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Areal features and linguistic reconstruction in Africa

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University of California, Berkeley

8th World Congress of African Linguistics
Workshop 3: Areal Phenomena in Northern Sub-Saharan Africa
23 August 2015

Is Africa a linguistic area?

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- Some scholars have claimed that Africa as a whole can be considered a linguistic area

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  - Heine and Leyew (2008): 11 “African” linguistic properties
  - Creissels et al. (2008): Africa forms a linguistic area based on morphosyntactic data

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  - 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)

Goals of this talk

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- 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

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- 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

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Areal Linguistic Features of Africa (ALFA) Project

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- The ALFA Project is the work of 11 linguists at UC Berkeley

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

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

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- 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

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- Language mapper (Ewert, 2015) 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)

Tone database

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- We gathered tone data from a database of 662 tone languages (Hyman, 2015)
  - 243 African languages

Tone database

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- 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

African languages by number of surface level tones

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- Languages were coded by the number of non-contour tones in their surface tone inventories

African languages by number of surface level tones

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African languages by number of surface level tones

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- 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

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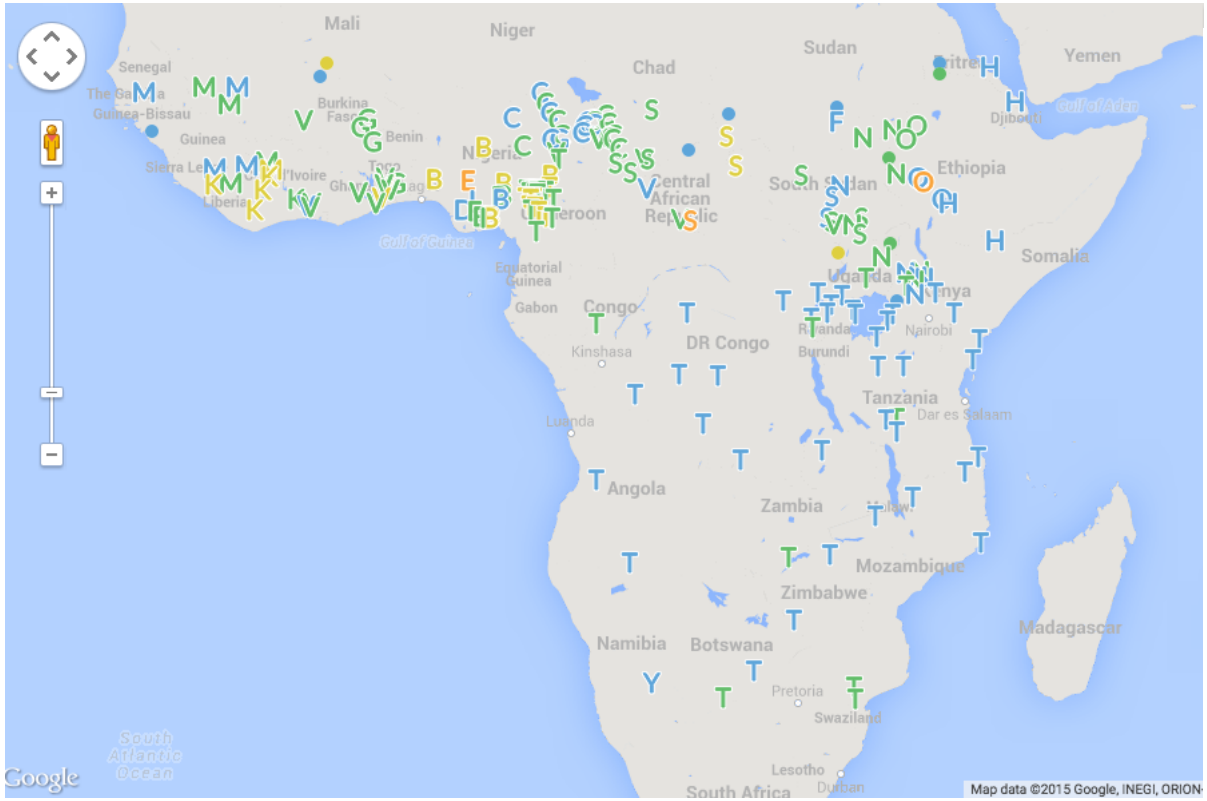

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Number of surface level tones - Mande/Kru Zone

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Number of surface level tones - Nigeria/Cameroon vs. Southern Bantu

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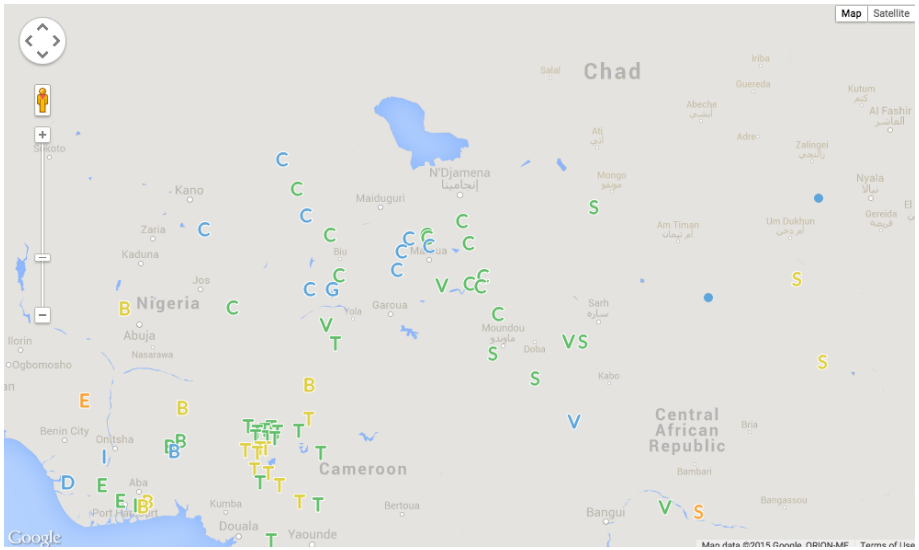

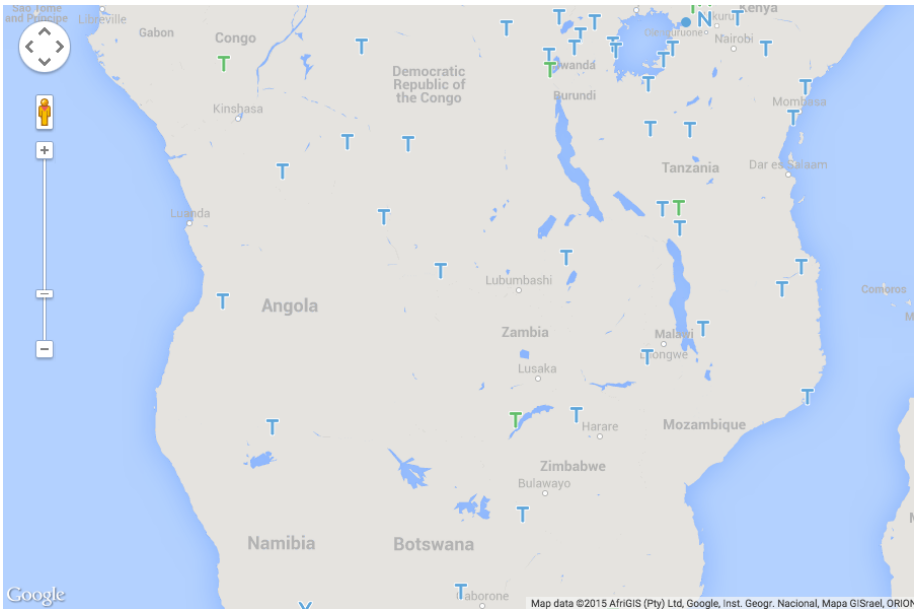

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Number of surface level tones - Summary

