A CLARIFICATION OF ASIAN TONAL FEATURES[*]

By Thomas Purnell

There are two types of description for the features of tones: notational and hierarchical. So far, models in both of these groups have difficulties accounting for the criteria in (1) which phonologists assert are essential for a successful theory of tonal features.

(1) a. features must categorize all tonal inventories, contrasts and synchronic alternations
b. features must account for tonogenesis and diachronic alternations
c. features must define natural classes

By reviewing how the two descriptive models handle these criteria, it is the purpose of this paper to propose changes to the characterization of hierarchical features of tone in light of recent developments in the theory of feature geometry.

1. NOTATIONAL DESCRIPTIONS. The first category of feature descriptions contains three kinds of notational characterizations of tones: alpha (e.g., H,L,M),[1] numeric (e.g., 1,2,3,4, etc.), and schematic (e.g., ˥ ˧ ˩ , etc.).[2] These notations were designed simply for discussing various tone systems on some gross level, such as using the alpha notation for non-contour systems of many African languages and the schematic notation for Asian tonal contours. Consequently, thesenotations cannot be utilized to sufficiently articulate the nature of tones.

To begin with, none of the three methods are able to categorize the inventory of tonal contrast. The alpha notation cannot differentiate well between tones which are not quite H, L, or M. The following tones in a five tone system may all be erroneously labeled as M: [+high, +central, -mid], [-high, +central, -mid], [-high, +central, +mid].[3] Although the schematic notation is a shorthand method for visualizing contour tones, it lacks precision and definition of a tone's fundamental properties. Also, the numeric system is only recognizable in relation to the maximum number of tones within a specific language, i.e., tone 3 by itself is not the same tone across all languages.

Additionally, each notational method mentioned above is primarily synchronic in nature and is unable to provide insight into, or explain the occurrence of, tonogenesis in Asian languages. In Proto-Vietnamese, for example, tonogenesis is thought to have evolved through three basic steps from Khmer which uses pitch extensively without the use of tones (cf. Haudricourt 1954, Matisoff 1973). First, the final consonants, -s/-ʃ lost their supralaryngeal tier via lenition, leaving final spirants and producing an -h/-ʔ alternation. Secondly, the final consonants, --h/-ʔ, became falling and rising tones respectively, again by assimilation and deletion in which the vowel developed a tonal distinction. Finally, the initial consonants developed a vocalic pitch contrast, with $C_{i[\alpha voice]}$ becoming $V_{[\alpha pitch]}$. It is very difficult to use one of the notational methods, as is attempted in (2), to capture the nature of how tone evolved in Vietnamese.

(2) a. *alpha notation*

pas → pa^{HL}

b. *numeric notation*

pas → pa^{21}

c. *schematic notation*

pas → pa

Each attempt fails to disclose the nature of the change from pas → $pà_{[-pitch]}$. Furthermore, although there is evidence that in some Asian languages, like Chinese, certain groups of tones can be shown to evolve from a similar underlying pitch, no real insight into the nature of tones can be displayed in notational descriptions.

Finally, the notations make no accurate predictions about natural classes. Numeric and alpha notations are too powerful since there is no way to determine, in an inventory of 5 tones, that tones 1 and 4, and 2 and 5 are natural classes where the former set of tones is low and the second pair is high in regard to tone, or that tones 1 and 2 are low and 4 and 5 are high in regard to pitch.

2. HIERARCHICAL DESCRIPTIONS. The second category of feature descriptions contains at least two systems of hierarchical features. In a hierarchical model, tones are arranged by some natural order, e.g., [-High] is lower than [+High]. The first system, proposed by Wang (1967), employs seven features to categorize thirteen tones Wang found in Asian languages: [Contour], [High], [Central], [Mid], [Rising], [Falling], and [Convex]. As to the treatment of tones, Wang's system is able to account for the difference between pitch/tone contours. The problem with this set of features, however, is that it accounts for natural classes by using natural classes, rather than by using the features that comprise the natural classes. For instance, rising tones are composed of two tones, the first of which is lower in pitch than the second (e.g., LM, LH, or MH).

