Tonal Diversity in Languages of Papua New Guinea

Michael Cahill
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Abstract

Tone is well known in Asian and African languages, but less so in languages of Papua New Guinea (PNG). The major survey of New Guinean tone systems is Donohue (1997). The present paper introduces published and original data that support several types of tone systems of PNG, distinct from pitch-accent systems. Tone languages of PNG operate on either the word level or syllable level. Word-level tone languages operate in one of two ways. The first is by a limited set of melodies that spread through syllables of the word via standard autosegmental operations. The second type of word tone is that one syllable of a word displays contrastive tone (e.g. H vs. HL), and the remaining syllables’ tone is filled in by default procedures. Other languages of PNG display syllable-based tone, contrastive on each syllable of the word, independently of other syllables. Of particular note are a set of adjectives in the Awa language which obliterate the lexical tone of following words. This work, though produced independently of Donohue’s, largely agrees with his typology.
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Tonal Diversity in Languages of Papua New Guinea
Michael Cahill, SIL

1. Introduction

The country of Papua New Guinea (PNG) has at least 830 living languages, falling into at least nine major language families on the level of the Indo-European family (Amto-Musan, Arai-Kwomtari, Austronesian, East New Britain, Left May, Sepik, Sko, Torricelli, Trans-New Guinea), as well as at least six language isolates (Lewis 2009). Not surprisingly, these languages exhibit a wide variety in almost every area of linguistics. The variation in suprasegmentals is correspondingly diverse. Some languages have predictable stress—for example, Yimas (Foley 1991:75ff.), Hua (Haiman 1980), Awtuw (Feldman 1986:15ff.), Bukiyp (Conrad 1991), Au (Scorza 1978:9), Tauya (MacDonald 1990:84), Ono (Phinnemore 1976), and Urii (Webb 1974), among others. Some languages are reported to have contrastive stress, such as Korafe (Farr and Farr 1974), Faiwol (Mecklenburg 1974), and Samo (Daniel and Shaw 1977). Nii (Stucky and Stucky 1973) is reported to have contrastive stress except on verbs, where it is predictable. Some have what may be labeled a pitch-accent system, e.g., Tinputz (Hostetler and Hostetler 1975), with one stress manifested as High tone per word (though some words lack this). Although Foley (1986:63) writes that most suprasegmental systems of Papuan languages are best analyzed as pitch-accent, many languages are definitely tonal. Among these are at least two languages, Binumarien and Gadsup, which use “whistle talk” in certain domains. Tone in PNG seems somewhat independent of genetic lines; Ford (1993) surveyed six dialects of the Yaguria language and found a continuum of systems ranging from pitch accent to full tonal systems. The goal of this paper is to present a brief survey of several languages of PNG which exhibit very different tonal systems.

Since most papers involving tone in New Guinean languages have been published in journals devoted to languages of the region (e.g., Oceania, Language and Linguistics in Melanesia, Pacific Linguistics, Oceanic Linguistics), tone in PNG has generally not come to the attention of the larger linguistics world, with one notable exception being Donohue (1997), who deals with languages of the island of New Guinea, including the western half, Irian Jaya (now called Papua), a province of Indonesia. Donohue presents at least some data from seventeen New Guinean languages (seven from the Irian Jaya side of the island), refers to a few dozen more, and attempts a typological classification of tone languages. In this classification he includes syllable-level tone, word-level tone, and pitch accent, concluding that the borders between these categories are not always clear cut. Interestingly, this is basically the same typological division I had proposed in this work before I was aware of Donohue’s work. (Kairi and Fasu are the only languages for which Donohue and the present work both give actual data and analysis.)

In this paper, I also survey several types of tone languages, different languages than Donohue’s for the most part, and then present a deeper look at the phonetics and phonology of...
OGTone in two typologically diverse languages for which I have first-hand data: Awad Bing and Gadsup.

2. Word tone

Some languages of PNG are described as having “word tone” by the source writings, meaning that there is one tonal melody per word that contrasts it with another word. However, there are at least two distinct subtypes within this cover term as well. In one subtype, a melody spreads through the word on the basis of standard autosegmental principles. Each syllable carries a phonemic tone which is the result of mapping the tonal melody onto those syllables. In the other subtype, there is one syllable which is stressed or nuclear, and tone is contrastive on this one syllable. The other syllables have pitch which is predictable on phonetic rather than phonological grounds. Momuni (Reimer 1986, fn. 1) may be an additional case of this sort, since she describes polysyllabic words as having a tonal contrast limited to the stressed syllable. In this section I describe representatives of both of these types, but Narak, with which I start, is slightly different than either of these prototypes.

