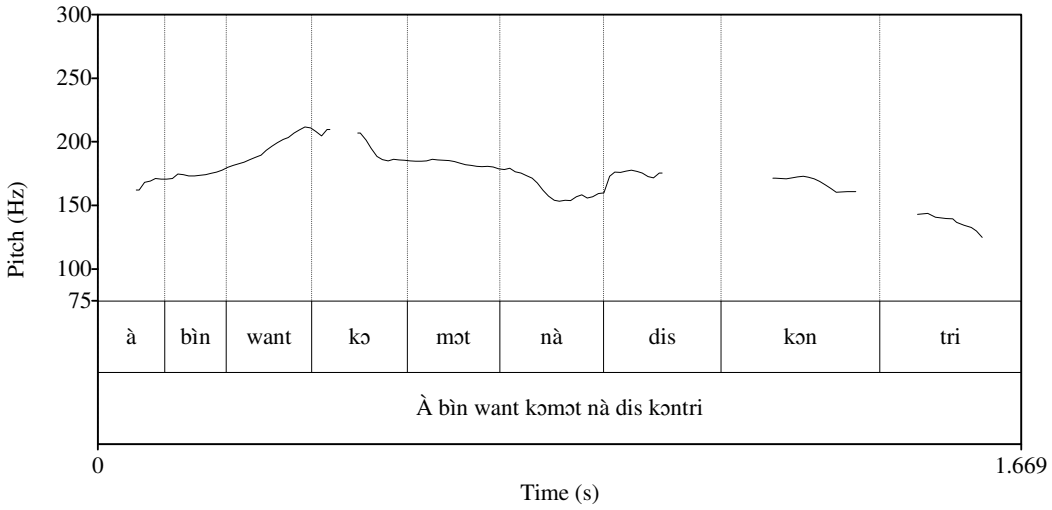

Figure 13: Declarative L% over H.X word

(12) **Declarative L% over H.X word**

À	bìn	want	kɔmɔ́t	nà	dis	kɔntri.	→	À	bìn	want	kɔmɔ́t	nà	dis	kɔn**tri**.	
L	L	H	H.H	L	H	H.X		L	L	H	H.H	L	H	H.**L%**	
1SG.SBJANT		want	go.out	LOC	this	country									

'I wanted to leave this country.'

In contrast, polysyllabic vowel-final words with a final H-Tone do not feature an utterance-final fall in non-emphatic declaratives. They retain their word-final H-Tone. Compare *bɔ̀bí* 'breast' in Figure 14 and (13) respectively:

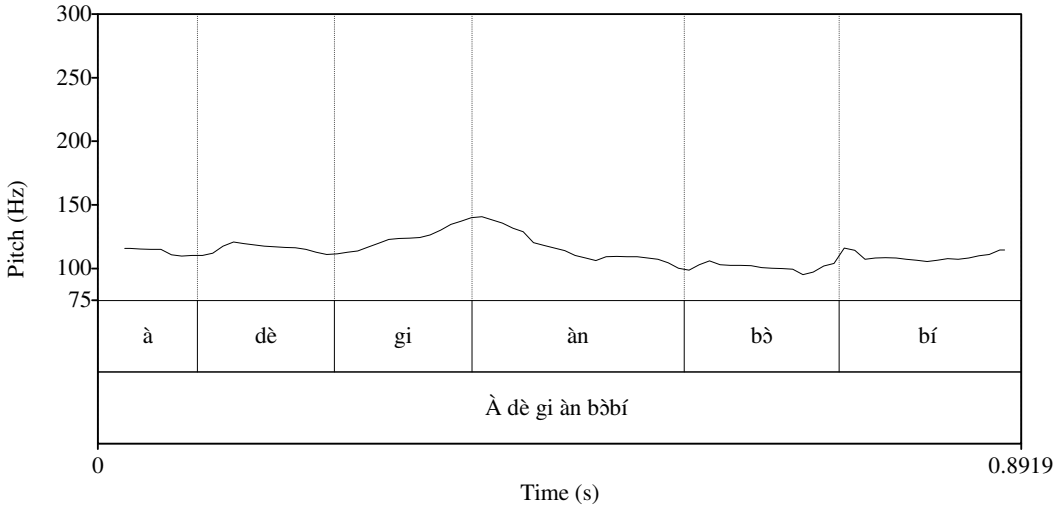

Figure 14: Neutralised declarative L% over X.H word

(13) **Neutralised declarative L% over X.H word**

À	dè	gi	àn	bɔ̀bí.	→	À	dè	gi	àn	bɔ̀**bí**.
L	L	H	L	L.H		L	L	H	L	L.**H**
1SG.SBJ	IPFV	give	3SG.OBJ	breast						

'I'm breast-feeding her.'

