Non-Plateaus, Non-Tonal Heads
Tone assignment in Colloquial Singaporean English

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Abstract: This paper presents an optimality theory account of stress-dependent tone assignment in Chinese speakers' Colloquial Singaporean English (CSE). Disagreements between previous transcriptions are reconciled, showing that speakers use low, mid, high and unspecified tone. Modifications to De Lacy's proposal on the stress-tone relationship and the Bantu constraint PLATEAU are proposed in order to cope with CSE's tonal inventory.

Corrections of substance. ***30 July:*** Cassimjee & Kisseberth (1999) throughout • (3a) *NONHEAD/H; *NONHEAD/M,H • (9c) *rhi'noceros* (9d) *A'merica* • (27a) violates *NONHEAD/M,H and SPECIFY once each; speaker CF16 omitted due to prestigious secondary school. • ***25 November:*** Postscript added • (23) all candidates violate σ̆(L) twice.

1 Introduction

In this paper I present an optimality theory account of stress-dependent tone assignment in Chinese speakers' Colloquial Singaporean English (CSE), applying De Lacy's (2006) proposal on the cross-linguistic relationship between stress and tone, as well as Cassimjee and Kisseberth's (1999) PLATEAU constraint, previously applied to Bantu languages. Section **2** reviews literature on the stress-tone relationship. Section **3** then reconciles previous descriptions of CSE before laying out the data and generalisations. In section **4** I identify the main issues for the analysis before proposing the necessary modifications to existing mechanisms in section **5**. The proposed analysis is summarised in section **6**. Data collection methods are described in the appendix. My notation is as follows:

(1) a. H: high M: mid L: low Ø: unspecified for tone.
b. Tone spreading is indicated with dashes, e.g. H-H-H.
c. Primary and secondary stress are both marked with '.
d. Multiple prosodic words are indicated with parentheses.

2 The relationship between stress and tone: Previous work

De Lacy (1999) uses two fixed rankings to enforce attraction between higher tones and metrically prominent positions, and conversely between lower tones and unstressed positions:

(2) a. *HEAD/L >> *HEAD/M >> (*HEAD/H)
b. *NONHEAD/H >> *NONHEAD/M >> *NONHEAD/L

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Admitting that their factorial typology predicts typologically unlikely languages where non-heads bear tone whereas heads do not, De Lacy suggests we avoid penalising heads for bearing high tone by omitting *HEAD/H (1999) and *NONHEAD/L (2002a). Most recently (2006:66), however, he has switched to stringent hierarchies instead:

(3) a. *HEAD/L; *HEAD/L,M; *HEAD/L,M,H
b. *NONHEAD/H; *NONHEAD/M,H; *NONHEAD/L,M,H

Note that this formulation revives the problems of *HEAD/H and *NONHEAD/L.

De Lacy has consistently argued against stating these constraints positively, originally on the grounds of category conflation (1999): similar tones often behave identically with respect to stress, whereas active positive constraints cannot assign equal harmony since they inherently seek exact matches. While admitting that this argument is no longer valid with stringent hierarchies (2002b), which excel at selecting feature subsets, he argues that positive stringent constraints can still result in feature pile-up when applied to multiple prosodic levels. In a non-stratal approach, assuming that tones introduced at different levels are functionally identical, he notes that a non-phrasal head which is also a foot head is realised as a contour tone under the following ranking:

(4)	**Hd_{Ft} = $NonHd_{Phr}$**	**$HEAD_{FT}$/H**	**$NONHEAD_{PHR}$/L**	**ONET/σ**
☞	a. HL			*
	b. H		W*	L
	c. L	W*		L

This result offends our intuition that more complex tones should be attracted by the greater prosodic prominence: if any foot head should get a contour tone, it should also be a phrasal head, not a non-phrasal head. Feature pile-up is therefore a serious point against positive stringent constraints.

