Iquito: a case for cola and Harmonic Serialism
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0. Talk outline

- Aims:
  - Argue in favour of the colon (κ) with data from Iquito after Michael (in press)
  - Claim that the analysis of Iquito stress requires use of both Harmonic Serialism, as well as of an understanding of F_BIN as minimally bimoraic and maximally disyllabic
  - Suggest that κ can easily be incorporated in the prosodic hierarchy following the assumptions of Schiering et al. (2010)

- Structure
  - §1. Iquito stress data
  - §2. Evidence for cola in Iquito and elsewhere
  - §3. Analysis within Harmonic Serialism
  - §4. No re-analysis within Parallel OT or strictly bimoraic feet
  - §5. Compatibility of κ with Emergent Prosodic Hierarchy

1. Stress

- Iquito (Zaparoan, Peru): all data based on Michael (in press)
- Forms R-L bimoraic trochees, i.e. (H) or (LL). Feet must be bimoraic rather than bisyllabic.
  Rightmost stress is primary [ˈ = primary stress,ˌ = secondary stress,́ = H tone]

(1) Bimoraic feet
a. L(LL)(H) nu(ˌta.ku)(ˈrɨɨ) *(LL)(LH) *(ˌnu.ta)(κuˈri) ‘s/he stood up’
b. (H)(H) (ˌii)(ˈpɨɨ) *(HH) (ˈii.pɨɨ) ‘Red Howler Monkey’

- Normally degenerate (L) feet are not admitted (2) ....

(2) Preference for binary feet
a. (‘LL) (‘afi) ‘bird sp. (Chloroceryle amazon)’
   (‘isi) ‘lizard spp. (Gonatodes spp.)’
   b. (ˌLL)(‘LL) (ˌkuma)(‘kiha) ‘suri (edible beetle grub)’
      (ˌnaʃi)(‘kaki) ‘snap (it) - IMP’
   → c. L(ˌLL)(‘LL) nu(ˌtaki)(ˈnaka) ‘his owls’
      ki(ˌtani)(ˈkura) ‘I wove (a few days ago)’
   d. (ˌLL)(ˌLL)(‘LL) (ˌkana)(ˌnahu)(‘kura) ‘we (excl.) wrote (a few days ago)’
      (ˌnuni)(ˌkiki)(‘kiki) ‘s/he trembled’
   → e. L(ˌLL)(ˌLL)(‘LL) nu(ˌniki)(ˌkiki)(‘kura) ‘s/he trembled (a few days ago)’
      ka(ˌnamɨ)(‘yiki)(ˈkura) ‘we (excl.) returned (a few days ago)’
• BUT not always

(3) Degenerate feet exceptionally admitted

a. (ˌL)(ˈLL) (ˌsa)(ˈtaki) 'laugh-IMP'
   (ˌni)(ˈyiti) 'male child'
   (ˌka)(ˈhaʃi) 'hair'

b. (ˌL)(ˈH) (ˌma)(ˈhuu) 'tree sp. (Rheedia sp.)'

c. (ˌL)(ˈHL) (ˌmɨ)(ˈtiiha) 'turtle sp. (Podocnemis unifilis)'

• Condition for admitting a degenerate foot
  o "a single light syllable 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 in
    press: 6)

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

(4) 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

(5) Ternary foot preferred over degenerate at the R edge

a. (ˈHL) and not *(ˌH)(ˈL) (ˈsaa.pi) 'stingray'
   (ˈmii.si) 'plant sp. (Mansoa alliacea)'

b. (ˌL)(ˈHL) and not *(ˌL)(ˌH)(ˈL) (ˌmɨ)(ˈtiiha) 'turtle sp. (Podocnemis unifilis)'

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

2. Evidence for the Colon κ in Iquito and elsewhere

• Colon = (F)(F)
  o Note that e.g. Golston (1998) equates the colon with the half-line in poetry. What
    corresponds to a colon in the present conception is instead called Verse Foot (VF)

• Michael (2012) claims that the reason the forms above arise is due to a preference for words
  to contain dipodic feet, i.e. a colon, an approach also adopted here

Evidence for the colon within Iquito

➢ as a target prosodic word size (cf. data in §1 and detailed analysis in §3)
➢ as the domain in which lexical and metrical tone are incompatible

The tone (T) facts

• Every Iquito word has to have at least one tone, thus, in the absence of lexical T₁, a metrical
  Tₘ gets to be inserted on the head of primary stress
(6) **Metrical T realized on head of primary stress**
   a. (ˌpi)(ˈrú\_su) ‘electric eel’
   b. (ˌpiru)(ˈsú\_ka) ‘electric eels’

