Bantu Spirantization is a reflex of vowel spirantization

Matthew Faytak, John Merrill

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Proto-Bantu (PB) is reconstructed with two sets of high vowels: ‘high’ and ‘super-high’

One among many proposals is that the super-high vowels may have been phonetically fricative vowels

Taking into account data from Southwest Bantu languages, we propose that the changes triggered and undergone by the PB super-high vowels are consistent with the development of attested cases of fricative vowels
Bantu Spirantization
Four vowel heights are typically reconstructed for Proto-Bantu:

- Traditionally, the highest has been called **super-high** or **super-close**, represented with the symbols *ɨ* and *ʉ*

  - **first-degree high vowels** → \(*i\) \(\rightarrow\) *ɨ* \(\rightarrow\) *ʉ*
  - **second-degree high vowels** → *e* \(\rightarrow\) *i* \(\rightarrow\) *u* \(\rightarrow\) *o* \(\rightarrow\) *a*
The high/super-high (Deg. 1–2) distinction was proposed to account for the phenomenon known as Bantu Spirantization (Meinhof 1899).

\[
\begin{array}{|c|c|c|}
\hline
 & \_i & \_u \\
\hline
*p, *b & > f, v (or s, z) & > f, v \\
*t, *d & > s, z & > f, v (or s, z) \\
*k, *g & > s, z & > f, v \\
\hline
\end{array}
\]

cf. Schadeberg (1994)

- Certain high vowels (Deg. 1) have a spirantizing effect on preceding consonants; others (Deg. 2) have no such effect.
- Merger of Deg. 1 and Deg. 2 vowels usually (but not always) accompanies Bantu Spirantization.
While the phonological distinction between Deg. 1 and Deg. 2 is uncontroversial, their phonetic realization has been subject to debate.

- Schadeberg (1994, 2003) argues strongly for a simple tense/lax or +/- ATR distinction

  “The term ‘super-close’ vowels should be avoided since it wrongly suggests untenable hypotheses about the phonetic nature of first and second degree vowels...” (2003, 147)

- Hyman (1999, 2003) also supports an ATR distinction
Another proposal is that *ɨ and *ʉ were instead “fricative vowels” or “noisy vowels,” similar to those found in some modern Bantoid languages of Cameroon and other places. (Maddieson 2003: 20)

“These facts combine to suggest that the distinctive characteristic of these original vowels was indeed an unusually narrow constriction, almost consonantional in nature. [...] The reconstructed ‘super-close’ vowel pair may therefore have been similar to the ‘fricative vowels’ known to occur in certain modern Sino-Tibetan languages...” (Maddieson 2003: 20)
The view from Southwest Bantu
Where?

Kwanyama

Nyaneka

Herero

Umbundu

Ila

Nyengo

Ndonga
Southwestern Bantu

At a glance . . .

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Brincker (1886)
Etaung Daniel (2000)
Fowler (2000)
da Silva (1966)
Consonants: Changes in place

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- palatalization/labiodentalization — Ila
- dentalization — Herero, Ndonga, Kwanyama, and also Mbunda (K15), Nyoka (L62)  
  
  Johnston (1919)
- no change in place — Nyaneka, Umbundu
Consonants: Changes in place

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- palatalization/labiodentalization — Ila
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- no change in place — Nyaneka, Umbundu
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- palatalization/labiodentalization — Ila
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  Johnston (1919)

- no change in place — Nyaneka, Umbundu
Consonants: Changes in manner

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- spirantization — numerous
- aspiration — Nyaneka
- no change in manner — Umbundu, Herero, Kwanyama
Consonants: Changes in manner

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- spirantization — many
- aspiration — Nyaneka
- no change in manner — Umbundu, Herero, Kwanyama
Consonants: Changes in manner

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<td>Nyaneka</td>
<td>R12</td>
<td>hi</td>
<td>hi</td>
<td>hi</td>
<td>vi</td>
<td>i</td>
<td>i</td>
<td>hi</td>
<td>th</td>
<td>hi</td>
<td>i</td>
<td>ri</td>
<td>i</td>
</tr>
<tr>
<td>Umbundu</td>
<td>R11</td>
<td>si</td>
<td>si</td>
<td>si</td>
<td>vi</td>
<td>(j)i</td>
<td>(j)i</td>
<td>fe</td>
<td>te</td>
<td>ke</td>
<td>ve</td>
<td>le</td>
<td>(j)e</td>
</tr>
</tbody>
</table>

- spirantization — many
- aspiration — Nyaneka
- no change in manner — Umbundu, Herero, Kwanyama
However, the Deg. 1 vowels themselves also exhibit some unusual changes