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- Mande languages near Kru have more surface levels

Number of surface level tones - Summary

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- Mande languages near Kru have more surface levels
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Number of surface level tones - Summary

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- Mande languages near Kru have more surface levels
- Bantoid languages near the Nigeria/Cameroon border have more levels that Bantu languages in southern Africa
- There are three areas of three level tones
  - Ghana/Togo/Burkina Faso
  - South of Lake Chad
  - Ethiopia/Sudan

African languages with three surface level tones

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- 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.

African languages with three surface level tones

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- 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

African languages with three surface level tones

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  - Low, High, Superhigh
- We recognize that which three levels a given language has is often a matter of analysis.

Three surface level tones

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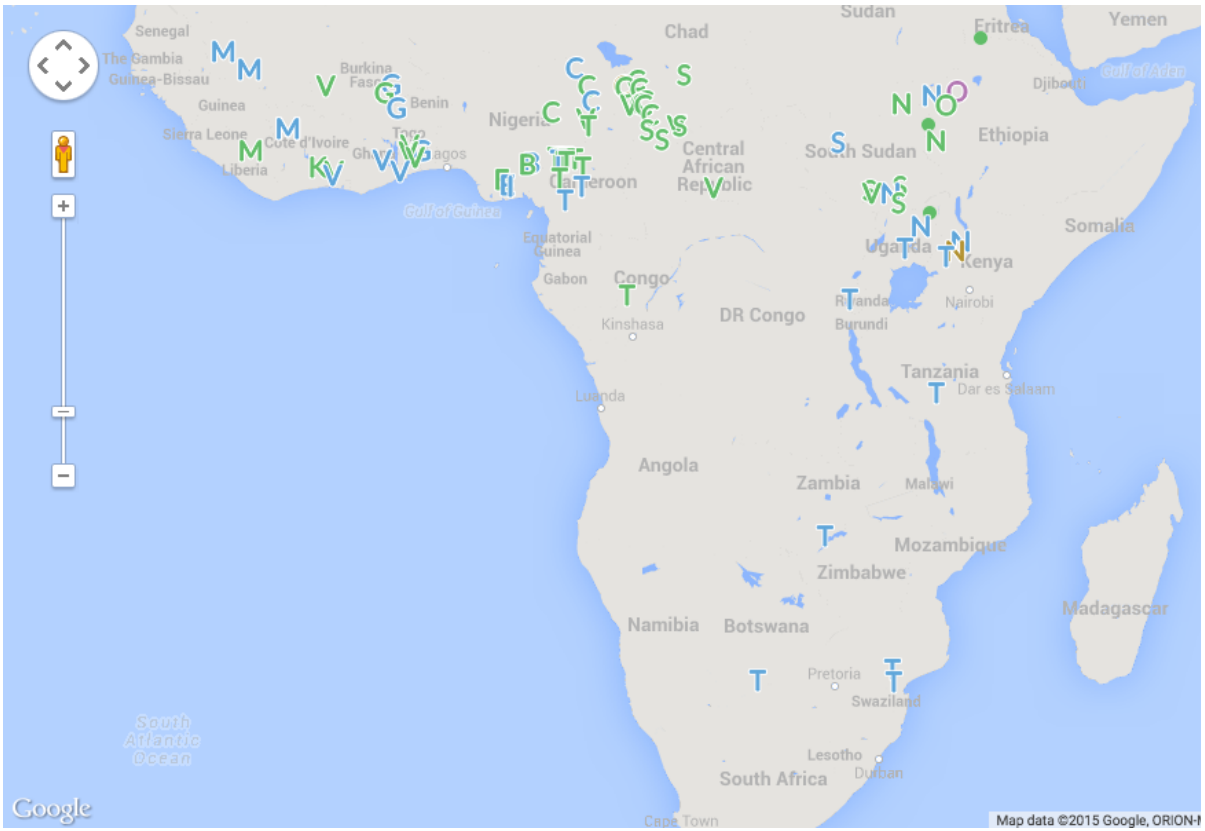

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Three surface level tones - West Africa

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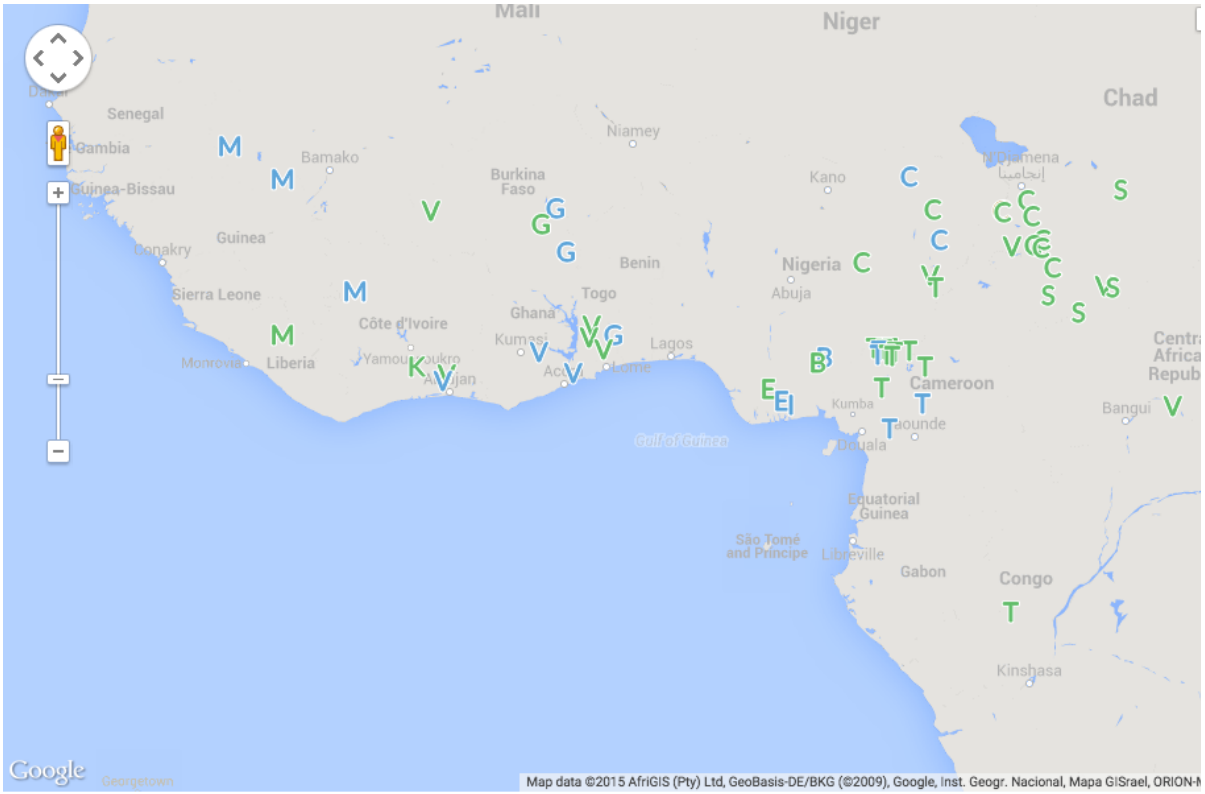

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Three surface level tones - Summary

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- Languages in Southern Africa have downstep.

