Place feature distribution in Khoisan lexical morphemes

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Khoisan lexical morphemes

- Dominant pattern of lexical morphemes:
  \[ C_1V_1C_2V_2 \]
  \[ C_1V_1V_2 \leftarrow C_1V_1(C_2)V_2 \]
  \[ C_1V_1N \leftarrow C_1V_1N(V_2) \]

- Typologically uncommon phonotactic constraints found in disyllabic lexical morphemes.

G|ui vowels and relevant features

<table>
<thead>
<tr>
<th>Plain</th>
<th>Nasal</th>
<th>Pharyngeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>i u</td>
<td>ī ū</td>
<td>u̥</td>
</tr>
<tr>
<td>e o</td>
<td>ā</td>
<td>ḁ</td>
</tr>
</tbody>
</table>

[± high, ± low]
[± back]
[± round]
[± nasal]
[± pharyngeal]

Phonemes and allophones in V₁

- /A/ [a e i ā ĭ] (predictable from C₁, C₂,V₂)
- /U/ [o u ū] (predictable from C₁, V₂)
- /ḁ/ [ḁ ḁ̄] (predictable from V₂)
- /u̥/ [u̥ ū̥] (predictable from V₂)
Phonemes and allophones in $V_2$

- $/i\ e\ a\ o\ u\ ĩ\ ũ\ [i\ e\ a\ o\ u\ ĩ\ ũ]$
- These vowels are more or less pharyngealized if $V_1$ is $/a^\text{ˤ}/$ or $/u^\text{ˤ}/$.

Summary: Constraints on $V_1$ and $V_2$

- $V_1$ contrasts only in term of $[±\text{ round}, ±\text{ pharyngeal}]$
  
  /A U a^\text{ˤ} u^\text{ˤ}/

- $V_2$ contrasts only in term of $[±\text{ high}, ±\text{ low}, ±\text{ back}, ±\text{ nasal}]$
  
  /i\ e\ a\ o\ u\ ĩ\ ũ/

C $V_1$ C $V_2$

- $[±\text{ high}, ±\text{ low}]$
- $[±\text{ back}]$
- $[±\text{ round}]$
- $[±\text{ nasal}]$
- $[±\text{ pharyngeal}]$

Question

How can this feature distribution be explained?
Constraints on consonants

- C1: 68 dorsals (77%)
  20 non-dorsals (23%)
  (52 clicks, 16 dorsals, 20 non-dorsals)
- C2: predominantly non-dorsal
  (/b r m n/ and infrequent /j w/)

Place feature distribution

- Nondorsal
  - [± round]
  - [± high, ± low]
  - [± pharyngeal]
  - [± back]
  - Dorsal-predominant
    (click, velar, uvular)
  - /b r m n (j w)/

- Dorsal
  - [± high, ± low]
  - [± pharyngeal]
  - [± back]
Hypothetical constraint

\[
\begin{array}{c c c c}
C_1 & V_1 & C_2 & V_2 \\
\text{Dorsal} & & \text{Dorsal} \\
\text{Non-dorsal} & & \text{Non-dorsal} \\
\text{[round]} & & \text{[pharyngeal]} & \text{[laryngeal]}? \\
\end{array}
\]