- Metrical and lexical Ts cannot co-exist. Only the lexical one survives

(7) **Ban on T\_i and T\_m within the same colon**
   (ˌkí\_pi)(ˈrusu) *(ˌkí\_pi)(ˈrú\_su) ‘my electric eel’ /kiH3 /

- Unless, T\_i is located to the left of the rightmost colon → emergence of T\_m too

(8) **Admission of T\_i and T\_m across cola**
   **Lexical tones preserved across cola**
   a. kí\_pi(ˌpiru)(ˈsú\_ka) ‘my electric eels’
   b. kí\_pi(ˌpiru)(ˌsuka)(ˈhá\_ta) ‘with my electric eels’

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

(9) **(Multiple) lexical tones always preserved**
   {{(ˌkí\_ná\_i)\_k ((ˌhuu)\_́(ˈtɨ/unɽP5[=4zotlιsś \_k)}} ‘I made someone write’

- Summary of tonal facts and cola

<table>
<thead>
<tr>
<th>Within (\kappa)</th>
<th>Across (\kappa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T_L</td>
<td>T_I [ T_M</td>
</tr>
<tr>
<td>T_M</td>
<td>T_I [ T_I</td>
</tr>
<tr>
<td>T_L, T_I (T_i)</td>
<td>* T_M [ T_M (Michael, p.c)</td>
</tr>
</tbody>
</table>

Evidence for the colon **beyond** Iquito

- Hungarian (Hammond 1987, but see Blaho & Szeredi 2011): primary and secondary stress associated with heads of cola, unlike tertiary stress
- Kakanda, Ebira, Idoma and Yoruba (Orie 1995: Chpt. 5): Roots are maximally dipodic. The maximum is also evident in Yoruba diminutives, clefted nouns and prefixes
- Bella Coola (Bagemihl 1998, Topintzi 2010): Roots are maximally quadrimoraic. Can be reanalysed as being maximally a colon
- Munster Irish, East Mayo Irish and Manx (Dubach Green 1997: Chpt. 4): distribution of stresses regulated by cola
  - Dubach Green (and refs. therein) also endorses the colon for Passamaquoddy, Eastern Ojibwa, Asheninca, Garawa and Neo-Štokavian


- **Some key components**
  - I assume with Pruitt (2010) that:
    - GEN only produces maximally disyllabic feet and creates metrical structure that cannot be altered or removed (**STRICT INHERITANCE**). This means that feet like (LLL) cannot be even generated, hence not considered at all.
- FTBIN is defined as: Feet are binary at some level of analysis (µ, ο), i.e. feet are minimally bimoraic and maximally disyllabic.
- I use FTBIN for this understanding of binarity, unless I contrast it with some other understanding, in which case, I indicate it as MinMax-FTBIN
- I propose the constraint: HAVECOLON, i.e. each word must contain a colon (satisfied if there is minimally a colon within the word)
- Note the different constraint: ALL-FT-R in HS but ALL-FT-L in ParOT

(10)  

<table>
<thead>
<tr>
<th>/LL/</th>
<th>HAVECOLON</th>
<th>ALL-FT-R</th>
<th>FTBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (LL)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. L(L)</td>
<td>*</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. (L)L</td>
<td>*</td>
<td>*!</td>
<td>*</td>
</tr>
</tbody>
</table>

Convergence on 2nd iteration, i.e. (LL) → ([LL])

(11)  

<table>
<thead>
<tr>
<th>/LLL/</th>
<th>HAVECOLON</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. (L)L(L)</td>
<td>*</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>d. (L)L(L)</td>
<td>*</td>
<td>**</td>
<td>*</td>
</tr>
</tbody>
</table>

2nd iteration: /LLL/ → (L)(LL)

Convergence on 3rd iteration

(12)  

<table>
<thead>
<tr>
<th>/L(LL)/</th>
<th>HAVECOLON</th>
<th>*(LH)</th>
<th>ALL-FT-R</th>
<th>FTBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L(L)</td>
<td>*</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (L)L(L)</td>
<td>*</td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

2nd iteration: /L(L)/ → (L)(L)

Convergence on 3rd iteration

(13)  

<table>
<thead>
<tr>
<th>/LLLL/</th>
<th>HAVECOLON</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. LLLL(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(/L)/ → [L(/LL)(/LL)]

<table>
<thead>
<tr>
<th>/LLL(/L)/</th>
<th>HAVECOLON</th>
<th>ALL-Ft-R</th>
<th>FtBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L(/L)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. L(/LL)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>/L(/LL)(/L)/</th>
<th>HAVECOLON</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>
<td></td>
</tr>
</tbody>
</table>

