Phonology in lexical variants

Feature opposition in selected feature types

TISLR-15
Addis Ababa, Ethiopia
January 14-17, 2025

Hope E. Morgan
hope.morgan@uni-hamburg.de
Margaret Odhiambo
margaret.odhiambo@uni-hamburg.de

BACKGROUND

Previous studies have evaluated lexical variation — especially in micro-community sign languages and homesign systems — by tracking both the "**iconic prototype**"[7,3] / "**sign base**"[6] as well as variation in phonological form.[6,5,2,1]

For example, Figure 1 shows three lexical variants for *avocado* from Kenyan Sign Language (KSL), with two conceptual sign bases. In **Fig.1a**, avocado is represented by its size and shape when held in the hands. In **Fig.1b** and **1c**, a different sign base depicts the removal of the avocado skin with the dominant hand, while the non-dominant hand represents the avocado itself. In 1b and 1c, the specific shapes on each hand differ, while the location and movement are the same.

Figure 1. Lexical variants for 'avocado' in KSL that use different iconic prototypes: (a) size & shape of avocado as held in hands, (b,c) how avocado skin removed

Prior studies have evaluated variations between lexical items elicited from pictures; e.g., butterfly, guava, hospital. Thus, the analysis is typically focused on form varitions around one lexical meaning at a time.

However, what happens when the same sign base/iconic prototype is used to represent more than one lexical meaning? The current study evaluates a cluster of four concepts in KSL that use the same visual referent:

an arc- or dome-shape placed on a flat landscape

This study is an expansion on previous observations about these four KSL signs based on partial data (see Morgan 2022: 80–84).

RESEARCH QUESTIONS

What are the effects on form (phonology) when multiple lexical signs share the same conceptual sign base / iconic prototype?

- What is conventionalised?
- What is the evidence for different lects?
  - *national lect, dialects, idiolects*
- How does the phonology of signs differ?

TARGET DATA

Signs in Kenyan Sign Language with these four meanings:

town, city, hill, mountain

METHODS

PARTICIPANTS (36 signers)

Gender. 31 new participants recruited, balanced for gender: 16 female, 15 male. 5 signers from previous data: 3 female; 2 male.

Age. Only adults recruited. Age was not controlled; the largest group is 25-35yrs (**Fig. 2**).

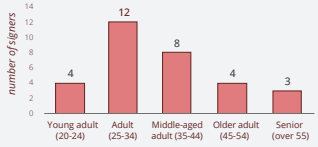


Figure 2. Age groups of 31 recruited deaf participants

Region. Deaf signers were recruited from 14 counties (**Fig. 3**) using a 2-step chain referral method: from 2nd author to 5 contacts, who then contacted 3-4 signers in nearby counties. Signers from Nairobi were not recruited to avoid influence from urban dialect-mixing. Signers from the central and coastal regions are under-represented in this study due to a bias in the social network.

Figure 3. Map of locations of signer hometowns (gray borders are counties)

Figure 4. Map of deaf schools (▲) attended by participants & other sources (▲)

TASK

Participants were asked to film themselves signing their KSL sign(s) for 21 meanings for **fruits & places**. They responded to a list of prompts in English, in the order shown in **Table A**. The four target signs for this study indicated with an arrow (⬅).

Table A. Order of prompts (presented in English)

order	category	prompt	
1	FRUIT	banana	
2	PLACE	city	⬅
3	PLACE	river	
4	FRUIT	coconut	
5	PLACE	mountain	⬅
6	PLACE	school	
7	FRUIT	mango	
8	PLACE	town	⬅
9	FRUIT	avocado	
10	PLACE	ocean	
11	FRUIT	guava	
12	PLACE	desert	
13	FRUIT	papaya	
14	PLACE	hill	⬅
15	FRUIT	passionfruit	
16	PLACE	coast	
17	FRUIT	orange	
18	PLACE	island	
19	FRUIT	pineapple	
20	PLACE	lake	
21	FRUIT	lemon	

