USING QINGTIAN TONE SANDHI DATA TO REFINE DEPRESSOR MORPHOTONEMICS

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ABSTRACT

Depressor features have been described for many varieties of Wu Chinese, from Shanghai south to the Ou varieties of Wenzhou. Acoustic tone sandhi data from the Chu variety of Qingtian refine the particulars of [±depressor].

Acoustic depressor features do not occur through the whole tone pattern, but do occur on syllables with voiceless initials and without initial consonants. No connection is found between depressor syllables and voicing in the data, suggesting that the depressor feature is indeed a feature of morphemes, rather than segments.

Keywords: tone, tone sandhi, depressor, Wu Chinese, Qingtian

1. INTRODUCTION

Qingtian 青田, in the south of Zhejiang province, China, is usually grouped [5] with the Chu (or Lishui) varieties of Wu. Despite this, the data examined here also demonstrate features of the Ou varieties it borders – notably the lack of syllables glottal stop in the coda. This paper also demonstrates that it shares the presence of depressor morphemes, something not found (so far) in other Chu varieties.

In order to see the surface realisation of depressor features, a comparison must be made between morphemes in different environments. In Wu varieties, they are visible when comparing word-initial realisations with their word-final equivalents (where "words" are disyllabic nouns read from a list).

In Qingtian, there are eight isolation (single-syllable) tones (see Fig 1. and Table 1). Six of these – high falling [41] and convex [341]; short high falling [41] and short convex [341]; and mid [311] and low falling-level [11] – form three pairs with a lowered F0 onset. The other two are a mid dipping tone [324] and a level falling tone [31] (see also [9]).

In a word-final environment, there are only five tones found – long and short high falling, mid level, mid dipping and convex (Fig 2 and Table 1). These all correspond to the equivalent isolation realisations, taking into account the variation expected from the different environment (smaller F0 range, shorter duration, etc.). In a word final environment, morphemes that bear the other three tones in isolation are realised with the tone of their citation tone pair – though one is unexpectedly different. This demonstrates that the tone pairs are in fact the same toneme with a lowered-onset allophone in word-initial and [+depressor] environment, similar to that described in [7].

Figure 1: Qingtian mean isolation tone F0 as a function of mean duration. Red lines show the unpaired dipping and level-falling tones; the blue lines are the paired low falling and low level tones; black lines show high falling and convex tones; green lines show the short high falling and convex tones.

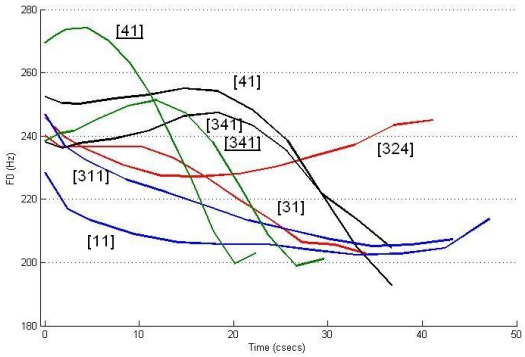

Table 1: Qingtian isolation tones with their Chao tone letter representation.

Tone	Example	Gloss
Dipping	冬 [dɑŋ 324]	'winter'
Mid falling	同 [tɑŋ 31]	'same'
High falling	等 [dəŋ 41]	'wait'
Convex	懂 [dɑŋ 341]	'understand'
Low falling	凳 [dəŋ 311]	'bench'
Low level	病 [pəŋ 11]	'sick'
Short high falling	德 [de 41]	'virtue'
Short convex	毒 [to 341]	'poison'

This pairing and separation of tones between isolation and word-final realisation demonstrates the depressor feature. At the beginning of a word,

the [+depressor] feature lowers the F0 onset of the tone. In other environments the feature has no effect.

2. DATA

The data presented here were recorded in Qingtian town (50km inland from Wenzhou) in 2007. The speaker was a 22 year-old native of Qingtian, also educated there. The speaker read monosyllabic, disyllabic and trisyllabic words from a list, recorded digitally on an Edirol R-09 at 44kHz. The corpus was selected to provide data on all tone groups and disyllabic combinations. The tones and segments were transcribed and then acoustically measured for F0 using Praat. Only one speaker's data is examined here, so normalised data will not be presented.

The Qingtian data do not consistently distinguish between voiced and voiceless segments. Although there are no repetitions of words in the data, some morphemes are repeated, and are found in the same environment with different VOT.

The inconsistent distribution of voicing shows that, like Lishui [8] and Jinhua City speech [1], this variety of Qingtian does not contrast the three VOT series of stops considered by Chao [2] as characteristic of Wu varieties.

Despite not contrasting voiced stops from voiceless, the lowered F0 onset and final-syllable tone similarity of the tone pairs indicates that depressor feature is still active.

2.1. VOT

The VOT features of the data show only two contrasting series of VOT for stop phonemes – voiceless aspirated and voiceless unaspirated.

