Tone systems in New Guinea

MARK DONOHUE

Abstract

After a short survey of existing classificatory schemes for tonal languages, and information from representative languages in the New Guinea area is examined, illustrating many of the complicated tonal patterns encountered. Different classes of tonal behaviour are identified on the basis of the domain of tonal contrast, rather than the shape of the tones (as in earlier analyses). Other grammatical or areal features that correlate with the presence of these different classes of tone systems are identified, and a classificatory scheme is proposed to handle the range of data. Because of the behaviour of some "intermediate" languages, a continuum of tonal variation is proposed, rather than a finite number of discrete categories.

Towards: Autosegmental Phonology, New Guinea phonology, pitch-accent, stress, tone

Introduction

This paper is intended to provide an argument for the usefulness of a range of distinguishing tonal systems through syntagmatically varying tones. The argument is built on the examination of data on tonal phenomena found in the New Guinea area. The choice of New Guinea as the source of most of the data presented is motivated by the fact that the range of kinds of tonally relevant tone systems occur in this area, as well as the fact that data from this part of the world is only sparsely known. It thus serves the dual need of highlighting the presence of tonal systems in New Guinea and offering a new approach to the classificatory classification of tonal systems.

The classificatory approach advocated here argues that not only the syntagmatic appearance of a tonal system (which and how many tone levels), but also the syntagmatic aspects of the system, that is, the

Tone Typology 1 (1997), 347–386

1430–0532/1997/001–347

© Walter de Gruyter
relationship of the tonal contrast to the word as a whole, need to be considered when evaluating the function of tone in a language. For example, using terminology that will be fully explained in the following sections, a language described as having contrasting pitch properties on words of two syllables, for instance two words distinguished by their pitches contrasting as High-Low versus Low-High, could be manifesting a pitch-accent, word-tone, or syllable-tone system; without more detail this cannot be determined, and the classification of the language remains in doubt. An example of the importance of this can be seen from the interpretation, justified by an examination of a wide body of data in each language, of just such High-Low vs. Low-High contrasts represented by *bgəda* and *pəɡədə* in Sikaritai (3.1.1), *tuhi* and *pikə* in Kairi (3.2.1), *bita* and *biti* in Una (3.3.1), *kino* and *keno* in Fasu (4.2), as representing quite different phonological systems.

### 1.1. Tone vs. stress

Whereas all languages use pitch² to some degree in either their phonemic or intonation systems, there is a difference between these various uses. A non-tonal language uses pitch only to signal intonation (see, amongst others, Cruttenden 1982). A further use of pitch is to signal the stressed syllable in non-tonal languages, such as English, in which it is well known that the primary acoustic correlate of stress is fundamental frequency movement, followed by radiated amplitude and duration. There is a difference, however, between the pitch movements associated with the "accented" syllable in English stress on the one hand and Isirawa (Kwerba stock, northern Irian Jaya; Oguri & Erikson 1975) pitch-accent or Obokuitai (Lakes Plain, Irian Jaya; Jenison & Jenison 1991) tone on the other. We can contrast the following pairs, the first two of which show lexical items differentiated only by pitch differences between the first and second syllables:

<table>
<thead>
<tr>
<th>English</th>
<th>Isirawa</th>
<th>Obokuitai</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>increase</em> (noun)</td>
<td><em>topa</em> ‘tree roots’</td>
<td><em>sotde</em> ‘bird species’</td>
</tr>
<tr>
<td><em>increase</em> (verb)</td>
<td><em>təpa</em> ‘bow (weapon)’</td>
<td><em>tib’duk</em> ‘bird species’</td>
</tr>
</tbody>
</table>

All of these languages have one word “stressed” on the first syllable and another on the second. The difference is that in Isirawa and Obokuitai the first syllable of the word will always display a higher pitch than the second in the first example (*təpa, sotde*), and in the second example always a higher pitch on the second syllable of than on the first (*topa, tib’duk*). In English, however, the relative pitch heights are dependent on the intonation contour associated with the utterance containing the words, and the illocutionary force assigned to the sentence. The stressed syllable is simply the one in which pitch movement takes place, but the direction or height of that pitch is not lexically specified. A detailed acoustic and phonological discussion of the differences between stress systems and pitch-accent systems can be found in Beckman (1986).

The historical differences between stress languages and pitch-accent ones may not be as great as has often been thought. The origins of some simple tone systems may lie in the formalisation of the pitch differences inherent from an old stress system; by this I mean that a stress system has through general speech trend formalised the acoustic manifestation of its phonological feature of stress as a pitch movement or target that is constant in different intonational environments, with a corresponding loss of the emphasis placed on the use of amplitude and lengthening as acoustic cues. The presence of words previously differentiated only by stress would then add strength to the developing use of pitch to signal lexical differences.

### 1.2. Previous classifications of tonal systems

There have not been many attempts to formulate a typology of tonal systems, only four significantly different divisions being widespread. The first of these, as will be seen, reflect the concern that tone languages show contrasts at the syllable level (though K. Pike is not wholly unbending in his exclusion of other language types). Only the remarks applicable to this paper will be presented here; for a fuller account of each classification system, the reader is referred to the original articles.

#### 1.2.1. K. Pike

The first detailed treatment of tonal phenomena is K. Pike’s (1948) division of tonal systems into contour tones, where there is generally significant movement in pitch associated with the tones, represented by the tone languages of East Asia, and register tones, where the absolute pitch is important and tonal movement is not a significant factor, as exemplified by many languages of Central America and West Africa. He restricts himself to the languages which show contrastive pitch at the syllable level: “In this book, however, the syllable type of tone must be present for a language to be labelled tonal” (1948: 5). Later (Pike & Warkentin 1975) he acknowledges the existence of tone languages in which a low lexical load is placed on tone, but which use tone patterns at the word level for grammatical purposes.
1.2.2. Wurm

Wurm (1954) divides the class of possibly tonal languages into three: tonal, semi-tonal, and non-tonal languages. The last of these categories need not concern us here, other than to note that Wurm follows Pike closely when he states that in a non-tonal language “no syllable tones are met with” (1954: 699). The first of his categories he divides into two: real tonal and quasi-tonal languages. A “real tonal language” is one in which

the tones a) are inherent parts of each syllable and not parts of the phrase melodies, b) have no independent meanings of their own, c) are contrastive, d) are unchangeable or change according to definite principles, e) are not correlated with another suprasegmental element such as stress and/or length. (1954: 697)

It is apparent that Wurm’s criteria reflect a reduced Pikean approach: the tone must be assigned to the syllable, must not be of its own accord meaningful (as is the case in several tonal languages which have a morpheme signalled by a tone alone). The emphasis on contrastive (i.e. lexical) function comes out as per Pike 1948: 3).

1.2.3. Welmers

Welmers (1959), in a short article, criticised the sharp schism that K. Pike proposed as the basis of his classification. Welmers also proposed a new definition of tone languages: “a tone language is a language in which both pitch phonemes and segmental phonemes enter into the composition of at least some morphemes” (1959: 2). The origins of this definition can be clearly seen in Welmers’ work in African languages. The more polysyllabic languages of Africa, some with extensive affixing morphology, lead to a definition in which a language may be tonal even though not every syllable is capable of carrying its own distinctive tone.

1.2.4. E. Pike

In the only discussion other than Wurm’s specifically making reference to the languages of New Guinea, E. Pike (1964) describes the pitch systems in the languages in her survey thus:

At least three types of tone systems are found in the Highlands: (1) a syllable-tone system with the tones high, low, falling, and rising; (2) a syllable-tone system with the tones high and low; (3) a word-tone system with contrastive tone on the stressed syllable only. (1964: 125)

The first two of these types are basically the “complex” and the “simple” tone systems, easily recognisable from Welmers’ and K. Pike’s work. The word-tone type is a radical departure from these first two, and from the earlier classification by K. Pike, in that the domain of the tonal contrast is not the syllable, as in the first two, but the whole word. E. Pike, then, follows Welmers in recognising that the many languages that use pitch lexically can also be classified as tone languages, even though not each syllable is tonally contrastive.

The important innovation introduced by Welmers and E. Pike was to acknowledge systems that are syntagmatically oriented; the terraced systems of Welmers and the word-tone system of E. Pike depend on the structure of the whole word for their realisation to be effected, and cannot be simply assigned to a slot in a paradigmatic chart.

1.2.5. Wang

Wang (1967) discussed mainly a system aimed at categorising the phonological features of tone, rather than the typological variation to be found amongst tone languages. Wang’s characteristics of different sorts of tonal languages are thus based on the function that they perform in the languages, and not on the form that they take.