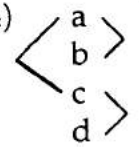
In the second system, Yip (1980) developed a two feature system using a primary Register feature, [Upper], which is subdivided by a Tone feature, [High], creating the hierarchy in (3).

(3)

Register	*Tone*
	+High
+Upper	-High
	+High
-Upper	-High

This model quite nicely relies on the relationship of only two features and avoids the problem of being overly specific like Wang's model. Furthermore, it proposes that the Tone feature was developed during the second step of tonogenesis while the Register feature developed in the third step, and it can account for natural class alternations in (4). This model claims that a ~ c, a ~ b, and c ~ d are natural classes. However, Yip's feature system needs to be revised in light of recent developments in the theory of feature geometry, primarily with regard to branching and nodes.

(4)

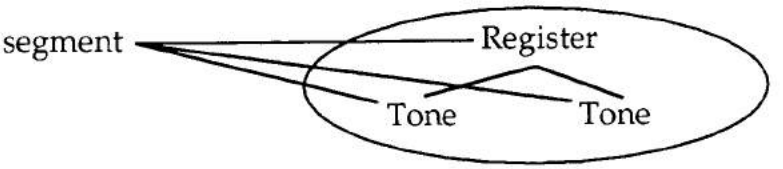


a ~ c = [+Upper] ~ [-Upper]
a ~ b = [+High] ~ [-High]
c ~ d = [+High] ~ [-High]

3. FEATURE GEOMETRY. Yip's theory makes a problematic claim, which influences its ability to describe tonal contrasts. The model in (3) asserts that although the Register and Tone

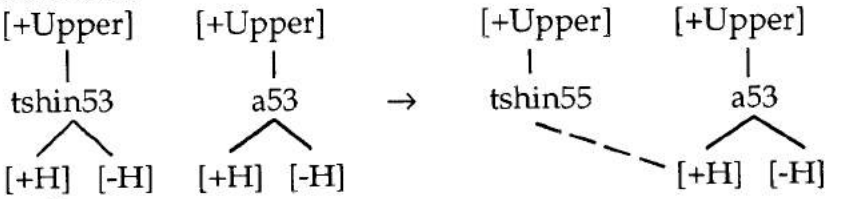
features are closely related, they are on different autosegmental levels, as Yip shows in (5).

(5)

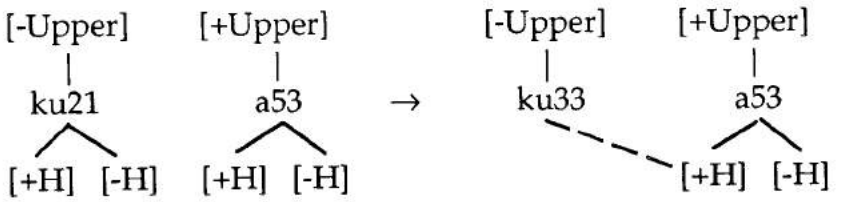


For some time, tonal features have been known to be autosegmental in that the features must follow the well-formedness condition's (WFC) association conventions connecting the tone to the vowel segment, while maintaining feature stability (Goldsmith 1991). But what is at issue here is whether or not the features are on the same or different autosegmental levels. Yip claims that Register and Tone are independent because of Tone deletion rules, like those involving the suffix /-a^{53}/ in Amoy (6),[4] in which the Tone feature is changed while the Register remains stable, permitting an a ~ c type alternation, as in (4).

