On foot templates and root templates

René Kager

0. Introduction

Many languages impose prosodic restrictions on the shape of the (canonical) root\(^1\). For example, restrictions may hold with respect to maximal root length (e.g. four syllables) or the distribution of quantity (e.g. vowel length occurs in even-numbered syllables). The notion of *canonical root* will be defined by frequency, (ir)regularity, repair, etc. The central claim of this paper is that canonical roots are members of *template pools* (Kager 1994a). A template pool is the natural class of prosodic shape invariants that together characterize a morphological category. Template pools are defined in terms of metrical feet, complex templates being *maximally* two feet long. As an example consider the pool of Japanese loan abbreviations (Itô 1992). Maximal templates equal two bimoraic feet [H] or [LL], and each template begins with a foot

\[
\begin{array}{cccc}
(1) & \text{a Strict MinWd Ft} & \text{LL} & \text{H-L suto (raiki)} & \text{strike} \\
& \text{b Loose MinWd Ft+\sigma} & \text{H-L LL+L} & \text{dai ya (moNdo) \ 'diamond'} \\
& \text{c Compound Ft+Ft} & \text{H+H LL+H} & \text{baa teN (daa) \ 'bartender'} \\
& & \text{H+LL koN bini (eNsu) \ 'convenience store'} \\
& & \text{LL+H ea koN (dishonaa) \ 'airconditioner'} \\
& & \text{LL+LL asu para (gasu) \ 'asparagus'} \\
\end{array}
\]

Deviating from the parametric approach of Kager (1994a), I derive template pools from *foot alignment*. McCarthy and Prince (1993) obtain prosodic minimality from $\text{MCat}=\text{PrWd}$, i.e. both edges of a morphological category must coincide with edges of a PrWd, a category of at least foot size. Maximality can be obtained likewise by constraining the distribution of feet within MCat. We start with *Compound*, in which both feet stand at some edge (left, right) of MCat. This is stated in the *asymmetrical* alignment constraint $\text{ALIGN (Ft, Rt)}$ (2a). Sharpening demands on foot distribution, all feet may be required to stand at a designated edge of MCat. For example, when (2b) is undominated the root consists of a single foot at its left edge, plus an optional unfooted syllable (*Loose MinWd*). Finally when both (2b) and (2c) are undominated, the root contains a single foot standing at both of its edges (*Strict MinWd*):

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\(^1\) I wish to thank Harry van der Hulst and an anonymous reviewer for comments on this paper.
When these constraints are permuted with Parse (‘input material must reoccur in the output’), a typology arises.

(3)  

| Parse > Align (Ft, Rt) > Align-L (Ft, Rt) > Align-R (Ft, Rt) |
|---|---|---|
| No maximality of MCat observed. | Maximal MCat is a left-headed Cpd. | Maximal MCat is a left-headed Lmw. |
| Maximal MCat is a Smw. |

Note that Japanese loan abbreviations can be characterised by ranking (3b):

(4)

<table>
<thead>
<tr>
<th>/asuparagasu/</th>
<th>Align (Ft, Rt)</th>
<th>Parse</th>
<th>Align-L (Ft, Rt)</th>
<th>Align-R (Ft, Rt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>([a.su].[pa.ra])</td>
<td></td>
<td>gasu</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>([a.su].pa)</td>
<td></td>
<td>ragasu!</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>([a.su])</td>
<td></td>
<td>paragasu</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>([a.su].[pa.ra].ga)</td>
<td>*!</td>
<td>su</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>([a.su].[pa.ra].[ga.su])</td>
<td>*!</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

This approach expresses implications within template pools that were predicted by Kager (1994a). Vertical: If Cpd occurs in the pool of some MCat, then Lmw and Smw should occur as well. If Lmw occurs in a pool then Smw should occur as well. Horizontal: If Cpd (e.g. H+LL) occurs in a pool, then other Cpd (e.g. LL-LL) should occur as well. If Lmw (e.g. H-L) occurs in a pool, then other Lmws (e.g. LL-L) should occur as well. Asymmetrical: If left-headed templates (e.g. H-L) occur in a pool, then right-headed templates (e.g. *L-H) should not occur, and vice versa.