1.2.6. McCawley

McCawley (1978), addressing the question of what constitutes a tone language, talks about the differences between Japanese, “a prototype for the notion pitch-accent system”, and Mandarin Chinese, “a textbook case of a true tonal system” (emphases original). Following this, he discusses languages (exemplifying with data from western Japanese dialects and two Bantu languages, Ganda and Kikuyu) intermediate between these two systems, concluding that the difference between the two types characterises “stages of derivations rather than whole languages” (1978: 128), and that there is not as great a difference between the two types as has been assumed (unless a much more abstract analysis in terms of pitch movements is adopted).

1.3. Characteristics of tone in the New Guinea area

There has been to date only one comparison of tonal phenomena found in the languages of the New Guinea area, viz. Wurm (1954), and that referred to only a fraction of the variety of tonal systems to be found. One of the few works to address the issue based on a large sample of data is E. Pike’s study (1964) of the different types of tonal systems to be found in some of the languages of the Highlands of New Guinea.
Dutton (1973: 499) recognises the presence of tone in the western areas of Papua when he writes that “as one moves inland into the Ok, Awin-Pare, Highlands, Pawaian and Angan languages tone and nasalisation become more important”.

In Foley (1986), the phenomenon of pitch and tone in Papuan languages is largely dismissed:

on the whole these [tonal systems] seem better analysed as pitch-accent systems rather than as genuine tonal systems. The vast majority of such Papuan languages have a single contrast between high and low tone, and this suggests a pitch-accent system with a contrast between accented syllables and unaccented ones. (1986: 63)

Foley appears to back away from this position later when he writes speaking of phonological properties characteristic of the central Sepik-Ramu region, that “suprasegmental phenomena are limited to stress languages with phonemic tone are unattested, in contrast to their common occurrence in the central highlands” (1991: 19, emphasis added).

In any case, as mentioned earlier (Section 1.1), the description of what the contrast is tells us nothing about the nature of the system behind it: this can only be seen in the light of the workings and co-occurrence restraints shown by the language.

2. Descriptive framework

I propose a distinction based on the systematic correspondences between the tones and the segmental units to which they are assigned. This implies an autosegmental approach to the problem of tonal representation, but should not be taken to mean that overly abstract analyses are favoured. The autosegmental approach will be used here in the analyses of the tone systems only where it provides helpful clues to the workings of the system as far as this typological approach is concerned.

I shall propose three primary types of tone systems, but do not base the divisions on the shape of the tones. The division into contour vs. register tones, a la K. Pike, is therefore irrelevant to this analysis. Rather, the domain of the tone is seen as being crucial to recognising the underlying workings of the system.

3. Examples of variations on the different system types

In the following survey, the tonal systems of various languages of the New Guinea area are described. After the name of each language any alternative names by which the language is known is mentioned in angle brackets, followed by the genetic affiliation in parentheses. Generally, examples of the tonal patterns on monosyllabic (1-s) and disyllabic (2-s) words are listed. Unless otherwise stated, an accent (') indicates the syllable with the high tone, and the lack of a diacritic indicates a low tone. The exemplary sketches given here, based on the data and analyses of the sources referred to, are neither full descriptions of the tonal phenomena in the individual languages (often through lack of depth of description), nor exhaustive lists of the range of tonal variation found in New Guinea, but are representative of the sort of variation encountered. For a more complete list of references and a wider range of languages exemplifying the tonal categories proposed here, see Donohue (1993).

4. Syllable-level

The languages in the following section, from widely different parts of New Guinea, all represent languages with a tone system that allows each syllable in the word to bear a distinct tone. Xau is unique amongst the languages described in allowing combinations of more than one tone to be present in one syllable.

4.1. Sikaritai [Alkwakai, Atj] (Lake Plains family, Irian Jaya)

The Sikaritai tonal system consists of two tones, high (H) and low (L), with each syllable in the word assigned a tone independent of the other syllables in the word (Martin 1991). The addition of affixing morphology appears to have no effect on the tones in the root, the affixes having their own tone and there appearing to be no tone sandhi rules operating. Examples of the contrasts on one to three syllable words are:

- H L
dig ‘pig’
tig ‘go’

- HH HL LH LL
ita ‘ironwood’ bgowda ‘bachelor’ pgadó ‘to divide’ asgad ‘leaf’

- HHH HHL HLH HLL
pièksó ‘girl’ kidjú ‘speech’ kidjokóvé ‘one’ kidjokóla ‘certain’
\[
| H | L | H | L | L | L | H |
\]
\[
\text{atéjé} \quad \text{igítógi} \quad \text{kiplá} \quad \text{akang}
\]
\[
\text{‘together’} \quad \text{‘knife’} \quad \text{‘old’} \quad \text{‘shoulder’}
\]

Since there are no restrictions on the co-occurrence of tones, and no sandhi rules to modify their phonetic form, there is a transparent correlation between underlyingly assigned tones and phonetically realised tones. We can state that there are a number of tonal units equal to the number of syllables, and that there is a one-to-one mapping relation between them. An example of the derivation of a word is given:

Surface contour: \[\square \square \square \] (e.g., kigjokwé ‘one’)

Underlying tones: \[H \quad L \quad H\]

We could analyse words such as tíóg and ksigkala in terms of tone spreading, but the need to have one-to-one assignment in other forms such as kigjokwé shows that this would not simplify the analysis of the tonal phonology for other examples.

The related language Obokuitai (Janison & Janison 1991) has an only slightly more complex system with three tones, displaying a three-way contrast between high, low and falling tones, independently assigned to syllables (with the provision that a falling tone may be final only in monosyllabic words). In Sko (Voorhoeve 1971) there are three tones: high, low and rising, again independent of each other, with high and low tones appearing as falling tones phrase-finally. A similar system is found in Vanimo (Ross 1980; Donohue & Van Vught 1992).

3.1.2. Chauve (Chimbu family, Central Highlands, Papua New Guinea)

The tone system in Chauve (like that of the related Chimbu language Golin) is the same as the Sikaritai system described in Section 3.1.1, but deviates from this archetypal contrast of high and low tones with the restriction that there must be at least one syllable with high tone in each word (Swick 1966). There is thus no contrast in monosyllabic words which are always high, and a slightly smaller contrast on polysyllabic words than would be expected from simply combining all the tones. That this is a genuine pattern, and not just an artefact of defective data, can be assessed based on the detail of presentation of patterns, and the consistent lack of any solely L-tones words across one-, two- and three-syllable words.

| Surface contour: \[\square \square \square \] (e.g., kigjokwé ‘one’)
| Underlying tones: \[H \quad L \quad H\]

We can formalise the restriction that each word contain at least one high-toned syllable with the following condition on well-formedness, stating that the derivation with only low tones assigned to syllables, and no high tones, is ill-formed:

**TONE REQUIREMENT**

\[
\begin{array}{c}
\ast \cdots \sigma \cdots \gamma
\end{array}
\]

\[
\text{(*H)} \quad \text{L} \quad \text{(*H)}
\]

A different sort of tonal system appears to operate in Wahgi, another Chimbu language, and, whilst the data is insufficient to draw definite conclusions, there appear to be three contrasts in operation on monosyllabic and three patterns contrasting on longer words, implying a move away from the simple one-tone-per-syllable system seen here.

3.3. Telefóá (Ok family, Papua New Guinea)

In Telefóá either one of two tonemes, rise (R) and fall (F) (Up and Down), are assigned independently to each mora except for a word final mora in a disyllabic word, which only receives one assigned tone (Hailey 1964).

| Surface contour: \[\square \square \square \] (e.g., kigjokwé ‘one’)
| Underlying tones: \[H \quad L \quad H\]

We can formalise the restriction that each word contain at least one high-toned syllable with the following condition on well-formedness, stating that the derivation with only low tones assigned to syllables, and no high tones, is ill-formed:

**TONE REQUIREMENT**

\[
\begin{array}{c}
\ast \cdots \sigma \cdots \gamma
\end{array}
\]

\[
\text{(*H)} \quad \text{L} \quad \text{(*H)}
\]

A different sort of tonal system appears to operate in Wahgi, another Chimbu language, and, whilst the data is insufficient to draw definite conclusions, there appear to be three contrasts in operation on monosyllabic and three patterns contrasting on longer words, implying a move away from the simple one-tone-per-syllable system seen here.

