Phonology

Tonal pattern of suffixes in Awa 'simple' noun phrase[1]

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0 Introduction

Awa is a tonal non-Austronesian (i.e. 'Papuan') language spoken in Eastern Highlands Province, Papua New Guinea. Awa has four phonemic tones (or 'tonemes'): low (*nàh* 'house'), high (*náh* 'breast'), falling (*nâh* 'taro') and rising (*năh* 'fish'). Each lexical item has its tonal pattern pre-determined, and remains unchanged if it is the only lexical item in the noun-phrase. (Describing words do not form a separate class of adjectives; they cannot be differentiated from nouns syntactically). While a number of suffixes have their tonal patterns pre-determined, the majority of suffixes are not pre-determined for their tonal patterns. For the suffixes which are not pre-determined for their tonal patterns, the tonal pattern they have depend on:

a) the final toneme of the word they are suffixed to;
b) the 'word class' (section 2.3) of the word they are suffixed to; and
c) the 'suffix class' of the suffixes (section 3).

This article will explain the process of how these suffixes acquire their surface tonal patterns in a 'simple' noun phrase, utilising the Autosegmental Phonology theory. The Autosegmental Phonology will be briefly discussed in section 1. All the preliminaries, including the phonological description of Awa, different 'word classes', and other rules will be discussed in section 2, before discussing the derivation of surface tonal pattern of the suffixes in section 3.

All linguistic data from Awa and other descriptions of Awa phonology presented in this article are drawn from Loving (1966, reprinted in McKaughan (ed), 1973). All quotations which are not referenced are from this Loving (1966) article. I am not aware of any other articles which look at the phonological aspects of Awa. Other articles concerning the morphology and syntax of Awa can be found in McKaughan ed. (1973).

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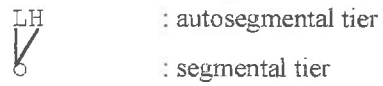
[1] A 'simple' noun phrase is defined as a noun phrase where there is at most one noun, with at most one suffix. Other types of noun phrases, e.g. more than one noun or more than one suffix, have a slightly different process of surface tonal pattern derivation. Tonal patterns for verb phrases are totally different. All types of tonal derivation process other than that of 'simple' noun phrases are outside the scope of this article.

1 Autosegmental Phonology

The Autosegmental Phonology theory is one of the most influential developments in modern phonology, and it started its life as Goldsmith's PhD dissertation AUTOSEGMENTAL PHONOLOGY (1976). Goldsmith's idea is that tones exist in a different level ('tier'), parallel to the line, or tier, of segments. The tones in the 'autosegmental tier' are then 'associated' with the vowels in the 'segmental tier' through 'association lines'. So the Awa word *ŏ* 'new', with a rising toneme, is represented as:



The usual tone association process involves (Leben, 1978):

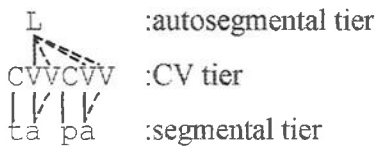
a. Associate the first tone with the first syllable, the second tone with the second syllable, and so on, until all tones or syllables are exhausted.
b. Tones or syllables not associated as a result of (a) are subject to the well-formedness condition.

The well-formedness conditions (WFCs) being (Goldsmith, 1976):

1. All vowels are associated with at least one tone; All tones are associated with at least one vowel.
2. Association lines do not cross.

1.1 Segmental, Autosegmental and Syllable tiers linked through the CV tier

In this article, I will also incorporate the concepts of 'CV tier' and 'syllable tier' (McCarthy 1981, Clements and Keyser 1983). Consonants and vowels in the segmental tier are associated with a string of CV 'skeleton' (consonants associating with Cs, and vowels associating with Vs). In my analysis, tones are associated with the Vs in the CV tier, not with the vowels in the segmental tier directly. (A tone is defined as each L or H in the autosegmental tier, and a toneme is defined as the sequence of tones (L, H, HL or LH) a syllable has.) So the suffix *tàpà* 'large', with low tonemes, would be represented as:



(Dotted association lines signify spreading.)

In normal circumstances, I let all vowels to be represented by two Vs in the CV tier, and each V handles only one tone. I put this formally as: Each vowel in the segmental tier is links up with one or two Vs in the CV tier, but each V in the CV tier can only associate with one L or H tone in the autosegmental tier. There are several reasons for this:

- Following Foley's suggestion for Awa (1986: 64), a syllable with contour tone like *nǎ* (*năh* in Awa orthography) is actually *nɔ́ɔ̀*, for that vowel length is not contrastive in Awa. There is no syllable weight difference in Awa, and each syllable only allows one vowel (vowels next to each other are considered as two syllables, not a diphthong of the same syllable).
- Awa generally disfavour the rising toneme (LH). During derivation, when a syllable with a rising toneme (LH) is followed by a syllable with a low toneme (L), the H tone is transferred to next syllable (LH + L → L.HL) (section 2.2). It seems reasonable to make all syllables with a level toneme to have two Vs (rather than some syllables having one V and others having two Vs), so that syllables with low tonemes are 'readied' to take an extra H in the situation described above.
- The first syllable of a suffix is incapable of taking contour tonemes/ more than one tone when the suffix is following a word where the final toneme has a high toneme. Section 2.4 introduces the *VV degemination rule*. The rule deletes the first V of the first syllable of a suffix in just this situation, so that the first vowel is linked with only one V, and that V can only take one tone. The remaining tones are 'shifted' to the next syllable according to the association principle of Awa.