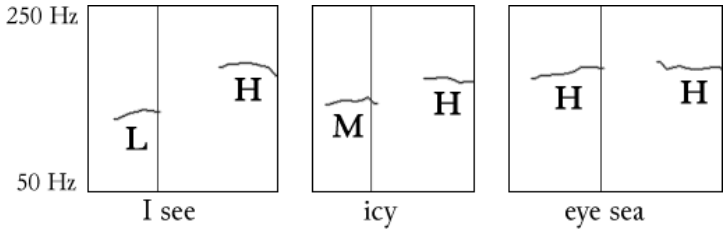
Yip (2001) successfully applies De Lacy's (1999) stress-tone proposal to other data, of which only two cases strictly require negative constraints. Firstly, she uses *HEAD/L to explain focus avoidance on *hen*^{21} 'very'; I would suggest this is unnecessary, since semantic bleaching encourages its replacement by other terms when focus is desired (Li & Thompson 1981:340). Secondly, Yip also suggests that *HEAD/L explains why tone 3 sandhi (21 → 35) is more likely under focus; note, however, that positive constraints would also work if this is a case of high tone epenthesis rather than low tone deletion. Yip then points out that Wuming Zhuang cannot be straightforwardly analysed using negative *HEAD/L, because low tone is preserved alongside high tone epenthesis on stress. Since *HEADMORA/L could be used instead, she concludes that this is suggestive but not conclusive evidence that some languages or speakers may use positive rather than negative constraints.

A different perspective on De Lacy's basic proposal comes from repeated findings that tones are more peripherally articulated in stressed or focused syllables, whether high or low (Longacre 1952 cited by Gussenhoven 2004:15; Rountree 1972:309; Xu & Wang 1997; Remijsen 2002). This effect has been phonologised in Mandarin Chinese, where tone is often completely lost on unstressed syllables (Yip 2001), as well as the diverse intonation systems where pitch accents are described as anchoring to prosodic heads (see Jun 2005 for an overview). It is in fact not just our intuition but a well-attested fact that more features should be realised on heads than non-heads (for vowels, see Gussenhoven 2004:15ff for an overview; for consonants, see Lavoie 2001:160). The evidence supports De Lacy's stand insofar as negative constraints are needed to explain feature loss on non-heads, but also implies that we need constraints which express an affinity between stress and tone: any specified tone, not high alone.

3 Colloquial Singaporean English data

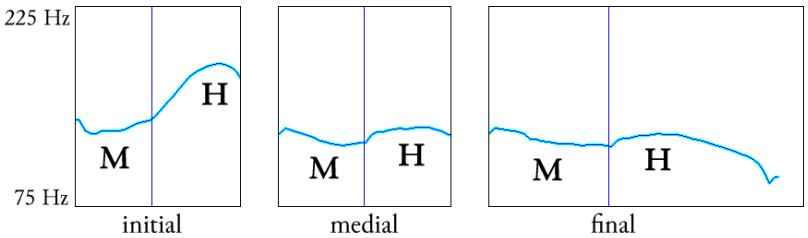
Singaporean English (SgEng) prosody has long been considered distinctive in several respects. SgEng stress is so weakly marked (Brown 1988; Low, Grabe & Nolan 2000), albeit significantly correlated with intensity and duration (Tan 2002:257; Ng 2008b), that the auditory impression is of a tone language with a series of level tones (Killingley 1968; Bloom 1986:430; Goh 1998; Lim 2004:42), usually rising within each word (Yeow 1987:87; Deterding 1994; Tan 1998:29; Wee 2000:67). These descriptions are consistent with recently proposed tone transcriptions for Chinese speakers' Colloquial Singaporean English (CSE) using low, mid and high tone (Wee 2008; Ng 2008a; Siraj 2008):

(5) **Low, mid and high tone on [aj.si]**



Tonal specification remains remarkably stable in different contexts:

(6) ***Money* (imaginary brand name) in different sentence positions**



Sentence-final lowering often obscures tones,[1] but the sentence-final rise-fall above is well-attested (Low & Grabe 1999; Zhu 2001:94; Date 2005; Deterding 2007:37; Lim 2004:42, 2008). The origins of this unusual final high are discussed in Ng (submitted).