3.3.1. Telefóá (Ok family, Papua New Guinea)

The tone system in Telefóá (like that of the related Chimbu language Golin) is the same as the Sikaritai system described in Section 3.1.1, but deviates from this archetypal contrast of high and low tones with the restriction that there must be at least one syllable with high tone in each word (Swick 1966). There is thus no contrast in monosyllabic words which are always high, and a slightly smaller contrast on polysyllabic words than would be expected from simply combining all the tones. That this is a genuine pattern, and not just an artefact of defective data, can be assessed based on the detail of presentation of patterns, and the consistent lack of any solely L-tones words across one-, two- and three-syllable words.

\[
| H | L | H \quad L | L | L | H |
\]

We can formalise the restriction that each word contain at least one high-toned syllable with the following condition on well-formedness, stating that the derivation with only low tones assigned to syllables, and no high tones, is ill-formed:

**TONE REQUIREMENT**

\[
\begin{array}{c}
\ast \cdots \sigma \cdots \gamma
\end{array}
\]

\[
\text{(*H)} \quad \text{L} \quad \text{(*H)}
\]
2-s RR RF FR FF
lām jāpakān lām lān
‘dream’ ‘small things’ ‘top-plate’ ‘dark water’

Teledofol appears to offer an example of a language with a contrast between two tones on a syllable level that are not the usual high and low. However, as Healey himself points out, they can be analysed as a series of high and low tones that are assigned to the right of their expected positions. According to Healey (1964: 48), “each word, in its basic form, has the same number of tonemes as it would in the UP and DOWN analysis, but the first vowel is toneless, and after the last vowel there is an extra floating toneme”. The tone patterns that Healey presents seem more amenable to analysis if we lexically assign one tone per syllable, as Healey suggests, but add a floating one after each lexically-assigned tone. In autosegmental terms, we can assume that the R and F tones represent underlying L and H, respectively, and add a dissimilated H or L to the right of each L or H tone. The words kāpakān and lān would have the following tone structure:


Register:
Underlying tones: L H H L high low

The true scale of tonal behaviour in Iau appears only when aspect marking on verbs is taken into account: this is done by means of tones, each tone marking a particular aspect and the tones can appear in combination to show a complex aspect. Examples of tone varying with tense/aspect are from Bateman (1986); in the following three examples the verb iau ‘contact the ground’ is used in all three sentences, but it bears a different tone in each of them, corresponding to the punctual (PUNCT.RES), punctual telic (PUNCT.TEL) and durative telic (DUR.TEL) tenses respectively (seq is a sequential marker):

3.1.4. Iau [Tur] (Lake Plains family, Irian Jaya)
Iau possesses the fullest inventory of tones operating in any language in New Guinea (and comes very close on a world scale). Iau possesses eight tonemes, each of which is contrastive, and additionally Iau allows up to two tonemes per syllable. The tones found are as in Table 1 (numbering conventions from 2 to 9 following Bateman 1990; see also Edmondson et al. 1992).

Although the size of the tonal inventory in Iau is impressive, the number of tones can be reduced simply to combinations of high and low tones, and a register component. For example, three of the tones could be analysed as having the following structure.

<table>
<thead>
<tr>
<th>Tone</th>
<th>Value</th>
<th>Description</th>
<th>Example</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>44</td>
<td>high level</td>
<td>du</td>
<td>&quot;wild pig&quot;</td>
</tr>
<tr>
<td>8</td>
<td>33</td>
<td>low level</td>
<td>a7</td>
<td>&quot;tree&quot;</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
<td>high rise</td>
<td>a5</td>
<td>&quot;dog&quot;</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
<td>low rise</td>
<td>a6</td>
<td>&quot;spirit&quot;</td>
</tr>
<tr>
<td>5</td>
<td>42</td>
<td>full drop</td>
<td>a6</td>
<td>&quot;land&quot;</td>
</tr>
<tr>
<td>4</td>
<td>43</td>
<td>high drop</td>
<td>a4</td>
<td>&quot;arm&quot;</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>low drop</td>
<td>ko</td>
<td>&quot;breadfruit&quot;</td>
</tr>
<tr>
<td>2</td>
<td>423</td>
<td>dipping</td>
<td>dū</td>
<td>&quot;crocodile&quot;</td>
</tr>
</tbody>
</table>

Surface contour: [45] [32] [42]

Register: 
Underlying tones: L H H L high low

The plane landed.’ (i.e., made contact with the ground)
The tree fell, was falling.’
The following combinations of tones have been observed on single syllables:

- 9-8
- 8-5 8-4
- 7-8 7-4 7-3
- 6-8 6-4 6-3
- 4-7

A verb that can have either a differing single tone or a combination of tones is *sui* 'die' (abbreviations in glosses: *mvcl* medial verb clause marker, *inc* incompleteive, *scl* subordinate clause marker, *tot punt* totality of action punctual, *chis* change of state):

- (d) *a se*<sup>6</sup> *di*<sup>3</sup> *da*<sup>5</sup>*di*<sup>9</sup> *a*<sup>se</sup>*sui*<sup>5</sup>
  - seq kill dur res mvcl seq die punt tel
  - 'When he killed it, it died.'

- (e) *a*<sup>6</sup> *a*<sup>se</sup>*sui*<sup>4</sup> *be*<sup>2</sup>*s
  - 1sg seq die inc tel scl
  - 'Then when I die, ...'

- (f) *a*<sup>4</sup>*iv*<sup>7</sup> *an*<sup>7</sup>*by*<sup>9</sup> *a*<sup>se</sup>*a*<sup>6</sup> *bi*<sup>3</sup>*sui*<sup>9</sup>*<sup>3</sup>
  - mother his seq before one die tot punt tot chis
  - 'One of his aunts died.'

- (g) *sui*<sup>2</sup>*<sup>9</sup> *da*<sup>8</sup>*dv
  - die punt res chis mvcl
  - 'When she died, ...'

Some nouns also exhibit a multiple tone, possibly as a result of historical fusion:

- *sa*<sup>6-4</sup> (tone contour of 3343) 'machete'
- *da*<sup>1-4</sup> (tone contour of 2343) 'mountain'

This last example could show the result of the fusing of the two vowels in *da*<sup>4</sup> 'sky-father'. This is doubly plausible when the more polysyllabic nature of the surrounding related languages is taken into account.

Other languages known to be tonal and to display systems that appear to be syllable-level tone are Pawaian (Trefry 1969; MacDonald, 1973) and Weri (Boxwell & Boxwell, 1966).

3.1.5. *Abau* (*Upper Sepik family, Upper Sepik River, Papua New Guinea*)

Abau is one of the few languages reported to be in the Sepik phylum that uses tone in its phonological system (Bailey 1975). This does not contradict Foley's claim (1991: 19) that tone is not an important feature of Sepik languages, as he excluded the Upper Sepik from his sample area.

Nevertheless, the analysis of tone in Abau has been slow and reluctant. Laycock (1965: 114) assumed that "none of the languages [Wogarisun, Isam, or Aboau] is tonal." Later he wrote that "the language shows some tonal contrasts, especially in verb morphology, but cannot be regarded as fully tonal" (1973: 21). Finally, Bailey (1975: 58) concludes that "tone is phonemic and obviously carries a considerable functional load". Bailey states (amongst others) the following forms showing minimal contrast maintained only by the tone of the syllables:

- *hi 'water' vs. hi 'flute'
- *bmp 'grass skirt' vs. bmpi 'mountain ridge'
- *ber 'mother' vs. bpet 'tree species'

These data show us that we have a contrast on monosyllables between *H* and *L*, and on disyllables between *HH*, *HL* and *LL* (There are no cases of LH in Bailey, but this is likely to represent defective data rather than a genuine pattern, given the brevity of the discussion of tonal phenomena.) Once we consider words of three syllables, all combinations of high and low appear to occur. Trisyllabic words show the following contrasts:

```
HHH
HHL
HHL
HLH
LLL
HHH
HHL
HHL
HLH
LLL
```

Thus far we have a system nearly identical to that found in Sikaritai. What sets Abau apart is that there are reported instances of tone sandhi; Bailey states that "when base forms with all low tones precede grammatical particles ke, sa, mon, ultimate low tone becomes high" (1975: 34).

For example, using *auklaiyo* 'bird species', the LLL tone pattern is changed to LLH before sa:

[kekele *auklaiyo* sa *hi] 'I see an auklaiyo'
3.1.6. Summary

The variations found in syllable-tone systems is considerable; we have seen examples of between two and eight contrastive tones per syllable, and cohesion ranging from languages like Sitkari with total independence of syllabically-assigned tones to the requirement that a word must contain a high tone in Chuave and also Weri (Kimurapu family; Boxwell & Boxwell 1966), or that a certain tone may not occur finally in polysyllabic words as in Obokuiti. Finally, there are also examples of systems in which the underlying shape of tones is obscured through regular phonetic processes, either applied uniformly to all underlying tone units (Telofoi) or only in certain tonal environments (Abau).