Phonetically, there are examples of voice onset lead, coincidence and lag. All three occur in both word-initial and intervocalic environments, but there is free variation between voice onset lead and coincidence, for example [t ~ d] in 苦头 [kʰu.døy] 'suffering' and 被头 [pi.tøy] 'quilt cover'.

The data are unusual for a Wu variety because many word-initial stops have voice onset lead. Wu varieties do not often exhibit utterance-initial voice onset lead [2], particularly on phonologically voiceless segments.

2.2. Isolation and word-final tone

There are three distinct sets of tonal F0 patterns in the data presented – isolation tones, word-final tones and disyllabic sandhi tones.

The isolation readings described earlier (Fig 1.) show eight F0 patterns. There are no simple tones and all but the dipping tone include a falling component. The high falling, convex and level-falling tones sound quite similar. The high falling and level-falling tones have a strong initial level component (with different onsets), contrasting with the audibly rising onset of the convex tone.

Figure 2: Qingtian mean 2nd syllable tone F0 as a function of mean duration. Red lines show the unpaired dipping and level-falling tones; the blue lines are the low falling and low level tones; black lines show high falling and convex tones; green lines show the short high falling and convex tones.

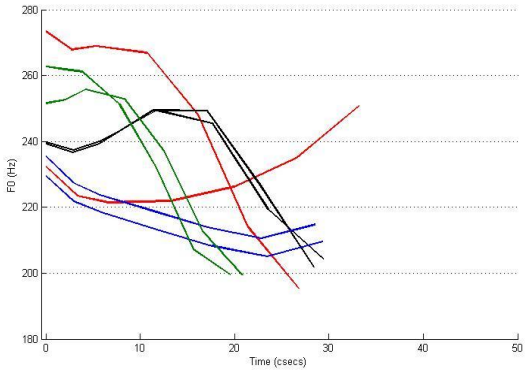

Table 2: Mean F0 (Hz) and mean duration (D - csecs) of isolation (shaded), disyllabic final syllable (unshaded) according to the isolation tone (first column), including the mid level final tone not found in isolation.

	F0 at % of mean duration							D
	0%	10%	20%	40%	60%	80%	100	
324	246	236	231	227	230	237	245	41
	232	223	221	222	226	235	251	33
31	240	237	237	233	220	206	203	34
	273	267	269	267	248	214	195	27
41	252	250	252	255	248	222	193	37
	240	237	240	249	245	219	204	30
341	238	238	239	246	243	222	205	37
	239	236	239	249	249	227	202	28
311	247	232	226	218	210	205	207	43
	236	227	224	219	214	211	215	28
11	228	214	209	206	204	203	214	47
	229	221	218	213	208	205	210	30
41	270	274	274	264	240	210	203	22
	263	261	261	251	232	207	199	20
341	238	242	246	251	238	209	201	30
	252	252	256	253	237	213	199	21
33	232	232	235	239	240	241	241	29

The word-final tones (Fig 2.) are the final tones of disyllabic words. In word-final tones, the pairs

that are found in isolation have merged. The F0 patterns are consistent in each combination as final syllable, with one exception. The low falling-level tone has an otherwise unattested mid level final-syllable tone when preceded by a morpheme with a low falling or low falling-level tone in isolation.

As a final tone, the category that has a mid falling tone in isolation has a much higher onset as a final syllable tone. Its isolation onset is lower than the isolation high falling tone (240Hz compared to 252Hz), but as a final syllable, the onset is higher than the high falling tone category's final syllable tone (273Hz compared to 240Hz). It is unusual that a tone's realisation rises when preceded by other tones, but the higher onset is conditioned by the high sandhi tones in the previous syllable.

Most of the isolation and word-final tones have a falling component. This, with the general complexity of the tone patterns, may be an utterance-final feature of the variety; the same feature is found in partly-analysed data from Zhenbu 祯埠乡 in the west of Qingtian county.

2.3. Sandhi tones

First syllable tones in the Qingtian data are one of five sandhi tones, shown in Fig. 3 and Table 3: high level, low level, low falling and high and low short.

Figure 3: Qingtian mean sandhi tone F0 as a function of mean duration.

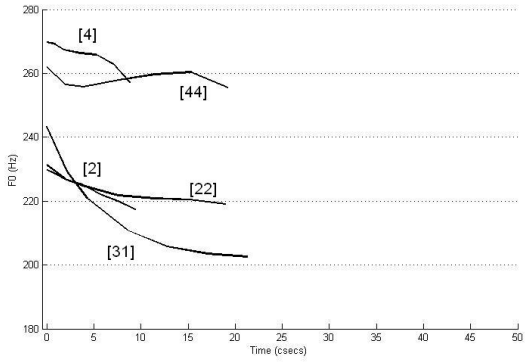

Table 3: Qingtian mean sandhi tone F0 (Hz) and duration (D – csecs.).