Convergence on 4th Iteration

14th Iteration: /HL/ → (HL)

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

<table>
<thead>
<tr>
<th>/HL/</th>
<th>HAVECOLON</th>
<th>ALL-Ft-R</th>
<th>FtBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. H(L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (H)L</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. (HL)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Convergence on 2nd Iteration

4. Problems with alternative analyses in Global/ParOT

- Notation: correct winners are at the left; incorrectly predicted winners are within ◊ ... ◊ (where applicable) and marked with • in tableaux

1. ParOT and MinMax-FtBIN

Version A: HAVECOLON >> ALL-Ft-L, MinMax-FtBIN

- Correctly produces:
  - (L)(/LL)
  - (L)(/H)
  - L(/LL)(/LL)

- Fails on
  - *(L)(/L) instead of (/LL) ×
  - *(H)(/L) instead of (HL) ×

15th Iteration: /LL/ → (/LL) ◊ *(L)(/L) ◊

<table>
<thead>
<tr>
<th>/LL/</th>
<th>HAVECOLON</th>
<th>ALL-Ft-L</th>
<th>MinMax-FtBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (LL)</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b. (L)(L)</td>
<td></td>
<td></td>
<td>**</td>
</tr>
</tbody>
</table>

16th Iteration: /HL/ → (/HL) ◊ *(H)(/L) ◊

<table>
<thead>
<tr>
<th>/HL/</th>
<th>HAVECOLON</th>
<th>ALL-Ft-L</th>
<th>MinMax-FtBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (H)L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (HL)</td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>c. (H)(L)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• *Problem* with ParOT: because it can look-ahead, it overgenerates, producing more degenerate feet than actually allowed
• HS can only parse one foot at a time, thus side-stepping the look-ahead problem
  o In words, such as /LL/, only {(L)L, L(L), (LL)} are viable candidates, but crucially no *(L)(L). \textit{HAVECOLON} is thus necessarily violated. At this point, binary winners are to be preferred, hence [(L)]
  o In longer words, degenerate feet will only be admitted at later iterations as a means to satisfy \textit{HAVECOLON}, e.g. [(L)(LL)]. When this is not at stake, the presence of degenerate feet is unmotivated, cf. [L(LL)(LL)]

\textbf{Version B: \textit{HAVECOLON}, \textit{MINMAX-FtBIN} $\gg$ \textit{PARSE-σ} $\gg$ \textit{ALL-Ft-L}}

• This improves things, but still doesn’t capture everything
• Correctly produces:
  o (LL) ✓ (L)(LL) ✓
  o (HL) ✓ (L)(H) ✓
• Fails on
  o L(L)(LL) 

\begin{equation}
/LL/ \rightarrow (LL)
\end{equation}

\[
\begin{array}{|c|c|c|c|}
\hline
/LL/ & \textit{HAVECOLON} & \textit{MINMAX-FtBIN} & \textit{PARSE}_σ & \textit{ALL-Ft-L} \\
\hline
a. (L)(L) & \ast & \ast & \ast & \ast \\
\hline
b. (LL) & \ast & \ast & \ast & \ast \\
\hline
\end{array}
\]

\begin{equation}
/LLL/ \rightarrow (L)(LL)
\end{equation}

\[
\begin{array}{|c|c|c|c|}
\hline
/LLL/ & \textit{HAVECOLON} & \textit{MINMAX-FtBIN} & \textit{PARSE}_σ & \textit{ALL-Ft-L} \\
\hline
a. (L)(L) & \ast & \ast & \ast & \ast \\
b. (L)(L) & \ast & \ast & \ast & \ast \\
c. (L)(L) & \ast & \ast & \ast & \ast \\
\hline
\end{array}
\]

\begin{equation}
/LH/ \rightarrow (L)(H)
\end{equation}

\[
\begin{array}{|c|c|c|c|}
\hline
/LH/ & \textit{HAVECOLON} & \textit{MINMAX-FtBIN} & \textit{PARSE}_σ & \textit{ALL-Ft-L} \\
\hline
?? a. (LH) & \ast & \ast & \ast & \ast \\
b. (LH) & \ast & \ast & \ast & \ast \\
c. (L)(H) & \ast & \ast & \ast & \ast \\
\hline
\end{array}
\]