1. Prosodic constraints on root shapes

Below I will discuss canonical root shapes of five East Australian languages: Yidiŋ (Dixon 1977), Wargamay (Dixon 1981), Mbabaŋam (Dixon 1991), Gumbayŋgir (Eades 1979) and Uradhi (Crowley 1983). All are genetically related, and interesting
Foot Templates and Root Templates

Variations occur in root shapes and stress. I will show that canonical roots in all five languages form template pools of the maximal type ‘Compound’ in the typology of MCats in (3). I will also show that for each language, the foot required for its stress pattern mirrors the foot required for its root definition (grammars are prosodically coherent in the terminology of Dresher and Lahiri 1991). Also, extrametricality and catalexis, if required for stress, are mirrored in canonical root shape. Finally, the alignment of stress feet with PrWd edge is mirrored by L/R-headed root templates.

An important issue, which will not be fully resolved here, is that of the level at which constraints on canonical roots take effect. Often root-based constraints seem to be violated at the level of the word. For example, in Yidiŋ long vowels only occur in even-numbered root syllables, while within a word odd-numbered root syllables may be long by pre-suffixal lengthening, cf. ‘wuŋabaa-ji-ŋ’ (hunt:-ji-PRES). Similarly, the Uradhi root contains maximally one long vowel, but again word-level pre-suffixal lengthening may lead to two long root vowels, cf. ‘taaraa-namu’ (reef-GEN). Here a ‘domains’ approach might be contrasted with a ‘stratal’ approach. Under the former, constraints on roots are evaluated at word level in terms of root-prosody alignment constraints. It is significant that in both examples given above the ‘misbehaved’ long vowel stands at the edge of the root, where it could be analysed as bi-morphemic. Under the ‘stratal’ approach of Lexical Phonology, the lexicon is sub-divided into strata, including root, stem and word. In Optimality Theory each stratum may define its own ranking of constraints (McCarthy and Prince 1993a). Canonical root shapes are defined by a set of ranked constraints on the output of the earliest lexical stratum, before derivation nor affixation has taken place. Still, root-level constraints may be shared with other lexical levels. For example, Gumbayŋgir root-level constraints are active at word-level, where they both trigger and constrain a length shift.

A crucial property of all languages to be discussed below is that their roots may occur as stems or even words in isolation, where they mark the absolutive case. For all languages except Yidiŋ, the prosodic shape of the root in its word-level isolation form is highly similar to its canonical shape. Transparency of canonical root shapes at word level may be a factor enhancing the role of root-based constraints in these languages. (Conversely we would expect root constraints to be much less apparent in languages in which each root is obligatorily inflected by non-zero material.)

2. Yidiŋ

Below the distribution of 836 roots in Dixon’s (1977) vocabulary of Yidiŋ is given, per prosodic type, by descending frequency:
Note that Yidiŋ has no monosyllabic roots, L nor H. Furthermore, vowel length contrasts are restricted to *even-numbered* syllables of roots. (We will return to the absence of LHL below.) As Dixon (1977:86) observes, there is no theoretical reason why we should not have an odd-syllabled root ending in a long vowel, e.g. LLH, as this length would surface in inflected words with an even number of syllables, e.g. CvCvCv-"gu". (Below the relevance of syllable number will be clarified.) And no roots have length in the initial syllable (e.g. *HL, *HLL), since initial length never surfaces in even-numbered words. Finally, the only two LLLLL roots may well be morphologically complex (e.g. ‘jilibugabi’ (next day), cf. ‘jili’ (eye), ‘buga’ (night)).

Turning to (word-level) stress and length, we find an interesting correlation with canonical root shape. In odd-numbered words, long vowels only occur in even-numbered syllables. Actually, the penult of an odd-numbered word always contains a long vowel by Penultimate Lengthening (Dixon 1977:43). Such words have iambic feet [LH], [LL] throughout. Final vowels outside a foot are apocopated except when an illegal coda would result (6d) by Final Syllable Deletion (Dixon 1977:58).

Kirchner (1990) argues that Penultimate Lengthening is a compensatory effect that is triggered by Final Syllable Deletion, which is in its turn driven by the preference for all syllables to be parsed into disyllabic feet (Dixon 1977:41), i.e. PARSE-ό.