- Lowering with “height switch”: Deg. 1 vowels end up lower than Deg. 2 vowels
- \( ^{*}i > e \) in Herero, also Luchazi (K13), Nyoka (L62)  

\[ \begin{array}{ll}
\text{Herero } ^{*}i > e & \text{Herero } ^{*}i > i \\
*gi > -\ddot{e} \text{ ‘to fly’} & *gi > -yi \text{ ‘egg’} \\
*kipa > -\thetaepa \text{ ‘vein’} & *kina > -\jina \text{ ‘dance’} \\
*jotI > -\yc\thetae \text{ ‘star’} & *ti > -ti \text{ ‘tree’} \\
*bij > -\ddot{e} \text{ ‘excrement’} & *bii > -\vi \text{ ‘bad’} \\
\end{array} \]

Johnston (1919)
Vowels: lowering, height switch

- Lowering with “height switch”: Deg. 1 vowels end up lower than Deg. 2 vowels

- *ụ > o in Nyengo (K16), also Yeyi (R41)  
  Johnston (1919)

<table>
<thead>
<tr>
<th>Nyengo *ụ &gt; o</th>
<th>Nyengo *u &gt; u</th>
</tr>
</thead>
<tbody>
<tr>
<td>*dedụ &gt; -levo ‘beard’</td>
<td>*junị &gt; -yuⁿze ‘bird’</td>
</tr>
<tr>
<td>*bụmo &gt; -vomo ‘belly’</td>
<td>*jucua &gt; jufua ‘fowl’</td>
</tr>
<tr>
<td>*bụ &gt; -vo ‘soil’</td>
<td>*jubo &gt; -duo ‘house’</td>
</tr>
<tr>
<td>*kụpa &gt; -fopa ‘bone’</td>
<td>*ku- &gt; ku- ‘INF prefix’</td>
</tr>
</tbody>
</table>

- If the Deg. 1/Deg. 2 distinction is only height-based, then this change is rather surprising
## Vowels: fronting and breaking

<table>
<thead>
<tr>
<th>PB</th>
<th>Herero</th>
<th>Ndonga</th>
<th>Kwanyama</th>
<th>Nyaneka</th>
<th>Umbundu</th>
</tr>
</thead>
<tbody>
<tr>
<td>*kụ́ ‘to die’</td>
<td>-tu</td>
<td>-swi</td>
<td>-fi</td>
<td>-kʰi</td>
<td>—</td>
</tr>
</tbody>
</table>
| *kụ́pa ‘bone’  | -tu-
| po | -swi-
| pa | -fipa   | -kʰi-
| pa  | -kepa   |
| *pokụ́ ‘blind’ | -po-
| tu | -poswi  | -ofi    | -pʰ-
| ke   | -peke   |
| *tụ̀ku ‘night’ | -tu-
| ku | -swiku  | -fiku   | -tʰ-
| ke   | -teke   |
| *jedụ́ ‘beard’ | -ye-
| ðu | -yezwi  | -dʒe-
| di   | -dʒeri  | -dʒele  |

### Fronting:

- *ụ́ is fronted to [i] in Kwanyama and Nyaneka, effectively merging the two Deg. 1 vowels
- Also in Umbundu, but with accompanying lowering: *ụ́ > e

### Breaking, possibly intermediate to fronting:

- *ụ́ becomes a diphthong [wi] in Ndonga (further developing to [i] in recent years)
Consonants may be affected in a number of ways by following Deg. 1 vowels:

- Manner: spirantization, aspiration
- Place: dentalization, palatalization, labiodentalization, debuccalization

Vowels may undergo two noteworthy changes:

- Lowering: *i > e, *u > o
- Fronting (via breaking): *u > wi > i

→ The label “spirantization” discards much of this complexity, especially in consonant place and in associated changes to the vowels themselves.
Fricative vowels
Fricative vowels

- For many of the SW Bantu changes discussed, there is no easy explanation in simple spirantization, palatalization, et cetera.
- However, there are compelling similarities with attested developments of fricative vowels, which happen to resemble the “noisy” or “consonant-like” vowels posited by Zoll, Maddieson, and others.
Fricative vowels

For many of the SW Bantu changes discussed, there is no easy explanation in simple spirantization, palatalization, et cetera.

However, there are compelling similarities with attested developments of fricative vowels, which happen to resemble the “noisy” or “consonant-like” vowels posited by Zoll, Maddieson, and others.

...but what is a fricative vowel?
Here, we use \textit{fricative vowel} to refer to a vowel that has frication as a target of its articulation and as a cue to its category.