2.1 Narak

Narak (Hainsworth 1969; Trans-New Guinea) contrasts a level High tone, and a Falling tone in monosyllabic words such as kā ‘bird’, and kâ ‘vine.’ “Word tone” is described as having a “basic tone pattern which remains regardless of the length of the word.” The last syllable or syllables of a word carry the contrastive tone pattern and the rest of the word has a level non-contrastive phonetically Low tone, as illustrated by the following, reproduced from Hainsworth:

(1)

<table>
<thead>
<tr>
<th></th>
<th>monosyllabic</th>
<th>disyllabic</th>
<th>trisyllabic</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>ka ‘bird’</td>
<td>kaye ‘his bird’</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>kâ ‘vine’</td>
<td>kaye ‘his vine’</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>kena ‘dog’</td>
<td>kenaye ‘his dog’</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>koka ‘grandfather’</td>
<td>kokaye ‘his grandfather’</td>
<td></td>
</tr>
</tbody>
</table>

Contrast is evident from the pitch drawings. In monosyllabic words there is a level High or a Falling tone; in disyllabic the contrast is between Low-High and High-Falling, and in trisyllabic words the contrast is between Low-Low-High and Low-High-Falling. We can abstract these away from the pitch diagrams above and summarize them as below:

(2)

<table>
<thead>
<tr>
<th></th>
<th>monosyllabic</th>
<th>disyllabic</th>
<th>trisyllabic</th>
</tr>
</thead>
<tbody>
<tr>
<td>tone type 1</td>
<td>H</td>
<td>LH</td>
<td>LLH</td>
</tr>
<tr>
<td>tone type 2</td>
<td>F</td>
<td>HF</td>
<td>LHF</td>
</tr>
</tbody>
</table>
While more analysis would undoubtedly be helpful, it seems that the basic tonal contrast of Narak is minimally a High tone vs. a High-Falling tone. If the High-Falling tone is on a monosyllabic word, it surfaces as simply a Falling tone, but in polysyllabic words, the High surfaces on the penultimate syllable and the Falling on the final one. A Low tone fills in any preceding syllables. Similarly, for a High-toned word, the High is on the rightmost syllable, and any previous syllables have a Low tone. It also seems that the noun stem contributes the tone, and the suffix makes no contribution.¹

### 2.2 Siane

Siane (Trans-New Guinea) has H, L, HL, and LH patterns on mono-, di-, and trisyllabic words, and HLH on all but monosyllabic ones (rising or falling contours are allowed on single Tone Bearing Units (TBUs) (James 1994). Diphthongs are short and act as single TBUs. Most suffixes are toneless and receive their tone by spreading from the last tone of the root. Siane exhibits classical autosegmental behavior in that when a vowel is elided, its tone persists.

One unusual pattern is that a single word-initial High-toned syllable followed by three or more Low-toned syllables is disallowed, and the initial High tone spreads one syllable right.

Three of the four autosegmental patterns are associated in classical autosegmental (Goldsmith 1976) manner: one-to-one, left-to-right, with extra syllables receiving tone from spreading. H, L, and LH are illustrated below:

<table>
<thead>
<tr>
<th>(3)</th>
<th>noun stem</th>
<th>1p.poss.</th>
<th>defin.</th>
<th>erg.</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>H</td>
<td>kúlá</td>
<td>kúlá́tέ</td>
<td>kúlá́mά</td>
<td>kúlá́kάfό</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>mèinà</td>
<td>mèinà́tέ</td>
<td>mèinà́mά</td>
<td>mèinà́kάfό</td>
</tr>
<tr>
<td></td>
<td>LH</td>
<td>mάfό</td>
<td>mάfό́tέ</td>
<td>mάfό́mά</td>
<td>mάfό́kάfό</td>
</tr>
<tr>
<td>b.</td>
<td>H</td>
<td>kétúfύ</td>
<td>kétúfύ́tέ</td>
<td>kétúfύ́mά</td>
<td>kétúfύ́kάfό</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>kόsinά</td>
<td>n.a.</td>
<td>kόsinά́mά</td>
<td>n.a.</td>
</tr>
<tr>
<td></td>
<td>LH</td>
<td>kίlífύ</td>
<td>kίlífύ́tέ</td>
<td>kίlífύ́mά</td>
<td>kίlífύ́kάfό</td>
</tr>
</tbody>
</table>

Note that most suffixes receive their tone by spreading from the last tone of the root.

The HL stems show a different pattern. In Siane, a single word-initial High-toned syllable followed by three or more Low-toned syllables is disallowed, and so in these cases, the initial High tone of HL spreads one syllable right.

<table>
<thead>
<tr>
<th>(4)</th>
<th>noun stem</th>
<th>1p.poss.</th>
<th>defin.</th>
<th>erg.</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HL</td>
<td>lόnό</td>
<td>lόnό́tέ</td>
<td>lόnό́mά</td>
<td>lόnό́kάfό</td>
</tr>
<tr>
<td></td>
<td>HL</td>
<td>mάfύnά</td>
<td>mάfύnά́tέ</td>
<td>mάfύnά́mά</td>
<td>mάfύnά́kάfό</td>
</tr>
</tbody>
</table>

This is reminiscent of “tone doubling” in Bantu languages (Odden 1995).