7.2. Emphatic intonation

Emphatic intonation expresses meanings like extra-emphasis, insistence, impatience or reproach. An H% boundary tone signals emphatic intonation. The H% is additive, it docks onto the final syllable after the L% boundary tone that characterises non-emphatic intonation - which is in turn preceded by the final syllable's lexical tone. Phonemically, an utterance-final X or L-toned syllable therefore bears an L.L%.H% sequence of tones. Phonetically, the utterance-final syllable of words with these two syllable types is realised as an LH contour. Figure 15 depicts the utterance-final rise over the sentence-final L-toned monosyllable *àn* '3SG.OBJ':

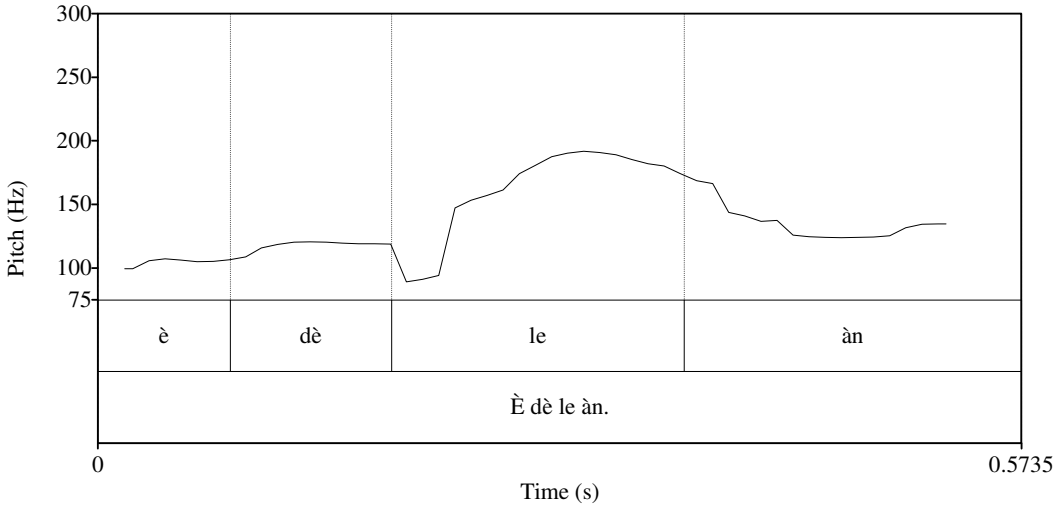

Figure 15: Emphatic H% over L-final word

(14) **Emphatic H% over L-final word**

È	dè	le	àn.	→	È	dè	le	**àn**.
L	L	H	L		L	L	H	**LH%**
3SG.SBJ	IPFV	lie.down	3SG.OBJ					

'She is laying it (on the table).'

In contrast, an utterance-final H-toned syllable first falls due to the operation of the non-emphatic declarative L% boundary tone before rising again due to the operation of the emphatic H% boundary tone. With this group of words, the utterance-final, lengthened syllable thus bears an HLH contour. Compare the contour over the final syllables in the figure below:

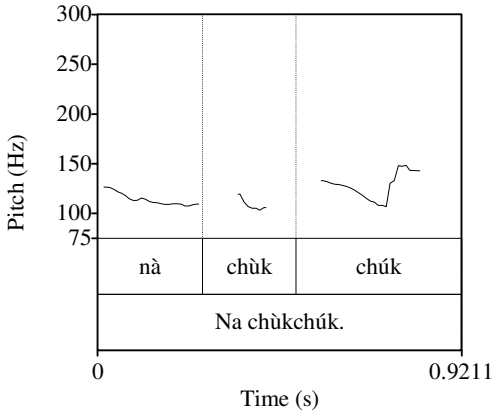

Figure 16: Emphatic H% over H-final word

(15) **Emphatic H % over H-final word**

Nà	chùk.chúk.	→	Nà chùk.**chúk**.	
L	L.H		L	L.H**L%H%**
FOC	thorn			

'That's a thorn [that's self-evident!].'