Wee (2008) and Ng (2008a) essentially concur on the transcriptions in (7) below. These can be described by the generalisations in (8) below:

(7)	a.	*'see*	'H	f.	*ma'chine*	L'H
	b.	*'money*	'MH	g.	*hi'biscus*	L'MH
	c.	*'elephant*	'MMH	h.	*A'merica*	L'MMH
	d.	*'Indo'nesia*	'MM'MH	i.	*elec'tronics*	LL'MH
	e.	*'minimi'sation*	'MMM'MH	j.	*res'ponsi'bility*	L'MM'MMH

(8) a. H is assigned to the final syllable of the prosodic word (p-word).
b. M spans all non-final stressed syllables.
c. L is assigned to initial unstressed syllables.
d. Remaining unstressed syllables receive M by rightward spreading.

There are two main areas of disagreement with Siraj (2008). Firstly, he consistently transcribes post-stress, pre-word-final unstressed syllables with high instead of mid tone:

(9)	**Siraj (2008)**			**Ng (2008a)**	
	a.	*'Panama*	'MHH	b. *'elephant*	'MMH
	c.	*rhi'noceros*	L'MHH	d. *A'merica*	L'MHH

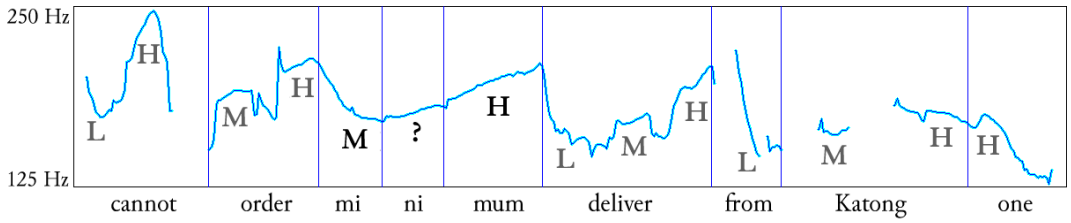
Secondly, his prosodic word contains maximally one foot:

(10)	**Siraj (2008)**			**Ng (2008a)**	
	a.	*'modifi'cation*	('MHH)('MH)	b. *'minimi'sation*	('MMM'MH)
	c.	*re'paira'bility*	(L'MH)('MHH)	d. *res'ponsi'bility*	(L'MM'MMH)

Our differences in (10) above are evidently due to speaker variation in p-word parsing, since we have each encountered one speaker of the other type (Pasha Siraj, p.c. 17 Nov 2008). For a discussion of how this process is morphologically conditioned, please see Ng (2008b). However, (9) above turns out to reflect genuine ambiguity in the pitch track:

[1] I have occasionally heard sentence-final H.L or M.L, though possibly in Standard Singaporean English rather than CSE.

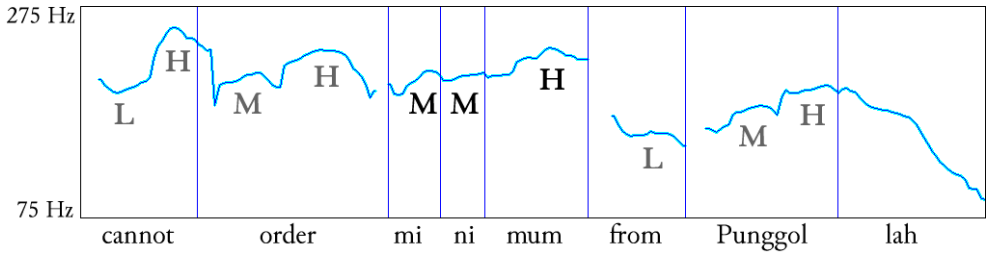
(11) ***'Minimum:*** **'MMH or 'MHH?**



'(You) can't order the kind of (brand name) delivered from (place name).'