¹ Rising and Rising-Falling tones patterns are also attested in Narak, but are quite limited and are considered allotones of the basic tones. For example, Rising tones always occur on monosyllabic forms with sonorant codas [m, n, j, w] if the vowel is [a, e, o]. Hainsworth regards it as an allotone of High. Also, a Rising-Falling tone pattern is in *nάnό* ‘I will eat’, among others. The expected pronunciation with all syllables present would be *nάnάnό*, but the medial vowel elides, leaving the tonal pattern behind. The Low-High is realized as Rising on the first syllable.
The HLH melody creates another unusual pattern in that the only word-internal contour is a Falling on the penultimate syllable. For trisyllabic or longer words, the tones follow the preceding pattern of associating one to one, left to right. However, on disyllabic words, the first two autosegments associate to the penultimate rather than to the final syllable:

(5)    noun stem 1p.poss defin erg gloss  
HLH kēfā  kēfâtê  kēfâmâ  kēfâkâfô  ‘meat’  
HLH ògûmû  ---  ògûmûmâ  ògûmûkâfô  ‘spider’

James accounts for this with an adjustment rule: if there would be a LH word-finally, reassociate that L to the preceding vowel. Evidently a Falling contour word-internally is preferable to a Rising tone word-finally.

2.3 Fasu

As another use of the term, “word tone” in Fasu (May and Loeweke 1965, Trans-New Guinea) is described as only one tonal contrast per word, and this tonal contrast is located on the “nuclear” (stressed) syllable, which may be any of the syllables in mono-, di-, or trisyllabic words, with tones on other syllables being predictable. This variation of the location of the stressed syllable is reminiscent of a pitch-accent system, but it does not fit the usual pitch-accent type, since the accented syllable may itself exhibit contrastive tone. The other three languages discussed in this section are of this type, as is Awad Bing, to be presented in more detail below. Contrasts of data are presented below; tone is marked only on the stressed syllable.

(6) Contrasts of Fasu tone  
   a.  mé    ‘language’  mè    ‘taro’  
   b.  támo    ‘down below’  tàmo    ‘matches’
       kénô    ‘tail’  kenó    ‘collarbone’
       pâpa    ‘banana (sp.)’  papâ    ‘(kinship term)’
       fitî    ‘loin cloth’  fitî    ‘banana (sp.)’
       kikî    ‘bone’  kikî    ‘tree (sp.)’
   c.  fêrepe    ‘bush knife’  èresa    ‘dark’
       sakârê    ‘arrow’  hiwâtî    ‘eyelash’
       kênari    ‘tree (sp.)’  kenari    ‘bamboo (sp.)’

2.4 Dadibi

The tonal pattern of Dadibi (MacDonald and MacDonald 1974; Trans-New Guinea) also follows the same general pattern: there is only one syllable on the word which bears contrastive tone, and this may be called the stressed syllable (MacDonald and MacDonald label it the “nuclear syllable”). A constellation of effects accompany a High or Low tone on such a nuclear syllable. A High tone has extra intensity, tends to raise the pitch of following tones, and the tempo of the word is faster. A Low tone lengthens the nuclear syllable, tends to lower the pitch of following syllables, and slows the tempo of the entire word. Tones preceding the nuclear syllable

2 James does not discuss the second example in depth; one would assume the first syllable of ‘spider’ is extrametrical.
tend to fluctuate in pitch. Tonal contrasts are documented for one-, two-, and three-syllable words, as below. Only the tone on the nuclear syllable is marked.

(7) Contrasts of Dadibi tone

| a.  | nà  | ‘shoulder’ | ná  | ‘aunt’ |
| b.  | káli | ‘kaukau’ | kalí | ‘tree type’ |
|     | píni | ‘bird type’ | piní | ‘small bat’ |
|     | kebá | ‘axe’ | kebà | ‘canoe’ |
|     | àga | ‘his’ | agà | ‘his own’ |
| c.  | bílibo | ‘moving’ | bidibo | ‘staying’ |
|     | silága | ‘bush food’ | medàbu | ‘bone needle’ |
|     | masalú | ‘scar’ | hanamù | ‘soot’ |

It was mentioned that Low tones tend to lower succeeding syllables, and High tones tend to raise succeeding syllables. This can be seen when suffixes (possibly clitics) with different tones are added. Unlike the suffixes in Narak, these morphemes do contribute a tone of their own. (Glosses are approximate.)