3.2. Word-level

The following languages are more restricted in their occurrence than those with syllable-tone systems, yet still show a wide geographic spread. They are grouped together on the grounds that the word as a whole is more important than the syllable as a domain for the assignment of tones. Wide variation is found in the restrictions that apply to the assignment of a tone or tones to a syllable within the word; only a couple of examples are presented.


Kairi shows four tonal contrasts, between (on monosyllables) high, rising, falling, and rise-fall tones (Newman & Pettersson 1989). The difference to the syllable-tone case, apart from the phonetic nature of the tones themselves, can be seen when disyllabic words are examined. Whereas syllable-tone language (for instance Sko) can show nine different possibilities of tonal contrasts over two syllables ($3 \times 3$), Kairi shows only four: high on both syllables, low on the first and high on the second, high on the first and low on the second, and finally low on the first and falling on the second. This can be illustrated as follows:

<table>
<thead>
<tr>
<th>Monosyllables</th>
<th>H</th>
<th>L</th>
<th>L</th>
<th>H</th>
<th>L</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disyllables</td>
<td>H</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

The similarities are more noticeable when the contours involved are broken up into sequences of alternating H(igh) and L(ow) tonemes:

<table>
<thead>
<tr>
<th>Monosyllables</th>
<th>H</th>
<th>LH</th>
<th>HL</th>
<th>LHL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disyllables</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>H</td>
</tr>
</tbody>
</table>

The same tones that occur on monosyllabic words are also those that appear, "stretched-out" to accommodate the greater number of syllables, on disyllabic words, and indeed on three or more syllabic expressions. The possibilities for tonal contrast on trisyllables, for instance, are:

| Monosyllables | H | H | L | L | H | H | L | L | HL |

Quite clearly these represent the same sequences of H, LH, HL, or LHL. There are often added complications to these sorts of systems; in the Kairi case, it is obvious that simply equating the tones to the syllables will produce incorrect predictions for the phonetic nature of the tones:

<table>
<thead>
<tr>
<th>Monosyllables</th>
<th>H</th>
<th>LH</th>
<th>HL</th>
</tr>
</thead>
</table>

We must posit a rule such that the second last tone unit (H, L, H, and L respectively) is associated with the last tone-bearing unit (syllable) of the word; this is a fixed position for tone-assignment in the language, and may not be varied. An example is shown with the derivation of the words tuhi 'far', tuhi 'lid', and aramerdau 'basket type':

<table>
<thead>
<tr>
<th>Monosyllables</th>
<th>tuhi</th>
<th>aramerdau</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disyllables</td>
<td>L</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>σ</td>
<td>σ</td>
</tr>
</tbody>
</table>

In the following examples, an acute accent (') represents a high pitched syllable (or a rising glide, if found on a monosyllabic word). A grave accent (') indicates the low pitch (or a falling glide on monosyllables), and the circumflex (') shows a falling pitch on polysyllabic words (or a fall-fall pitch contour on monosyllabic words); tones listed as H and L are the underlying tones:

<table>
<thead>
<tr>
<th>Monosyllables</th>
<th>sa 'pulverised'</th>
<th>'split'</th>
<th>'by, with'</th>
<th>'tree species'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disyllables</td>
<td>H</td>
<td>LH</td>
<td>HL</td>
<td>LHL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monosyllables</th>
<th>nai</th>
<th>'termite'</th>
<th>'turtle'</th>
<th>'fear'</th>
<th>'lid'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disyllables</td>
<td>H</td>
<td>LH</td>
<td>HL</td>
<td>LHL</td>
<td></td>
</tr>
</tbody>
</table>
4-8 H LH HL LHL
harakanë rarakanë pepeherô aroamerû
‘prawn species’ ‘palate’ ‘peg’ ‘basket type’

In the disyllabic words the assignment of the underlying tones to individual syllables is as follows: in huni, the underlying H spreads unproblematically over the whole word. The underlying LH and HL tone melodies are also unproblematically assigned one underlying tone per syllable. Notice that in the quadrisyllabic expressions it is only the last syllable of the word that receives the second of the two underlying tones, and that there is no tonal glide that spreads uniformly across the word as a whole (as is the case in Enga of Western Highlands, Papua New Guinea). The more complicated LHL pattern also assigns the second of its underlying tones to the last syllable of the word, and then the third of the tones as well, producing the falling pitch. On the monosyllabic words, both the LH and the HL underlying patterns produce (different) glide assigning as they do both tones to the one syllable, and the LHL tone produces a rise-fall contour. The rather complicated sandhi rules that are associated with affixing in Kairi will not be discussed here.

3.2.2. Kewa (Eungan family, Papua New Guinea)
Kewa shows four tones that spread over the word (including any affixes): H, L, HL, and LH; these tones are radically changed by sandhi induced by the presence of other tones in a close syntactic juncture (Franklin, 1971). In the following examples the tone on ni ‘I’ is invariant, while the suffix -wa ‘indicative’ assimilates to the tone on the verb-root. For details of the extensive sandhi rules in Kewa see Franklin (1971). The examples presented show only the spreading of the last assigned tone in a word to the suffixed -wa:

<table>
<thead>
<tr>
<th>H</th>
<th>LH</th>
<th>L</th>
<th>H</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>σ</td>
<td>σ</td>
<td>σ</td>
<td>σ</td>
<td>σ</td>
</tr>
<tr>
<td>ni</td>
<td>rámâ-wâ</td>
<td>kâla-wâ</td>
<td>rubá-wâ</td>
<td>pa-wa</td>
</tr>
</tbody>
</table>
‘I ... ... climbed to it.’ ... gave it.’ ... threw it ... did it.’ out.’

A similar system appears to be operating in the related language Enga except that there are only three tones that spread over the word: falling, rising, and dipping.
Notice that in the LL pattern the underlying low tone is assigned to two syllables; this is necessary, given that there is no accented syllable for the H to attach to, and yet each syllable must be assigned a tone. In the HH pattern the same thing happened in reverse, with the assignment of the H to the last syllable blocking the L from assigning to the first syllable, and so in order to produce fully specified syllables the H spread to both syllables.

The analysis of the surface form HH as an underlyingly HL sequence, and LL as underlyingly LH, can be justified when we see how the tones on these words interact with toneless affixes (the realization of this affix as -e and -re is accounted for by the presence of an underlying syllable final consonant in 'noise', and not in 'man'; see Bee & Glasgow 1973 for more details):

\[
\begin{align*}
\text{waa} & \rightarrow \text{waaē} \text{ 'It is a man.} \\
\text{wāā} & \rightarrow \text{wāāe} \text{ 'It is a noise.'}
\end{align*}
\]

From this behaviour we can see that the surface pattern of two high-pitched syllables arises from an underlying HL σσ structure, and not from the LH σσ option, from the assignment of tone to the suffix. Similarly the surface pattern of two low-pitched syllables reflects an underlying LH sequence on unaccented syllables, and not a HL sequence of tonemes. We can make the generalisation that unassigned tonemes must appear to the right of assigned ones, in order to be available to the suffixing morphology that the language uses. The derivation of the two examples above thus is as follows:

\[
\begin{align*}
\text{L H L} & \rightarrow \text{L H} \\
\text{σ σ σ σ σ} & \text{waa} \quad \text{waaē}
\end{align*}
\]

\[
\begin{align*}
\text{H L} & \rightarrow \text{H L} \\
\text{σ σ σ σ σ} & \text{wāā} \quad \text{wāāe}
\end{align*}
\]

The difference between a single and a double accent can be seen in the following minimal tonal pair:

\[
\begin{align*}
\text{LFL} & \text{is analysed as} \quad \sigma \quad \sigma \quad \text{anēma 'bird species'} \\
\mid & \quad \mid
\text{L H L}
\end{align*}
\]

The secondary accent is necessary to differentiate, for example, the following five-syllable word patterns, which are all derived from the same underlying LHL tone-pattern:

\[
\begin{align*}
\text{L H L L L} & \quad \text{L H L L L} \quad \text{L H H H L} \\
\text{σ σ σ σ σ} & \quad \text{σ σ σ σ σ} \quad \text{σ σ σ σ σ} \\
\mid & \quad \mid \quad \mid
\text{L H L} & \quad \text{L H L} \quad \text{L H L}
\end{align*}
\]

\[
\begin{align*}
\text{bilbergia} & \quad \text{arātīyo} & \quad \text{iyānārā} \\
\text{sweet potato species} & \quad \text{'Show him!'} & \quad \text{'puppy'}
\end{align*}
\]

\[
\begin{align*}
\text{L H L L L} & \quad \text{L H L L L} \quad \text{L L L H L} \\
\text{σ σ σ σ σ} & \quad \text{σ σ σ σ σ} \quad \text{σ σ σ σ σ} \\
\mid & \quad \mid \quad \mid
\text{L H L} & \quad \text{L H L} \quad \text{L H L}
\end{align*}
\]

\[
\begin{align*}
\text{tahāma} & \quad \text{ikamōnipo} & \quad \text{umotyāmā} \\
\text{sound of rain'} & \quad \text{I will certainly hit it'} & \quad \text{‘bad cough'}
\end{align*}
\]

The function of the secondary accent is to show the place of assignment of the L tone that precedes the H in a sequence of underlying tonemes.