Perception studies are clearly needed, but when I question speakers informally using clear-speech renditions, MMH is preferred. It also seems a plausible transcription in cases like the following:

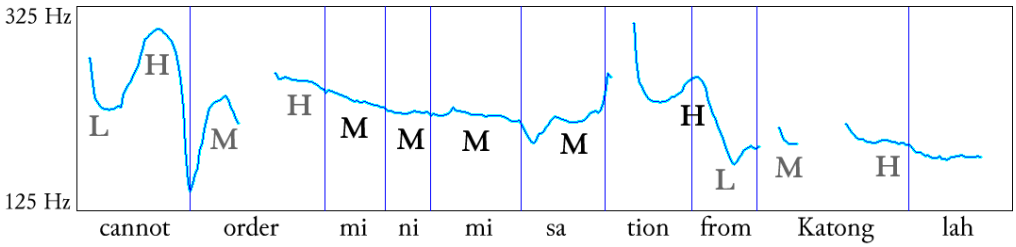
(12) ***'Minimum:*** **'MMH**



'(You) can't order the (brand name) from (place name) (pragmatic particle).'

In the absence of formal perception studies, and in the interests of reconciling these divergent data, I suggest that we recognise variation between mid and unspecified tone in such cases. Interpolation over the unspecified tone would then explain why we see a straight-line rise in (11) above, but quite the opposite in the sustained mid of (13) below:

(13) ***'Minimi'sation:*** **'MMM'MH**



'(You) can't order (brand name) from (place name) (pragmatic particle).'

The following data and generalisations would then supersede (7) and (8) above:

(14)	a.	*'see*	'H	f.	*ma'chine*	L'H
	b.	*'money*	'MH	g.	*hi'biscus*	L'MH
	c.	*'elephant*	'MMH, 'MØH	h.	*A'merica*	L'MMH, L'MØH
	d.	*'Indo'nesia*	'MM'MH	i.	*elec'tronics*	LL'MH
	e.	*'minimi'sation*	'MMM'MH	j.	*res'ponsi'bility*	L'MM'MMH, L'MM'MØH

(15) a. H is assigned to the final syllable of the p-word.
b. M spans all non-final stressed syllables.
c. L is assigned to initial unstressed syllables.
d. Remaining unstressed syllables receive M by rightward spreading or remain unspecified for tone.

Note that the low and mid tones must be fully specified, as Pulleyblank (2004) proposes for Yoruba. This is in keeping with their resistance to interpolation in the H_H environment of (5) and (13) above.

4 Issues for an analysis

In this paper I make the following assumptions:

(16) a. Stress (Tongue 1979:34ff) and p-word structure (Ng 2008b) are given.
b. The TBU is the syllable; contour tones are not considered.
c. A level pitch track is interpreted as spreading. Candidates with adjacent identical tones, e.g. MMH or MØMH, are not considered.

4.1 A previous analysis of CSE tone assignment

Siraj's (2008) analysis uses both p-word and foot boundary tones to capture the double high he transcribes in words like *'Panama* ('MHH) (9):

(17) **R-EDGE$_{PWD}$(H$^-$):** The right edge of a PWd must have a H$^-$ Tone.

(18) **R-EDGE$_{FT}$(H$^-$):** The right edge of a Ft must have a H$^-$ Tone.

Something like (17) is clearly indispensable, and can be restated within McCarthy's (2003) ANCHOR constraint family:[2]

(19) **ANCHOR-R (PWD, H):** One violation per TBU at the right edge of a prosodic word which is not linked to a high tone. Abbreviated **H]$_{PWD}$**.

However, as we have seen, the foot high boundary tone (18) can and must be dispensed with if we assume the representations in (14) above.

Siraj's remaining two constraints are described in terms of pitch accent:

(20) **σ̆(L):** An unstressed syllable must have a L Tone.

(21) **HD$_{FT}$(M*):** The head of a Ft must have a M* Tone.