(8)

| a.  | nomá + dè → nomade (− − _) | ‘concerning the shadow/soul’ |
|     | nomá + bá → nomaba (− − −) | ‘to the shadow’ |
| b.  | kebà + dè → kebade ( _ _ _) | ‘concerning the canoe’ |
|     | kebà + bá → kebaba ( _ _ _) | ‘to the canoe’ |
| c.  | dòmu + dè → domude ( _ _ _) | ‘concerning the porcupine’ |
|     | dòmu + bá → domuba ( _ _ _) | ‘to the porcupine’ |
| d.  | púli + dè → pulide (− \_ _) ∼ (− \_ −) | ‘concerning the bird of paradise’ |
|     | púli + bá → puliba (− − −) | ‘to the bird of paradise’ |

In (a), we see the tonal distinctions of the two suffixes clearly: a High nuclear tone drops sharply to an adjacent Low suffix, while High tones unsurprisingly remain High in the second case. In (b), when all tones are Low, the phonetic result is all Low tones. In the second example, however, we see that the High-toned suffix is lowered after a nuclear Low tone, and in the second example in (c), we see that even with the nuclear Low two syllables away from the suffix, the same suffix lowering occurs. The examples in (d) especially are consistent with the notion of non-nuclear syllables being unspecified for tone, and the phonetic pitches are entirely determined by the environment (see Pierrehumbert and Beckman [1988] for a treatment of Japanese in these terms). In the first example of (d), the nuclear High tone is phonetically High, and the nuclear Low tone, non-adjacent to the High, is Low or sometimes raised a bit. The syllable in between has a transitional pitch, falling from the High to the Low. In the second example of (d), the unspecified syllable is between two High syllables, and not surprisingly, is also High.
2.5 Kairi

Kairi (also known as Rumu, Trans-New Guinea) has been analyzed in detail in Newman and Petterson (1990), and the following analysis basically summarizes theirs. Newman and Petterson (N&P) label Kairi a pitch-accent system on the basis that there is one accented syllable per phonological word, and following the claim of Foley (1986) about the prevalence of pitch-accent languages in Papua New Guinea. However, this accented syllable is the anchor for one of four contrastive tone patterns: H, HL, LH, and LHL, so this is, at the least, not a prototypical pitch-accent language.\(^3\) Note that L is not one of the four patterns; evidently a High tone is required in a word. This pattern also occurs in several unrelated languages (e.g., Mixtec, Korean, Kɔnni) discussed in Cahill (1999, 2007).

Monosyllabic words have each of the four basic tone patterns. In disyllabic words, rather than the multiple tones being manifested on a one-to-one basis on the syllables, we find the following tones. The ` is High, ` is Low, ` is Rising, ` is Falling, ^ is Rising-Falling, and vowel clusters are monosyllabic diphthongs.\(^4\)

<table>
<thead>
<tr>
<th>(9) Patterns of tones</th>
<th>High</th>
<th>Rising</th>
<th>Falling</th>
<th>Rising-Falling</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-syllable</td>
<td>hó</td>
<td>hó</td>
<td>hè</td>
<td>hó</td>
</tr>
<tr>
<td></td>
<td><code>tree sp.</code></td>
<td><code>bag</code></td>
<td><code>blow</code></td>
<td><code>grub sp.</code></td>
</tr>
<tr>
<td>2-syllable</td>
<td>hónó</td>
<td>hónó</td>
<td>hónó</td>
<td>hónó</td>
</tr>
<tr>
<td></td>
<td><code>clan</code></td>
<td><code>garden</code></td>
<td><code>husk</code></td>
<td><code>a poison</code></td>
</tr>
<tr>
<td>3-syllable</td>
<td>ēkémú</td>
<td>hótukú</td>
<td>hákánê</td>
<td>àrâwê</td>
</tr>
<tr>
<td></td>
<td><code>conch shell</code></td>
<td><code>armpit</code></td>
<td><code>grasshopper</code></td>
<td><code>post</code></td>
</tr>
<tr>
<td>4-syllable</td>
<td>hárákánéá</td>
<td>rârâkánê</td>
<td>pépéhērō</td>
<td>àrâmârâu</td>
</tr>
<tr>
<td></td>
<td><code>prawn sp.</code></td>
<td><code>palate</code></td>
<td><code>peg</code></td>
<td><code>basker type</code></td>
</tr>
</tbody>
</table>

Abstracting away from the data gives us the following schematic chart:

<table>
<thead>
<tr>
<th>(10) Patterns of tones</th>
<th>H</th>
<th>LH</th>
<th>HL</th>
<th>LHL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-syllable</td>
<td>H</td>
<td>˘H</td>
<td>˘LH</td>
<td>˘LHL</td>
</tr>
<tr>
<td>2-syllable</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>3-syllable</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>4-syllable</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

To account for these patterns, N&P invoke the pitch-accent notion of assigning the tone to an accented syllable. They assign the second tone to the final syllable, which they label the accented syllable. Then the first tone is mapped to the first syllable, and a rightward tone

\(^3\) Hyman (2006) asserts that there is no prototypical pitch-accent language, but that languages labeled pitch-accent partake of a varied combination of properties of stress languages and tone languages. Nonetheless, when the term “pitch-accent” is raised, one does not typically think of contrastive tones on a single syllable.