When the underlying form has no long vowels, and an even number of syllables, all feet in the word are balanced trochees [LL] (8a-d). When a long vowel occurs in an even-numbered syllable, feet are iambic throughout the word (8e-f). Finally, when the word contains a special suffix that induces length in the preceding syllable, long vowels occur in odd-numbered syllables, with trochaic feet [LL] or [HL] (8g-h):
We find that stress feet at word level are strictly disyllabic [LL], [LH], or [HL], excluding *[H]. Iambic [LL] occurs under pressure of prominence harmony only (Dixon 1977:41, McCarthy and Prince 1986). However, the unbalanced trochee [HL] never occurs in roots, its only source being pre-suffixal length. (If roots such as HL occurred at all, we would expect even-numbered forms with trochaic stress, cf. (8g-h)). Accordingly the root stratum strictly enforces the optimal feet [LL] and [LH], in a template pool Cpd-Left:

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\[
\begin{array}{ll}
(8) & \text{a } /\text{waril}/ \quad [\text{wa.\text{ril}}] \quad \text{`doorway-ABS'} \\
& \text{b } /\text{gudaga-ni}/ \quad [\text{g.\text{da}],[\text{g.\text{a}i}] \quad \text{`dog-GEN'} \\
& \text{c } /\text{wawal-nunda}/ \quad [\text{wa.\text{wal}],[\text{n\text{u}\text{n}da}] \quad \text{`see-DAT SUB'} \\
& \text{d } /\text{majinga-nal-nunda}/ \quad [\text{ma.\text{jin}],[\text{d\text{a} na}],[\text{n\text{u}nda}] \quad \text{`walk up-COM-DAT SUB'} \\
& \text{e } /\text{durguu}/ \quad [\text{dur.\text{g\text{uu}}} \quad \text{`mopoke owl-ABS'} \\
& \text{f } /\text{durguu-nu-la}/ \quad [\text{dur.\text{g\text{uu}}],[\text{n\text{u}la}] \quad \text{`mopoke owl-GEN-LOC'} \\
& \text{g } /\text{gali-nal-ji-\eta}/ \quad [\text{ga.li}],[\text{n\text{a} ji}] \quad \text{`go-COM-:ji-PRES'} \\
& \text{h } /\text{wu\text{naba-:ji-nunda}/} \quad [\text{wu.na}],[\text{ba.\text{ji}],[\text{n\text{u}nda}] \quad \text{`hunt-ji-COM-DAT SUB'}
\end{array}
\]

Note that the root level does not require exhaustive parsing of syllables by disyllabic feet, in contrast to the word level. We find that root structure is, one the one hand, more restrictive than word structure in disallowing [HL] feet, but on the other hand less restrictive, in allowing for Lmw.

Let us now turn to the puzzling absence of LHL roots. No trisyllabic roots occur whose second syllable length surfaces in even-numbered case forms. For example, given a trisyllabic LHL root */gudaagu/, we might expect a quadrisyllabic case form *[gu.daa],[ga.ni]. However, the only attested type of form is [gu.daa],[ga.ni]. Reduplication is another source of evidence for lack of LHL roots, since putative length is not copied along, cf. /waguja/ [wang\text{uu}\text{a}] `man-ABS’, [wag\text{u}=wag\text{uu}\text{a}] *[wagu\text{u}=wag\text{uu}\text{a}] `lots of men-ABS’ (Dixon 1977:69). The absence of LHL roots may be due to the fact that the effect of Penultimate Lengthening is abstracted away from the underlying root.
Consider the distribution of 917 roots in the Wargamay vocabulary (Dixon 1981):

\[
\begin{array}{|l|l|l|}
\hline
\text{Type} & \text{Number} & \text{Example} \\
\hline
\text{LL} & 489 & \text{bada 'dog', gawal 'call'} \\
\text{LLL} & 268 & \text{gagara 'cane dilly-bag', girawan 'scrub hen'} \\
\text{LLLL} & 69 & \text{gayambula 'white cockatoo', jiubina 'falling star'} \\
\text{HL} & 58 & \text{wiigi 'no good', muugil 'freshwater black bream'} \\
\text{HLL} & 17 & \text{giibara 'fig tree', giirigin (proper name)} \\
\text{H} & 15 & \text{yaa 'top of a tree', jiin 'eyebrow'} \\
\text{LLLLL} & 1 & \text{burayjiubara (proper name)} \\
\hline
\end{array}
\]