(22)	**hi.'bis.cus**	**HD$_{FT}$(M*)**	**σ̆(L)**
☞	a. L'MH		
	b. Ø'MH		W*
	c. L'H-H	W*	

[2] Note that though (19) and (44) are both stated as ANCHOR constraints, (44) is more typical of the ANCHOR family because it requires tone and p-word edges to coincide, whereas (19) does not.

Cross-linguistically we have seen that tone constraints on non-heads like (20) are better stated negatively so as to capture tone loss; its negative stringent counterpart *NONHEAD/M,H could easily combine with SPECIFY(TONE) to eliminate candidate (b) above. But the M* pitch accent enforced by (21) above cannot be so straightforwardly translated into De Lacy's (2006) *HEAD/L because high tone must be actively *dis*preferred on stress in candidate (c) above. It also runs counter to our observation that tone is often realised more peripherally on stress. I have my doubts about such a language-specific constraint.

Finally, note that Siraj's analysis will not allow either the fully specified or interpolated variants as transcribed in (14) above to win under any ranking:

(23)	**A.'me.ri.ca**	**R-EDGE$_{FT}$(H$^-$)**	**R-EDGE$_{PWD}$(H$^-$)**	**HD$_{FT}$(M*)**	**σ̆(L)**
💣	a. L'MH-H				**
☜	b. L'MØH	W*			**
☜	c. L'M-MH	W*			**

An analysis which accounts for all existing CSE data is therefore still lacking.

4.2 Specifying tone on heads vs. non-heads (interpolated variety)

Since CSE stressed syllables take only mid or high tone, and unstressed syllables only low, unspecified or (with spreading) mid tone, De Lacy's (2006) stringent hierarchies appear appropriate:

(24) ***HEAD/L:** One violation per stressed syllable linked to low tone.

(25) ***NONHEAD/M,H:** One violation per unstressed syllable linked to mid/high tone. Abbreviated ***NHD/M,H**.

Of course, if left unchecked, these constraints would allow for a totally toneless language. De Lacy suggests that this can be avoided using SPECIFY:

(26) **SPECIFY(TONE):** One violation per TBU not linked to tone.

However, a global SPECIFY is inadequate for the interpolated variety of CSE because heads must be tone-bearing, while non-heads may be toneless. This requires the following contradictory rankings:

(27)	**'e.le.phant**	***NONHEAD/M,H**	**SPECIFY**
☞	a. 'MØH	*	*
	b. 'M-MH	W**	L

(28)	**'In.do.'ne.sia**[3]	***NONHEAD/M,H**	**SPECIFY**
☜	a. 'M-M-'MH	*	
💣	b. 'MØ'ØH	L	W**

[3] The candidate *'Indo'nesia* ('MØ'MH) could win in (28), but violates my assumption on spreading as stated in (16) above.

De Lacy's (2006) constraints can distinguish the *types* of tone preferred by heads and non-heads, but not *whether* they take tone at all. Some other mechanism is therefore needed.

4.3 Assigning L, M, Ø on non-heads (specified variety)

Note that *'elephant* appears as ('MØH) and ('M-MH), but never ('MLH). The obvious solution is to make low tone more costly than mid (Wee Lian-Hee, p.c. 7 Aug 2008):

(29) ***L:** One violation per low tone.

However, in the fully specified variety this leads to the following contradictory rankings:

(30)	**'e.le.phant**	***L**	***NONHEAD/M,H**
☞	a. 'M-MH		**
	b. 'MLH	W*	L*

(31)	**hi.'bis.cus**	***L**	***NONHEAD/M,H**
☜	a. L'MH	*	*
💣	b. M-'MH	L	W**

Some other mechanism is needed to forbid low non-heads word-medially.