(6) a. *small scale*

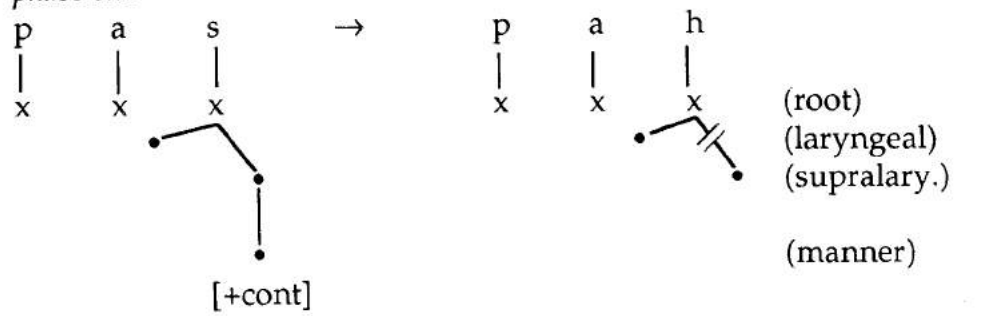


b. *uncle*

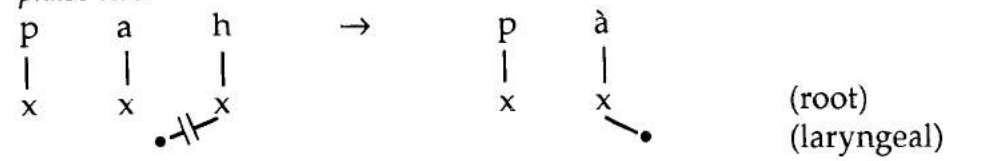


4. REVISION TO YIP'S DESCRIPTION. According to Yip's model Register and Tone are separate nodes. A possible revision to this model would be to place Register and Tone on the same node since they are similar in their dealing with laryngeal activity. The case of Proto-Vietnamese tonogenesis (mentioned above) displays just how closely pitch and tone are related. Notice how, in the second phase of tonogenesis (7b), the laryngeal node from the deleted final consonants joined to the vowel to form tones.

(7) a. *phase one*

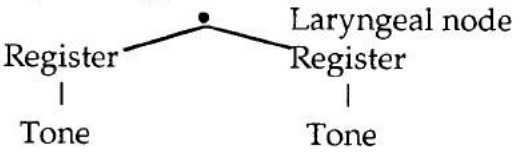


b. *phase two*



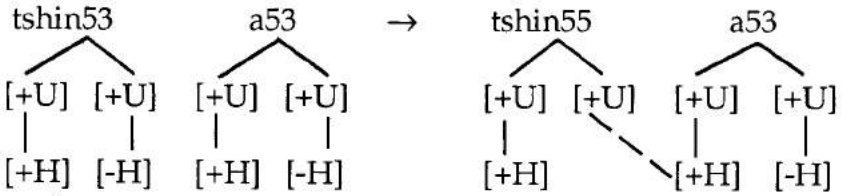
A revised model of (5) would place non-branching, but binary, features under the laryngeal node as in (8). This latter model is preferred, however, primarily because the current theory of feature geometry claims that no feature node can branch, except for class nodes like the root, laryngeal, and supralaryngeal nodes (Piggott, 1988, cited in Buckley, 1992). Thus, neither the Register tier nor the Tone tier (nodes, for all practical purposes), can branch, disallowing (5). Separating the two features, Register and Tone, onto two autosegmental levels is not permissible because of the logical nature of the hierarchy of features in (3), i.e., Tone is a subdivision of Register. Therefore, if Tone is a subdivision of Register, then Register is the head of Tone. Yip's theory also makes the claim that while the features are posited on different levels, they act in conjunction with each other. As a result, this revised model (8) can account for Asian tonal contrasts, such as the tonal inventory of Mien (see Appendix I), as well as Wang's tonal inventory (see Appendix II).

(8)

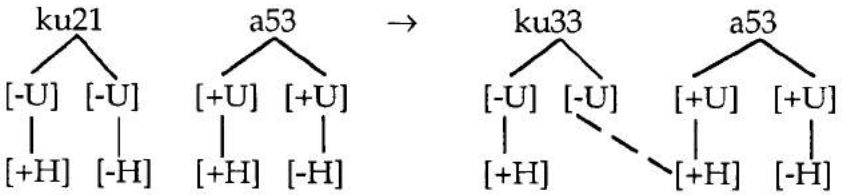


Also, the revised model can handle the Amoy data (6). However, the deletion and subsequent spreading must be explained since there are two branches from the laryngeal node. Looking at the data in (9), it is clear that only the Tone portion of the latter laryngeal branch actually deletes.

(9) a. *small scale*



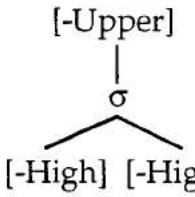
b. *uncle*



5. CONCLUSION. This paper has set out to revise the features for tone: Register and Tone. The revisions stem from the current notion that only nodes can branch and that since both features are produced in the same part of the mouth, they should be connected to the same node, that being the laryngeal node.