All of these examples we can see the tones spreading from their assigned positions as necessary to assign a tone to every syllable.

2.4. Fore (Goroka family, Papua New Guinea)

The tone system of Fore consists of underlying strings of H and L tones, arranged such that no sequences of adjacent tones (HH or LL) are allowed underlyingly (Scott 1990). The length of the underlying string can be as great as the number of syllables in the word plus one, and that extra tone is assigned to a following particle, but is not assigned to a syllable in the stem that has already been assigned a tone. In this manner, the total possible tonal patterns in a word is equal to twice the number of syllables in the root, plus two.

The following are underlying tonal combinations possible for roots of one and two syllables, yielding contrastive patterns on words of up to three syllables; the bracketed syllable (ne-we) is the indicative particle, meaning 'it is a ...', added to show the effect of the underlying tone on the following syllable:
1-s
kao(ne)
‘It is ...
... your friend’

2-s
antaa(we)
‘It is ...
... his intestines’

HL
ano(ne)
... his head’

L
kli(né)
... your friend’

LH
nonó(né)
... breast’

LH
wanti(né)
... water’

HL
ke(né)
... path’

HL
ama(né)
... his shadow’

HL
awa(we)
... his tooth’

Words in which there are more underlying tone units than syllables do not realise the last of these unless a suffix is attached to the word, as seen in the examples; to elaborate, ke LH ‘path’ only realises the underlying H half of its tone component when suffixed. This is in contrast to the behaviour of the similar underlying tone sequence in Kairi, in which both underlying units attach to the same syllable, combining to produce a rising glide. This reflects different low-level restrictions on tone assignment in the two languages.

3.2.5. Summary
The other languages of the Kaimantu family all show tonal behaviour, many of which can be modelled as being word-level tonal processes. Languages in the neighbouring Goroka family, such as Yagarai (Renou 1975), also show such tonal behaviour. Additionally, Doutai (McAllister & McAllister 1991) and Yabém (Dempwolff 1939; Ross 1993; Streicher 1982) are languages with word-level tone from elsewhere in New Guinea. The variation that we have seen in the word-tone systems includes fairly straightforward matching of tonal contours to syllables in the word (Kewa), the existence in addition to a tonal contour of a fixed (non-contrastive) tonal ‘inflexion point’ (Kairi) or a contrastive one (Usasupa), requiring additional specification, to constraints on the types of tones that may appear underlying assigned to adjacent syllables (Fors).

3.3. Pitch-accent
The languages in the following section all display tonal behaviour that can be described as minimally complex when compared to the languages already treated. Whilst tonal phenomena are present, they are highly restricted or predictable from context, and require less phonological notation. Languages with a pitch-accent type of system are extremely common in New Guinea, accounting for languages in at least 40 per cent of the genetic groupings on the island.

Una (Mak languages, Star Mountains, Irian Jaya)
Una shows an almost prototypical pitch-accent system (Louverse 1978). All words of more than one syllable in Una must have one syllable which is spoken at a higher pitch than the others; the difference between the tone pattern of different words lies in the positioning of this pitch-accent. Note that the presence or absence of this accented syllable is not optional; all polysyllabic words must contain one and only one accent. The number of possible contrasts is thus equal to the number of syllables in a word, except that monosyllables still show a two-way contrast. Note that this is similar to the constraint found in Chuave, except that monosyllables are exempted from the high tone requirement. To exemplify, pitch contrasts on words of one to three syllables in Una, following the orthographic conventions for the language, and with low pitch not marked except on the monosyllables:

Mai
‘tree species’

dai
‘marsupial species’

Se
‘truly’

dë
‘frogs’

Sa
‘joint’

Sa
‘pimple’

Sa
‘building materials’

A similar system operates in Iba (West Bomberai family; Donohue 1982), which allows maximally one high-pitch-accented syllable per word, and possibly in the Ok language Ketengban (Sim & Sim 1982).

Arigibi Kiawai (Kiawai family, Gulf Province, Papua New Guinea)
Arigibi Kiawai appears to have a pitch-accent system that allows one high pitch in a word, but has the restriction that there must be at least one low in each word (Wurm 1973; Franklin 1973). Monosyllables, thus, do not show a contrast in pitch. Wurm writes about the Kiawai languages in general and about the northern languages of Kerewo, North-Eastern Kiawai, and Arigibi in particular.

The suprasegmental systems are relatively complicated, ... and a two-tone system is present in all the languages, except apparently Waboda. Its function appears to be low in all the languages except for North-Eastern
Kiawai and (Arigibi?) where it seems to be quite high. (1973: 226) The problem of the suprasegmental features of North-Eastern Kiawai, and in fact of the Kiawai languages as a whole, calls for much further study. (1973: 250) ... many of the homophones or near-homophones resulting form the shortening of words are distinguished by suprasegmental features including tones. (1973: 249)

It appears likely that there is a pitch-accent system in all of the closely related Kiawai languages, and the shortening of words in the northern languages has resulted in a greater functional load being placed on pitch than in the Southern Kiawai languages, which generally have words with a greater number of syllables. Indeed, writing about Wabuda, Wurm notes:

On the phonological level, Wabuda differs quite markedly from the other Kiawai languages in displaying what appear to be archaic features in the phonological shapes of many of its lexical items, ... and in apparently lacking a tonal system. (1973: 237)

Examples of the different pitch patterns found on words from one to four syllables in Arigibi can be seen in the following:

1-s L na: 'fish'
2-s LL tutu: 'long'
   LH umii 'dog'
   HL nimo 'house'
3-s LLL LL vo,voʔo 'bird'
   LH mudub 'claw'
   LHL ivio 'sun'
   HLL ggiʔepu 'heart'
4-s LLLL əlala 'hot'
   LLLH olaʔolă 'red'
   LHLL tənlə 'all'
   LHHLL iːdɔːmi 'eye'
   HLLL niʔstama 'bark'

Unlike Una, which requires at least one high pitched syllable in all but monosyllabic words, Kiawai does not require that there be a H in the phonological word, but does require there to be one L associated with the word. Put in terms of pitch-accent placement conventions, Kiawai allows for one pitch-accent per word, but requires that there be at least one non-pitch-accented syllable in a word. This Kiawai restriction on the
to kapsabō-ahi 'What will he say to you?'
to kapsabō-ahi 'What will he say to him?'

There is also at least one case of morphological affixes being differentiated by the tone alone, noted by Voorhoeve (1975: 358), in which the syllable ka has two different meanings.

3.3.4. Kaure (Kaure stock, Irian Jaya)
Kaure has a pitch-accent system, with the pitch contrast constrained so that it appears only on the stressed syllable, of which there can be only one per word (Dommel & Dommel 1991, and personal communication).

The pitch-accent system is unusual in that it specifies not only the location of the pitch-accent in the word, but also the phonetic type of pitch contour that may be chosen: the realisation of the pitch-accent can be either a high pitch on the relevant syllable or a fall in pitch on that syllable. This contrast is not predictable, and so is an additional relevant phonemic feature.

1-s hin 'woods species' non-accented \(\sigma\), HL
hin 'blood' accented \(\sigma\), H

2-s sia 'lů 'path' non-accented \(\sigma \ '\sigma\), n H
'in hoi' 'mountain site' non-accented \(\sigma \ '\sigma\), H n

dai 'tā' 'mouse's sago' accented \(\sigma \ '\sigma\), n HL
'dai tai 'wife's footprint's' accented \(\sigma \ '\sigma\), HL n

This is one of the few reported examples of a language that employs contrastive pitch contours as well as using contrastive placement of the pitch-accent, even though the two are not independent of each other. More work needs to be done on this sort of system to determine how its functions, though it appears that Kaure may be better reanalysed as having a system similar to that found in Momuna and Fasu (see Section 4), or intermediate between the canonical pitch-accent systems described here for Una and Kiwai and the Momuna/Fasu type of phonological system.