5 Proposed mechanisms

5.1 Positive stress-tone constraints

I propose that while constraints linking prosodic non-heads to tone should continue to be stated negatively, their counterparts for prosodic heads should be stated positively as in (32) below:

(32) a. HEAD/H; HEAD/M,H; HEAD/L,M,H
b. *NONHEAD/H; *NONHEAD/M,H; *NONHEAD/L,M,H

HEAD/M,H enables us to correct the contradictory rankings of (27) and (28) above:

(33)	**'In.do.'ne.sia**	**HEAD/M,H**	***NONHEAD/M,H**	**SPECIFY**
☞	a. 'M-M-'MH		*	
	b. 'MØ'ØH	W*	L	W**

This mixture of positive and negative stringent hierarchies is also cross-linguistically sound in that it forbids typologically unlikely languages in which non-heads must bear tone and heads must be toneless. This is a concern in De Lacy (1999, 2002a) but goes unaddressed in his (2006) proposal. We could of course just supplement negative stringent hierarchies with HEAD/T:

(34) **HEAD/T:** One violation per prosodic head which is not linked to tone.

But since HEAD/T (34) is functionally equivalent to HEAD/L,M,H, (32) above is a far more parsimonious solution.

Note that there is no motivation for formulating *non*-head stringent constraints positively, since Yip (2001) shows that *NONHEAD/T >> SPECIFY(TONE) is a crucial ranking for Mandarin Chinese, and we have seen that unstressed syllables are prone to lose tonal specification. Instituting *NONHEAD/T would patch this up but would also multiply constraints unnecessarily.

Feature pile-up was a serious criticism of positive stringent constraints, but turns out not to apply when positive and negative hierarchies are mixed, because complex tones are no longer rewarded twice by head and non-head constraints:

(35) $\mathbf{Hd_{Ft} = NonHd_{Phr}}$	$\mathbf{HEAD_{FT}/H}$	$\mathbf{*NONHEAD_{PHR}/H}$	**ONET/σ**
☞ a. H		*	
b. HL		*	W*
c. L	W*	L	

Now any constraint forbidding contour tones, such as ONET/σ above, will harmonically bound candidates such as (b).

5.2 *Dip >> Plateau

In Bantu languages it is common for underlying HØH or HØ...ØH sequences to be realised as high tone plateaus (Kisseberth & Odden 2003). This has been formalised as the constraint PLATEAU in Cassimjee and Kisseberth's (1999) analysis of Emakhuwa dialects:

(36) **PLATEAU:** The mora sequence H-Toneless-H is ill-formed.

To make this constraint applicable to languages with low, mid *and* unspecified tone, not to mention non-mora TBUs, I propose redefining PLATEAU as *DIP:

(37) ***DIP:** One violation for each maximal fall-rise sequence.

*DIP now prevents HL…LH as well as HLH, both needed for Bantu analyses. It also obviates the need for *L, hence resolving the contradictory rankings in (30) and (31) above:

(38) **'e.le.phant**	***DIP**	***NONHEAD/M,H**
☞ a. 'M-MH		**
b. 'MLH	W*	L*

(39) **hi.'bis.cus**	***DIP**	***NONHEAD/M,H**
☞ a. L'MH		*
b. M-'MH		W**

Note that *DIP is also more true to the spirit of optimality theory, since it refers to surface form.

6 Proposed analysis

Variation between the fully specified and interpolated varieties can be obtained by swapping the rankings of SPECIFY(TONE) and *NONHEAD/M,H:

(40)	'e.le.phant	SPECIFY	*NONHEAD/M,H
☞	a. 'M-MH		**
	b. 'MØH	W*	

(41)	'e.le.phant	*NONHEAD/M,H	SPECIFY
☞	a. 'MØH	*	*
	b. 'M-MH	W**	L

Only two more constraints are needed, both based on Yip (2002:83). ***LONGH** stops high tone from spreading, though this would permit a high head:

(42) ***LONGH:** One violation per high tone linked to more than one TBU.