FINDINGS

A. Signers overwhelmingly refer to the same visual referent of an arc- or dome-shape(s) on the land for *town, city, hill, mountain,* as shown in **Table B** (128/139 responses; 92%). This means that signers widely share this form-meaning mapping across the country — i.e., **evidence of a national lect.**

Table B. Signs with arc/dome as conceptual base

Signer	town	city	hill	mountain
1	arc	arc	arc	arc
2	arc	arc	arc	arc
3	arc	arc	arc	arc
4	arc	arc	arc	arc
5	arc	arc	arc	arc
6	arc	arc	arc	arc
7	- -	arc	arc	arc
8	arc	arc	arc	arc
9	arc	different	arc	arc
10	different	arc	arc	arc
11	arc	- -	- -	arc
12	arc	arc	arc	arc*
13	arc	arc	arc	arc
14	arc	arc	arc*	arc
15	arc	arc	arc	arc
16	arc ?	arc ?	arc	- -
17	arc	arc	arc	arc
18	arc	arc	arc	arc
19	arc	clump	arc	arc
20	arc	arc*	- -	arc
21	arc ?	arc ?	arc	arc
22	arc	arc	arc	arc
23	clump	different	arc**	arc
24	arc	arc	arc	arc
25	arc	arc	arc	arc
26	arc	arc**	arc	arc
27	arc	arc	arc	arc
28	arc ?	different	arc	arc
29	arc	arc	arc	arc
30	arc	arc	arc	- -
31	arc	- -	arc	- -
32	arc	- -	arc	arc
33	arc	- -	arc	arc
34	arc	different	arc	arc
35	arc	arc	arc	arc
36	arc	arc	arc	different

5 signers from previous data (Morgan 2022)

KEY
arc — use arc/dome as visual referent
arc* — signer gives 2 signs; one is 'arc'
arc** — compound with one sign as 'arc'
arc ? — form is arc/dome, but with modification
clump — arc/dome image via claw handshape
different — sign has a different motivation & form
- - — sign missing

B. A breakdown of the key features in the four signs across signers (**Appendix A**) show similar features re-occuring, as well as possible default signs; however no clearly defined lexical variants.

Also, no clear patterns by region, deaf school, age, or gender emerge from this small sample, though a larger sample might show clearer trends. **Thus far, no evidence for dialectal variation is found.**

► See videos for *town, city, hill, mountain* **(on laptop)**

C. Problem: how to view identical forms found for different meanings across signers (**Fig. 5**): is it polysemy?

This "problem" is resolved by treating **idiolects** as the organising principle for form patterning in the four signs. When tracking just the features used to distinguish signs (or not) between all 6 pairs within individual signers, the patterning is more systematic. An especially clear case is Signer 13 who has a near-symmetrical paradigm between the four signs, as shown in **Fig. 6**: town↔city and hill ↔mountain are both minimal pairs that differ by **repetition**, while town ↔hill and city↔mountain differ by **path size**. The cross-oppositions both differ the same by two features.

Yet, other signers use different phonological paradigms: different minimal pairs, and use of different features.

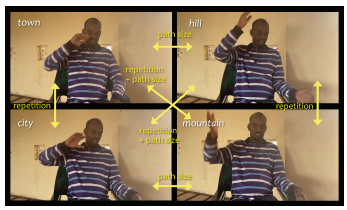


Figure 6. Signer 13 with (near-)symmetrical phonological paradigm

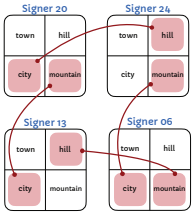


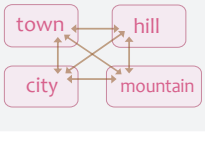
Figure 5. Same forms but different meanings across signers: polysemy?