This does not encompass:

- Devoiced or voiceless vowels \hspace{1cm} Smith (2003)
- Pre-/post-aspirated vowels \hspace{1cm} Helgason (2002) Mortensen (2012)
- Articulatory overlap at high speech rate
- Wall noise sources in high vowels \hspace{1cm} Shadle (1990)
Vowels that do seem to have frication as a target of their articulation and as a cue to their category:

- **Apical vowels** in Chinese
  - Lee (2005)
  - Feng (2007)

- **Viby-i, Göteborges-i**, etc. in Swedish
  - Engstrand et al. (2000)
  - Holmberg (1976)

- **Fricative vowels** in Bantoid
  - Kelly (1974)
  - Connell (2007)

- And perhaps the **Degree 1 vowels** of Proto-Bantu
Examples — coronal

Wanghao Wu, female speaker

mzmɔ 'eyebrow'
Examples — coronal

Wanghao Wu, female speaker ‘eyebrow’
Wanghao Wu, female speaker ‘free (of charge)’
Examples — coronal

Wanghao Wu, female speaker  ‘free (of charge)’
Examples — labiodental

Limbum, male speaker ‘ashes’
Examples — labiodental

Limbum, male speaker ‘ashes’
Examples — labiodental

Limbum, male speaker  ‘bean’
Examples — labiodental

Limbum, male speaker ‘bean’
Labiodentals can be visually verified as such; quite distinct from cardinal [u].

Coronals are also quite different from cardinal [i], e.g. Wanghao:
Articulation and frication noise

All of this suggests that frication is central to the production and perception of fricative vowels:

- Likely tongue body grooving to accommodate fricative production
  Narayanan et al. (1995)

- Place of frication appears to be an important cue (even with the presence of formants)
  Cheung (2004)
Formants

- F2 reflects a tongue *body* position like a central vowel

  Engstrand et al. (2000)
  Feng (2007)
  Connell (2007)

- Coronals’ F1 has also been shown to be higher than one might expect, e.g., Suzhou

  Feng (2007)
Where are the parallels?
The Ring languages
The Ring languages

SOUTHWESTERN CAMEROON
ENLARGED AREA

Language Families
- Niger-Congo:
  - Volta-Congo:
  - Adamawa-Ubangi
- Benue-Congo:
  - Cross River
- Grassfields
- Jukunoid

WIDESPREAD LANGUAGE
(Atlantic)
- Kano-Kasina-Bororo Fufuile

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Consonants: changes in place

Consonant mutations are associated with the analogous first-degree high vowels in **Proto-Central Ring (PCR)**, within **Grassfields Bantu**

- ***k¸u, *g¸u > pf-, bV-** (Ring—vowel dep. on coda)

<table>
<thead>
<tr>
<th>PCR</th>
<th>Babanki</th>
<th>Bum</th>
</tr>
</thead>
<tbody>
<tr>
<td>*-ŋg¸u ‘chicken’</td>
<td>m^bVu</td>
<td>ŋgu</td>
</tr>
<tr>
<td>*-(ŋ)gùn ‘cadaver’</td>
<td>m^bVeN</td>
<td>gun</td>
</tr>
<tr>
<td>*-ŋk¸us ‘leprosy’</td>
<td>m^pfes</td>
<td>ŋkuh</td>
</tr>
</tbody>
</table>

- **bɔ > d(z)ə** (Ring, elsewhere)

<table>
<thead>
<tr>
<th>PCR</th>
<th>Lamnso’</th>
<th>Bum</th>
</tr>
</thead>
<tbody>
<tr>
<td>*-b(ŋ)i ‘to give birth’</td>
<td>ñdzəə</td>
<td>buŋ</td>
</tr>
<tr>
<td>*-bin ‘to dance’</td>
<td>ñdzən</td>
<td>bin</td>
</tr>
<tr>
<td>*-mbɔ ‘world’</td>
<td>ñdzə</td>
<td>—</td>
</tr>
</tbody>
</table>

Elias and Voorhoeve (1981)
Hyman and Jisa (1977)
Consonants: changes in manner (?)

Manner changes must be described (given available data) as sporadic

- e.g. *-lį > Kom -z; Aghem -ni ‘to enter’

More widespread (in the neighboring Mbam-Nkam group): Bamileke “aspiration”

Hyman (1976)
Vowel breaking, lowering

We might ask: how does a fricative vowel lower (or open)?

The **timing of the frication** varies within and between language:

- Frication may not be realized all the way through the vowel, being “released” into a central vowel
- Central vowels tend to lower over time (the “[–peripheral] track”)
- Perhaps fricative vowels lower by breaking . . .

