Areal features and linguistic reconstruction in Africa

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Is Africa a linguistic area?

- Some scholars have claimed that Africa as a whole can be considered a linguistic area
  - Creissels et al. (2008): Africa forms a linguistic area based on morphosyntactic data
- Others reject the idea of Africa as a single linguistic area, but identify smaller linguistic areas on the continent
  - Güldemann (2008): The “Macro-Sudan Belt” is a linguistic area
  - Clements and Rialland (2008): Africa can be divided into 6 phonological areas
  - Creissels (2015): West Africa is a linguistic area based on morphosyntactic tone and other features.
- More detailed study of the linguistic geography of Africa is needed in order to identify both macro- and micro-areas (Heine and Nurse, 2008)
Based on data from 243 tone systems and 74 vowel systems, we argue that Africa as a whole does not form a unified linguistic area.

Likewise, these data do not provide evidence for the Macro-Sudan Belt as a unified phonological area.

Instead, we find evidence for smaller linguistic micro-areas:

- South of Lake Chad
- The Nigeria/Cameroon border
- The Ghana/Togo/Burkina Faso cluster
- The Kru/Mande Zone
1. Introduction

2. Methodology
   - The ALFA Project
   - Tone database

3. Results
   - Tone
   - Vowel systems

4. Conclusion
The ALFA Project is the work of 11 linguists at UC Berkeley.

We are gathering data on 7 linguistic features that have been claimed to be “African”:

- Tone
- ATR systems
- Nasal vowels
- Syllable and word structure
- Verb extensions
- Serial verbs
- S AUX O V

For each feature, we have created a database of languages coded for key properties.

We created a web application to map the languages based on these properties to identify areal and genetic patterns.
Language mapper is a web application
- Input: spreadsheets of data, Glottolog language data (Hammarström et al., 2015)
- Output: a Google map of language data letter-coded with genetic information and color-coded for linguistic features (Google, 2015)
We gathered tone data from a database of 662 tone languages (Hyman, 2015)
- 243 African languages

The data was recoded with a numerical system we designed to encode equivalencies across different traditions of representation

Our coding allowed us to look at numerous features of tone inventories including:
- Number and identity of level tones
- Number and identity of downstepped tones
- Number, direction, and identity of contour tones
Languages were coded by the number of non-contour tones in their surface tone inventories. This count included downstepped tones as constituting a separate surface level. The goal of this analysis was to separate languages based on the number of contrastive pitch levels they distinguish on the surface. There are several micro-areas defined by the number of levels that languages distinguish in their surface tone inventories.
Number of surface level tones
Number of surface level tones - Nigeria/Cameroon vs. Southern Bantu
Mande languages near Kru have more surface levels.

Bantoid languages near the Nigeria/Cameroon border have more levels than Bantu languages in southern Africa.

There are three areas of three level tones:
- Ghana/Togo/Burkina Faso
- South of Lake Chad
- Ethiopia/Sudan
As seen in the previous maps of number of surface level tones across African languages, the most common number of levels is 3, especially in the Macro-Sudan belt.

The following maps show only those African languages which have exactly three level tones, differentiating them by which tones are in their inventories:

- Low, Mid, High
- Low, !High, High
- Low, !Low, High
- Low, High, Superhigh

We recognize that which three levels a given language has is often a matter of analysis.
Three surface level tones
Three surface level tones - West Africa

- A Atlantic
- B Benue-Congo
- C Chadic
- D Ijoid
- E Edoid
- F Kordofanian
- G Gur
- H Cushitic
- I Igboid
- J Kainji
- K Kru
- M Mande
- N Nilotic
- O Omotic
- S Central Sudanic
- T Bantoid
- V Volta-Congo
- W Kwa
- X Nubian
- Y Khoe-Kwadi
- Z Atlantic-Congo
- Low, Mid, High
- Low, !High, High
- !Low, Low, High
- Low, High, SuperHigh
Languages in Southern Africa have downstep.

Bantoid languages nearer the Nigeria/Cameroon border are more likely to have a mid tone.

Languages south of Lake Chad have a mid tone.
African languages by number of surface contour tones

- We have seen the distribution of surface level tones, and now we turn to surface contours.
- We find that high numbers of contour tones are found in the Kru/Mande zone of southern West Africa.
- There are also marked areas that lack contour tones entirely.
Number of surface contour tones
Number of surface contour tones - West Africa
Number of surface contour tones - Mande/Kru Zone
Number of surface contour tones - Nigeria/Cameroon vs. Southern Bantu
Number of surface contour tones - Summary

- There is a high concentration of numerous contour tones in the Kru/Mande-zone, but not in Mande languages further away.
- There are sporadic languages with high numbers of contours throughout the rest of the Macro-Sudan belt (cf. Central Sudanic).
- Bantoid languages on the Nigeria/Cameroon border tend to have more contours than Bantu languages in southern Africa.
- There are two regions that lack contour tones entirely
  - Ghana/Togo/Burkina Faso
  - South of Lake Chad
Are languages with a high number of level tones more likely to have a high number of contours?

- The Ghana/Togo/Burkina Faso cluster is an area of 3-level tones that lacks contours
- Central Sudanic languages have 3 level tones and most have no contours
- The Kru/Mande zone has high numbers of level tones and contours
Here we are interested whether falling versus rising contour tones pattern together areally.

We find little evidence that the direction of contours is an areal feature; however, the Kru/Mande zone is the only area where multiple languages show complex contours.
Direction of surface contour tones
Direction of surface contour tones - Mande/Kru Zone
Direction of surface contour tones - Summary

- There is little evidence that falling versus rising contour tones are areally diffused.
- The Kru/Mande Zone is the only region with more than one language that has complex contours; this correlates with a high number of surface tones.
The final tonal feature we examine is the distribution of surface downstepped tones.