3.3.5. Summary
Pitch accent systems appear to be very common in New Guinea; other languages with such systems include the already mentioned Isirawa (Ogilvie & Erikson 1975), which has the requirement that a contrastive pitch accent be placed in the last four syllables of the word, various Awyu Dumut languages (see, for example, de Vries 1993), Meriam Mer, Molen (Haycock 1978), and Maya (van der Leeden 1983; 1993). Variation in type of system is rife; there are no examples of a "pure" pitch-accent system in my sample, with all languages having some embellishment, ranging from restrictions on where the contrast may appear (Isirawa, Marind) to requirements that a word contain an accented syllable (Una) or an unaccented one (Kiwai, Kamoro), or to further complications in relating the pitch-accent system to the stress system.

4. Intermediate cases
These languages, and the consequences arising from the analysis of their tonal systems, will be discussed in the conclusion. The tonal systems of Momuna and Fasu appear to form a bridge between the pitch-accent systems on the one hand and the word-tone system on the other. Like the pitch-accent systems, they show phonemic contrasts at only one place in each word, and any other pitch movements are conditioned. Like the word-tone systems, however, they contrast more than one basic tone pattern per word (or perhaps phrase). The placement of a single diacritic tone is thus not sufficient to determine the pitch contour of the word, as was the case with the pitch-accent languages, since the value of that diacritic must also be specified (high or low pitch). It can be viewed as either a very (overly) sophisticated pitch-accent system or a drastically reduced word-tone system. (For a discussion of systems similar to this, see van der Hulst & Smith 1988, and many of the other papers in that volume.)

1. Fasu (West Kutubu family, Papua New Guinea)
Fasu shows a contrast between high and low, which can only appear as a compulsory contrast on the "stressed" syllable of the word (May & Beekve 1965). This "stressed" syllable is not fixed, and is thus a second variable that needs to be considered when determining the pitch shape of the word. Unlike the similar case in Momuna, neither the high nor the low tone corresponds to the pitch of the unstressed syllables. Examples of the contrast on two- and three-syllable words (taken from E. Pike (1975)) are as follows:

\[\sigma \ '\sigma\] 'tail'
\[\sigma \ '\sigma\] 'collarbone'
\[\sigma \ '\sigma\] 'loomcloth'
\[\sigma \ '\sigma\] 'banana'
\[\sigma \ '\sigma\] 'machete'
\[\sigma \ '\sigma\] 'arrow'
\[\sigma \ '\sigma\] 'eyelash'
σ σ σ
kenari  ‘tree species’
kenari  ‘bamboo species’

The assignment of tones to some of the words listed is as follows (TBU stands for tone-bearing unit):

<table>
<thead>
<tr>
<th>sakâre</th>
<th>hiwâti</th>
<th>kenari</th>
</tr>
</thead>
<tbody>
<tr>
<td>σ σ σ σ  σ σ σ σ</td>
<td>TBU</td>
<td>TBU</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>L</td>
</tr>
</tbody>
</table>

We can see that the placement of the contrastive syllable is variable, characteristic of a pitch-accent language: this is illustrated by the contrast between fiti and fiti. Furthermore, there is a contrast in the pitch assigned to the contrastive syllable: the pitch there can be either high or low, seen in the pair kenari and kenari, a characteristic of word-tone syllable-tone languages. Fasu thus shows characteristics of both pitch accent and word-tone languages.

4.2. **Momuna [Somahai] (Central and South New Guinea Stock, Irian Jaya)**

In Momuna, monosyllabic words contrast a low (marked with a grave accent), mid (unmarked), and high (acute accent) (data from Reine 1986):

[bô] ‘house’  H
[bo] ‘go’  n
[bô] ‘log’  L

Polysyllabic words contrast only two levels, a distinctly high tone and a low one, which is equal to the pitch of the unaccented syllable. There is a contrast only on the accented syllable. The following show contrasting pitch-patterns for disyllabic words, with L and H indicating the presence of a low or high tone on the (necessarily) accented syllable, respectively, and an n indicating a tonally neutral, non-stressed syllable.

[bôro] ‘earth’  Hn
[kae] ‘food’  nH
  L\n[ban\] ‘arrow’  nL

Fasu and Momuna are languages in which designating the location of the stressed syllable alone is insufficient information for determining the pitch shape, as the stressed syllable itself has a contrast in tone, between high and low (and mid, for Momuna monosyllables).

**Summary**

Systems of this kind are important because they form a “bridge” between the pitch-accent system on the one hand and word-tone systems on the other. The analysis of this sort of tonal phenomenon as either a highly reduced word-tone system (contrasting on only one syllable per word) or an augmented pitch-accent system (requiring different tones that may be attached to the specified point in the word) is essentially arbitrary. The most reasonable empirical conclusion is to state that on the continuum between pitch-accent languages and word-tone languages, these languages are a midway point.

**Summary of the major types of tone systems discussed**

3.1. **Syllable-tone type: One tone per syllable**

The syllable-tone type, best known from many of the languages of East and Southeast Asia, typically has several distinct tones that are assigned to all or most syllables at an underlying level. New Guinea languages representative of this type are Sikaritai, Chuave, Abau, Wewul, Telofol, Pawaian, Sko, Vanimo, Obokuitai, and Iau. At the extreme end of the spectrum lie Iau with eight contrastive tones, about the minimal system that has been found, and the various Chimbu languages of Sikaritai, which show a two-way contrast between high and low tones. What all these systems have in common is that they assign a **SINGLE TONE TO EACH SYLLABLE IN A WORD.**

3.2. **Word-tone type: One tone per phonological word**

The second type involves languages in which there are several distinct tones, but only one tone is assigned to each word. In New Guinea this type can best be seen in Kairi, Usaru, Fore, Kewa, and Enga. Enga represents the less complicated end of the range, with simple phonetic splitting of the word-tone over the whole word. Usaru shows unexpected complications, with a variable point of assignment of the underlying tones to the syllables. This means, for instance, that the total productive possibilities on a trisyllabic expression are not four but ten. This is shared by all the systems of this type is that the Domain of each TONE is THE WORD AS A WHOLE, and not each syllable.
5.3. Pitch-accent type: One marked syllable per phonological word

The final type is the pitch-accent system where there is one tone that (optionally) assigns to each word. Examples of this sort of system are Una, Kamoro, Arigihi, Kiwai, Isirawa, Marind, Kaure, and possibly Ekari. Una has a simple, and compulsory one pitch-accent word (slightly relaxed with monosyllables), and represents the least complicated system of this type. Kaure, Kamoro, and Marind both share restrictions as to where the pitch-accent may occur, and Arigihi Kiwai requires at least one non-accented syllable per word. The languages all share the fact that there is only a simply designated syllable that determines the shape of the pitch pattern on the rest of the word.

5.4. Languages reported to be or likely to be tonal languages

Many languages are either reported to display tonal behaviour, or appear from available wordlists to be likely to either use some sort of intra-syllabic or inter-syllabic factor in differentiating words, or to have an unaccountably large number of homonyms amongst their basic vocabulary. Due to the lack of data, however, the nature of the tonal system present in the languages concerned cannot be given in detail. A listing of these languages is given, with their classification (following Wurm (ed.) 1975 and Foley 1986). For details of the evidence or reports supporting the claim that they might be tonal, see Donohue (1993). The languages thought to be tonal are as follows: Karon Dori (West Papua family), Tarungoro (East Geelvink Bay), Wodani, Moni, Uhundui (Wesi Lakes), Kettengban, Nalitva (Meek family), Foau, Dabra (East Lake Plains), Kenia, Rawo (Sko phylum), Yaqay (Marind family), Yonggom, Rimin, Minima, Wagareyabi, Ngalum (Ok family), Duna (Duna-Bogaya), Awin, Awon (Awon-Pa family), Nomad/Samo, Beami, Kamula, Kali, Kalamo, Helai, Konai (Boavi stock), Daribi (Teberan family), Sawuy, Kombai (Awon-Dumut), Enga (Engan family), Wurw (possibly Engan), Anga, Wongokeso, Angaitha (Angan family), Meriam Mer (Eastern Trans-But, Suwa (Binandere family), Romkun (Ramu phylum), Ningil (Tompoki), Bikai (Sepik phylum), Amto, Musian (Amto-Musian), Rege, Reak, Bo, Ann, Nimo (Arai family), Biyom Brahman (Southeast Adelbert Range).