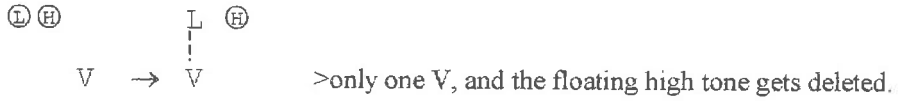
The syllable structure in Awa will be discussed later in this section. Apparently there are no cases where two identical vowels belonging to two adjacent syllables are not intervened by any consonants, so a vowel can only link up with at most two Vs in our model.

Tones only spread rightward in Awa. Each V of a lexicon (and a small number of suffixes) is pre-assigned with their tones lexically. Most suffixes have 'toneless' Vs (Vs which are not yet associated with any tones), and most words and suffixes carry floating tones (a floating tone is a tone waiting to be assigned). If there are more empty Vs then floating tones, a tone is allowed to associate with more than one V. But if there are more floating tones than empty Vs, there is a problem because one V is only allowed to associate with only one tone in Awa. Here is a set of tone association rules specific to Awa:

a. Associate the first floating tone with the first V, the second floating tone with the second V, and so on, until all tones or syllables are exhausted.
b. Tones not associated as a result of (a) are deleted.
c. Syllables not associated as a result of (a) will receive the nearest tone towards its left (because tones only spread rightward in Awa).

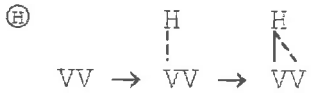
Although this set of association rules violate the statement of 'all tones are associated with at least one vowel' of the well-formedness conditions (WFC), The WFC are just a set of common conditions, which is not universal, and are allowed to be violated.

Example of association rule b. (from Suffix Class III, Ⓛ Ⓗ are floating tones):

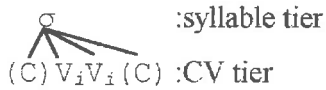


>only one V, and the floating high tone gets deleted.

Example of association rule c. (from Suffix Class I):



Syllables (symbolised as σ) are placed in the syllable tier. Syllables are associated to the Cs and Vs in the CV tier. A syllable in Awa consists of at most one vowel, and that vowel can be preceded by one consonant and/ or followed by one consonant. In the CV tier, that is represented by $(C)V_iV_i(C)$. A syllable is attached to a string of $(C)V_iV_i(C)$, *where the two Vs are linked to the same vowel in the segmental tier.*



:syllable tier
:CV tier

A <u>tone</u> is defined as each L or H in the autosegmental tier, and a <u>toneme</u> is defined as the sequence of tones (L, H, HL or LH) a syllable has. The notion of syllable and syllable tier is only relevant for a small part of this paper, and will be ignored most of the time.

In summary:

- The segmental tier (consonants and vowels), the autosegmental tier (L and H tones) and the syllable tier (σ) is linked through the CV tier (the 'skeletal' Cs and Vs) in the centre.

- Each σ in the syllable tier is linked to a string of (C)V_iV_i (C) in the CV tier, where the Vs in the middle need to be linked to the same vowel in the segmental tier.
- Each tone in the tonal tier can link with one or more Vs in the CV tier, but one V can only take one tone.
- Each consonant in the segmental tier is linked with one C in the CV tier (there are no consonant geminates in Awa). A vowel can link with one or two Vs.

1.2 The steps towards the surface tonal realisation

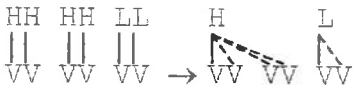
The whole transformation process needed to derive the surface tonal pattern involves these six steps (which is only sufficient for 'simple' noun phrases):

1. Lexicons and suffixes carrying their inherent pre-assigned tones and inherent floating tones are put into the linear order required;
2. For the class V suffix (there is only one suffix in that class, section 3.4), it acquires a floating B tone at the beginning if the word it follows has no inherent floating tones;
3. *B tone transformation rules* (*B rules* for short, section 2.3) and *VV degemination rule* (*HV rule* for short, section 2.4). The B rules concern the behaviour of B tones in the autosegmental tier, and the HV rule concerns the Vs of the suffixes in the CV tier. Because these rules operate on different tiers, they can occur at the same time;
4. *Obligatory Contour Principle* (*OCP*, discussed below at section 1.3) is observed cyclically after the B rules. If two identical floating tones or two identical pre-assigned tones are produced by the B rules, OCP will collapse the two identical tones resulted by the B rules. Other naturally occurring adjacent identical floating tones will also be simplified to one by the OCP;
5. The *association* of the floating tones to the 'toneless' Vs, subject to the association principle for Awa discussed above;
6. *LH elimination rules* (or *LH rules* for short, section 2.2).