---

Labov (1994)
Examples — coronal, released

Wanghao, female speaker ‘rice’

(Contrast: ‘eyebrow’)
Examples — coronal, released

Wanghao, female speaker ‘rice’

(Contrast: ‘eyebrow’)
Examples — labiodental, released

Kom, male speaker ηgv ‘chicken’
Examples — labiodental, released

Kom, male speaker ŋ̄gv ‘chicken’
→ A fricative vowel cannot be lowered or opened, but its vowel ‘release’ can

A “released” fricative vowel *[ν] in Ring is attested as undergoing lowering and a loss of its fricated portion

> Kom: /ν/ → [v] ~ [vɐ]
> Oku: /ν/ → [vɐ] ~ [ə], no [γ]

Oku has phonologized the “release” seen in Kom
Vowel breaking, lowering

A large subset of Oku reflexes of *ʉ have -v-:

<table>
<thead>
<tr>
<th>PCR</th>
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<th>Kom</th>
<th>Oku</th>
</tr>
</thead>
<tbody>
<tr>
<td>*-ŋu-ʉ</td>
<td>-ŋu</td>
<td>-ŋv(ə)</td>
<td>ŋvəə</td>
</tr>
<tr>
<td>*-kʊn-ʉ</td>
<td>-kʊn</td>
<td>-kv(ə)jn</td>
<td>kfən</td>
</tr>
<tr>
<td>*-kʊl-ʉ</td>
<td>-kʊl</td>
<td>-kv(ə)l</td>
<td>kfəl</td>
</tr>
<tr>
<td>*-(w)ʊt-ʉ</td>
<td>-wʊs</td>
<td>-v(ə)s</td>
<td>-vəə</td>
</tr>
</tbody>
</table>

A large subset of Oku reflexes of *ʉ lack -v-:

<table>
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<tr>
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<th>Kom</th>
<th>Oku</th>
</tr>
</thead>
<tbody>
<tr>
<td>*-nu-ʉ</td>
<td>-nu</td>
<td>-nv(ə)</td>
<td>ŋəə</td>
</tr>
<tr>
<td>*-jʊ-ʉ</td>
<td>-ju</td>
<td>-zv(ə)</td>
<td>zəə</td>
</tr>
<tr>
<td>*-sʊ-ʉ</td>
<td>—</td>
<td>-f(ə)</td>
<td>səə</td>
</tr>
<tr>
<td>*-sʊt-ʉ</td>
<td>-suh</td>
<td>-f(ə)s</td>
<td>səə</td>
</tr>
</tbody>
</table>
We even end up with a “height switch”

<table>
<thead>
<tr>
<th>Oku *ʊ &gt; ə</th>
<th>Oku *u &gt; u</th>
</tr>
</thead>
<tbody>
<tr>
<td>*-sʊ &gt; -sœə ‘fish’</td>
<td>*-su &gt; -suu ‘to wash’</td>
</tr>
<tr>
<td>*-ŋkʊ &gt; -ŋkœə ‘rope’</td>
<td>*-ku &gt; -kuu ‘sheath, holster’</td>
</tr>
<tr>
<td>*-sʊt &gt; -sœə ‘to pour’</td>
<td>*-süt &gt; -sus ‘hot pepper’</td>
</tr>
</tbody>
</table>

Note that in this case, we have especially good reason to suspect a fricative vowel *[v] for Oku at some point, like its close relative Kom
Reconstructing *i̯, *u̯

→ Bantu Spirantization is due to the vowel itself being cued by, and produced with, fricative noise; this allows us to account for both vowel changes and consonantal mutation.

\[
\begin{align*}
\text{X} & \quad \downarrow \\
\text{C} & \quad \text{V} \\
*\text{i}, *\text{u} & \text{ as } [\text{i}, \text{u}] \\
\text{X} & \quad \downarrow \\
\text{C} & \quad \text{V} \\
*\text{i}, *\text{u} & \text{ as } [\text{i}, \text{u}] \\
\end{align*}
\]

- **Vowel changes** are caused by reconfiguration of articulators for fricative production.
- **Consonant changes** are caused by imposition of extra consonant-like constrictions in a rigidly CV syllable.
Bantu Spirantization is an effect of Proto-Bantu first-degree high vowels

- If they are taken to be fricative vowels, a broader set of reflexes can be explained straightforwardly

- If they are taken to be normal high vowels, we must associate a lot of particularly unusual sound changes with them
Caveats

- There’s not enough data
  - Less than complete picture of Bantu Spirantization (variation, morphological conditioning . . . )
  - In general: not very much data on any fricative vowels!
- What “some associated noise” means: many ways of implementing
  cf. Mortensen (2012)
- We do not claim to argue for or against cognacy of Grassfields Bantu and Narrow Bantu Deg. 1 vowels (the two groups are distantly related)
Conclusions

Knowledge of the typology of possible and expected sound changes is essential in determining the phonetic realization of reconstructed segments.

- Research into fricative vowels has led to the expansion of one corner of this typology
- We hope this contributes substantial heft to one side of a long-standing debate in Bantu historical linguistics
Thanks to Andrew Garrett, Larry Hyman, and Keith Johnson Emmanuel Chiabi and Julia Zhao for lending us their voices and Amy Shimizu for extracting sound files

References