By way of extension, this paper would also like to suggest that theoreticians should be wary of derivations involving notational descriptions. Consider the Mandarin sandhi rule in which tone 3 becomes tone 2 when followed by another tone 3. The reason this sandhi occurs to two adjacent tone 3's is because the most complex tone is doubled. Yip begins her analysis of this rule using the conversational representation for tone 3 as in (10).

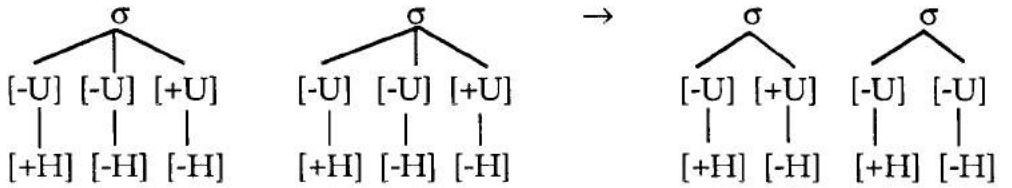
(10)



She proposes that sandhi occurs because of the dissimilaition of adjacent segments, i.e., on the first tone, the [-Upper] becomes [+Upper] and the second [-High] becomes [+High].

Taking the underlying representation as our starting point,[5] however, this example is reduced to a two-step ease of articulation process. The first tone 3 (214) becomes 24 while the second tone 3 becomes 21. This output of the second tone, then, is better resembled by (11) rather than by (10).

(11)



The two steps, then, involve eliminating the middle branch on the first tone and then eliminating the final branch of the seond tone.

(12) *Rule 1*

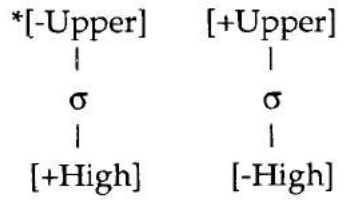
$$[\text{-Upper}] \rightarrow \text{ø} \ / [[\text{-Upper}] \_\_ [\text{+Upper}] \ldots]$$

Rule 2

$$[\text{+Upper}] \rightarrow \text{ø} \ / [\ldots [\text{-Upper}]_2 \_\_]_{\text{phrase}}$$

One advantage this revised model has over its predecessors is that it can account for cross Register tones, as is the case with Mien tone 5 (Appendix I). Yip's model fails to account for the tones that begin as [-Upper, +High] and resolve as [+Upper, -High], without having to create a new segment. Neither creating a new segment (13) nor combining two nodes onto one segment (14) will work in Mien words where a geminate is not present, like /24/ "again" and /k24/ "older brother". However, only if the model conforms to the fact that only the laryngeal node branches can this tone be account for (15).

(13)



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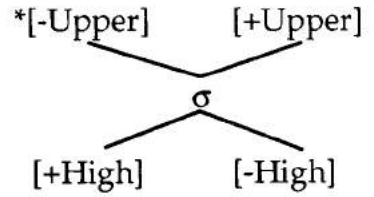

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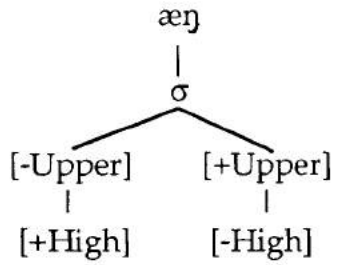


Notes

*Thanks to Herbert Purnell for his helpful suggestions. All errors are my own.

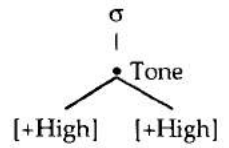
[1] This class of notation includes practical orthographic conventions, such as in Mien where-v represents a high rise-fall tone, -h represents a falling tone, -x represents a rising tone (Purnell, 1992).

[2] This class of notation includes diacritical marks.

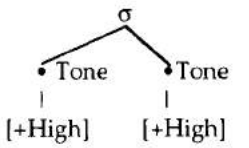
[3] Using Wang's (1967) features.