The whole six-steps process may sound very complicated, but each of these steps and rules are in fact very simple and logical. Section 2.2 of this article outlines the last (and easiest) process, the *LH rules*. The 'B rules' and the 'HV rule' are outlined in sections 2.3 and 2.4. Bur first of all, we will discuss briefly about the OCP in the next sub-section.

1.3 The OCP, and the OCP in Awa

The Obligatory Contour Principle (OCP) was first discussed in Leben (1973), and termed OCP by Goldsmith (1976). The basic idea is that 'when two identical tones are associated with adjacent vowels, the right most tone is deleted (and the leftmost is associated with the freed vowels)' (Odden, 1986). In Awa, we are assuming that tones are associated with the Vs in the CV tier, an example of the OCP:



(OCP)

In Odden (1986), other than discussing languages which need the OCP to derive the correct surface tonal patterns, he also discussed many counter-examples to the OCP. One of the examples, where a pre-assigned tone has an identical floating tone next to it, is also found in Awa. For example:

(as in class *i* words, see section 2.3)

In Odden (1986), he suggested that the OCP is in fact an 'ordered rule', ordered just like any other rules in that language. He refused to call it an 'ordered principle' for a 'principle' implies that it would be applied cyclically. For this analysis, I propose that:

- The OCP is observed within a string of neighbouring associated tones and within a string of neighbouring floating tones, but not between associated tones and floating tones.
- The OCP is observed after the application of the Step 3 of the six steps process of surface tonal realisation, and is applied cyclically after that point.

2 The tonal phonology of Awa

2.1 The phonemes of Awa

Awa has the following consonants: p, t, s [dz], k, q [ʔ], m, n, w and y. The following seven vowels are found in Awa: i, u, e, o, eh [æ], a [a~ə] and ah [ɒ/ɔ].

Awa has four phonemic tones ('tonemes'): low, high, falling and rising. In Awa orthography, high toneme is marked on the vowel with an acute (´), falling toneme with a circumflex (ˆ), rising toneme with a wedge (ˇ), and the low toneme left unmarked. The low toneme will be marked with a grave (`) in this article, consistent with the marking of the other

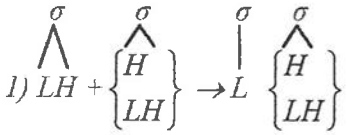
tonemes. The usual practise in autosegmental phonology is to symbolise a low tone as L, and the high tone as H. The falling toneme can be thought of as a high to low contour toneme, symbolised as HL, and the rising as LH. Both representations are used here, where appropriate.

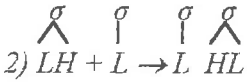
The low toneme occurs most frequently. 'In ten pages of Awa folktale text the percentage of occurrences were as follows: low 68%, high 22.8%, falling 5.4%, and rising 3.8%'. The low toneme is the most unmarked toneme in Awa, it has the highest occurrence.

2.2 The LH elimination rules (LH rules)

Non-utterance-final rising tonemes are avoided. When a rising toneme is not utterance-final, the following changes occur: 1) Following an H or HL toneme, the LH toneme loses its H ('delinked' in terms of autosegmental phonology), resulting in the word-final syllable having a L toneme. 2) Following an L toneme, the H of the LH toneme is transferred ('delinked' with its original vowel and 'spread') to the next syllable, resulting in the next syllable to have a HL toneme. These rules are termed 'LH elimination rules' (or 'LH rules' for short) in this paper. In summary:

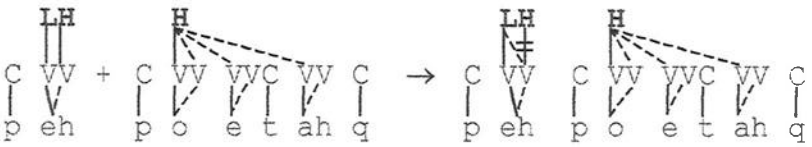
LH elimination rules:



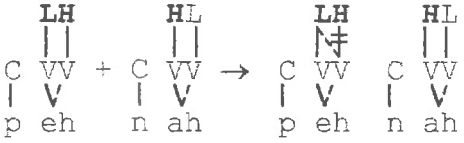


(The syllables link with the tones via the CV tier.)

Examples for 1):



pĕh 'just' + *póétáhq* 'pig' → *pèh póétáhq* 'just a pig'

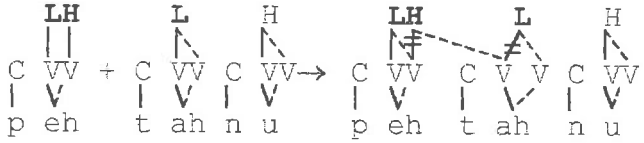


pĕh 'just' + *nâh* 'taro' → *pèh nâh* 'just taro'

So is this a postlexical tonal rule or does it work at the lexical level as well?

In these cases, the H is delinked with the word final Vs due to the LH rule. But well-formedness condition requires a vowel to be associated with at least one tone; the now 'toneless' V needs to acquire a tone from somewhere. Since tones only spread rightward in Awa, the only tone available is the L tone to the left. The L tone spreads rightward, associating itself with the 'toneless' V.