\(^4\) Newman and Petterson’s transcriptions mark tone only on the contrastive syllable, with the result that a zero-marked syllable may be either High or Low (e.g., ho is High, but the first syllable of hɔnɔ is Low, with the Rising tone on the second syllable indicated by `). To avoid the ambiguity, I have translated their transcription with a marking system that explicitly and unambiguously indicates the pitch of each syllable.
mapping rule \textit{a la} Goldsmith (1976) spreads this first tone through the empty syllables until it reaches the final syllable (which has already been assigned a tone). A spreading rule finally creates the final Rising and Falling tone contours on the HL and LH patterns. A plausible alternative to their proposal would be to assign the \textit{penultimate} tone to the final syllable, and the patterns would fall out equally well, and the final spreading rule would be unnecessary. There are about 8.5 percent of words which must be marked with the accent on the penultimate rather than the final syllable.

This paper is notable for its explicit recognition of phonetic “downstep,” which is what in other works in the literature might be called declination. The second of two tones, whatever it is, is pronounced on a lower tonal register than the first one. Thus a sequence of three High tones might give the phonetic impression of High-Mid-Low. In careful speech this process may not happen, and the domain for the process is said to be within phrases (VP, NP, and PP). A few samples of this phonetic tone lowering are given below.

\begin{align*}
(11) \quad & a. \quad \text{L} \text{L} \rightarrow \text{L} \text{L} & b. \quad \text{L} \text{L} \rightarrow \text{L} \text{L} & c. \quad \text{L} \text{L} \rightarrow \text{L} \text{L} & d. \quad \text{L} \text{L} \rightarrow \text{L} \text{L}
\end{align*}

One other related detail is that a LHL contour on a second syllable often simplifies to HL. N&P (1990:65) note the possibility that this is to avoid “dipping” contours of a relative High, then Low, then up to High again, that is, a HLH is consistently avoided. (This pattern is also the case in Kõnni and related languages; see Cahill 1999, 2007.)

Tone sandhi across words exhibits several patterns, as below (N&P 1990:66).

\begin{align*}
(12) \quad & \text{Tone patterns of separate words} & \quad \text{Tones after sandhi (changes underlined)} \\
& a) \quad \text{LH} \quad \text{LH} & \rightarrow \quad \text{L} \quad \text{LH} \\
& \quad \text{LH} \quad \text{HL} & \rightarrow \quad \text{L} \quad \text{HL} \\
& \quad \text{LH} \quad \text{LHL} & \rightarrow \quad \text{L} \quad \text{LHL} \\
& b) \quad \text{H} \quad \text{LH} & \rightarrow \quad \text{H} \quad \text{HL} \\
& \quad \text{HL} \quad \text{LH} & \rightarrow \quad \text{H(L)} \quad \text{HL} \\
& \quad \text{LHL} \quad \text{LH} & \rightarrow \quad \text{LH(L)} \quad \text{HL}
\end{align*}

First of all, a Rising tone (LH) at the end of the first word as in (a) will be simplified to L, with no effect on the tone of the second word. This might be seen in autosegmental terms as a prohibition against multiple association of tones phrase-medially. However, the second major sandhi also targets the Rising tone. In this case, if the second word begins with Rising (LH), it will change to HL, with any final tone on the preceding word except L. N&P apply these rules in this order. If there is a L-H-LH sequence, the first tone changes to L, giving L-LH. Since the first word now ends with L, the second rule does not apply. These rules apply within noun phrases and verb phrases. It is noteworthy that most of these patterns also have the effect of avoiding the HLH sequence.

Newman and Petterson give much more detail than this brief summary, including more on syntax-tone interactions, and the reader is referred to their paper for more specifics.
3. Syllable-based tone

The Eastern New Guinea Highlands group tends to have tonal languages, such as Gadsup, Binumarien, Siane, Awa, Kanite, etc. which may contrast tone on any syllable (see McKaughan [1973] for several of these).

3.1 Awa

Awa (Trans-New Guinea; Loving 1973) exhibits High, Low, Rising, and Falling tones, and these may contrast on any syllable. In monosyllabic forms, one finds all these tones. In di- and trisyllabic words, Rising tones occur only word-finally. In disyllabic words, ten out of the sixteen possible combinations are found. In trisyllabic words, all contrasts are found word-finally, and all but Rising contrast word-initially. Of the sixty-four possible combinations, 23 are attested (though I find only twenty listed). Of the missing forty-one patterns, thirty-six are accounted for by the restriction against Rising occurring initially and medially, and a restriction not noted by Loving, that adjacent Falling tones are prohibited.⁵

⁵ A broader statement would be that sequences of identical contour tones (RR, FF) are prohibited, but the RR prohibition is already counted under the prohibition of Rising initially and medially.
We noted that Rising tone occurs only word-finally, but the restriction is more rigid than that; it is only phrase-finally. If a word which would have a Rising tone in isolation is followed by another word in the same phonological phrase, the Rising becomes Low. The following word always surfaces with an initial High tone in this case; the High component of the Rising tone has associated to the second word.