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- Languages south of Lake Chad have a mid tone.

African languages by number of surface contour tones

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- We have seen the distribution of surface level tones, and now we turn to surface contours.

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- 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

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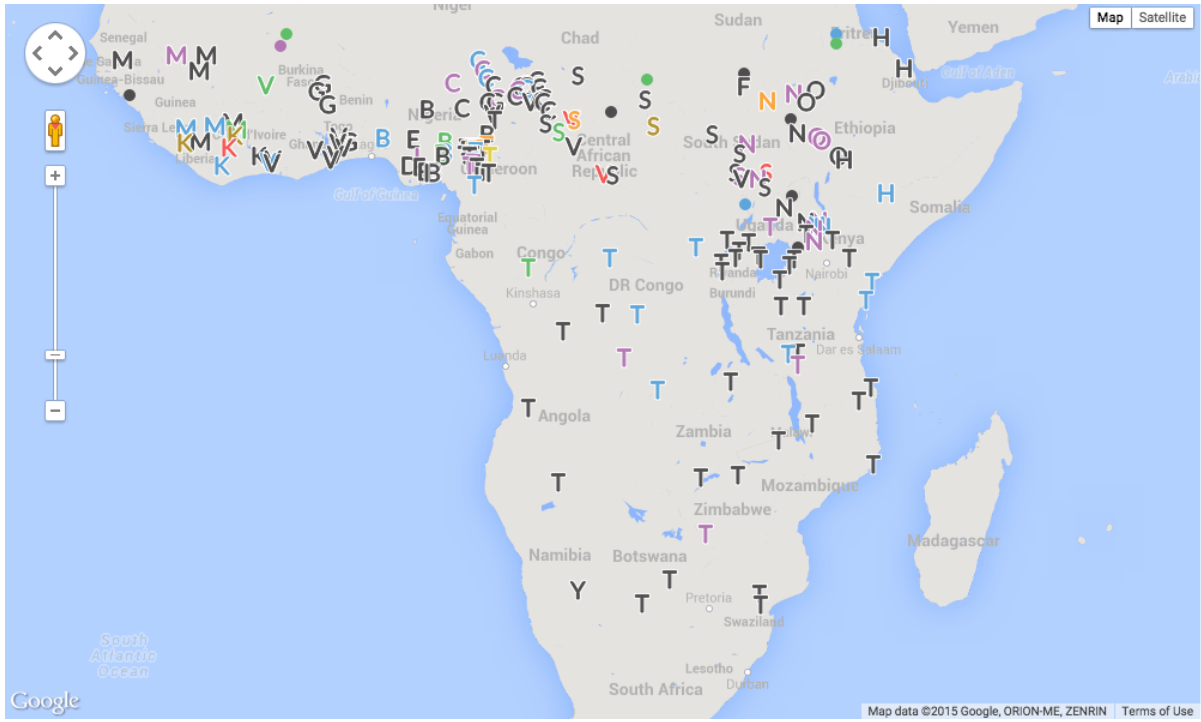

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Number of surface contour tones - West Africa

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Number of surface contour tones - Mande/Kru Zone

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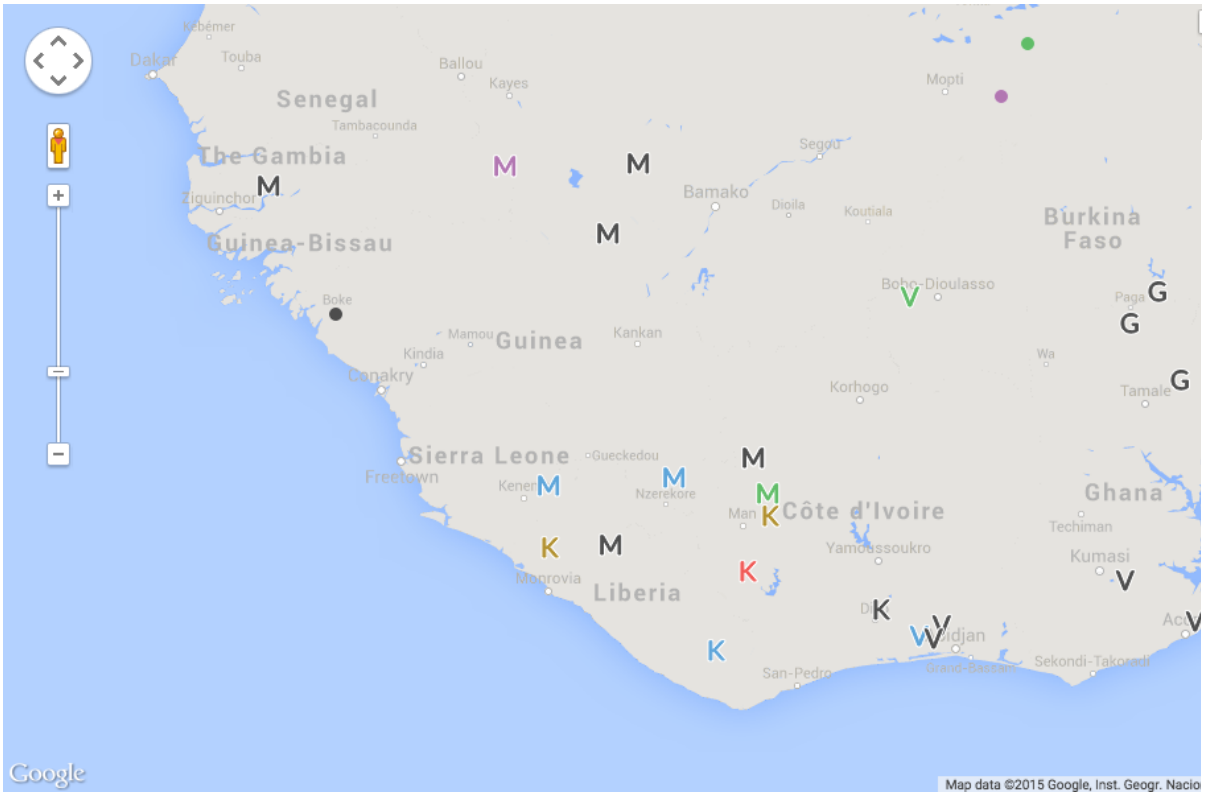