Examples for 2):

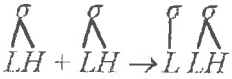


pěh 'just' + *tàhnú* 'flea' → *pèh tâhnú* 'just a flea'

The LH rule requires the H to be delinked from its original V. The H then spreads itself rightward to the next V, this is permitted because the following L is still associated with at least one V (an association condition specific to Awa). The 'toneless' V in turn receives a tone from the previous L.

An example of a rising tone followed by another rising tone can be found when an LH-final class *i* word (section 2.3) is followed by a class III suffix (section 3.2). These suffixes have an LH tone when following an LH-final class *i* word. The result is that, the H of the first LH toneme is delinked, and the second LH toneme is unaffected.

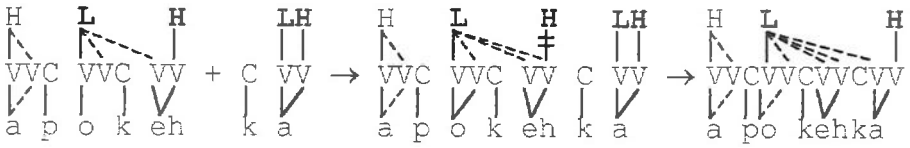
LH elimination rules:



3) LH + LH → L LH

(The syllables link with the tones via the CV tier.)

Examples for 3):



ápòkěh 'tree top' + *kǎ* actor marker → *ápòkèhkǎ* 'the tree top did it'

Looking at the second step: When the H of the first LH syllable is delinked, it has no anchor V to re-link/ spread to, due to the facts that each V can only associate with only one L or one H, and each of the L and H of the second syllable is only associated with one V, they

cannot 'make way' for the delinked H of the first syllable. That H is then deleted because there are no Vs for it to associate with. The third step is in response to the obligatory contour principle (OCP): when the H of the first syllable is deleted, it leaves the L in front and the L after next to each other. The two adjacent Ls then simplify to one L.

2.3 Word class, B tone and the B tone transformation rules (B rules)

The 'word class' of the word which is being suffixed to is also a factor in determining the surface tonal pattern for some of the suffixes. The lexical nouns (including the describing words) are divided into two classes: class *i* and class *ii*[2]. All class *ii* words ends in an H tone (H or LH toneme), e.g. *kàpàntéh* 'sick', *sòpùyǎ* 'thin'. While most class *i* words end in an L tone (L or HL toneme), e.g. *kàwèq* 'good', *ànòqtâq* 'big', a number of class *i* words end in an H tone, e.g. *ǒ* 'new', *èyòyó* 'light'. I postulate that other than the sequence of tones a word have in the surface form,

- Class *i* word also have an inherent 'floating tone' at the end of the sequence of tones after the last pre-associated tone.
- Class *ii* words do not have any inherent floating tones.

The floating tones do not surface when the word is spoken in isolation because tones only associate rightward in Awa (they occur after the last pre-associated tone), but they are crucial in the surface realisation of the tonal patterns for the suffixes. Most suffixes have at least some un-associated Vs, and the floating tones are used to associate with the 'empty' Vs. Class *i* words ending in an L tone have an extra floating L tone at the end of the sequence of tones, and class *i* words ending in an H tone have an extra floating 'B' tone at the end of the sequence of tones. For example, for the word *ǒ* 'new', other than having the pre-associated L and H tones, there is also a floating Ⓑ tone after the pre-associated H tone.

A 'B' tone is a tone which is waiting for its tonal value to be determined. The B tone copies the tone which follows:

- B + L = L + L
- B + H = H + H

For instance: H/LH ending class *i* words (e.g. *tàhnú* 'flea') have an inherent floating B tone at the end of the word; class I suffixes (e.g. *-me* identificational) have an inherent floating H tone at the beginning of the word. When a class *i* word is suffixed with a class I suffix, the floating B tone at the end of the word will copy the floating H tone of the suffix:

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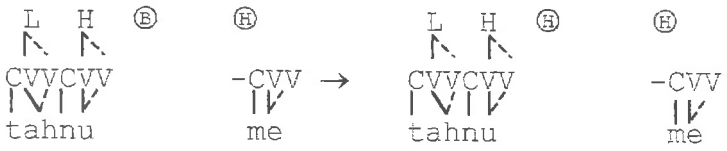
[2] There is another closed word class, the word class *iii* (see Loving 1966). But this these words do not take any suffixes, they are ignored in this article.



(The end result, after OCP and tone-association: *tàhnú* 'flea' *-me* idenfication al → *tàhnúmé* 'the flea')

It becomes interesting when a B tone is followed by another B tone (suffixes belong to suffix class III has an inherent floating B tone at the beginning; suffixes belonging to suffix class IV and V have a pre-associated B tone). As mentioned in section 2.1, the low toneme is the most unmarked toneme in Awa; in some sense the L tone is the 'default' or the 'unspecified' tone. The B tone is in a sense a special kind of L tone. The need for the B tone to 'acquire' its tonal content from the neighbouring tone suggests that the B tone is 'empty' in tonal content. Being 'empty', the B tone is equally 'unspecified' as the L tone.