(43)	hi'bis.cus	*LONGH	HEAD/H
☞	a. L'MH		*
	b. L'H-H	W*	L

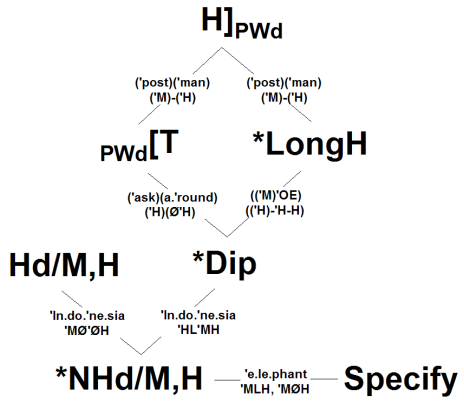
$_{PWD}$**[T** prevents word-initial toneless non-heads at the cost of *DIP:

(44) **ANCHOR-L (PWD, T):** The p-word left edge must coincide with the left edge of a tone. Abbreviated $_{PWD}$**[T**.

(45)	('ask)(a.'round)	$_{PWD}$[T	*DIP
☞	a. ('H)(L'H)		*
	b. ('H)(Ø'H)	W*	L

The crucial rankings are as follows.

(45)



(Note: *MOE* is a common acronym for the Ministry of Education.) The crucial losing candidates are indicated in the ranking diagram above and also appear in the tableau below. Note that *NONHEAD/M,H dominates SPECIFY(TONE) for the interpolated variety, and vice versa for the fully specified variety.

(46) **Tableau for the interpolated variety of CSE**

i. ('e.le.phant)	**H]$_{PWD}$**	***LONGH**	**$_{PWD}$[T**	**HD/M,H**	***DIP**	***NHD/M,H**	**SPECIFY**
☞ a. ('MØH)						*	*
b. ('M-MH)						W**	L
c. ('MLH)					W*	*	L
d. ('L-LH)				W*		*	L
e. ('HLL)	W*					L	L
ii. (hi.'bis.cus)	**H]$_{PWD}$**	***LONGH**	**$_{PWD}$[T**	**HD/M,H**	***DIP**	***NHD/M,H**	**SPECIFY**
☞ a. (L'MH)						*	
b. (L-'LH)				W*		*	
c. (M-'MH)						W**	
d. (L'H-H)		W*				*	
e. (Ø'MH)			W*			*	W*
iii. ('In.do.'ne.sia)	**H]$_{PWD}$**	***LONGH**	**$_{PWD}$[T**	**HD/M,H**	***DIP**	***NHD/M,H**	**SPECIFY**
☞ a. ('M-M-'MH)						**	
b. ('ML'MH)					W*	L*	
c. ('HL'MH)					W*	L*	
d. ('MØ'ØH)				W*		L*	W**
iv. ('ask)(a.'round)	**H]$_{PWD}$**	***LONGH**	**$_{PWD}$[T**	**HD/M,H**	***DIP**	***NHD/M,H**	**SPECIFY**
☞ a. ('H)(L'H)					*		
b. ('H)(Ø'H)			W*		L		W*
v. (('M)'OE)	**H]$_{PWD}$**	***LONGH**	**$_{PWD}$[T**	**HD/M,H**	***DIP**	***NHD/M,H**	**SPECIFY**
☞ a. (('H)'MH)					*	*	
b. (('H)-'H-H)		W*			L	*	
vi. ('post)('man)	**H]$_{PWD}$**	***LONGH**	**$_{PWD}$[T**	**HD/M,H**	***DIP**	***NHD/M,H**	**SPECIFY**
☞ a. ('H)-('H)		*	*				
b. ('M)('H)	W*	L	L				

7 Conclusion

Chinese CSE's use of low, mid, high *and* unspecified tone has made it a valuable test case for De Lacy's (1999, 2002a, 2002b, 2006) proposal on the stress-tone relationship, pointing to the need to mix positive tone stringent hierarchies for heads and negative ones for non-heads (32). It also demonstrates the applicability of Cassimjee and Kisseberth's (1999) PLATEAU constraint beyond Bantu languages if redefined as *DIP (37).