Number of surface contour tones - Nigeria/Cameroon vs. Southern Bantu

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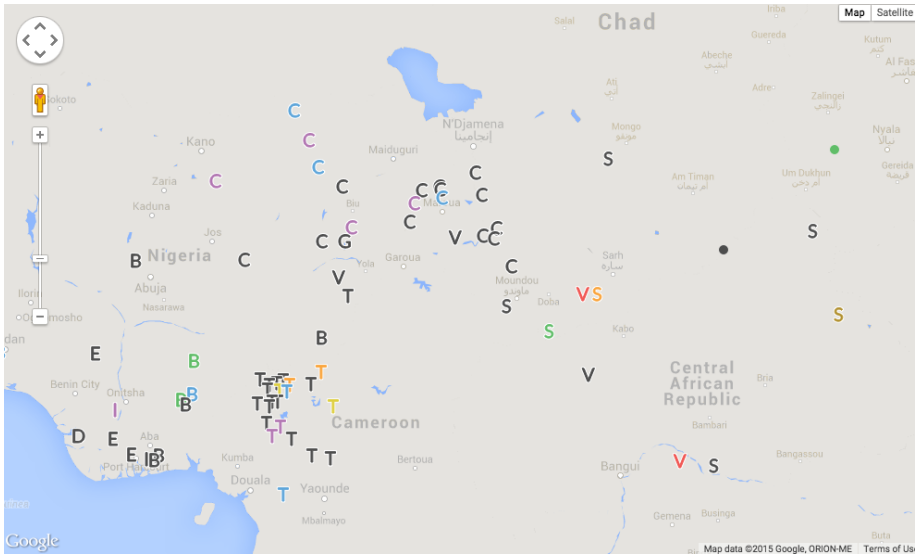

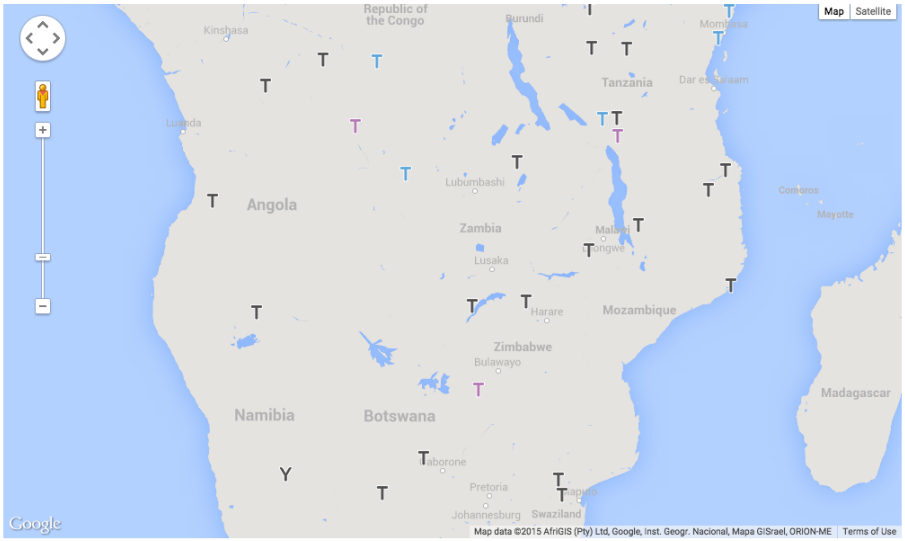

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- 1 Number of Contour Surface Tones
- 2 Number of Contour Surface Tones
- 3 Number of Contour Surface Tones
- 4 Number of Contour Surface Tones
- 5 Number of Contour Surface Tones
- 6 Number of Contour Surface Tones
- 7 Number of Contour Surface Tones
- 8+ Number of Contour Surface Tones

Number of surface contour tones - Summary

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- There is a high concentration of numerous contour tones in the Kru/Mande-zone, but not in Mande languages further away.

Number of surface contour tones - Summary

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- 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).

Number of surface contour tones - Summary

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- 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

Number of surface contour tones - Summary

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- 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?

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- The Ghana/Togo/Burkina Faso cluster is an area of 3-level tones that lacks contours

Are languages with a high number of level tones more likely to have a high number of contours?

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- 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

Are languages with a high number of level tones more likely to have a high number of contours?

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- 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

African languages by direction of contour tones

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- Here we are interested whether falling versus rising contour tones pattern together areally.

African languages by direction of contour tones

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- 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

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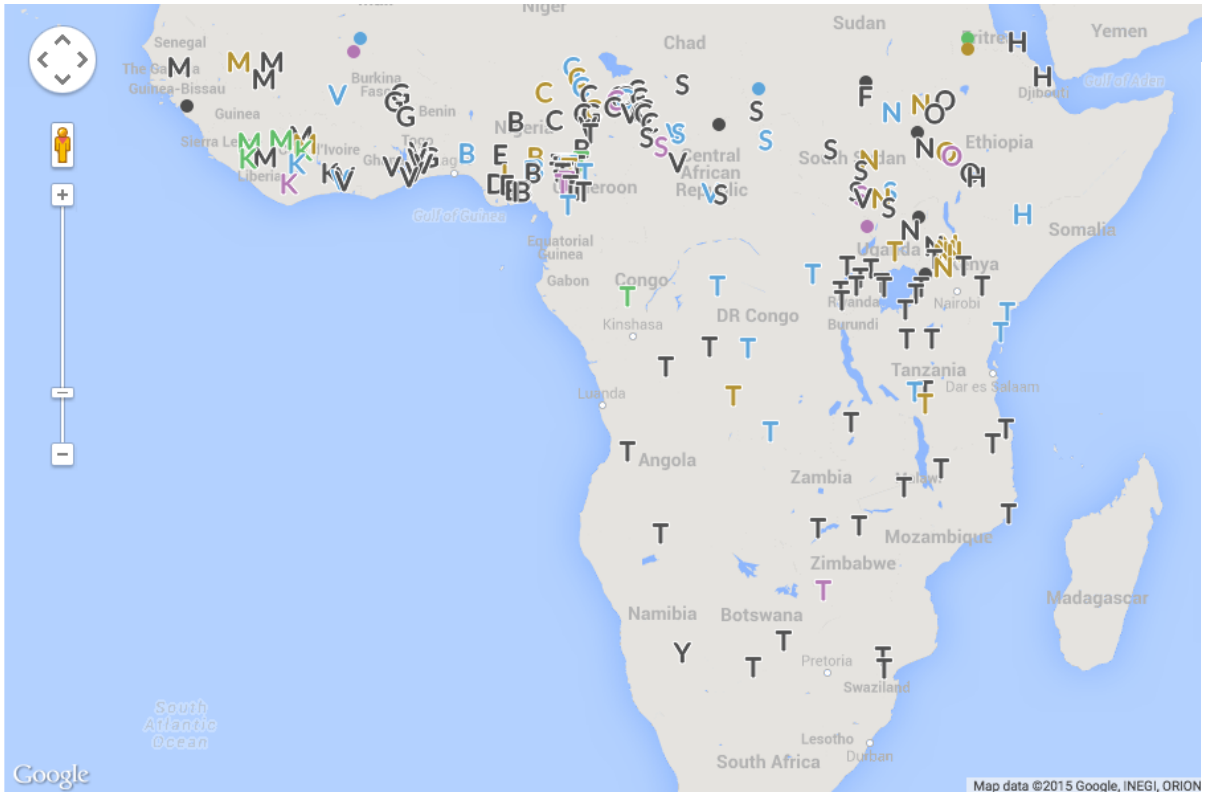

