The prosodic colon in stress, tone and prosodic templates: evidence from Iquito and elsewhere
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0. Talk outline

- Aims:
  - To re-consider the prosodic constituent colon κ in phonology and show that various languages and phenomena support its existence
  - To provide more detailed evidence from Iquito, where use of the colon is fundamental for the understanding of stress assignment
  - To argue that the colon fares better than its alternatives and that its integration in the prosodic hierarchy is compatible with recent ideas, e.g. emergent prosodic hierarchies on a language-specific basis (Schiering et al. 2010)

1. The Colon κ: what (is it) and where (is it found)?

- (Prosodic) colon κ = (F)(F)
  - Note that Golston (1998) uses the term colon in poetry to indicate a half-line. What corresponds to a colon in the present conception is instead called there a Verse Foot (VF)
  - Only marginally considered in past literature primarily with respect to (i) stress
    - in Hungarian primary and secondary stress are associated with heads of cola unlike tertiary stress (Hammond 1987)
    - in Munster Irish, East Mayo Irish and Manx stress distribution is regulated by cola (Green 1997)
  - But there is evidence for κ beyond stress!

(ii) Root/word-size restrictions

- Benue-Congo languages, e.g. Kakanda, Ebira, Idoma and Yoruba (Ola 1995) set a maximal dipodic size for roots
  - in Yoruba the maximum also applies to diminutives, clefted nouns and prefixes
- Bella Coola (Bagemihl 1998; Topintzi 2010): quadrimoraic root maximum
- Japanese hypocoristics of long names with suffix –tyan: have 2 templates: (a) 2μ, (b) 4μ (Poser 1990: 88)
  - gisaburo > gii-tyan or gisaburo-tyan
  - kenzaburoo > ken-tyan or kenzabu-tyan
• Japanese secret language in entertainment industry: two-foot template accompanied by shortening or lengthening depending on target’s size (Poser 1990: 95-96)

\[
\text{man}e\text{ge}yyaa > (zya)(\text{mane}) \quad \text{‘manager’ with shortening}
\]
\[
\text{mesi} > (\text{si})(\text{mee}) \quad \text{‘meal’ with lengthening}
\]

(iii) tone

• Kuria (Marlo et al. 2013) or Matumbi (Odden 2011): assign a H-tone on the 4th mora

(1) Matumbi H-tone (Odden 2011: 484)

<table>
<thead>
<tr>
<th>'you should V'</th>
<th>'you should go V'</th>
</tr>
</thead>
<tbody>
<tr>
<td>ubóé</td>
<td>ukalóbé</td>
</tr>
<tr>
<td>upakitíke</td>
<td>ukapakátike</td>
</tr>
<tr>
<td>ukatjabaníke</td>
<td>ukakatjabaníke</td>
</tr>
<tr>
<td>utfangáále</td>
<td>ukutfangáále</td>
</tr>
<tr>
<td>upapákije</td>
<td>ukapapáákije</td>
</tr>
<tr>
<td>ulaambáte</td>
<td>ukalaámbate</td>
</tr>
<tr>
<td>ukeenggéembe</td>
<td>ukakeénggéembe</td>
</tr>
</tbody>
</table>

2. \(k\) in Iquito

2.1. The facts

• Iquito (Zaparoan; Peru) is low-density tonal language that also displays stress (Michael 2011)
• Tone contrast with stress remaining constant
  [máʃiku] ‘raft’ vs. [maʃíku] ‘bird species’
• Notation used: ‘\(\text{\texttext{'}}\) = primary stress, , = secondary stress, \(\text{\texttext{'}}\) = H tone, H = heavy \(\sigma\), L = \(\sigma\)
• Note: tone is only indicated if relevant to the discussion, otherwise omitted
• Evidence for the colon within Iquito
  o as a target prosodic word size
  o as the domain in which lexical and metrical tone are incompatible

The stress facts

• Forms R-L bimoraic trochees, i.e. (H) or (LL). Rightmost stress is primary.