When a B tone is followed by another B tone, the first B tone 'copies' the second B tone. Although the tonal content is still empty, nevertheless they are now sharing the 'un-specificity', and thus both of them become the 'unspecified' L tones. The two neighbouring L tones collapse into one L tone in a later stage, due to OCP:

- $B + B = L + L \rightarrow L$

These rules which transform the underlying B tones are called the 'B tone transformation rules', or 'B rules' for short. In summary:

B tone transformation rules:

1) $B + L \rightarrow L + L$

2) $B + B \rightarrow L + L$

3) $B + H \rightarrow H + H$

(and OCP will collapse the two neighbouring tone at a later stage)

The B rules works from the left to right, consistent with Awa's rightward only association rules. When two B tones is followed by an H: B + B + H, the B rule will transform the first two B tones into L tones before the second B tone has a chance to copy the next H tone.

2.4 The VV degemination rule (HV rule)

There is a rule which is specific to the suffixes, concerning the CV tier. I will call this the 'VV degemination rule', or 'HV rule' for short:

VV degemination rule (HV rule):

$$V \rightarrow \emptyset \,/\, \overset{\overset{H}{\wedge}}{\underset{\underset{\sigma}{V}}{VV}} \_ V$$

In other words, a suffix will lose its first V in the CV tier when it is attached to a high toneme ending word. The rule will not apply when the last toneme of the word is low, falling or rising.

This rule applies before the association of floating tones to the 'toneless' Vs. However ad hoc this rule may seem, the rule is evidenced at the derivation of the surface tonal pattern for suffix class III and suffix class II. Although this rule will not affect the derivation of the surface tonal pattern for other suffixes, lets assume that the HV rule applies to all suffixes for consistency.

3 The surface tonal pattern for suffixes

Most of the suffixes are not pre-determined for their tonal pattern. These suffixes are divided into six classes, following Loving's (1966) terminology. The suffixes are introduced in numerical order from Suffix Class I to Suffix Class VI, except for Suffix Class II which is introduced after Suffix Class VI. Suffixes which have all their tones pre-associated are introduced in section 3.7.

3.1 Suffix Class I

'The suffixes in this class are: *-miq* predicative, *-me* identificational, *-teh* conjunctive plural.' Class I suffixes are one-syllable suffixes which have a high toneme when following a word which has a final H or LH toneme, and have a rising toneme when following a word which has a final L or HL toneme. In my analysis, these suffixes carry a floating H tone underlyingly. In summary:

Suffix Class I: *one-syllable*

a) *after H/LH* $\rightarrow H$

b) *after L/HL* $\rightarrow LH$

Ⓗ
-VV

Examples for suffix class I are:

a) póétáh 'pig' + *-me* identificational = *póétáhmé* 'the pig';

a) ànôwă 'mother' + *-teh* conjuntive plural = *ànôwàtéh* 'his mother and others' (LH rule applied);

b) àhtè 'woman' + *-miq* predicative = *àhtèmìq* 'it is a woman';

b) àyàhtâ 'hair' + *-me* identificational = *àyàhtâmĕ* 'the hair'.

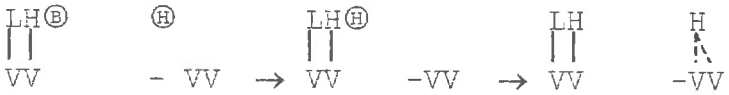
so this words are a syntactic level?

Autosegmental representation of tonal derivation of class I suffixes:

Following an L/ HL ending class *i* word (which carries an inherent Ⓛ):

(Normal association procedure, one tone with one V. The adjacent Ls will collapse into one L due to OCP.)

Following an H/ LH ending class *i* word (which carries an inherent Ⓑ):



(If the word ends in an H toneme instead, the suffix will only have one V due to HV rule. B rule: B + H → H + H → H (OCP). Then the floating H associates with the Vs of the suffix. The adjacent assigned Hs will collapse into one H due to OCP.)

Following a class *ii* word (which carries no inherent floating tones):

(HV rule applied, thus the suffix has only one V. The HV rule would not have applied if the class *ii* word ends in an LH toneme, and the suffix will have two Vs in that case.)

3.2 Suffix Class III

'The suffixes are: *-pa* 'to, at' (animate); *-ne* possessive marker; *-ka* actor marker; *-taq* 'at,on'; *-sahq* purposive collective'. Class III suffixes are one-syllable suffixes, and the tonal pattern they have depends on both the word class of the word and the final toneme of the word they are attached to. When following a class *i* word which is L, HL or LH final, the suffix has an LH toneme; when following a class *i* word which is H final, the suffix has an L

toneme; when following a class *ii* word, the suffix has an H toneme. In my opinion these suffixes carry a floating tone sequence of B and H. In summary:

Suffix Class III: one-syllable

a) *after word class i L/HL/LH → LH*

b) *after word class i H → L*

c) *after word class ii (LH/H) → H*

Ⓑ Ⓗ
- VV

So do you think all suffixes should be treated in the same way? Is it relevant?