- **A** Atlantic
- **B** Benue-Congo
- **C** Chadic
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- **E** Edoid
- **F** Kordofanian
- **G** Gur
- **H** Cushitic
- **I** Igboid
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- **K** Kru
- **M** Mande
- **N** Nilotic
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- **S** Central Sudanic
- **T** Bantoid
- **V** Volta-Congo
- **W** Kwa
- **X** Nubian
- **Y** Khoe-Kwadi
- **Z** Atlantic-Congo
- Complex Contours
- Both Up and Down Contours
- Up Contours
- Down Contours
- No Contous

Direction of surface contour tones - Mande/Kru Zone

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Direction of surface contour tones - Summary

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- There is little evidence that falling versus rising contour tones are areally diffused.

Direction of surface contour tones - Summary

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- 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.

African languages by surface downstepped tones

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- The final tonal feature we examine is the distribution of surface downstepped tones.

African languages by surface downstepped tones

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- 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.

African languages by surface downstepped tones

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- 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 nothern Rwanda/Kenya

Surface downstepped tones

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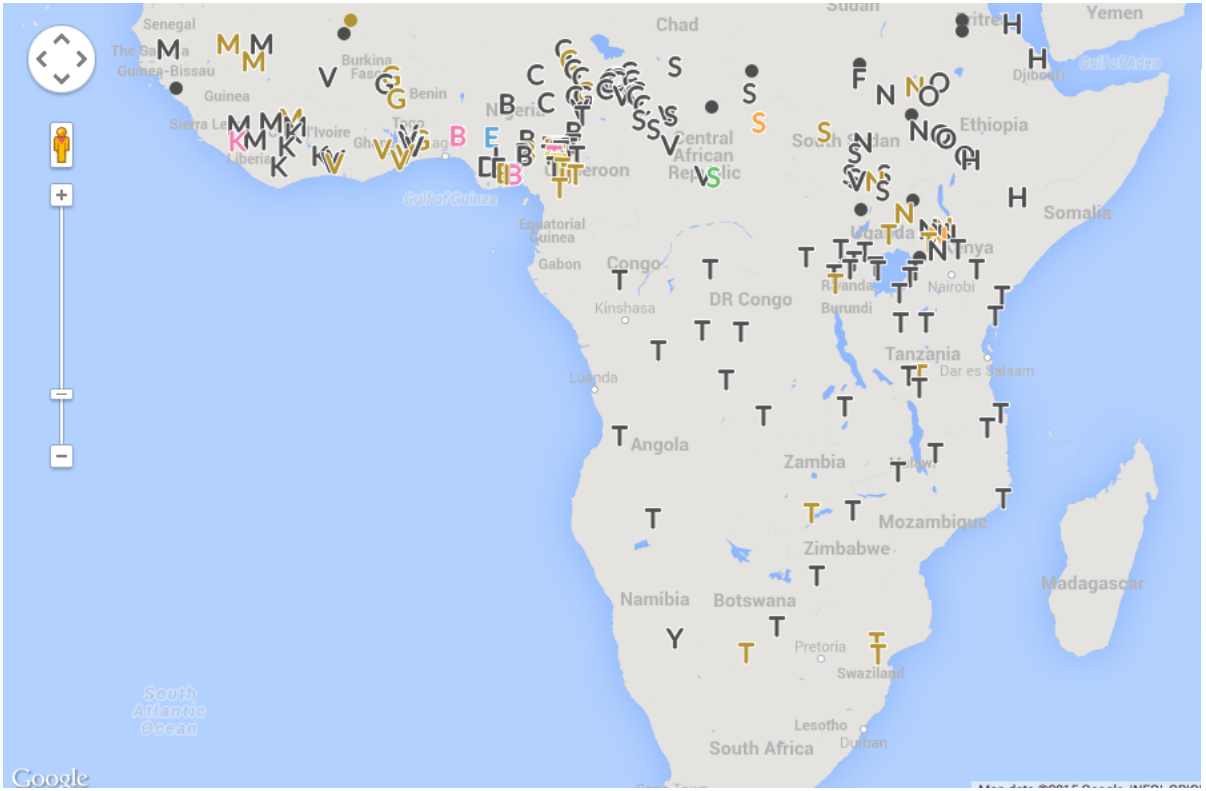

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- **S** Central Sudanic
- **T** Bantoid
- **V** Volta-Congo
- **W** Kwa
- **X** Nubian
- **Y** Khoe-Kwadi
- **Z** Atlantic-Congo
- Has tones !Low, !Mid, !High
- Has tones !Low, !Mid
- Has tones !Mid, !High
- Has tones !Low, !High
- Has tones !Low
- Has tones !Mid
- Has tones !High
- Does not match other tone groups.

Surface downstepped tones - Nigeria/Cameroon vs. Southern Bantu

Areal features

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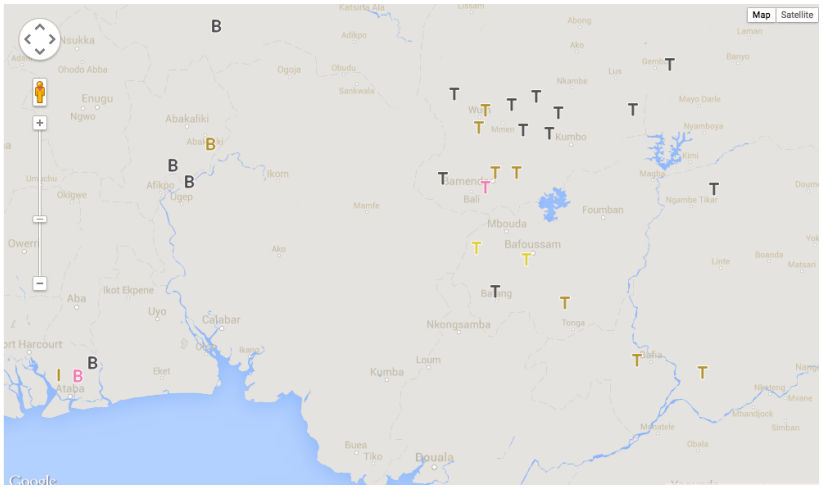