(14) Tone sandhi

a. pæ ‘just’ + póétį ‘pig’ → pæ póétį ‘just a pig’
   pæ ‘just’ + nɔ ‘taro’ → pæ nɔ ‘just taro’

b. pæ ‘just’ + tɔnú ‘flea’ → pæ tɔnú ‘just a flea’
   pæ ‘just’ + kàpɔtɔ ‘bird’ → pæ kàpɔtɔ ‘just a bird’

nénɛ ‘my’ + nɔ ‘house’ → nénɛ nɔ ‘my house’

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6 In Loving’s transcription, orthographic {ah} = ʌ/ a, orthographic {eh} = æ, and orthographic {q} = ʔ. Here I use the IPA symbols.
Note that this is a neutralizing environment; the words for ‘taro’ and ‘house’, distinct in isolation, are homonymous after a word with an underlying Rising tone.

What Loving calls “satellite words,” generally adjectives, cause various kinds of perturbations on nouns which follow them. With one set of these words (Class I), the following word exhibits either a Rising or Low-High pattern, depending on whether it is monosyllabic or not, and reportedly, even if the “satellite word” ends in High or Rising tone, though he gives no alternations for these.

(15) Class I satellite perturbations
   a. kàwè? ‘good’ + nò ‘house’ → kàwè? nò ‘good house’
   ànò?tò ‘big’ + kàpàtä ‘bird’ → ànò?tò kàpàtä ‘big bird’

Class II satellite words cause following words to perturb to all High tones, as in the following:

(16) Class II satellite perturbations
   pàpùsà ‘black’ + wà ‘man’ → pàpùsà wà ‘black man’??
   kàpàntë ‘sick’ + kàpàtä ‘bird’ → kàpàntë kàpàtä ‘sick bird’
   kàìnèntúpè’étë ‘from Kainantu’ + mòpì ‘boy’ → kàìnèntúpè’étë mòpì
       ‘the boy from Kainantu’

Loving’s Class III satellite words do not cause any perturbation of following words, except for the general pattern noted when such words end in a Rising tone, as in (14). Words in this class include ítè ‘not’, pè ‘just’, mò̀kè ‘all’, and all possessives.

Interestingly, when more than one satellite is present, the first satellite word controls the tone of all following words:

(17) a. òwòtì ‘sick’ (Cl. I) + pàtòsà ‘blind’ (Cl. II) + òtòtì ‘girl’ →
      òwòtì pàtòsà òtòtì
   b. ítò?kè ‘no good’ (Cl. I) + ‘foolish’ (Cl. I) + pàtòsà ‘blind’ (Cl. II) +
      wàú?kè ‘people’ → ítò?kè sètò pàtòsà wàú?kè

There are several varieties of tonal behavior of nominal suffixes as well. A few suffixes have stable tone no matter what word they suffix, but most suffixes have tone which varies with the noun to which they are attached.

3.2 Mianmin

Mianmin (Trans-New Guinea; Smith and Weston 1974) has tones on single syllables of High, Low, Rising, and Falling. The Rising and Falling patterns are restricted to word-final syllables, and Falling does not occur on monosyllabic words (some segmental phonetic detail is omitted below):

?? There is evidently a typographical error in Loving’s discussion of this form. From the data in other parts of the paper, I assume that the correct underlying tone for wà ‘man’ is Low.
(18) Low-Low kèmit ‘gourd’
    Low-High kàwá ‘axe’
    Low-Rise kòmòk ‘headman’
    Low-Fall sìlîm ‘snake’
    High-High múnúŋ ‘nose’
    High-Low ánòk ‘bow’
    High-Fall básål ‘veranda’

Given the tonal patterns discussed thus far, the only gap in disyllabic patterns is that there is no High-Rising pattern. If we consider the contour tones as composed of concatenated level tones, this means HLH is not allowed. LHL is allowed, however, and there is thus an asymmetry. This is found in other languages of the world as well (see Cahill 1999, 2007 for the same prohibition of HLH in other languages).

Several tone perturbations are reported across word boundaries. First, a word-initial High becomes Low after a Low or a Falling tone on the preceding word (Smith and Weston give no data for the pattern involving the Falling tone):

(19) básål ‘veranda’ but né sùm básål ‘my big veranda’ (cf. né básål ‘my veranda’)

Second, a word-final High or Rising tone will change an initial Low tone on a following word to High:

(20) flèlèŋ ‘light’ but kàwá flèlèŋ ‘light axe’, mìfím flèlèŋ ‘light sago’

This behavior is typical of classical autosegmental analysis. If we assume a rule of tone spreading from one word to a following one, all these patterns are accounted for.