The picture is much different from Yidi-. First, a fair number of monosyllabic roots occur. Significantly, all are heavy syllables, pointing to a bimoraic minimum, e.g. Root = PrWd. Second, vowel length is contrastive in the first root syllable only. Third, no quadrisyllabic HLLL occurs next to LLLL, but rather HLL next to LLLL. Again this points to the bimoraic foot [H], [LL], maximal root length equalling two feet. As in Yidji, the rarity of LLLL shows that it must be non-canonical.

Stress in Wargamay falls on a heavy syllable (11a-c), and in words that have no heavy syllables, on the initial syllable in even-numbered words (11d, f) and on the second syllable in odd-numbered words (11e, g), which is slightly lengthened. Secondary stress goes on the penult, but no clash is allowed:

\[
\begin{align*}
\text{a) yâa} & \quad \text{‘top of tree’} \\
\text{b) múuba} & \quad \text{‘stone fish’} \\
\text{c) giibara} & \quad \text{‘fig tree’} \\
\text{d) bâda} & \quad \text{‘dog’} \\
\text{e) gagâ’ra} & \quad \text{‘dilly bag’} \\
\text{f) gidawulu} & \quad \text{‘freshwater jewfish’} \\
\text{g) jutâ’gay-miri} & \quad \text{‘Niagara Vale - FROM’}
\end{align*}
\]

Arguably, the stress foot is bimoraic [H] or [LL]. Iambic [LL] occurs to avoid lapse (cf. Kirchner 1990 on Yidi). The slight lengthening of non-initial stressed vowels may be a weak form of iambic lengthening. The mixed trochaic/iambic pattern is highly reminiscent of Yidi, where it is also quantitatively supported by Penultimate Lengthening. In section 5, we will see another instance of the effect in Gumbayngir, i.e. a length shift. The Wargamay template pool is \textit{Cpd-Left}: 
FOOT TEMPLATES AND ROOT TEMPLATES

Note that the compound root ([gii].[ba.ɾa]) does not display the secondary stress on the penult that its templatic analysis would predict. This discrepancy between the root and word structure may be due to an undominated word-level constraint ruling out clash, *[gii].[ba.ɾa], or final stress, *[gii].[ba.ɾa] (Dixon 1983:20). We must then conclude that prosodic conditions on canonical roots may function as ‘analytic’ only, i.e. ‘the root can be analysed as a Cpd’, not: ‘the root has two stress feet’.

Two residual issues should be addressed. First, why don’t we find ([H]+[H]) and ([LL]+[H]) compound templates? A tentative answer may be provided by conflicting undominated word-level constraints governing main stress: (i) the leftmost foot must be main-stressed, while (ii) heavy syllables must be main-stressed. Assuming these two constraints to dominate PARSE at word-level, we need not complicate the set of root structure constraints. Second, low frequency of Lmw ([H]) roots as compared to Lmw ([LL]) roots might reflect a cross-linguistic tendency of minimal disyllabicity. It is found in Japanese loan abbreviations (and in morphological categories of many more languages, see Kager 1994b).

4. Mbabar’am

Next consider the distribution of 332 roots in Mbabar’am vocabulary (Dixon 1991):

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>LL</td>
<td>169</td>
<td>muga ‘aunt’, wuɾgun ‘young boy’</td>
</tr>
<tr>
<td>L</td>
<td>94</td>
<td>mba ‘belly’, bib ‘breast’</td>
</tr>
<tr>
<td>LLL</td>
<td>30</td>
<td>agaɾu ‘to scratch’, yaraman ‘horse’</td>
</tr>
<tr>
<td>H</td>
<td>19</td>
<td>bi ‘ear’, wiɾ ‘head hear’</td>
</tr>
<tr>
<td>LH</td>
<td>17</td>
<td>abu ‘ground’, nambuɾ ‘big brown snake’</td>
</tr>
<tr>
<td>HL</td>
<td>2</td>
<td>nɔɔmbi ‘big red wallaroo’, ɲɔɔlmbu ‘small’</td>
</tr>
<tr>
<td>LLLL</td>
<td>1</td>
<td>ɲaɾabulgan ‘Mount Mulligan’ (loan)</td>
</tr>
</tbody>
</table>