• Superficial problem: as it stands, it wrongly generates (LH), but the constraint *(LH) (cf. (12) before) will rule out (a) and correctly favour (L)(H)

\begin{equation}
/HL/ \rightarrow (L)(H) or (HL)
\end{equation}

\[
\begin{array}{|c|c|c|c|}
\hline
/HL/ & \textit{HAVECOLON} & \textit{MINMAX-FtBIN} & \textit{PARSE}_σ & \textit{ALL-Ft-L} \\
\hline
a. (HL)(L) & \ast & \ast & \ast & \ast \\
b. (HL) & \ast & \ast & \ast & \ast \\
\hline
\end{array}
\]

\[1\text{ Thanks to an anonymous reviewer for this analysis, adapted here with the addition of \textit{PARSE-σ} and the strict ranking \textit{PARSE-σ} $\gg$ \textit{ALL-Ft-L}; although it fares better – compared to the original \textit{HAVECOLON, FtBIN} $\gg$ \textit{ALL-Ft-L} suggestion – it’s still unsuccessful.}\]
(21) /LLLL/ \(\rightarrow\) L(LL)(LL) \(\circ\) *(LL)(LL)L \(\circ\)

<table>
<thead>
<tr>
<th>/LLL/</th>
<th>HaveCol</th>
<th>MinMax-FtBin</th>
<th>Parseγ</th>
<th>All-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L(LL)(LL)</td>
<td>…</td>
<td>*</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>b. (LL)(LL)(L)</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>c. L(LL)(LL)</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>d. (L)(LL)(L)</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

- For completeness: the ranking HaveCol, MinMax-FtBin \(\gg\) Parse-γ, All-Ft-R reverses the problem. It produces correctly all forms – including L(LL)(LL) – aside from (L)(LL). For that, it predicts either *L(LL) (under All-Ft-R \(\gg\) Parseγ) or (LL)(L) (under Parseγ \(\gg\) All-Ft-R)

II. ParOT and 2μ-FtBin

- Perhaps the solution is in understanding FtBin differently, i.e. as being exactly equal to 2μ (2μ-FtBin)²
- Proves to be even worse!
- As before: HaveCol, 2μ-FtBin \(\gg\) Parse-γ \(\gg\) All-Ft-L wrongly produces *[(LL)(LL)L]
- But it also wrongly generates *[(H)(L)]

(22) /HL/ \(\rightarrow\) (H)L or (HL)

<table>
<thead>
<tr>
<th>/HL/</th>
<th>HaveCol</th>
<th>2μ-FtBin</th>
<th>Parseγ</th>
<th>All-Ft-L</th>
</tr>
</thead>
</table>
| a. (H)(L) | … | * | * | *
| b. (HL) | * | * | * | *
| c. (HL) | * | * | * | *

5. Discussion and Wrap-Up

- Iquito thus provides support for the use of colon κ in phonology and argues in favour of both HS and an understanding of FtBin as minimally bimoraic and maximally disyllabic
- But, what does introduction of κ mean for the prosodic hierarchy?

(23) Commonly accepted prosodic hierarchy with the addition of κ

Intonational Phrase (i)
Phonological Phrase (φ)
Prosodic Word (ω)

\(\text{Foot (}\pi\text{)} \rightarrow \text{Colon (}\kappa\text{)} \rightarrow \text{Syllable (}\sigma\text{)} \rightarrow \text{Mora (}\mu\text{)}\)

2 Pruitt (2010) shows that 2μ-FtBin is problematic in the examination of a generalised trochee type of language, as in Wergaia. The system is partially QS in odd-parity words, but not in even-parity ones, thus: odd-parity: (.o)(.o)(.H) (.buna)(.qay) ‘broad-leaved mallee’ or (.o)(.o)(.o). (‘delguna’ ‘to cure’ vs. even-parity: (.o)(.o) (.wem)’bulga) ‘to chase’. The system is derivable in both ParOT and HS, but only under MinMax-FtBin, use of 2μ-FtBin in 2μ-FtBin \(\gg\) Parse-γ \(\gg\) All-Ft-L correctly predicts (buna)(.qay), but wrongly *(.del)(.guna). A solution is to add top-ranked *Clash to eliminate *(.del)(.guna) in favour of *(delguna). Hyde (2007: 312) though notes that admission of *Clash in ParOT predicts untested patterns. Pruitt however argues that HS utilizing MinMax-FtBin avoids these problems even if *Clash continues to be admitted in Con.
• Possible objection: addition of κ 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 κ. For example, Schiering et al. (2010) show that Vietnamese visibly only makes use of σ & φ as domains for phonological processes, but not of ω & π, both well-accepted and well-argued-for prosodic categories
• Does that mean that we should discard with ω & π?
  o Perhaps YES in reference to Vietnamese
  o 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)
• This idea is totally in line with the Iquito facts and the evidence for κ
• Iquito’s emergent prosodic hierarchy *must* include κ next to other levels (π, σ, μ), but this does not imply that other languages utilize κ unless there is positive evidence in favour of it