7.3. Continuative intonation

A Ø% boundary tone signals continuative intonation. Use of this boundary tone involves deletion of the non-emphatic declarative L%. As a consequence the final syllable is therefore pronounced with the same pitch as it would in utterance-medial position. The tone functions as a floor-holding device, a juncture marker on the right edge of utterances in order to prepare the ground for following material. In Figure 17, the topical NP *mì layf* 'life' is set off from the rest of the utterance by a pause. The monosyllable *layf* 'life' bears continuative Ø%. Compare the utterance-final monosyllable *bad* 'bad', which features non-emphatic declarative HL%. The symbol [p] indicates a pause:

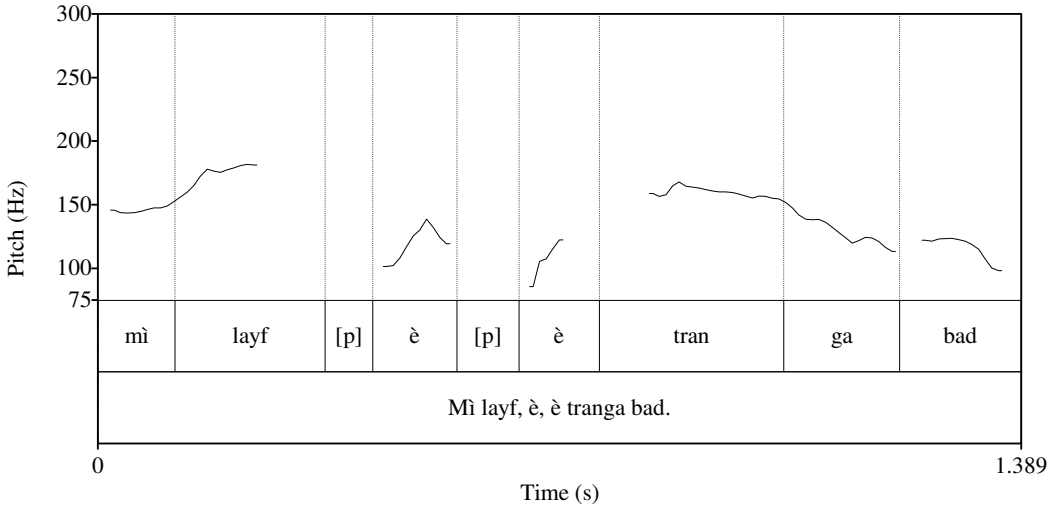

Figure 17: Ø% after left-dislocated topic

(16) **Ø% after left-dislocated topic**

Mì	layf,	è,	è	tranga	bad.	→	Mì	**layf**,	è,	è	tranga **bad**.
L	H	L	L	H.X	HL%		L	**HØ%**	L	L	H.X H**L%**
1SG	life	3SG.SBJ	3SG.SBJ	be.strong	bad						

'My life was really tough.'

7.4. Question intonation

Yes-no questions are formed by the insertion of an H% at the right edge of the utterance. As opposed to emphatic intonation, the lexical tone over the utterance-final syllable is deleted and the toneless syllable realised as a default L. In this way, the utterance-final syllable of a yes-no question invariably bears an LH contour, irrespective of its original-Tone. Compare the pitch contour over the sentence-final toneless, hence L-toned second syllable of *Pichi* 'Pichi' in Figure 18:

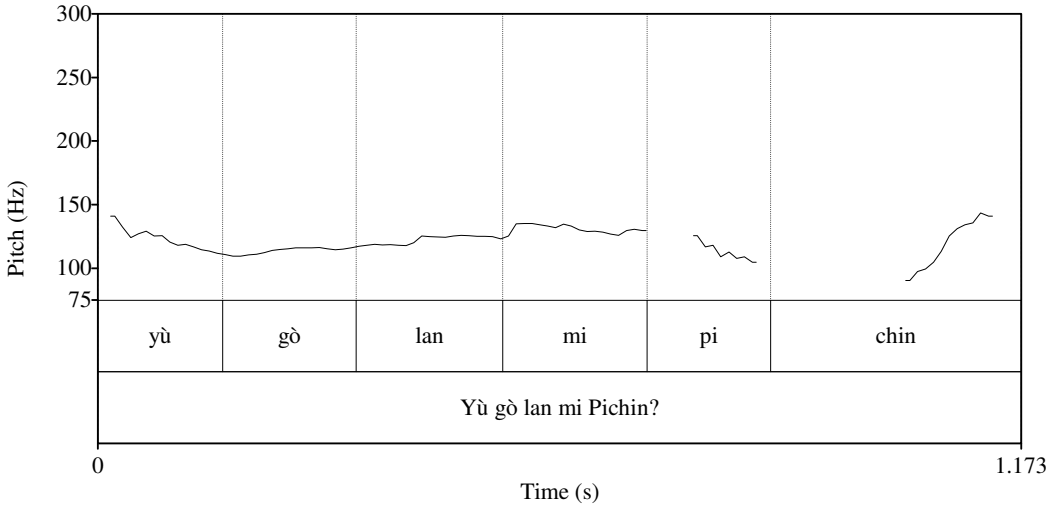

Figure 18: Interrogative H% with H.X word

(17) **Interrogative H% with H.X word**

Yù	gò	lan	mi	Pichi?	→	Yù	gò	lan	mi	Pichi?
L	L	H	H	H.X		L	L	H	H	H.**LH%**
2SG	POT	teach	1SG.EMP	Pichi						

'Will you teach me Pichi [won't you do that for me]?'

7.5. Tonal words

Intonational boundary tones are not normally inserted at the right edge of an utterance if the final word is tonal. Pichi employs particles instead in order to convey the pragmatic and grammatical functions of intonation with accented words. In Figure 19, the tonal word *nyɔní* 'ant' is followed by the tag *nɔ̀* 'right', which bears the LH contour of yes-no intonation. In Figure 20, the tonal word *okobó* 'impotent man' is followed by the sentence-final particle *ò*,

which expresses emphasis:

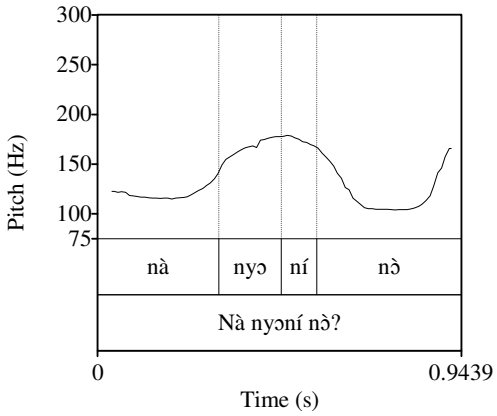

Figure 19: Final tonal word in question

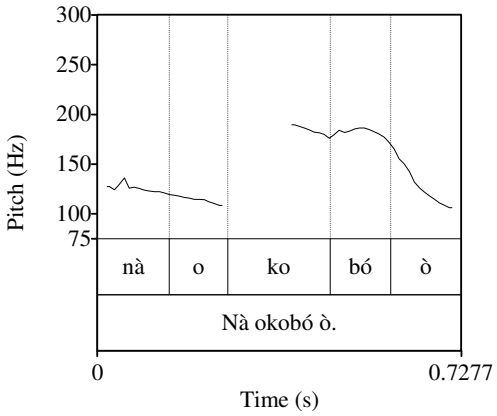

Figure 20: Final tonal word in declarative

(18) **Final tonal word → LH% over tag**

Nà	nyɔní	nɔ̀?
L	H.H	**LH%**
FOC	ant	right

'That's an ant, isn't it?'

(19) **Final tonal word → use of ò 'SP' for stress**

Nà	okobó	ò.
LL	.H.H	L
FOC	impotent.man	SP

'He's an impotent man [I tell you].'

8. Conclusion

Pichi exhibits a mixed suprasegmental system in which individual words may be classified as pitch-accented or tonal. The tonal component of the lexicon is considerably smaller than the pitch-accented one. Equally, the use of lexical tone and tonal processes is relatively restrained as compared to other languages of the region. In this, Pichi falls in line with other Atlantic Creoles, which have been shown to have similar systems. The data presented here also adds to the growing body of evidence on the existence of other types of mixed prosodic systems in the languages of the world (see e.g. Remijsen 2002), which, after all may not be as unusual as previously assumed.

Abbreviations

ANT	relative past tense	POT	potential mood marker
ART	article	PRF	perfect tense-aspect
ASS	associative preposition	Q	question particle
COP	copula	QUOT	quotative marker
EMP	emphatic particle	RED	reduplicant
FOC	focus marker	SBJ	subject case
HAB	habitual marker	SBJV	subjunctive marker
IPFV	imperfective aspect	SG	singular
LOC	locative preposition	SP	sentence particle
NAME	personal name	SUB	subordinator
NEG	negative	TMA	tense-mood-aspect
NP	noun phrase	VP	verb phrase
OBJ	object case	.	morpheme boundary
PCL	discourse particle	`	low tone
PFV	narrative perfective	´	high tone
PL	plural	1	first person
PLACE	place name	2	second person
POSS	possessive	3	third person

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