On the whole, Mbabar’am roots are much shorter than Yidp or Wargamay roots. Monomoraic (‘sub-minimal’) roots L are not only allowed, but quite numerous. Also roots exceeding three syllables are rare. Vowel length contrasts are almost restricted to monosyllables and to the second syllable of disyllabic roots (i.e. *LHL).

Shortness of the canonical root is closely related to the stress pattern through the notion of catalexis, as I will now show. Mbabar’am stress is complex and lexically variable. Heavy syllables are always stressed (14a-b). An initial /a/ never bears main stress, which usually falls on the second syllable (14b-d). Disyllabic full-vowel roots
are stressed on either the second syllable (14e-f), or the initial syllable (14 g-h). Most trisyllabic full-vowel roots are stressed on the second syllable (14i-j), some on the final syllable with an initial secondary stress (14k-l):

(14) a nambúúț (snake)  g búmba ‘ashes’
b abúu ‘ground’  h láŋgil ‘light’
c abáț ‘sister’  i đambára ‘nulla nulla’
d aráman ‘woomera’  j malgájir ‘very big’
e jibú ‘no good’  k gúrídl ‘eaglehawk’
f mijál ‘lip’  l gúludún ‘dove’

Accordingly, the stress foot is the *moraic trochee*, with optional *mora catalexis*. Catalexis is a segmentally empty mora at the right edge of the root (Kiparsky 1991, Kager 1995), making a final light syllable count as heavy (hence ‘L’). The foot is right-aligned in the root. The root template pool is *Cpd-Right* modulo μ catalexis.

(15) a Smw 94 ([L’])  mbá
12 ([LL])  búmba
19 ([H])  bii
b Lmw 152 (L-[L’])  jibú 93 of which (a-[L’])(e.g. abáț)
23 (L-[LL])  yuwałíg 10 of which (a-[LL])(e.g. aráman)
17 (L-[H])  muṟáal 10 of which (a-[H])(e.g. abúu)
c Cpd 5 ([LL]-[L’])  gúludún
1 ([LL]-[LL])  žarábúlgan

We are now able to state the distribution of initial /a/: its syllable must occupy the ‘adjunct’ (pre-head) position in Lmw. Under this analysis, only four roots resist a ‘canonical’ analysis. They are: ‘àçungúł’ (kite hawk) (which has initial /a/ in non-adjunct position); ‘nɔmbí’ (big red wallaroo) and ‘nɔmbú’ (small), both of which have the left-headed Lmw structure [H]+L; and ‘mbaba|;am’ (language name), which also has a left-headed Lmw structure [LL]+L.

Furthermore, attested roots have gaps as compared to predictions of the template pool. Absence of noncatalectic Cpd ([LL]+([H])) must be an accidental gap. The fact that no Cpds have a heavy initial foot (e.g. ([H]+([L’])), ([H]+([LL])), ([H]+([H])), may well be due to clash avoidance. 
5. Gumbayngir

The distribution of 473 roots in the Gumbayngir vocabulary (Eades 1979) is given below:

(16) Type | Number | Example
--- | --- | ---
HL | 126 | miimi ‘mother’, jaawan ‘pheasant’, yiila ‘to cook’
LL | 108 | baga ‘knee’, badaj ‘rat, mouse’, bira ‘to dig’
LH | 80 | duluu ‘ankle’, babaar ‘club’, bagii ‘to burn’
LLL | 71 | bulari ‘two’, balawir ‘flying fox’, bagulwa ‘to slay’
LHL | 36 | guluura ‘bone’, nguluuŋgir ‘clever man’, baguuli ‘to lie down’
H | 20 | ûum ‘smoke’, ñaa ‘to see’ (irregular)