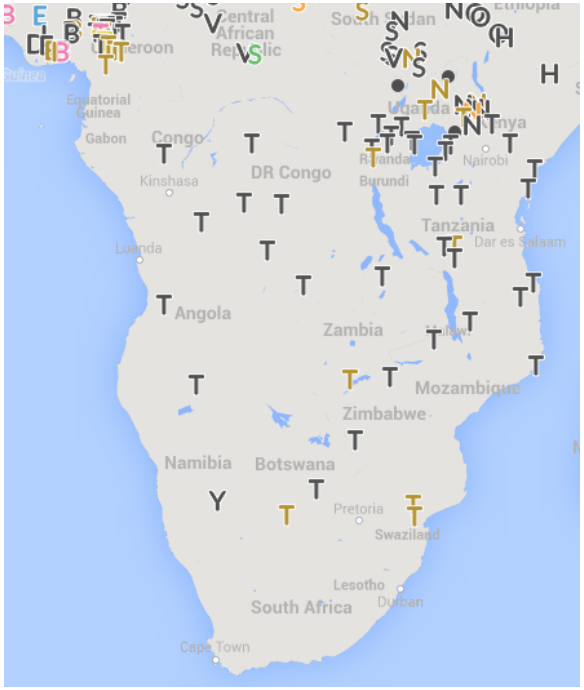

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- Has tones !Low, !Mid, !High
- Has tones !Low, !Mid
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- Has tones !Mid
- Has tones !High
- Does not match other tone groups.

Surface downstepped tones - Summary

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- The highest concentration of downstep is in West Africa between Côte d'Ivoire and the Nigeria/Cameroon border.

Surface downstepped tones - Summary

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- 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.

Surface downstepped tones - Summary

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- The highest concentration of downstep is in West Africa between Côte d'Ivoire and the Nigeria/Cameroon border.
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- Languages south of Lake Chad lack downstep

Surface downstepped tones - Summary

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- 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

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- South of Lake Chad
  - Three level tones that are H M L
  - No contours or downstep

Linguistic micro-areas based on tone

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- 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

Linguistic micro-areas based on tone

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- 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

Linguistic micro-areas based on tone

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  - 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

A closer look at tone as a areal feature in the Kru/Mande Zone

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- Proto-Mande is reconstructed with two level tones (Vydrin, 2002).

A closer look at tone as a areal feature in the Kru/Mande Zone

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- Proto-Mande is reconstructed with two level tones (Vydrin, 2002).
- Proto-Kru is reconstructed with four level tones (Marchese, 1979; Marchese Zogbo, 2012).

A closer look at tone as a areal feature in the Kru/Mande Zone

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- 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.

A closer look at tone as a areal feature in the Kru/Mande Zone

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- 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

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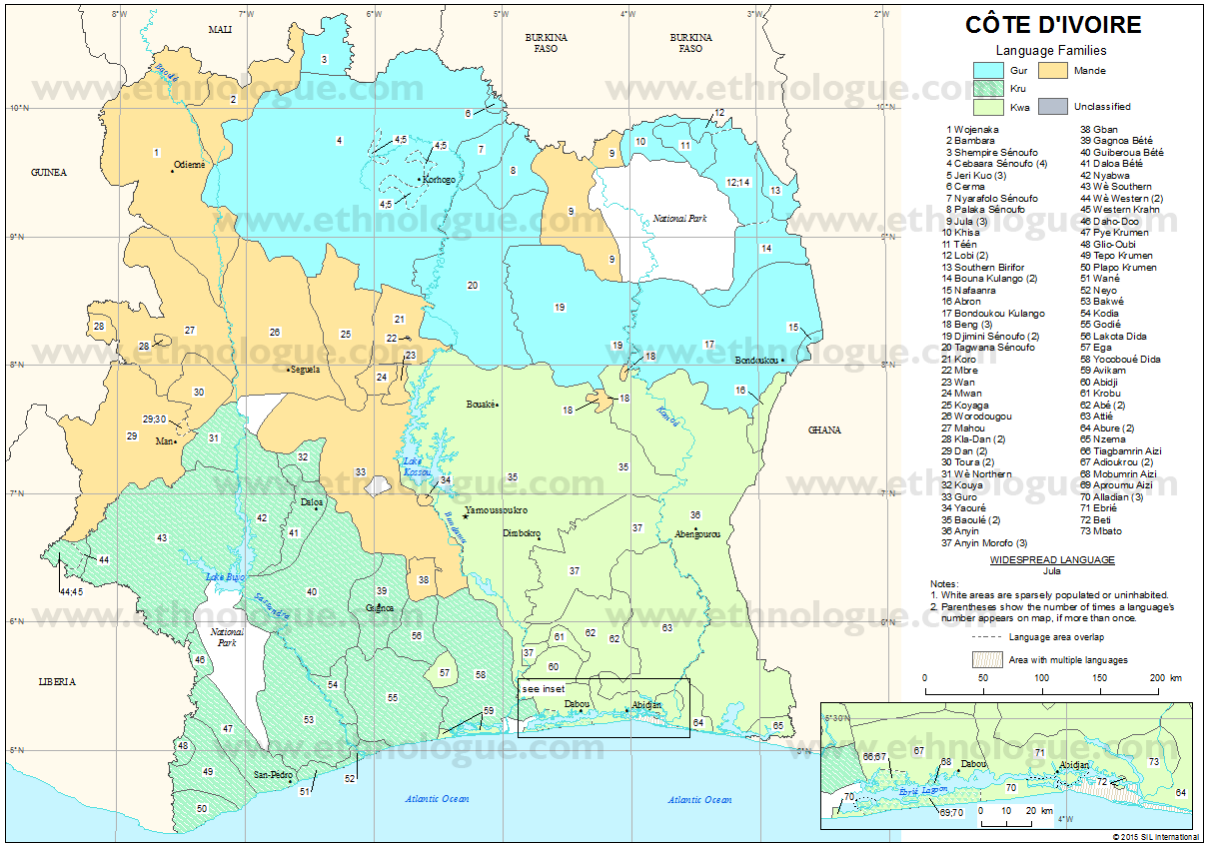

- Kru tone heights:
  - Niaboua (Western Wè) - 4 (Bentinck, 1978)
  - Kouya - 4 (Saunders, 2009)
  - Guéré (Southern Wè) - 4 (Paradis, 1983)