2. Bimoraic feet and NOT bisyllabic feet

a. L(LL)(H) nu(taku)('rii) *(LL)(LH) *(nuta)(kurii) ‘s/he stood up’

b. (H)(H) (isi)(pii) *(HH) *(iipii) ‘Red Howler Monkey’

• Normally degenerate (L) feet are not admitted (3) ....

3. Preference for binary feet

a. (LL) (‘afí) ‘bird sp. (Chloroceryle amazon)’

b. (LL)‘(LL) (kuma)(kiha) ‘suri (edible beetle grub)’
c. L(LL)(LL) nu(taki)(‘naka) ‘his owls’
k(i(tani)(‘kura) ‘I wove (a few days ago)’

d. (LL)(LL)(LL) (‘kana)(nahu)(‘kura) ‘we (excl.) wrote (a few days ago)’
(‘nu(ni)(ki(‘kiki) ‘s/he trembled’

\rightarrow e. L(LL)(LL)(LL) nu(niki)(ki(‘kura) ‘s/he trembled (a few days ago)’
ka(nami)(‘kiki)(‘kura) ‘we (excl.) returned (a few days ago)’

• ... BUT not always

4 Degenerate feet exceptionally admitted
a. (L)(LL) (‘sa)(‘taki) ‘laugh-IMP’
(‘ni)(‘yiti) ‘male child’
(‘ka)(‘hafj ‘hair’

b. (L)(H) (‘ma)(‘huu) ‘tree sp. (Rheedia sp.)

c. (L)(HL) (‘mi)(‘tiiha) ‘turtle sp. (Podocnemis unifilis)’

• Condition for admitting a degenerate foot
  o “a single light σ at the left edge of the word is parsed into a degenerate foot in precisely
    those cases in which doing so results in a dipodic prosodic word” (Michael 2011: 6)

• Degenerate feet are never admitted at the right edge of the word

5 Ban on degenerate feet at the R side
* (L)(L), *(H)(L)

• In fact, ternary feet are exceptionally permitted over binary ones, if that leads to degenerate
  foot avoidance at the right side

6 Ternary foot preferred over degenerate at the R edge
a. (‘HL) and not *(H)(L) (‘saa.pi) ‘stingray’
(‘mi(‘si) ‘plant sp. (Mansoa alliacea)’

b. (L)(HL) and not *(L)(H)(L) (‘mi)(‘tiiha) ‘turtle sp. (Podocnemis unifilis)’

• The latter point about ternarity, however, may not be so. A parsing like [(‘H)L] or [(L)(H)L] is
  also compatible with facts. I will thus consider that for the relevant forms, either parsing is
correct

The tone (T) facts

• Every Iquito word has to have at least one tone, thus, in the absence of lexical Ti, a metrical TM
  gets to be inserted on the head of primary stress

7 Metrical T realized on head of primary stress
a. (pi)(‘ru(su) ‘electric eel’
b. (piru)(‘s(u)ka) ‘electric eels’

• Metrical and lexical Ts cannot co-exist within the same colon. Only the lexical T survives

8 Ban on Ti and Tm within the same colon
(‘ki,pi)(‘rusu) *(ki,pi)(‘ru(su) ‘my electric eel’ /kiH- /

• Metrical and lexical Ts can co-exist across cola
Admission of TL and TM across cola

a. *ki('piru)'sú,ka) 'my electric eels'
b. *ki('piru)',suka)'há,ta) 'with my electric eels'

- While most morphemes lack TL and those that do, typically have only one, lexical tones are always preserved within and across cola

(Multiple) lexical tones always preserved

{(kí-ńá),{huu}-(tiś)}, 'I made someone write'

Summary of tonal facts and cola

<table>
<thead>
<tr>
<th>Within κ</th>
<th>Across κ</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL</td>
<td>TL [TM</td>
</tr>
<tr>
<td>TM</td>
<td>TL ] TL</td>
</tr>
<tr>
<td>* TL</td>
<td>* TL [TM (Michael, p.c)</td>
</tr>
</tbody>
</table>