	F0 (Hz) at % of mean duration							D
	0%	10%	20%	40%	60%	80%	100	
4	270	269	267	266	266	263	257	8.8
44	262	256	256	258	260	260	256	19
2	230	228	227	225	222	220	217	9.4
22	231	227	225	222	221	220	219	19
31	243	229	221	211	206	204	203	21

The high and low short tones and high and low level tones are likely to be allotones of the same toneme, conditioned by the short duration of vowels in the tone-bearing unit. The environments in which they occur (before low falling-level and mid level-falling final-syllables) are common to both tones. They do not look like the short isolation tones, but share the same onsets.

The low falling sandhi tone resembles the low falling isolation tone with a shorter duration, and can be considered phonologically the same. The high level sandhi tone resembles the level-falling isolation tone's level portion (i.e. without the utterance-final falling feature). The low level sandhi tone does not resemble any isolation tone.

The environments in which the first-syllable sandhi tones are found are in Table 4. The mid falling tone almost always occurs before a mid dipping tone. High level tones occur before level-falling tones and on morphemes bearing mid dipping tones in isolation. All other environments – 41 of the 64 combinations – bear a low level sandhi tone.

Table 4: First syllable sandhi tones in Qingtian; first-syllable inputs are on the left, second-syllable inputs across the top.

<table>
<tr><td></td><td>324</td><td>331</td><td>41</td><td>231</td><td>211/11</td><td>42</td><td>341</td></tr>
<tr><td>324</td><td rowspan="7">31</td><td rowspan="2">44</td><td rowspan="4" colspan="3">22</td><td rowspan="2">44</td><td rowspan="4" colspan="2"></td></tr>
<tr><td>31</td></tr>
<tr><td>41</td><td rowspan="3">44</td></tr>
<tr><td>341</td><td rowspan="2">31</td></tr>
<tr><td>311</td><td>31/22</td><td>31</td></tr>
<tr><td>11</td><td rowspan="2">4</td><td rowspan="2">2</td><td rowspan="2">4</td><td rowspan="2">4/2</td><td rowspan="2">2</td></tr>
<tr><td>41</td><td rowspan="2">2</td><td rowspan="2">2</td></tr>
<tr><td>341</td><td></td></tr>
</table>

3. DISCUSSION

Depressor features have been described for, among others, the Wu varieties of Shanghai [10] and Wenzhou [7], but also for Bantu languages, for example, Xhosa, Zulu and Nguni [4]. Depressor features have been strongly linked to phonemically voiced consonants or [slack voice], though they may not actually co-occur with phonetic voicing, in either Wu or Bantu languages [3, 6].

In Wenzhou and Shanghai, phonologically voiced consonants have VOT lead intervocalically and VOT coincidence. The isolation tones' lowered onsets correlate mostly with phonologically voiced consonants. Jessen and Roux [6] have shown that the correlation is not complete in Shanghai – lowered onsets occur with some syllables with no initial consonant and some

voiced consonants (some nasals and laterals, for example Shanghai 拎 [liŋ 53] ‘carry’, 妈 [ma 53] ‘mother’) do not trigger onset lowering. These phenomena can be accounted for in some languages.

Where there is no initial consonant, the link between depression and the voicing of an initial consonant can be maintained by the introduction of a breathy initial consonant /ɦ/ that manifests phonetically as the lowered F0 onset word initially and has no phonetic realisation in an intervocalic position, for example Shanghai 饭镬 /vɦɛ 13/+/ɦoʔ 13/ [vɛ̰.oʔ 11.13] ‘pot for frying rice’.

Similarly, when voiced consonants do not trigger the lowered F0 onset of depression, they can be separated with their own phonemes, contrasting /m/ and /n/ with /ʔm/ and /ʔn/ (as used in [11], among others). These do not apply easily to the Qingtian data.

Rose [7] shows a still simpler set of descriptors for depressor phenomena. The depressor feature is a feature of morphemes, not segments. The result of this is that for Rose’s depressors there is no connection between tone depression and voiced or voiceless phonemes. Morphemes as a depression-bearing unit do not rely on phonetic features.

Rose’s morpheme-based analysis suits the Qingtian data better than a segmentally-based analysis. Qingtian’s lack of voiced-voiceless contrast certainly demonstrates that the voicedness of neither phones or phonemes has any connection with tone depression. However, one cannot say that Qingtian has depressor consonants without creating a mirror set of phonemes, the only distinctive feature of which being that of causing depression. A morpheme-based analysis allows the depression to be borne by a subset of Qingtian morphemes without connection to any phonetic feature. It is the most logical analysis.

4. CONCLUSION

The acoustic properties of the eight isolation tones, five word final tones and five sandhi tones of Qingtian have been described, including the environments of the sandhi tones. The correspondences between isolation and word-final tones show depressor phenomena.

Depressor phenomena are present despite the absence of voiced stop phonemes in the data. This affirms that it has no consistent connection with voicedness, despite their frequent correlation, but also suggests that, like Wenzhou, [7] morphemes bear the [±depressor] feature, not segments.

5. REFERENCES

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