6. Exceptional and unusual uses of tone

6.1. Asmat (Asmat-Kamoro family, Central South-West New Guinea stock, South-West Irian Jaya)

Certain Asmat languages, especially Citak Asmat, appear to have contrastive pitch phenomena (data from Voorhoeve 1980 and Bromley 1989). In Citak Asmat, a disyllabic form may be either LH or HL; a monosyllabic word may be either H or L, or LH if it is long, though speakers of some dialects do not maintain the pitch difference (which is most prominent in the village of Tiau), differentiating forms on the basis of a rather unclear distinction between "surging" and "ballistic" syllabic onsets (Voorhoeve 1980: 37). Examples of this contrast are:

- *korum* ‘paddle’
- *kudat* ‘turtle’
- *kait* ‘bat’
- *chit* ‘small white crayfish’
- *chit* ‘tooth’

Asmat as spoken on the coast does not usually use pitch outside of its usual stress system. Citak Asmat, however, spoken further inland—representing a different language (Voorhoeve, personal communication)—shows what appears to be a pitch-accent system with allophonic complications. Coastal Asmat retains the use of something like a pitch-accent system only in specialist ritual words. This indicates a situation in which a phonological feature (i.e., the pitch-accent) has been lost in the language except in a small corpus of words that would be inherently resistant to change.

In the dialect of Central Asmat on which Voorhoeve worked, it appears that pitch contrasts are limited to a small number of ritual words, the majority of the words in the language having a stress-type system operating in which the direction of pitch movement is insignificant. Only in a small number of words is this putative remnant of an earlier system preserved (Voorhoeve, personal communication). Such a phenomenon can also be observed in the case of the (historically and orthographically) retroflexed consonants in Nepali, which are only preserved as retroflexes in the case of gods and words connected with temple ceremony, elsewhere taking the same as the dental-alveolar set of consonants (Donohue 1989).

2. Labu (Markham family, Austronesian, Huon Gulf, Papua New Guinea)

Labu appears to have borrowed the idea, if not necessarily the acoustic values, of a tonal system from its prestigious neighbours Ya'bm and Yavas. Both of the latter have developed tonal systems based on the prosodic voicing of (usually) initial consonants. Labu appears to have added occasional low tones, which now serve to differentiate otherwise
identical sequences (data from Siegel 1984). Notice how the following words, at least the first of which seems to be a loan word, have strong segmental correlates with Yabêm, but no correlations in tone:

Labu: yalə ‘year’
yalə ‘kerosene lamp’
yə̀ ‘fire’
Yabêm: yə̀rə̀ (<German Jahr)

I found only 33 words with the low tone from approximately 800 words listed in Siegel (1984), only 4 per cent of the total, suggesting that the arrival of tone in the language is relatively recent, and has not yet spread through the lexicon enough to be considered a fully functional phonological feature. This can be compared to the borrowing of ejectives in the Pacific North-West of America, where it appears that the Salish languages have borrowed the [t̪ʰ] phoneme from neighboring Wakashan and Haida languages, but not the corresponding [t̪] phoneme (Barry Carlson, Thom Hess, personal communication). The more salient ejective sounds were borrowed, leading to asymmetrical phoneme inventories in most of the Salish languages.

7. Taxonomies of tonal systems: Summary and conclusions

I have presented in essence three categories into which most of the tonal languages of the New Guinea area can be classified: pitch-accent, word-tone, and syllable-tone languages. These categories all have their exponents outside the New Guinea area as well. Japanese is the most cited example of a pitch-accent language, and Serbo-Croatian as well as several North American Indian languages would also fit into this category. The class of word-tone languages has not previously been reported as such, as a separate typological class, but Mende from Sierra Leone in West Africa, and Shanghai from East-Central China would clearly fall into this category. The syllable-tone languages are those on which most work has focused, as well as being the “typical” tone language for most people; this group includes most Chinese languages (Mandarin, Cantonese, Hakka), Southeast Asian languages (Thai, Vietnamese), many West African languages (Igbo, Yoruba), and assorted other languages such as Tzapanec in Mexico or Southern Nambiquara in Brazil. My three categories and those of previous authors can be compared as follows:

This analysis:

<table>
<thead>
<tr>
<th>PITCH-ACCENT</th>
<th>WORD-TONE</th>
<th>SYLLABLE-TONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Una, Japanese</td>
<td>Kairi, Mende, Shanghai</td>
<td>Vanimo, Cantonese</td>
</tr>
<tr>
<td>Fasu, Lithuanian</td>
<td>Fuzhou</td>
<td></td>
</tr>
</tbody>
</table>

Previous classifications:

<table>
<thead>
<tr>
<th>PITCH-ACCENT</th>
<th>WORD-TONE</th>
<th>SYLLABLE-TONE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The problem with this classification arises when the “tricky case languages are taken into account. An analysis of Fasu tonal phonology as two mutually exclusive choices: either the language exhibits a highly reduced version of a word-tone system, in which all pitch contrast eliminates except on the stressed syllable of that word, or it exhibits a fully developed version of a pitch-accent system, in which not only may there be a contrast between the presence or absence of a pitch-accent on every syllable, but that there may be a further contrast as to the manner in which sort of pitch movement there is, if present. The important point that there is NO BASIS FOR CHOOSING between these two options.

Similarly, whilst there are languages that are clearly word-tone languages, for example that are clearly syllable-tone languages, the distinction becomes blurred when the language is (potentially) classifiable as a tone language has a low average number of syllables per word and much, if any, affixing morphology. Such a language may form syllabic words through compounding, but remain essentially a monosyllabic language; an example of this sort of language is Fuzhou Chinese, whose very complicated right-dominant tone sandhi distorts the isolation of all but the last syllable of a compound beyond recognition; only the tone is a product of the word, but unlike the Shanghai case, where the tone of the word can be considered a “stretched” version of the normal citation tones, the tone of a sandhi-changed syllable in a compound in Fuzhou depends on the input tone of both the altered tone and the invariant syllable.

This can be illustrated with data from C. Donohue (1992).
toyk + zaik = iy zaik
23 23 5 23
‘bamboo’ ‘section’ ‘bamboo section’

In this example both of the input syllables have a low rising checked tone 23 when said in isolation. The 23 tone on toyk changes to a high level tone when it appears before zaik in a compound. If the final tone in the compound was not another tone 4 (the tone with a 23 realisation in isolation), but a (for instance) tone 6 (which has a rising-falling 23 contour in isolation), then the tonal realisation of toyk in the compound would not have been a high level [5] but a falling [42]:

\[23 + 231 \rightarrow [42 231]\]

Here we can see that while we clearly need to recognise tones at the word level, the shape of those tones is dependent on the representation of them at a syllable level. This feature of Fuzhou (and several other languages in the Fujian-Zhejiang area) leads to the same classificatory quantity as that the Fasu data presented; it can be seen as either an extremely complicated example of a word-tone language or a simplified example of a syllable-tone language, and the choice between the two classifications is essentially arbitrary.

I conclude that whilst there do appear to be categories into which most tonal languages can be classified, these are not so much discrete categories but rather typologically neutral areas, systems of relatively low complexity towards which languages seem to develop.

While there are more languages of these types, this is a product of similar development and not membership in a class. The labels “pitch-accent type”, “word-tone type”, and “syllable-tone type” are therefore not strict ones, and do not preclude the existence of other “sorts” of languages, but are convenient labels for typologically similar groupings of languages, just as the labels “Head-marking” and “Dependent-marking” do not preclude the existence of languages that display elements of both types.

In reality there is a continuum of types, ranging from the minimally pitch-using languages, which only specify one pitch perturbation in each word, to the maximally pitch-using languages that can have as many as several specified tones on each syllable, as in Iau and Mixtec (Mexico). The obvious link between the pitch-accent languages at the lower end of this scale is with languages that emphasise the pitch component as the primary correlate of stress, such as Tukang Besi (mentioned earlier); the continuum of types from the Una-style pitch-accent system to Iau can be diagrammed as shown in Figure 1, where the vertical axis represents the frequency of occurrence of each type, which is shown on the horizontal axis.

5. Typological and areal considerations
5.1 Syllable-tone systems

The main complicating factor that can occur with the syllable-tone type of tonal system lies in the number of tones that can contrast on the syllable, as pointed out by Welmers (1959), the majority of these systems are a mixture of level and contour tones. Further complications can be observed in the placement of tones in polysyllabic words, most-syllable-tone languages tend to be polysyllabic in proportion to the number of tones that they have. Restrictions on tonal co-occurrence can be either a simple restriction requiring a certain tone, or restricting it to a certain environment, or of the type “Tone X cannot occur before/after/near Tone Y”, or more complicated restrictions such as “Tone X becomes Tone Z before/after/near Tone Y”.

Less common, but also attested, are compoundings of tones due to stress morphology that carries its own tone. This is, however, observed
The word-tone style of tonal system varies between systems that are on the surface very simple or, through a few systematically simple additions to the rules that specify tonal assignment, very complex. One of the most basic systems specifies a fixed "inflection point" in the word, and the tones are spread with that point as a fixed reference point. The first complication that can arise is that the inflection point becomes mobile, allowing different surface realisations of the same underlying tonal specification. Complete changes can be produced by non-phonemic alterations to the pitch of syllables in certain environments (for example, between the beginnings of the word and the inflection point all syllables take low pitch).