2.2. An HS analysis of the stress data

- The analysis proposed implements Harmonic Serialism (McCarthy 2008a, b; 2010). Topintzi (to appear) argues for this account over other possibilities that implement Classic Parallel OT
  - HS is a serial version of OT with multiple iterations
  - Single constraint ranking throughout (in contrast to e.g. Stratal OT)
  - No single /input/ → [output] mapping, but multiple sequential mappings called iterations
  - More constrained GEN: apart from the faithful candidate, the remaining candidates may only exhibit a single change per iteration compared to the input (gradualness)
    - e.g. for /lab/ > [labi] or [lap] are possible, but not [lapi] (unlike classic OT)
  - The repeated procedure is completed with convergence when an output is the same as the most recent input
- For the stress particulars, I largely assume the HS stress account of Pruitt (2010), dubbed IFO (Iterative Foot Optimization), key components of which are that:
  - GEN only produces maximally disyllabic feet and creates metrical structure that cannot be altered or removed (STRICT INHERITANCE) → *(LLL)
  - FtBin is defined as: Feet are binary at some level of analysis (μ, σ), i.e. feet are minimally bimoraic and maximally disyllabic

- I propose the constraint: HAVE-K, i.e. each word must contain a colon (satisfied if there is minimally a colon within the word)
- I show that this constraint, assisted by gradualness, proves fundamental in the analysis of Iquito

1st Iteration: /LL/ → (LL)

<table>
<thead>
<tr>
<th>/LL/</th>
<th>HAVE-K</th>
<th>ALL-FY-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td># a. (LL)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. L(LL)</td>
<td>*</td>
<td></td>
<td>*!</td>
</tr>
<tr>
<td>c. (LL)</td>
<td>*</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

Convergence on 2nd Iteration, i.e. (LL) → [(LL)]
• Crucial note: in ParOT, a candidate like (L)(L) would be viable and in fact it would win!! In HS, such candidate would violate gradualness

1st Iteration: /LLL/ → L(LL)

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. LL(L)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. L(LL)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. (LL)L</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>d. (L)LL</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2nd Iteration: /L(LL)/ → (L)(LL)

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L(LL)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (L)(LL)</td>
<td>*</td>
<td></td>
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</tr>
</tbody>
</table>

Convergence on 3rd Iteration

1st Iteration: /LH/ → L(H)

I assume that there’s a constraint banning *(HL) trochaic feet, but its exact location is unclear, cf. Pruitt (2010) for something similar with BALTROCHEE banning (HL) trochees.

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>*(HL)</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (LH)</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (L)H</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. L(H)</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2nd Iteration: /L(H)/ → (L)(H)

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>*(HL)</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L(H)</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (L)(H)</td>
<td>*</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Convergence on 3rd Iteration

1st Iteration: /LLLLL/ → [LLL(LL)]

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td># a. LLLL(L)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. LLLLL(L)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. (L)LLLL</td>
<td>*</td>
<td>***!</td>
<td></td>
</tr>
<tr>
<td>d. (L)LLLL</td>
<td>*</td>
<td>****!</td>
<td></td>
</tr>
</tbody>
</table>

2nd Iteration: /LLL(LL)/ → [L,(L)(LL)]

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. LLLL(L)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. L,(L)(LL)</td>
<td>**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3rd Iteration: /L,(L)(LL)/ → [L,(L)(LL)]

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L,(L)(LL)</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (L),(L)(LL)</td>
<td>****!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Convergence on 4th Iteration

1st Iteration: /HL/ → (HL)

note that this generates the foot *(HL) that Pruitt excludes, hence *(HL) must be low-ranked.

<table>
<thead>
<tr>
<th></th>
<th>HAVE-k</th>
<th>All-Ft-R</th>
<th>FtBin</th>
</tr>
</thead>
</table>
3. The Colon $\kappa$: implications and alternatives

What does introduction of $\kappa$ mean for the prosodic hierarchy?