Postscript

Since presenting this paper, it has been pointed out to me that the greater need to specify features on heads compared to non-heads may not necessarily be best captured by positive stringent constraints in all cases. They do indeed provide the most parsimonious solution for the CSE stress-tone data discussed here, but might be problematic with other stress-sensitive features such as vowel quality (Moira Yip, p.c. 26 July 2009). A more generalisable solution would be a family of SPECIFY-HEAD constraints, penalising only heads for lacking some feature: the relevant member of this family here would be defined like HEAD/T (34) above. It is however possible that tone requires special treatment, since vowel constrasts, for instance, are normally underlying and hence amenable to MAX-HEAD rather than SPECIFY-HEAD. Alternatively, we could use the ANCHOR family instead of positive stringent constraints (Paul de Lacy, p.c. 18 September 2009). Such an analysis would need the slightly peculiar combination of ANCHOR-L (HD, T) and ANCHOR-R (T, HD) for the interpolated variety, ranked where the fully specified variety would have *HEAD/L. In a third possible analysis, De Lacy's stress-tone constraints could be sufficient with only the addition of *TONE (economising on number of tones) and a modified *LONGH (penalising adjacent high tones as well as high spreading) if we relaxed assumption (16c) on tone spreading such that the interpolated variety had *'Indo'nesia* 'MØ'MH instead of 'M-M-'MH. These forms were not considered because they do not capture the persistence of mid tone across a span of stresses.

I would also like to add that *DIP (37) is essentially identical to *TROUGH as previously proposed by Yip (2002:137).

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Appendix: Data collection

All speakers are ethnic Chinese and lifelong residents of Singapore. They attended government secondary schools and in some cases have tertiary education, but not university degrees. Speakers were interviewed in English, their dominant language. Languages are listed in order of proficiency according to self-report. Note that CM2 speaks Malay better than Chinese because he grew up in a Malay kampung (village).

Recordings were carried out between July 2008 and January 2009, in a quiet room with a Marantz PMD671 solid state recorder and a Shure SM10A microphone. Phonetic analysis was done in Praat 5.0.12. Labelling was primarily impressionistic, but pitch tracks were referred to in cases of doubt.

Most target words were presented as imaginary brand names; idioms were presented in conversation fragments. Speakers were asked to aim for informal but clear delivery, as if to a deaf aunty, and to emphasise only the words in capitals. Either the speaker or researcher could decide to have a token repeated if the speaker stumbled the first time, but speakers were asked not to emphasise the correction.

Experiment 1: Speakers read from PowerPoint slides, replying to experimenter's prompt "Who say one?" 14 target words were collected in 3 conditions (sentence-initial, -medial and -final) with 6 repetitions.

Sample of script

1. ALI say cannot order. Money deliver from Katong no standard one.
2. ALI say cannot order Minimum deliver from Katong one. No standard.
3. ALI say cannot order Tikam-tikam. Deliver from Katong no standard one.

	CM2	**CM4**	**CF1**	**CF4**
Gender, age	Male, 53	Male, 22	Female, 60	Female, 23
Languages spoken, (understood)	English, Malay, Hokkien, Mandarin	English, Mandarin, (Teochew, Hokkien)	English, Mandarin, Hokkien, Cantonese, Malay	English, Mandarin, Hokkien, (Malay, Cantonese)

Experiment 2: Speakers read from a paper script, replying to a prompt by the experimenter if requested. 160-240 target words were collected with 2 repetitions.

Sample of script

1. NEVER order IC from Katong lah.
2. ALWAYS order Helpful from Punggol lah.
3. BETTER order Locate from Jurong lah.

	CM7	**CM11**	**CF3**	**CF9**
Gender, age	Male, 23	Male, 35	Female, 21	Female, 53
Languages spoken	English, Mandarin, Hakka, Hokkien, Cantonese	Mandarin & Hakka, Hokkien, English, Cantonese	Mandarin, English, Hokkien, Japanese, Korean	Cantonese, English, Mandarin, Hokkien, Malay

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