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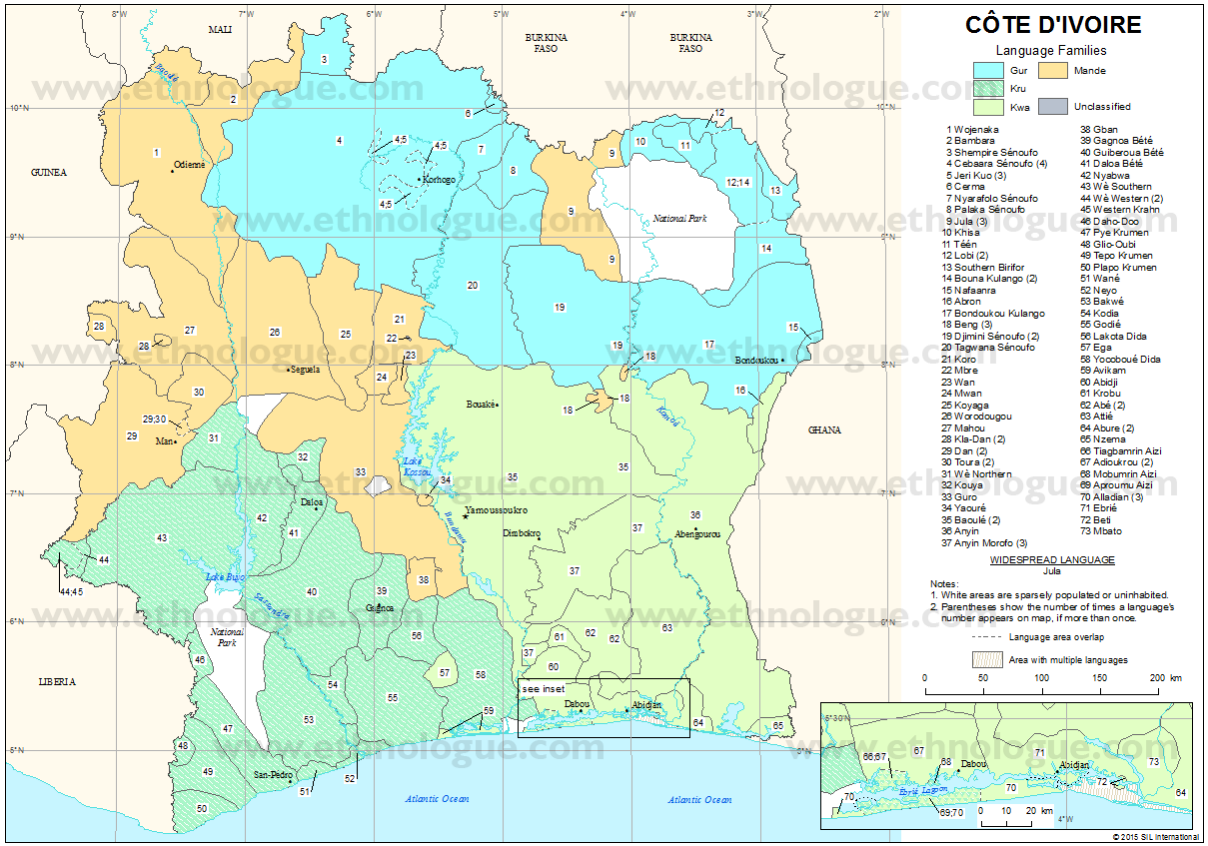

- Mande tone heights:
  - Dan - 5 (Bearth and Zemp, 1967)
  - Toura - 4 (Bearth, 1971)
  - Mahou - 3 (Creissels, 1988)

A closer look at tone as a areal feature in the Kru/Mande Zone

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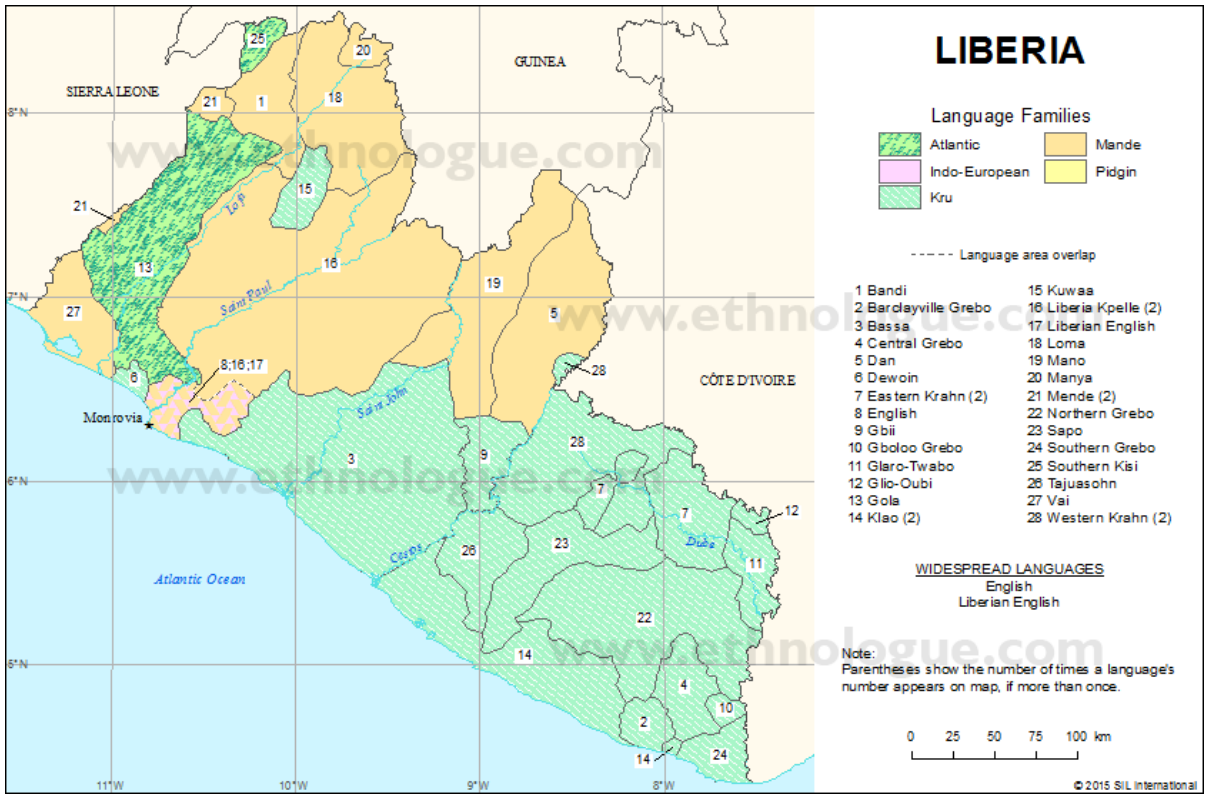

- Kru tone heights:
  - Bassa - 3 (Hobley, 1964) or 4 (Bertkau, 1975)
  - Krahn - 3 (Duitsman)
  - Niaboua (Western Wè) - 4 (Bentinck, 1978)