(16) Commonly accepted prosodic hierarchy with the addition of $\kappa$

Intonational Phrase ($\iota$)
Phonological Phrase ($\varphi$)
Prosodic Word ($\omega$)
Foot ($\pi$)
Syllable ($\sigma$)
Mora ($\mu$)

- Possible objection: addition of $\kappa$ burdens the prosodic hierarchy unnecessarily, since there are many languages that present no argument for its use whatsoever
- But, this problem is not inherent to $\kappa$.
  - Vietnamese (Schiering et al. 2010) only uses $\sigma$ & $\varphi$ as domains for phonological processes, but not $\omega$ & $\pi$ (both well-accepted and well-argued-for categories)
- Does that mean that we should discard with $\omega$ & $\pi$?
  - Perhaps YES in reference to Vietnamese
  - But NO as possible prosodic constituents in general
- Schiering et al. (2010) solution: prosodic categories (their argument is for the pros.word, but it presumably extends to the others too) are language particular; prosodic structure should be constructed based on the individual processes at work in the language, instead of imposing a limited number of domain types defined a priori (2010: 705)
- A weaker alternative (Hyman 2011): prosodic categories are universal, but might be exploited to different degrees across languages, cf. Gokana which relies on moras and syllables play at a best cursory role
- Both proposals are in line with the Iquito facts and the evidence for $\kappa$
- Iquito’s emergent prosodic hierarchy *must* include $\kappa$ next to other levels ($\pi$, $\sigma$, $\mu$), but this does not imply that other languages utilize $\kappa$ unless there is positive evidence in favour of it

Do we really need the colon?

- Most plausible alternative: reference to two feet
- PROs:
  - works for some cases, e.g. Poser (1990) uses it for some of the prosodic templates in Japanese
• requires no new constituent and keeps in line with counting up to two (or three, cf. trimoraic syllables)

• CONs:
  o may fail for some cases, unless modification applies → thus enriches the theory too
  o may fail completely for other cases

• CLAIM: The colon fares better!

(I) Empirical evidence

• Reconsider Matumbi (cf. (1))
  ‘you should V’       ‘you should go V’
  upakatike           ukapakátike          ‘shake down’
  ufjangáale         ukaťfjangáale       ‘wonder’
  ulaambáte           ukalaámbate          ‘lick’

• Under the two-foot approach
  o H attracted to R edge of rightmost foot → works only if there are maximally two feet
  OR
  o H attracted to R edge of 1st foot → works only if the actual first foot is extrametrical

• The colon instead produces a more straightforward account: the H tone is attracted to the head of a right-headed moraic colon at the left edge of the stem (Marlo et al. 2013: 12 on Kuria)

(II) Counting

• Prediction: existence of maxima of the type ‘two cola’

• Possible cases
  o Western Apache (Greenfeld 1972: 273): the higher phonological unit – what he calls the “meter” – consists of 1-4 feet (and roughly corresponds to grammatical phrase)
  o Wapishana (Tracy 1972): reference to the “contour” which “groups together feet that have syntactic relationships” and comprises 1-4 feet (possibly more).
    o Unclear what exactly “meter” and “contour” here allude to, but the reference to up to four feet should not be overlooked and re-worded as one foot to two cola”.

(III) Domain of phonological processes

• Canadian English raising of the diphthong /ai/ to [ai]
  o triggered by a voiceless segment within the PrWd, e.g. [jait] ‘write’ vs. [jaid] ‘ride’
  o triggering element can belong to a weaker foot, but not to a stronger one → for Bermudez-Otero (2004) this is an indication that Raising applies within the κ domain, hence [çi,sai][çi,taent]] ‘nitrates’ vs. [çi,sai][çi,’fa:nik]] ‘syphonic’
  o dipodicity is insufficient to characterize the domain in question and would require supplementary reference to strong and weak feet. Accepting κ as a domain captures the generalization neatly
Summing up

- Data from multiple phenomena and languages speak in favour of the prosodic colon
- The κ not only refers to stress, but to a variety of prosodic phenomena, such as metrical templates and tone
- The case-study of Iquito has shown that the colon proves fundamental; I have offered an analysis of the stress pattern that requires introduction of the constraint HAVE-κ
- Integrating the colon into the prosodic hierarchy is compatible with recent approaches that view prosodic hierarchies as either emerging on a language-specific basis (Schiering et al. 2010) or as universal, but where constituents may play a stronger or weaker role for the purposes of phonology (Hyman 2011)

REFERENCES