Finally, some of the assigned pitch may be assigned to a point outside the word, appearing only when preceding or following inflection is added, thus reducing the apparent contrast on words in isolation. Unlike the syllable-tone and pitch-accent systems, affixing morphology may preserve its own tone in languages with a word-tone system, most languages either deleting the added accents or (as is often the case) applying various tone sandhi rules, such as in Kewa and Kairi. By necessity, a language analysed as having word-tone is at least partly polysyllabic, otherwise it would be indistinguishable from the syllable-tone type. As mentioned, if there is affixing morphology then it is likely that the tone of the morphemes will be subordinate to that of the stem, but there are also word-tone languages without a great deal of morphology, but with remapping that allows the scope of the tone to be observed.

Word-tone systems do not occur in one language in isolation, being restricted in many languages of the Lake Plains in Irian Jaya or the loss of tone in Vanimo.

Syllable-tone systems also appear to be the tone system most likely to spread to other, previously non-tonal, languages; Weri, a language of the otherwise toneless Kunimaipa family in South-Eastern Papua New Guinea, has, in all likelihood, acquired its tonality from contact with the neighboring Angan and nearby Chimbu language families, in which syllable-tone systems are the norm. The same appears to be the case in the north side of the highlands, where Biyom Brahman has assumed such characteristics, probably from association with the adjacent Chimbu languages. It appears that syllable-tone systems both require aren support, and foster the spread of such systems in their contact with other languages.

8.2. Word-tone systems

In Iau and Mixtec, in which there is morphology that consists solely of a tonal category that is compounded onto the tone of the stem. This is rather unusual for these languages, which tend to correlate with low degree of morphology, tending towards the isolating end of the spectrum (though this is not an absolute; the agglutinative Chimbu languages also appear to have syllable-tone systems). The generally short words often appear to result from syllable loss, evidenced when compared with either a related language or a proto-language. Accompanying the reduced number of syllables are restrictions on their phonotactic structure, and reductions in the segmental phoneme inventory (such as the loss of nasal in many languages of the Lake Plains in Irian Jaya or the loss of the velar series in Vanimo).

Syllable-tone systems also appear to be the tone system most likely to spread to other, previously non-tonal, languages; Weri, a language of the otherwise toneless Kunimaipa family in South-Eastern Papua New Guinea, has, in all likelihood, acquired its tonality from contact with the neighboring Angan and nearby Chimbu language families, in which syllable-tone systems are the norm. The same appears to be the case in the north side of the highlands, where Biyom Brahman has assumed such characteristics, probably from association with the adjacent Chimbu languages. It appears that syllable-tone systems both require aren support, and foster the spread of such systems in their contact with other languages.

8.2. Word-tone systems

The word-tone style of tonal system varies between systems that are on the surface very simple or, through a few systematically simple additions to the rules that specify tonal assignment, very complex. One of the most basic systems specifies a fixed "inflection point" in the word, and the tones are spread with that point as a fixed reference point. The first complication that can arise is that the inflection point becomes mobile, allowing different surface realisations of the same underlying tonal specification. Complete changes can be produced by non-phonemic alterations to the pitch of syllables in certain environments (for example, between the beginnings of the word and the inflection point all syllables take low pitch).

Finally, some of the assigned pitch may be assigned to a point outside the word, appearing only when preceding or following inflection is added, thus reducing the apparent contrast on words in isolation. Unlike the syllable-tone and pitch-accent systems, affixing morphology may preserve its own tone in languages with a word-tone system, most languages either deleting the added accents or (as is often the case) applying various tone sandhi rules, such as in Kewa and Kairi. By necessity, a language analysed as having word-tone is at least partly polysyllabic, otherwise it would be indistinguishable from the syllable-tone type. As mentioned, if there is affixing morphology then it is likely that the tone of the morphemes will be subordinate to that of the stem, but there are also word-tone languages without a great deal of morphology, but with remapping that allows the scope of the tone to be observed.

Word-tone systems do not occur in one language in isolation, being restricted in many languages of the Lake Plains in Irian Jaya or the loss of tone in Vanimo.

Syllable-tone systems also appear to be the tone system most likely to spread to other, previously non-tonal, languages; Weri, a language of the otherwise toneless Kunimaipa family in South-Eastern Papua New Guinea, has, in all likelihood, acquired its tonality from contact with the neighboring Angan and nearby Chimbu language families, in which syllable-tone systems are the norm. The same appears to be the case in the north side of the highlands, where Biyom Brahman has assumed such characteristics, probably from association with the adjacent Chimbu languages. It appears that syllable-tone systems both require aren support, and foster the spread of such systems in their contact with other languages.

8.2. Word-tone systems

The word-tone style of tonal system varies between systems that are on the surface very simple or, through a few systematically simple additions to the rules that specify tonal assignment, very complex. One of the most basic systems specifies a fixed "inflection point" in the word, and the tones are spread with that point as a fixed reference point. The first complication that can arise is that the inflection point becomes mobile, allowing different surface realisations of the same underlying tonal specification. Complete changes can be produced by non-phonemic alterations to the pitch of syllables in certain environments (for example, between the beginnings of the word and the inflection point all syllables take low pitch).

Finally, some of the assigned pitch may be assigned to a point outside the word, appearing only when preceding or following inflection is added, thus reducing the apparent contrast on words in isolation. Unlike the syllable-tone and pitch-accent systems, affixing morphology may preserve its own tone in languages with a word-tone system, most languages either deleting the added accents or (as is often the case) applying various tone sandhi rules, such as in Kewa and Kairi. By necessity, a language analysed as having word-tone is at least partly polysyllabic, otherwise it would be indistinguishable from the syllable-tone type. As mentioned, if there is affixing morphology then it is likely that the tone of the morphemes will be subordinate to that of the stem, but there are also word-tone languages without a great deal of morphology, but with remapping that allows the scope of the tone to be observed.

Word-tone systems do not occur in one language in isolation, being restricted in many languages of the Lake Plains in Irian Jaya or the loss of tone in Vanimo.

Syllable-tone systems also appear to be the tone system most likely to spread to other, previously non-tonal, languages; Weri, a language of the otherwise toneless Kunimaipa family in South-Eastern Papua New Guinea, has, in all likelihood, acquired its tonality from contact with the neighboring Angan and nearby Chimbu language families, in which syllable-tone systems are the norm. The same appears to be the case in the north side of the highlands, where Biyom Brahman has assumed such characteristics, probably from association with the adjacent Chimbu languages. It appears that syllable-tone systems both require aren support, and foster the spread of such systems in their contact with other languages.
These languages have not been reported from the New Guinea area, but the brevity of vocal descriptions would obscure the presence of these systems, if they are present.

The reverse is definitely not true (isolating structure implying tonality), as languages such as Kimmama (also called Kimaghama; Kolopom Island, South-West Irian Jaya) are highly isolating structures without any tonal system, making phonological differentiation by means of a large number of consonant and vowel phonemes, diphthongs, and contrastive nasalization.

References


Tone in New Guinea. Unpublished manuscript, Department of Linguistics, Australian National University.

Uza grammatical sketch. Unpublished manuscript, Australian National University.


Drukkerij St. Paul.


It is not often that linguistic journals devote a special issue to typology or language universals (some examples are Linguistics 21-1 (1983), Folia Linguistica 20-1/2 (1986), Lingua 74 (1988)). However, it is not only for the reason that this special issue of the Nordic Journal of Linguistics is noteworthy publication for typologists and other linguists. The collection presented by Koptjevskaja-Tamm contains valuable contributions to a wide variety of topics in the area of linguistic typology and I believe that in the whole, this collection would have made an interesting issue of Linguistic Typology.

In the first article, Typology versus mythocly: The case of the zero-predicate, Leon Stassen takes issue with the generally accepted hypothesis that he calls the DUMMY HYPOTHESIS) that the copula is a semantically empty element which only serves as a “hat-rack” to express certain grammatical functions (like aspect, tense, mood) in sentences with non-predications. If this hypothesis were true, he argues, we should not find copulas in contexts where these grammatical categories are absent or marked. Restricting himself to class membership predications (e.g., the verb class "be" transitive), Stassen shows that this is not the case, providing examples from different languages to prove his point. However, he does mention Hengeveld's (1992) study on non-verbal predications in which it is demonstrated that at least two other factors play a role in determining the presence or absence of a copula: whether or not the sentence contains a deictic element, and (avoiding) possible ambiguity. Stassen also shows that some languages use pronouns or particles (rather than free verbal copulas or affixes), whose primary function it is not to indicate that the predication contains a (certain type of) non-verbal

"Typology versus mythocly: The case of the zero-predicate."