Examples for suffix class III are:

a) nâh 'taro' + *-sahq* purposive collective = *nâhsăhq* 'taro colecting';

a) àhtè 'woman' + *-ne* possessive marker = *àhtèně* 'the woman's';

a) ápòkĕh (class *i*) 'tree top' + *-ka* actor marker = *ápòkèhkă* 'the tree top did it';

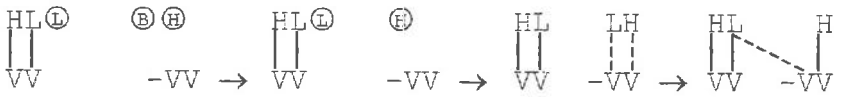
b) tàhnú (class *i*) 'flea' + *-ka* actor marker = *tàhmúkà* 'the flea did it';

c) òyétá (class *ii*) 'egg' + taq 'at, on' = *òyétátáq* 'on the egg';

c) păh (class *ii*) 'fish' + sahq purposive collective = *pàsăhq* 'fish collecting'.

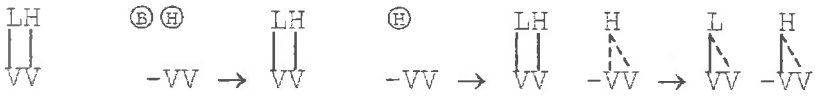
Autosegmental representation of tonal derivation of class III suffixes:

Following an L/ HL ending class *i* word:



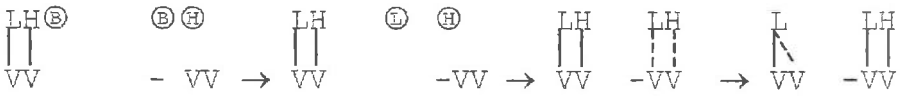
(B rule: B+H→H) (OCP)

Following a class *ii* word:



(B rule applied) (OCP and LH rule)

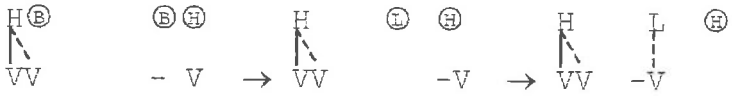
Following an LH ending class *i* word:



(B rule applied: B+B→L) (LH rule)

(OCP will cause the two adjacent Ls to become one in a later stage.)

Following an H ending class *i* word **(one of the evidences for the HV rule here)**:



(HV rule: first V deletes)(B rule: B+B=L)

(There is only one V left for the Ⓓ and the Ⓗ, because a V can only associate with one tone in Awa, only the Ⓓ gets associated with the lone V. Without the HV rule, this and the previous case would be identical.)

3.3 Suffix Class IV

'The suffixes are: *-sape* causational, referential; *-tate* dual; *-tato* trial; *-mati* plural; *-kaqta* 'elongated'; *-kaqkaq* conjunctive; *-taqte* instrumental; *-piqpeq* 'in'; *-tapa* 'over, across'. Class IV suffixes are two-syllables suffixes, and the tonal pattern they have depends on both the class of the word and the final toneme of the word. When following a class *i* word which is L or HL final, the two-syllables suffix has an L-H pattern; when following a class *i* word which is H final, it has an L-LH pattern; when following a class *i* word which is LH final, it has an HL-LH pattern; and when following a class *ii* word, it has a H-H pattern. These suffixes have a B and an H tone pre-specified for the second syllable. In summary:

Suffix Class IV: two-syllables

		BH
a) *after word class i*	*L/HL* → *L*	*H*
b) after word class i	*H* → *L*	*LH*
c) after word class i	*LH* → *HL*	*LH*
d) after word class ii	*(LH/H)* → *H*	*H*

- VV VV

(initial H of the suffix is a result of LH rule)

Examples for suffix class IV are:

a) kàpàtà 'bird' + *-tato* trial = *kàpàtàtàtó* 'three birds';

a) nâh 'taro' + *-mati* plural = *nâhmàtí* 'many taros';

b) tàhnú (class *i*) 'flea' + *-tate* 'two' = *tàhnútàtě* 'two fleas';

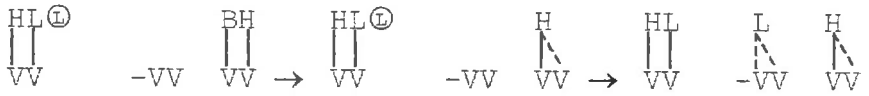
c) ápòkèh (class *i*) 'tree top' + *-kaqkaq* conjuntive = *ápòkèhkâqkăq* 'and a tree top';

d) òyétá (class *ii*) 'egg' + *-tate* dual = *òyétátáté* 'two eggs';

d) păh (class *ii*) 'fish' + *-mati* plural = *pàhmátí* 'many fish'.