We first observe that the minimal root is bimoraic. (The exception ‘bu(m)’ (to hit) always surfaces as a bimoraic stem by an augment, e.g. imperative ‘bum-a’.) Second, no adjacent heavy syllables occur (e.g. *HH, *HHL). Third, vowel length does not occur outside the first two root syllables, (e.g. *LLH, *LLHL, *HLHL). Fourth, a closer look at roots of the shapes LLLL, HLL, and LHLL reveals that almost all are verbs. One of the two nominal HLL roots (‘gaagun-ga’ (fig tree)) has the ‘tree suffix’ ‘-ga’, which also occurs in three out of six LLLL nominal roots (‘balawun-ga’ (ti-tree), ‘barigir-ga’ (ironbark tree), ‘gayabar-ga’ (boxtree)), and the single nominal LHLL root (‘wuruuŋaga’ (salt water oak tree), buraabadi ‘to return’).

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The question then is: can all canonical root shapes of (16) be captured by a single root formula? Let us first look into the stress pattern. Stress falls on a heavy syllable (17a-d). When there are no heavy syllables, stress is initial and optionally on the second syllable of words longer than two syllables (17e-f):
That is, the stress foot is minimally bimoraic and maximally disyllabic, with vowel length aligning with right edge of foot: the ‘uneven iamb’ [H], [LH], [LL]. The actual choice between trochaic [LL] and iambic [LL] depends on rhythm. That is, default prominence in [LL] feet is trochaic, but \( \text{lapse avoidance} \) in trisyllabic words causes optional second syllable stress, with [LL]. We then arrive at a template pool \( \text{Cpd-Left} \) for verbal roots, and \( \text{Lmw-Left} \) for nominal roots:

\[
\begin{align*}
\text{(18) a } & \text{ Smw } & \text{ (N, V) } & \text{ ([H]) } & \text{ ([LL]) } & \text{ ([LH]) } \\
& \text{ ([uum])} & \text{ ([na.mi])} & \text{ ([ba.gii]}) \\
\text{ b Lmw } & \text{ (N, V) } & \text{ ([H]-L) } & \text{ ([LL]-L) } & \text{ ([LH]-L) } \\
& \text{ ([miim].mi) } & \text{ ([ba.gul].wa}) & \text{ ([na.luu].gir] } \\
\text{ c Cpd } & \text{ (V) } & \text{ ([H]-[LL]) } & \text{ ([LL]-[LL]) } & \text{ ([LH]-[LL]) } \\
& \text{ ([naa].[gi.li])} & \text{ ([bi.la].[ga.ra])} & \text{ ([bu.raa].[ba.dii])} \\
\end{align*}
\]

As Wargamay, Gumbayngir has a number of unattested compound templates:

\[
\begin{align*}
\text{(19) a } & \text{ *[([H]-[H])} & \text{ c } \text{ *[([LL]-[H])} & \text{ e } \text{ *[([LH]-[H])} \\
& \text{ ([H])} & \text{ ([LH])} & \text{ ([LL])} \\
\text{ b *[([H]-L])} & \text{ d } \text{ *[([LL]-[LH])} & \text{ f } \text{ *[([LH]-[LH])} \\
& \text{ ([H]-L) } & \text{ ([LL]-[LL]) } & \text{ ([LH]-[LL]) } \\
\end{align*}
\]

Absence of these root shapes can be explained as in Wargamay. No vowel length occurs outside the first two syllables because of converging stress requirements that both outrank Parse, i.e. (a) a constraint that heavy syllables must be main-stressed, and (b), a constraint that the initial foot must be main-stressed.

The interest of Gumbayngir resides in the fact that HLL is avoided in ‘derived’ nouns. If an inflectional suffix is added to a (vowel-final) HL nominal root, vowel length obligatorily shifts from the first to the second syllable.

\[
\begin{align*}
\text{(20) } & \text{ Base Inflected form} \\
& \text{ a waanji } \text{ waanji-gu} & \text{ ‘dog-DAT’ } & \text{ (*waanji-gu) } \\
& \text{ guuru } \text{ guuru-la} & \text{ ‘black-LOC’ } & \text{ (*guuru-la) } \\
\text{ b niigar } \text{ niigar-gu} & \text{ ‘man-DAT’ } & \text{ (*niigar-gu) } \\
\end{align*}
\]