CONCLUSION:

This cluster reflects a **national lect** at the level of the conceptual 'sign base', but morpho-phonological patterning at the **idiolectal level.**

ANALYSIS

1. The target videos for each person were imported into FileMaker Pro database to compare side-by-side (e.g., Fig. 6)
2. Each sign assessed for whether it adhered to the same sign base; that is, the concept of a *dome-shape-on-a-horizontal-plane*
3. Each sign coded for form features:
   a. handshape
   b. axis
   c. path size
   d. repetitions
   e. other: height, speed, mouth, eyes
4. Within each signer, feature differences were coded between all possible pairs in the set of four signs; i.e., **six oppositions**:



D. Quantifying pair oppositions (Figs. 7, 8) clarifies the systematicity across signers:
- Closer in meaning is closer in form: polysemy (■) in *town*↔*city* and *hill*↔*mountain*; with greatest distance (■) in *city*↔*hill*
- There are many minimal pairs (■) across signers, as expected from Morgan 2022
- Unique connection linking this 4-part cluster is the overlap in form between *town* and *hill*

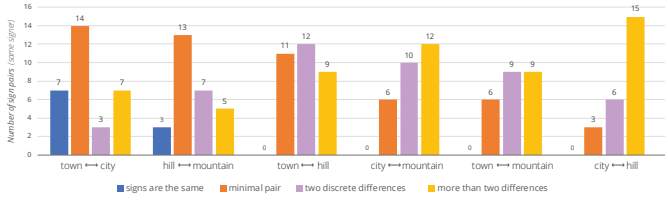


Figure 7. Degrees of phonological difference by features between pairs in the cluster (signs in compounds not included)

E. The same features are repeatedly recruited in oppositions, but **repetition** is the most common feature contrast found in minimal pairs. **Axis** features (e.g., *horizontal*, *midsagittal*), on the other hand, appear in most signs in the cluster, but were only found in one minimal pair and seven 2-feature contrasts.

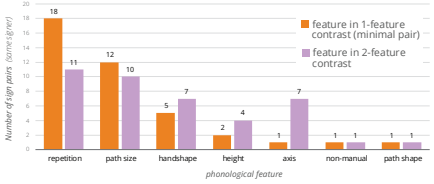


Figure 8. Contrasting features in 100 pairs that differ by 1 feature (minimal pair,■) or 2 features (■); (36 signers x 6 pairs, excluding pairs with compounds or missing signs; sorted by # minimal pairs)

REFERENCES

1 Horton, Laura (2020). Representational strategies in shared homesign systems from Nebaj, Guatemala. In Le Guen, Safar, & Coppola (eds), *Emerging sign languages of the Americas*, 97–154. Berlin: Walter de Gruyter.
2 Hou, Lynn (2018). Iconic patterns in San Juan Quiahije Chatino Sign Language. Sign Language Studies 18 (4):570–611. https://www.jstor.org/stable/26637449
3 Morgan, Hope E. (2015). When does a word emerge? Lexical and phonological variation in a young sign language. *San Diego Linguistics Papers*: 2–17. https://escholarship.org/uc/item/0dg64753
4 Morgan, Hope E. (2022). *A Phonological Grammar of Kenyan Sign Language*. Berlin, Boston: De Gruyter Mouton. https://doi.org/10.1515/9783110765694
5 Mudd, Katie, Hannah Lutzenberger, Connie de Vos, Paula Fikkert, Onno Crasborn, & Bart de Boer (2020). The effect of sociolinguistic factors on variation in the Kata Kolok lexicon. *Asia-Pacific Language Variation* 6(1):53–90.
6 Reed, Lauren W. (2022). Sign networks: Nucleated network sign languages and rural homesign in Papua New Guinea. *Language in Society* 51: 627–661. https://doi.org/10.1017/S0047404521000798
7 Sandler, Wendy, Mark Aronoff, Irit Meir, and Carol Padden (2011). The gradual emergence of phonological form in a new language. *Natural Language & Linguistic Theory* 29: 503–543. https://doi.org/10.1007/s11049-011-9128-2

Part of this study supported through Margaret Odhiambo's research on KSL variation at Kenya Institute of Special Education (KISE).

Funded/Co-funded by the European Union (ERC, SemaSign, No.101117081). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Council. Neither the European Union nor the granting authority can be held responsible for them.