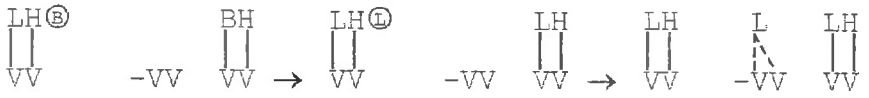
Autosegmental representation of tonal derivation of class IV suffixes:

Following an L/ HL ending class *i* word:



(B rule: B+H→H)

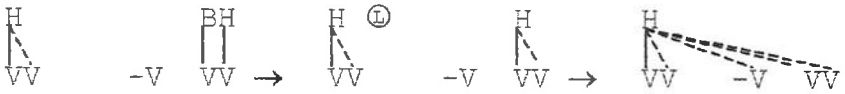
Following an H/ LH ending class *i* word:



(B rule: B+B→L)

(HV rule applies if the word ends in H toneme. LH rule applies last, if the class *i* word ends in LH.)

Following a class *ii* word:



3.4 Suffix Class V

'Suffix Class V consists of one suffix *-tahnsa* 'similar.' This suffix is identical to those of suffix class IV in most aspects. The only difference is that (other than the fact that *-tahnsa* is a minor suffix), when it is following class *ii* words (which ends in either H or LH), the suffix has the tonal pattern as if it is following an H or LH final class *i* words. In other words, the suffix *-tahnsa* acquires a floating B tone at the beginning when it is following class *ii* words, a rule which is specific for *-tahnsa* (Step 3). In summary:

Suffix Class V: *two-syllables*

a) *after L/HL →L H*

b) after H →L LH

c) after LH →HL LH

(initial H of the suffix is a result of LH rule)

(Ⓑ)	BH
- VV	VV

Examples for suffix class V are:

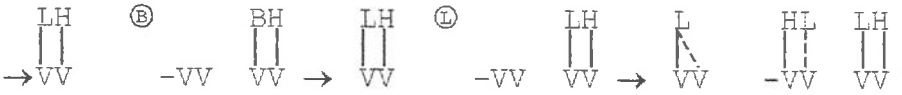
a) nàh 'house' + *-tahnsa* 'similar' = *nàhtàhnsá* 'like a house';

b) tàhnú (class *i*) 'flea' + *-tahnsa* = *tàhnútàhnsǎ* 'like a flea';

c) păh (class *ii*) 'fish' + *-tahnsa* = *pàtâhnsă* 'like a fish'.

Autosegmental representations of tonal derivations of the class V suffix is the same as class IV suffixes, except when it is following a class *ii* word:

(*-tahnsa* acquires a Ⓑ if the preceding word has no floating tone, the word being a class *ii* word.)



(B rule: B+B→L) (LH rule)

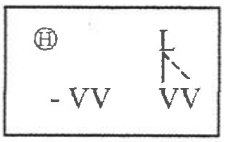
3.5 Suffix Class VI

'The suffixes in this class are: *-pomo* dubitative; *-poqpoq* dubitative conjunctive.' Class VI suffixes are two-syllables suffixes. They have an L-HL sequence following a word which is L or HL final, and a H-L sequence following a word which is H or LH final. These suffixes have a floating H tone at the beginning, and the second syllable pre-associated with an L tone. In summary:

Suffix Class VI: two-syllables

a) *after L/HL* →*L HL*

b) *after H/LH* → *H L*



Examples for suffix class VI are:

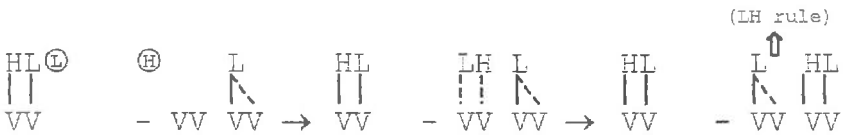
a) nâh 'taro' + *-pomo* dubitative = *nâhpòmô* 'a taro?';

a) nàh 'house' + *-poqpoq* dubitative conjuntive = *nàpòqpôq* 'and a house?';

b) tàhnú 'flea' + *-pomo* dubitative = *tàhnúpómò* 'a flea?';

b) păh 'fish' + *-poqpoq* dubitative conjuntive = *pàhpóqpòq* 'and a fish?.

When following H/LH ending class *i* words and class *ii* words (also H/LH ending), the tonal pattern derivation is easy and straightforward. Here is the autosegmental representation of tonal derivation of class IV suffixes when it is following L/HL ending class *i* words:



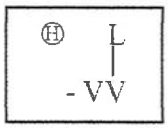
3.6 Suffix Class II

'The suffixes in this class are: *-po* question marker, and *-seq* personal dual.' Suffix Class II is like a one-syllable version of Suffix Class VI. The tonal pattern the suffixes have is like that of Suffix Class VI, but without the first tone (H̶ HL; H̶ L). Underlyingly, like Suffix Class VI, it has a floating H tone at the beginning and a pre-specified L tone, but in Suffix Class II, the L tone is pre-associated with the second V of the single syllable (instead of the second syllable as in Suffix Class VI). In summary:

Suffix Class II: *one-syllable*

a) *after L/HL/LH* → *HL*

b) *after* *H* → *L*



Examples for suffix class II are:

a) àhtè 'woman' + *-po* question marker = *àhtèpô* 'is it a woman?';

a) ànôwă 'mother' + *-seq* personal dual = *ànôwàsêq* 'and his mother';

a) nâh 'taro' + *-po* question marker = *nâhpô* 'is it a taro?';

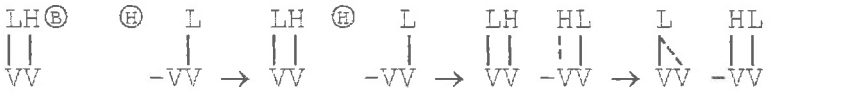
b) póétáhq 'pig' + *-po* question marker = *póétáhqpô* 'is it a pig?'.