[4] Note that Yip assumes that the Tone tier deletion occurs to the roots permitting the spreading of the adjacent tone. However, if the tones are two features (ii) rather than one node (i), then a double deletion must occur to explain the disappearance of both tones. The fact that (ii) is also invalid is dealt with in section 4.

(i)



(ii)



[5] It is recognized that with sandhi the starting point is probably the representation that exits the lexicon but has not undergone any fast speech rules. Additionally, with the loss of thetheoretical distinction in recent years between the lexical and post lexical areas, it is especially important to begin with the underlying representation.

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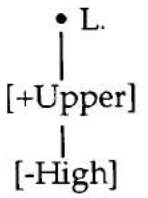
December, 1992; revised February, 1993

Appendix I. *Mien tones.* (revised version of Purnell, 1992)

Tone

1.



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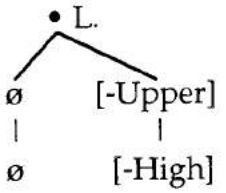

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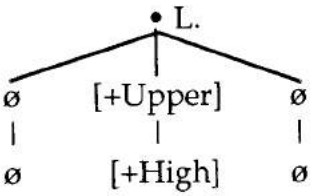

Tone

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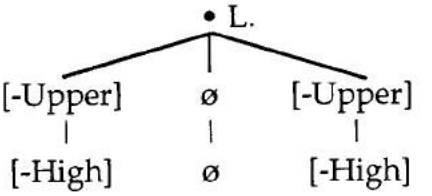

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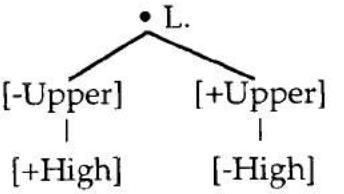

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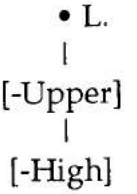
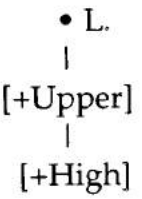


Appendix II. *Chinese tonal inventory.* (revised version of Wang, 1967)

Tone

1.



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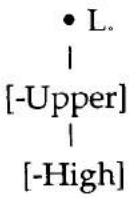

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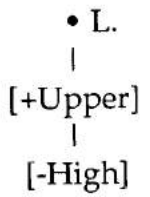
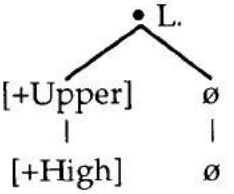


Tone

8.



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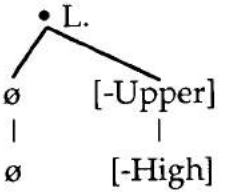

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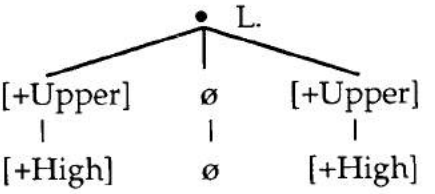

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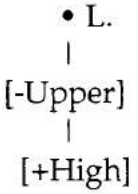
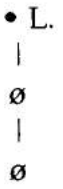

• L.
[-Upper]
[+High]

5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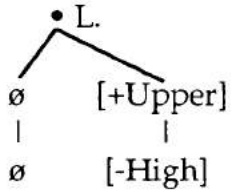
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[+Upper]
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[-High]

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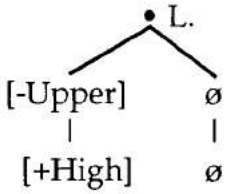
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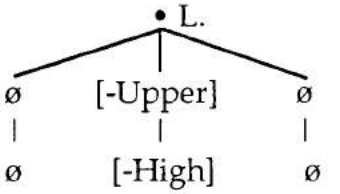
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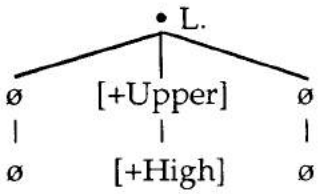
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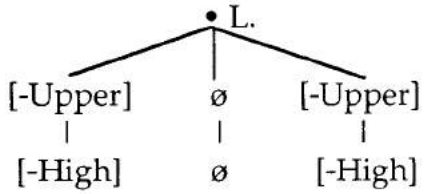
• L.
[-Upper]
ø
[-Upper]
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