A closer look at tone as a areal feature in the Kru/Mande Zone

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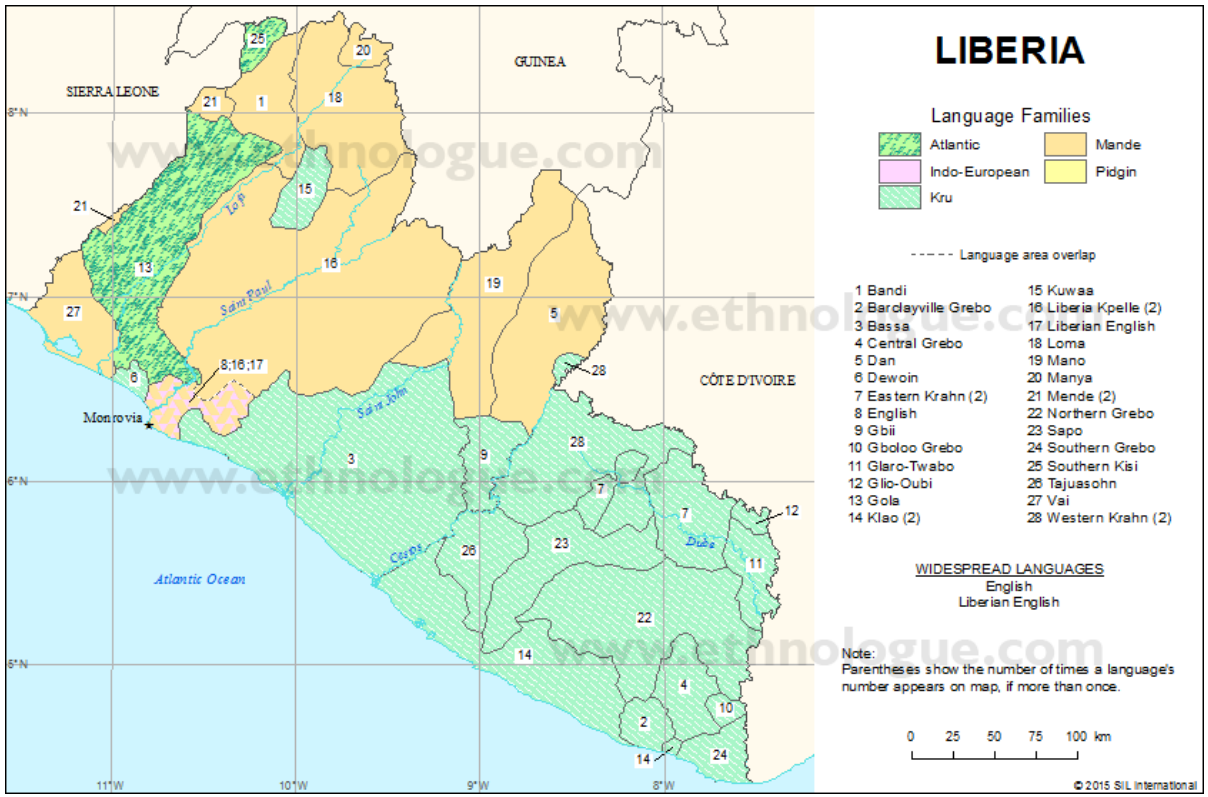

- Mande tone heights:
  - Dan - 5 (Bearth and Zemp, 1967)
  - Mano - 3 (Kachaturyan, 2014)
  - Kpelle - 3 on the surface but only 2 phonemically (cf. Konoshenko 2011 for an overview)

Further phonological evidence of micro-areas in Africa

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

Vowel features

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- 74 languages of the Macro-Sudan belt

Vowel features

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- 74 languages of the Macro-Sudan belt
- Coded for vowel inventory, nasality, ATR harmony

Vowel features

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- 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

African languages by ATR and Interior Vowels

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- The literature is not in agreement about whether Proto-Niger-Congo had ATR harmony (cf. Dimmendaal 2001 for an overview)

African languages by ATR and Interior Vowels

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- 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

African languages by ATR and Interior Vowels

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- 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

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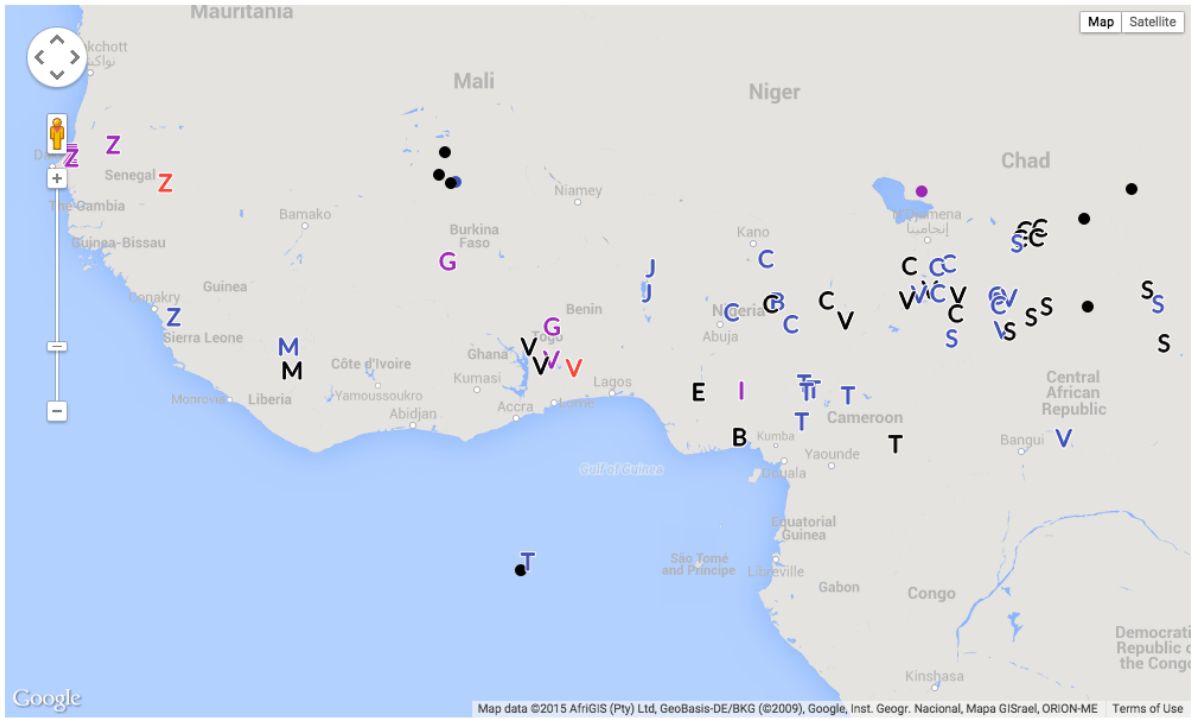

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- **S** Central Sudanic
- **T** Bantoid
- **V** Volta-Congo
- **W** Kwa
- **X** Nubian
- **Z** Atlantic-Congo
- ■ no ATR, no interior vowels
- ■ ATR, no interior vowels
- ■ no ATR, interior vowels
- ■ ATR, interior vowels

ATR and Interior Vowels - Summary

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- Many languages at the Nigeria/Cameroon border and south of Lake Chad have interior vowels but lack active ATR systems

ATR and Interior Vowels - Summary

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- 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

ATR and Interior Vowels - Summary

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- 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

Nasal Vowels

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- Based on data from 473 languages, Rolle (2015) finds evidence for five micro areas in West Africa having only oral, not nasal, vowels

Nasal Vowels

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References

- 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

Syllable and word structure

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- 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

Syllable and word structure

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- 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

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- We have found evidence for linguistic micro-areas including:

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- 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

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- 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

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- 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

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- 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

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- 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

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

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- 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?

Acknowledgements

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