In suffix classes IV, V and VI, the floating tones have pre-assigned tones in front and behind them. The floating tones are in some sense 'squeezed' between pre-assigned tones, but that is not an issue for those suffixes, because there are enough empty Vs for the floating tones to anchor. But in the case of suffix class II, there are cases where a 'squeezed' floating tone having no empty V to associate with, and also one case where two 'squeezed' floating tones 'fight' for one empty V to anchor.

Autosegmental representation of tonal derivation of class II suffixes:

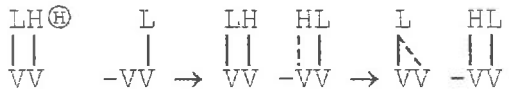
Lets have a look at the 'less problematic' ones first:

Following an LH ending class *i* word:



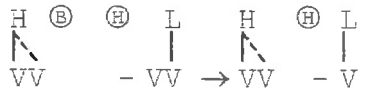
(B rule applied) (OCP and HL rule)

Following an LH ending class *ii* word (which is very similar to the previous case):



When following words ending in the H toneme, the suffix will have only one V left, the second V which has an L pre-assigned to it, **due to the HV rule.** The floating H tone has no V to associate with, so it fails to surface in the spoken form, and gets deleted.

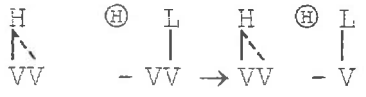
Following an H ending class *i* word:



>The Ⓗ fails to anchor, and gets deleted.

(B rule and HV rule)

Following an H ending class *ii* word:

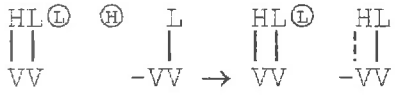


>The Ⓗ fails to anchor, and gets deleted.

(HV rule)

In the next case of a class II suffix following an L/ HL ending class *i* word, the word carries an inherent Ⓛ at the end, and the suffix carries an inherent Ⓗ in front. All the Vs of the word are pre-associated with tones, and the second V of the suffix is pre-associated with an L tone. The only empty V available is the first V of the suffix. Now we have a Ⓛ and a Ⓗ 'fighting' for that one empty V. In normal circumstances when the floating tones are not being 'squeezed' (occurring between pre-assigned tones), the association principle would predict that the first tone gets the lone V. But here the floating tones are occurring between pre-assigned tones. In my analysis, in these 'fighting' situations, the one 'closer' to the V can 'reach the V faster' and get associated first (a rule specific to Awa, at least). In other words, the one towards the right, the inherent Ⓗ of the suffix, gets the chance to associate with the empty V of the suffix. The Ⓛ 'loses', fails to anchor because a V is only allowed to associate with one tone in Awa, and the Ⓛ gets deleted.

Following an L/ HL ending class *i* word:



>The Ⓛ fails to anchor, and gets deleted.

3.7 Suffixes which have all their tones predetermined

The tonemes of the following suffixes remain unchanged: *-è* 'augmentative', *-tàpà* 'large', *-tàpîtă*, *-tàpîtàmô*, *-tàpîtàqpómò* 'dubitative', *-tàníáhq* 'very long'. In my analysis, these suffixes have all their tones pre-assigned. It does not matter if the word they are suffixed to have inherent floating tones or not, the floating tones would have no empty Vs to associate with.

Examples of class X suffixation: *tàhnú* 'flea' + *-è* augmentative = *tàhnúè* 'a flea'; *nàh* 'house' + *-tàpà* 'large' = *nàhtàpà* 'big house'.

4 Conclusion

The analysis presented in this data is based on a very small set of data, and much more investigations are needed to make this analysis conclusive. Any theories need to be tested. The autosegmental phonology theory has tremendous success in accounting for the tonal systems of many different languages, especially that of African languages. Many Papuan languages (and Austronesian languages of New Guinea) are not yet described or very poorly described, let alone their pitch-accent/tone systems. The autosegmental theory has worked very well in explaining tonal perturbation in Awa noun-phrases (with minimal ad-hoc modifications), and this paper proves the validity of the autosegmental theory. Although it seems that Awa, and some of the closely related language, are the only Papuan languages having contour tones (e.g. Usarufa (Bee and Barker-Glasgow, 1962) has a falling tone, Gadsup (Frantz and Frantz, 1966) has an 'up-glide' and a 'down-glide'), there are still many other 'tonal' Papuan languages poorly described, which would provide further data for testing the model of autosegmental phonology.

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Hilaire,

This is a very good paper and I can see how you came up with the solution that you did. (I tried an analysis myself) I am however concerned as to the learnability of parts of it. There hasn't been a lot of research on Awa, so there are lots of questions.

That aside - you have shown me that you do understand the principles of Autosegmental Phonology and I am pleased that you have used them well in this analysis.

A/