4. Awad Bing

The data and analysis of Awad Bing is still at quite a preliminary stage, and should be regarded with caution. In particular, it has been suggested that the four-syllable words noted below are actually comprised of two words. With this caveat, I believe the data presented here is still noteworthy, though plans are to update the analysis.

Awad Bing (Austronesian), like Fasu, appears to have contrastive tone only on one syllable. Tonal contrasts are High and Falling, with the highest part of the Falling generally starting at a higher pitch than a High. On disyllabic words, the contrastive syllable is consistently on the second syllable, with the exception of gáógàò ‘crow’, which may well be an onomatopoetic form. On trisyllabic or longer forms, the location of the contrastive syllable is unpredictable on the basis of the limited data available. Below, the vowels marked with a macron (e.g., á) are intermediate in pitch between lower tones marked à, and higher tones marked á. Contrastive syllables are underlined.
(21) High tone
   a. wűm ‘yam garden’
   b. dímâd ‘our (incl.) arms’
   c. fârid ‘our (incl.) lips’
   d. wûdûd ‘swim’
   e. tîbànâd ‘our (incl.) heads’
   f. âtébibî ‘our (incl.) chests’
   g. âgârádû ‘our (incl.) necks’

(22) Falling tone
   a. wûm ‘oven made with stones’
   b. dímâd ‘their arms’
   c. fârid ‘their lips’
   d. wûdûd ‘help’
   e. tîbànâd ‘their heads’
   f. âtébibî ‘their chests’
   g. âgârádû ‘their necks’

An /i/ in the initial syllable, as in (b) and (e), is quite short and gets a High tone, while other word-initial vowels are Low, as in (c), (d), (f), and (g). Tones after a contrastive Falling tone are lower than those after a High tone, as marked particularly in (f).

An /i/ in the initial syllable, as in (b) and (e), is quite short and gets a High tone, while other word-initial vowels are Low, as in (c), (d), (f), and (g). Tones after a contrastive Falling tone are lower than those after a High tone, as marked particularly in (f).
5. Gadsup

Gadsup (Trans-New Guinea; Frantz and Frantz 1973) exhibits a completely different system. A syllable may exhibit High, Low, Rising, or Falling tones, with tonal contrasts available on every syllable. Long and short vowels make no difference in tonal perturbations; the TBU is the syllable, and in terms of the tones above, no more than one of the H, L, R, F tones occurs per syllable. Whether R and F can be decomposed into LH and HL is discussed below.

Though there are very few monosyllabic words in the Frantz papers (e.g., máá? ‘house’), these were pronounced with disyllabic forms in the speech of my language consultant (máá?ì). In that dialect, there do not appear to be any monosyllabic words.
(26) Tonal contrasts

a. disyllabic words

<table>
<thead>
<tr>
<th>LL</th>
<th>LR</th>
<th>LH</th>
<th>HH</th>
<th>LF</th>
<th>HL</th>
<th>FH</th>
<th>FR</th>
</tr>
</thead>
<tbody>
<tr>
<td>bèú</td>
<td>‘I stay’</td>
<td>bèú</td>
<td>‘I go’</td>
<td>ànî</td>
<td>‘path’</td>
<td>ànî</td>
<td>‘the point of...’</td>
</tr>
<tr>
<td>ónì</td>
<td>‘stone’</td>
<td>ónì</td>
<td>‘face’</td>
<td>kôyí</td>
<td>‘lizard’</td>
<td>âandà</td>
<td>‘tree trunk’</td>
</tr>
<tr>
<td>ànî</td>
<td>‘path’</td>
<td>ânî</td>
<td>‘the point of...’</td>
<td>ànî</td>
<td>‘path’</td>
<td>ànî</td>
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<tr>
<td>àndà</td>
<td>‘tree trunk’</td>
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<td>àndà</td>
<td>‘tree trunk’</td>
<td>àndà</td>
<td>‘tree trunk’</td>
</tr>
</tbody>
</table>

b. trisyllabic words

<table>
<thead>
<tr>
<th>HHL</th>
<th>HHF</th>
<th>HFL</th>
<th>HRL</th>
<th>HLF</th>
<th>LHF</th>
<th>LRL</th>
<th>RRL</th>
<th>FHL</th>
<th>FFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>yápúmí</td>
<td>‘grasshopper (sp.)’</td>
<td>bá?dóni</td>
<td>‘wearing apparel’</td>
<td>mémêmí</td>
<td>‘goat’</td>
<td>kábánì</td>
<td>‘frog (sp.)’</td>
<td>mákùnì</td>
<td>‘earthquake’</td>
</tr>
<tr>
<td>mákùnì</td>
<td>‘village’</td>
<td>èyàmì</td>
<td>‘wing’</td>
<td>iýàmì</td>
<td>‘dog’</td>
<td>ômì</td>
<td>‘spirit’ (Frantz owemí)</td>
<td>ónémì</td>
<td>‘he chokes’</td>
</tr>
<tr>
<td>âandà</td>
<td>‘tree trunk’</td>
<td>àndà</td>
<td>‘tree trunk’</td>
<td>àndà</td>
<td>‘tree trunk’</td>
<td>àndà</td>
<td>‘tree trunk’</td>
<td>àndà</td>
<td>‘tree trunk’</td>
</tr>
</tbody>
</table>

Where Frantz has àpúi ‘ripe’, my language consultant gave àpúí. It appears possible that her dialect does not tolerate words with all Low tones. At least one High is required.