This length shift achieves three prosodic goals. First, the derived form is made to conform to canonical noun format, which extends to word level. Recall that Lmw ([LH]-L) is allowed in nominal roots, but Cpd ([H]-[LL]) is not. Here length shift
is a word-level strategy to extend the scope of canonical root shape. Simultaneously, the right edge of the root is aligned with the right edge of a foot, cf. \([\text{wa}ŋ\text{jii}]-\text{gu}) > *[\text{wa}ŋ\text{jii}]-\text{gu}].\) Third, length shift avoids lapse, clash, and final stress in the same way as we saw earlier in Yidiŋ and Wargamay, cf. *[\text{wa}ŋ\text{jii}]-\text{gu}, *[\text{wa}ŋ\text{jii}]-\text{gu}, *[\text{wa}ŋ\text{jii}]-\text{gu}].\) Relevance of lapse avoidance is shown by optional lengthening, in the same morphological context, of the vowel in the second syllable of an LL base, e.g. \(/\text{nami}/, ‘\text{nami}’-\text{nar}’ ∼ ‘\text{nami}’-\text{nar}’ (woman-ABL).

6. Uradhi

Consider the distribution of 1090 roots in Uradhi vocabulary (Crowley 1983). For roots with long vowels, root statistics are split into three dialects: Atampaya (At), Angkamuthi (An), Yadhaykenu (Y) (some roots are identical for 2/3 dialects):

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>LL</td>
<td>413</td>
<td>ama ‘man, person’, iku ‘short-nose bandicoot’</td>
</tr>
<tr>
<td>LLL</td>
<td>380</td>
<td>iŋtinu ‘story-place of brown snake’, [uŋu] ‘cigarette’</td>
</tr>
<tr>
<td>LLLL</td>
<td>129</td>
<td>umuŋu ‘nose’, ukumala ‘sweet potato’</td>
</tr>
<tr>
<td>LLLLL</td>
<td>26</td>
<td>ayparumpiwa ‘sparrowhawk’, uṭalaḷa ‘sick’</td>
</tr>
<tr>
<td>L</td>
<td>7</td>
<td>wa ‘to cook, burn’, ma ‘to pick up’ (all irregular)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>At</th>
<th>An</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>LHL</td>
<td>58</td>
<td>28</td>
<td>22</td>
</tr>
<tr>
<td>LH</td>
<td>43</td>
<td>-</td>
<td>36</td>
</tr>
<tr>
<td>HL</td>
<td>20</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>LH</td>
<td>5</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>LHLL</td>
<td>5</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>HLL</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>LLHL</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

First, note that no monosyllabic roots occur except for 7 L roots (4 irregular verb roots, 3 particles). Monosyllabic H roots are unattested. Therefore minimal size of the canonical roots is disyllabic. Second, we find a large number of long roots, most notably LLLLL (which seems to exceed Cpd). Third, roots with vowel length on the antepenult (i.e. HLL, LHLL) are rare and occur in the Angkamuthi and Yadhaykenu dialects only. Most are probably morphologically complex, e.g. ‘wuulaða’ (father’s father), cf. ‘wuula(n)’ with identical meaning. Fourth, vowel length in the final root syllable occurs in the Atampaya and Angkamuthi dialects only.
Let us now consider the stress pattern. In words with light syllables only, stress is antepenultimate. In words that have a long vowel, this is stressed. That is, the stress foot is a trochee \([H], [LL], [HL]\) with final light syllables extrametrical.

\[(23)\]

\begin{align*}
\text{a} & \quad [\text{á.má}] & \text{‘person’} \\
\text{b} & \quad [\text{yú.yu}.\{\beta\a}] & \text{‘cigarette’} \\
\text{c} & \quad u.[\text{kú.ma}.\{\la}] & \text{‘sweet potato’} \\
\text{d} & \quad ay.pa.[\text{rúm.pi}.\{\wa}] & \text{‘sparrowhawk’} \\
\text{e} & \quad a.[\text{ðáa}] & \text{‘hole’} \\
\text{f} & \quad a.[\text{máa}.\{\ka}] & \text{‘message stick’} \\
\text{g} & \quad [\text{aa.ni}.\{\ma}] & \text{‘to do’} \\
\text{h} & \quad al.[\text{ýúu.ma}.\{\la}] & \text{‘child’}
\end{align*}