We see a high concentration of downstep across the Macro-Sudan belt, with a break between central Cameroon and east South Sudan.

Alternatively, we see two micro areas of downstep:

- West Africa between Côte d’Ivoire and west Cameroon
- East Africa between South Sudan and northern Rwanda/Kenya
Surface downstepped tones
Surface downstepped tones - Nigeria/Cameroon vs. Southern Bantu
The highest concentration of downstep is in West Africa between Côte d’Ivoire and the Nigeria/Cameroon border. Bantoid languages on the Nigeria/Cameroon border have downstep while the Bantu languages in our database do not, showing evidence for the areal distribution of downstep in West Africa.

Languages south of Lake Chad lack downstep.

Languages with many surface level tones and contours tend to lack downstep (Kru, Mande).
Linguistic micro-areas based on tone

- South of Lake Chad
  - Three level tones that are H M L
  - No contours or downstep
- The Nigeria/Cameroon border
  - More surface levels and contours than Bantu languages in southern Africa
  - At least on downstepped tone
- The Ghana/Togo/Burkina Faso cluster
  - Three surface level tones
  - No contours
  - Downstep
- The Kru/Mande zone
  - Many surface level tones and contours
  - Complex contour tones
Proto-Mande is reconstructed with two level tones (Vydrin, 2002).

Proto-Kru is reconstructed with four level tones (Marchese, 1979; Marchese Zogbo, 2012).

We have seen that those Mande languages situated nearest to Kru have large tonal inventories, while those further north do not.

These findings are consistent with Vydrin (2009), who shows the validity of the Mande/Kru Zone as a linguistic area based on multiple features, including the number of tone heights.
A closer look at tone as a areal feature in the Kru/Mande Zone

- Kru tone heights:
  - Niaboua (Western Wè) - 4 (Bentinck, 1978)
  - Kouya - 4 (Saunders, 2009)
  - Guéré (Southern Wè) - 4 (Paradis, 1983)
A closer look at tone as a areal feature in the Kru/Mande Zone

- Mande tone heights:
  - Dan - 5 (Bearth and Zemp, 1967)
  - Toura - 4 (Bearth, 1971)
  - Mahou - 3 (Creissels, 1988)
A closer look at tone as a areal feature in the Kru/Mande Zone

- Kru tone heights:
  - Bassa - 3 (Hobley, 1964) or 4 (Bertkau, 1975)
  - Krahn - 3 (Duitsman)
  - Niaboua (Western Wè) - 4 (Bentinck, 1978)
Mande tone heights:
- Dan - 5 (Bearth and Zemp, 1967)
- Mano - 3 (Kachaturyan, 2014)
- Kpelle - 3 on the surface but only 2 phonemically (cf. Konoshenko 2011 for an overview)
Further phonological evidence of micro-areas in Africa

- Other phonological features that show preliminary evidence for micro-areas in Africa:
  - ATR harmony
  - Central vowels
  - Nasal vowels
  - Syllable and word structure
Vowel features

- 74 languages of the Macro-Sudan belt
- Coded for vowel inventory, nasality, ATR harmony
- Here we focus specifically on ATR systems and the inventory of ‘interior’ vowels
  - We define an ATR system as exhibiting an active harmony process
  - ‘Interior’ vowels are defined as central vowels, except /a/, and back unrounded vowels
The literature is not in agreement about whether Proto-Niger-Congo had ATR harmony (cf. Dimmendaal 2001 for an overview)

There is evidence for an area of the Macro-Sudan belt lacking ATR harmony

With more data, we may find that those languages that lack ATR systems are more likely to have interior vowels, which are not reconstructed for Proto-Niger-Congo and thus are likely an innovation.
ATR and Interior Vowels
Many languages at the Nigeria/Cameroon border and south of Lake Chad have interior vowels but lack active ATR systems.

These data suggest a tendency toward a complementary distribution of vertical and horizontal expansions of vowel systems.

Future work will include adding more languages that exhibit ATR harmony to the database to investigate this hypothesis.
Based on data from 473 languages, Rolle (2015) finds evidence for five micro areas in West Africa having only oral, not nasal, vowels.

Three of these micro areas match the micro areas that exhibit areal tonal patterns:
- Ghana/Togo/Burkina Faso cluster
- South of Lake Chad
- Nigeria/Cameroon border
Based on data from roughly 50 languages, Lamoureux and Lionnet (2015) find preliminary evidence for a micro area in the Kru/Mande Zone lacking codas.

The Nigeria/Cameroon border appears to be less restrictive with respect to possible codas.
Is Africa a linguistic area?

- We have found evidence for linguistic micro-areas including:
  - South of Lake Chad
  - The Nigeria/Cameroon border
  - The Ghana/Togo/Burkina Faso cluster
  - The Kru/Mande zone

- We do not find evidence for the Macro-Sudan Belt as a cohesive area with respect to tone and vowel systems
Implications for reconstruction

- While certain phonological features are common in many areas across Africa, we find evidence for micro-areas rather than a widespread distribution of each feature.
- The areal distribution of the features we have examined suggests innovation rather than conservation within families.
- If these features have been independently innovated in multiple micro-areas, this could inform our typology regarding ease of innovation.
Future work

- For the tone project:
  - More Atlantic data, more data from Southern Africa
  - Context-sensitive tonal processes

- For ALFA:
  - S AUX O V
  - Serial verbs
  - Syllable and word structure
  - Are there overlapping micro areas?
  - Is there statistical evidence for micro areas?
  - What can these micro areas tell us about language contact and human prehistory in Africa?
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Vydrin, V. (2002). Some hasty notes on the ways of the evolution of Mande tonal system. In Nicolai, R. and Zima,