In cases of two adjacent Falling or adjacent Rising tones, there is a declination effect; the second contour has an overall markedly lower pitch and flatter contour than the first.

(27)
In several nominal constructions, the head noun becomes High when preceded by certain words:

(28) nòmî ‘water’ éná nòmî ‘another water’  
únámì ‘bag’ ámù?nà únámì ‘many bags’  
vòkáni ‘work’ nùrànkéná vòkáni ‘yesterday’s work’  
kùkùnì ‘fence’ kàmàn kùkùnì ‘sweet potato garden (lit. fence)’

Note also the change of contour to level tones in the target noun. No perturbation takes place when these same nouns are preceded by other words (e.g., tiyà nkàn kùkùnì ‘ten fences’). There is also Low spreading across some words, as in màřì ‘house’, but ìkà? wàndà màřì ‘the middle house’. Within words, there is also High spreading, as in àkàmì ‘big’ vs. yàyà-kàmì ‘big tree’ (lit. ‘tree-big’).

(29) nòmî ‘water’ éná nòmî ‘another water’

(30) kùkùnì ‘fence’ kàmàŋ kùkùnì ‘sweet potato garden (lit. fence)’

When a syllable drops out, the tone can remain behind.

(31) ànómì ‘important’ + wàntè ‘man’ → ànóm bwàntè ‘important man’
The recordings I made have something more like ànóm bwàntê with a High tone rather than Falling on the relevant syllable. This may be a dialect or idiolect difference. “Whistle-talk” is also used to a limited extent among Gadsup speakers.

(32) ‘Where are you going’

‘I’m going to the garden’

6. Concluding remarks

Languages of Papua New Guinea display quite a variety of prosodic behaviors, and in this brief paper, I have only surveyed the ones which can be legitimately labeled “tonal.” Even here there is some controversy: are languages which have been labeled “pitch-accent” actually firmly in the “tonal” camp or not?

Most tonal behaviors fit into categories that are well-known from other parts of the world. For example, classic autosegmental behavior (tonal stability when segments are deleted, spreading, toneless suffixes) is attested in a number of languages, such as Aangatuna, Siane, Baruya, etc.

Some languages seem to require a High tone in a word (Narak, Kairi, Kanite, Awad Bing, etc.). In others, such as Kairi and Mianmin, a HLH sequence is prohibited. Both have counterparts in other languages of the world (Cahill 2007).

Other tonal behaviors of Papua New Guinea languages are rarer cross-linguistically. For example, Awad Bing combines elements of pitch-accent systems with full tonal ones, in a way that is more reminiscent of Swedish than a typical Asian or African language. Also, some languages (Awa, Gadsup) have modifiers which seem to require replacement of all the tones of a following word with a new melody.

Somewhat unusually typologically, even closely related dialects in PNG may have quite different prosodic systems. In the Kamano-Yagaria dialect chain (Ford 1993), the Move lect can be analyzed tonally but is basically a pitch-accent system. On the other hand, Hua (Haiman 1980) has been analyzed in terms of stress only. Finally, in different villages of Kafe Kamano both stress, on the basis of alternating stresses (Payne and Drew n.d.), as well as full-blown tone with three levels of pitch (Ford 1994), have been proposed.

The analysis of many languages is still uncertain. Just to mention a few, Wahgi (Phillips 1976) is described in terms of word-level melody, and there are only three tone melodies possible per phonological word, but none of the melodies for one-, two- or three-syllable words can be
straightforwardly mapped on each other, unlike the cases of word tone discussed in Section 2. (For example, three-syllable words can be LHL, LLH, or HLL, while four-syllable words can be LLHL, LLLH, or LHL. While the first two pairs can be mapped, the last pair doesn’t follow the same pattern.) Fore has been described by different researchers as having pitch-accent (Pike and Scott 1963, Scott 1978, 1992) or distinctive stress (Pilch 1975), but Scott’s 1990 autosegmentally-based analysis removes some uncertainty of the earlier writings and places it more firmly into the word tone category described above. San Roque’s (2008) preliminary investigation of Duna indicates a probable additional case of word tone, but possibly a different type than discussed here.

As usual, this summary has raised several other questions, and there is much scope for remaining study.

References