Accordingly, the template pool is Cpd-Right, modulo \(\sigma_u\) extrametricality. There are two restrictions. The minimal root is disyllabic. Moreover, no long vowels may appear in the non-head foot (of a Cpd template).

\[(24)\]

\begin{align*}
\text{a} & \quad \text{Smw} & \quad ([H]) & \quad ([LL]) & \quad ([HL]) \\
& & \quad (*Min 2 \sigma) & \quad ([\á.má]) & \quad (*E.m. parse) \\
\text{b} & \quad \text{Lmw} & \quad (L-[H]) & \quad (L-[LL]) & \quad (L-[HL]) \\
& & \quad (a.[\text{ðáa}]) & \quad (*E.m. parse) & \quad (*E.m. parse) \\
\text{c} & \quad \text{Cpd} & \quad ([LL]-[H]) & \quad ([LL]-[LL]) & \quad ([LL]-[HL]) \\
& & \quad ([a.ðú], [\text{ðáa}]) & \quad (*E.m. parse) & \quad (*E.m. parse)
\end{align*}

\[(25)\] Extrametrical analysis:

\begin{align*}
\text{a} & \quad \text{Smw} & \quad ([H]) & \quad ([LL]) & \quad ([HL]) & \quad ([LL]) & \quad ([HL]) \\
& & \quad ([máa], [ru]) & \quad ([tú.yu], [\beta\a]) & \quad ([fá.a.ni], [\ma]) \\
\text{e} & \quad \text{Lmw} & \quad (L-[H]) & \quad (L-[LL]) & \quad (L-[HL]) & \quad (L-[HL]) & \quad (L-[HL]) \\
& & \quad (a.[máa], [ka]) & \quad (u.[kú.ma], [\la]) & \quad (a.[gúu.ma], [\la]) \\
\text{f} & \quad \text{Cpd} & \quad ([LL]-[H]) & \quad ([LL]-[LL]) & \quad ([LL]-[HL]) & \quad ([LL]-[HL]) & \quad ([LL]-[HL]) \\
& & \quad ([yu.ku], [tii], [na]) & \quad ([fay.pa], [rúm.pi], [wa]) & \quad (accidental gap?)
\end{align*}

As in Wargamay, minimal discrepancies arise between the templatic analysis of Cpd roots and their reported stress pattern, which is apparently single-stressed.

We may account for the fact that root-final syllables cannot contain long vowels in the Yadhaykenu dialect by means of general root-final extrametricality (while in the other dialects only light syllables are extrametrical).

Note that the root templates HLL and LHL, which are based on the unbalanced trochee [HL], are in fact marginal. This observation matches the universal tendency
to avoid unbalanced trochees, cf. Hayes (1995). (The Atampaya dialect excludes all unbalanced feet: it has no HLL nor LHLL roots at all.) Interestingly Uradhi enforces this restriction at the root level rather than at the word level. This can be concluded from two pre-lengthening suffixes (genitive ‘-:namu’, reciprocal ‘-:nißa’), which derive words ending in HLL, a sequence rarely found in roots. For example, the genitive of the HL root ‘taara’ (reef) is ‘tâarânamu’, a double-stressed HHLL sequence with two long vowels in adjacent syllables. This output is deviates from root-level prosody in another way as well, since no Uradhi root contains adjacent long-vowelled syllables.

7. Conclusions

We have found that for all languages discussed, canonical root shapes (maximal size and position of length) can be captured by template pools. And for all languages, the foot required in root shape agrees with the stress foot. Prosodic coherence was even enhanced by correspondence (in root shape and stress pattern) of extrametricality (Uradhi) and catalexis (Mbabaram). However, there appears to be no full isomorphy between stress feet and ‘templatic’ feet in some languages (Wargamay, Uradhi) in which the template pool functions as ‘analytic’ only.

References


\(^{2}\) However, Van der Hulst and Klamer (1995) argue that the unbalanced trochee governs root structure in Kambera, an Austronesian language.


