The Handshape Parameter in Kenyan Sign Language

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Goals

- Provide a description of the phonological system of under-studied sign language, Kenyan Sign Language.

- Show that KSL conforms to phonological restrictions governing two-handed signs (Symmetry & Dominance Conditions) in most ways, with a few exceptions.

- Provide evidence for a new kind of handshape restriction: on the *dominant hand* in two-handed signs with handshapes that don't match.

PART 1

- History & background of KSL

- Handshape parameter in Kenyan Sign Language

PART 2

- Symmetry & Dominance Condition in KSL

- Explanations for KSL signs that don't conform to the Dominance Condition

Background of Kenyan Sign Language

- Origin in 1960s with 2 deaf schools in the west; spread during the1970s-80s, with standardization over that time. (Okombo & Akach 1997)

- 46 primary schools, 4 secondary schools, 35 units (serving 8300+ students) (U.S. Peace Corps Survey 2007)

- Evidence for some influence of ASL and/or Signed Exact English in the lexicon (Hochgesang 2007; Roberts 2009; Morgan, et al., in preparation)

- No more than 20% full cognates with ASL; "not a creole of ASL" (Roberts 2009)

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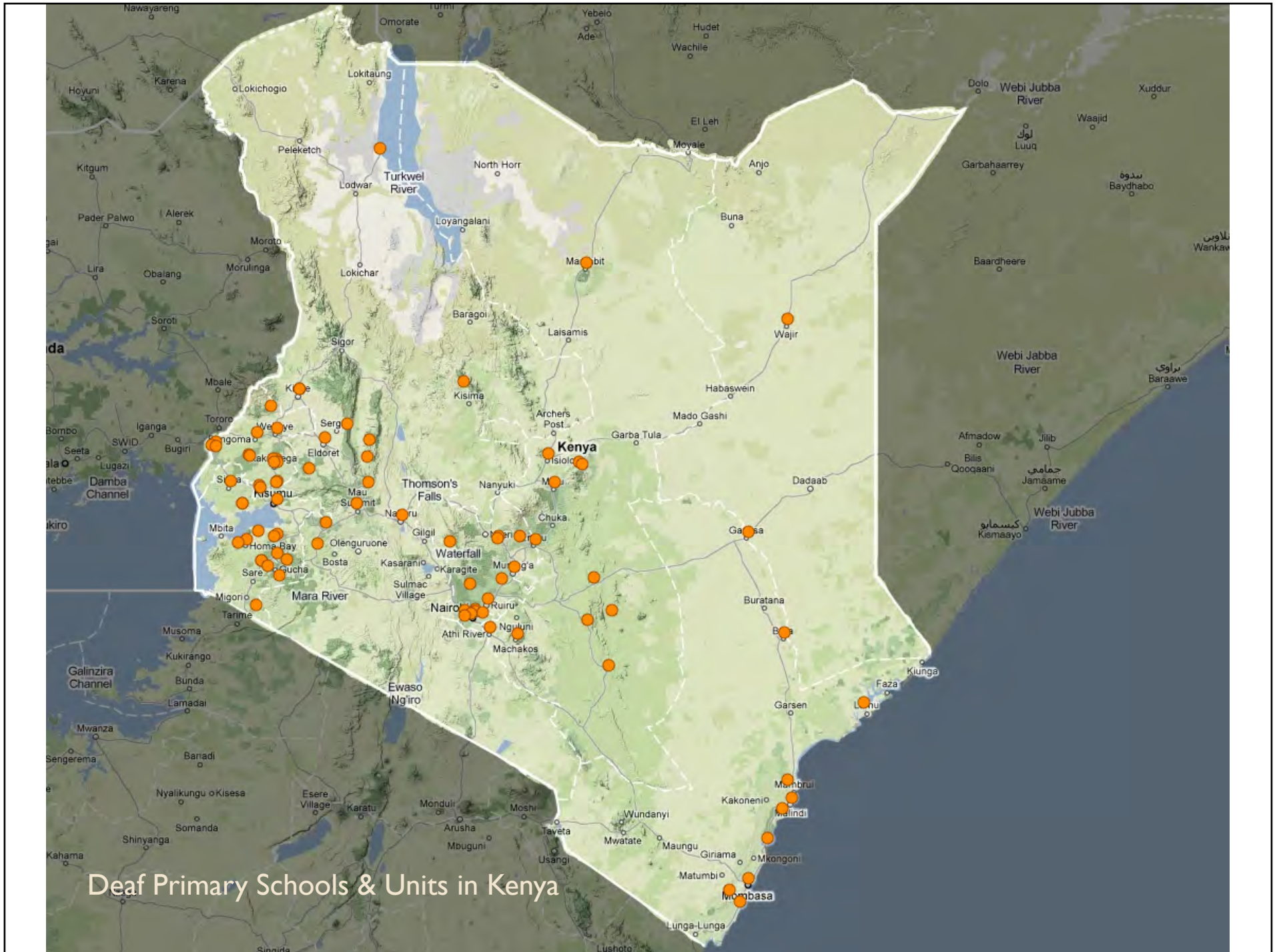
Deaf Primary Schools & Units in Kenya

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- 46 primary schools, 4 secondary schools, 35 units (serving 8300+ students) (U.S. Peace Corps Survey 2007)

- Evidence for some (limited) influence of ASL and/or Signed Exact English in the lexicon (Hochgesang 2007; Roberts 2009; Morgan, Gilchrist, & Burichani, in prep)

- No more than 20% full cognates with ASL; "not a creole of ASL." (Roberts 2009)

Data set

- Interactive video dictionary of 991 QuickTime movies.
- Joint project of the KSL Research Project (U. of Nairobi) & U.S. Peace Corps volunteers (2004).
- Design: a tool for families with deaf members to learn KSL.
- Female signer in her 30s from Central Province, Kenya.

Data set

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- Female signer in her 30s from Central Province, Kenya.

- **958 lexical entries**, after 33 fingerspellings, duplicates, & homophones, removed.

- Data coded in a in a FileMaker Pro database:

FIELDS:

- HANDSHAPE
- HANDEDNESS (1or2 hands)
- MOVEMENT TYPE
- SIGN TYPE (Battison 1978)

Phonological parameters in KSL

- The three major phonological parameters in signed languages are *handshape*, *location*, and *movement*.

- **Minimal pairs:** two signs that vary by only one parameter

  - show that each parameter is *phonemic*. That is, a change in only a single handshape, a single location, or a single movement can change the meaning of the sign.

(near) Minimal Pairs in KSL

HANDSHAPE   LOCATION   MOVEMENT

GITHERI (beans & rice dish)   LUO (name of tribe)

(near) Minimal Pairs in KSL

HANDSHAPE   LOCATION   MOVEMENT

GLASSES   A.I.D.S

(near) Minimal Pairs in KSL

HANDSHAPE   LOCATION   **MOVEMENT**

PORRIDGE

IGNORE

Phonetic Inventory of 52 KSL Handshapes

Using Hamburg Notation System (Prillwitz, et al. 1989)
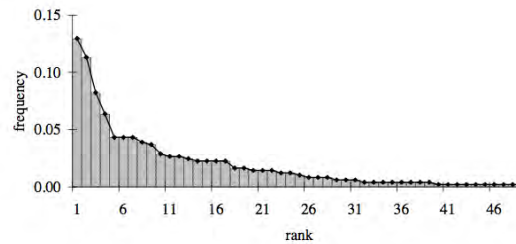
Distribution of KSL Handshapes
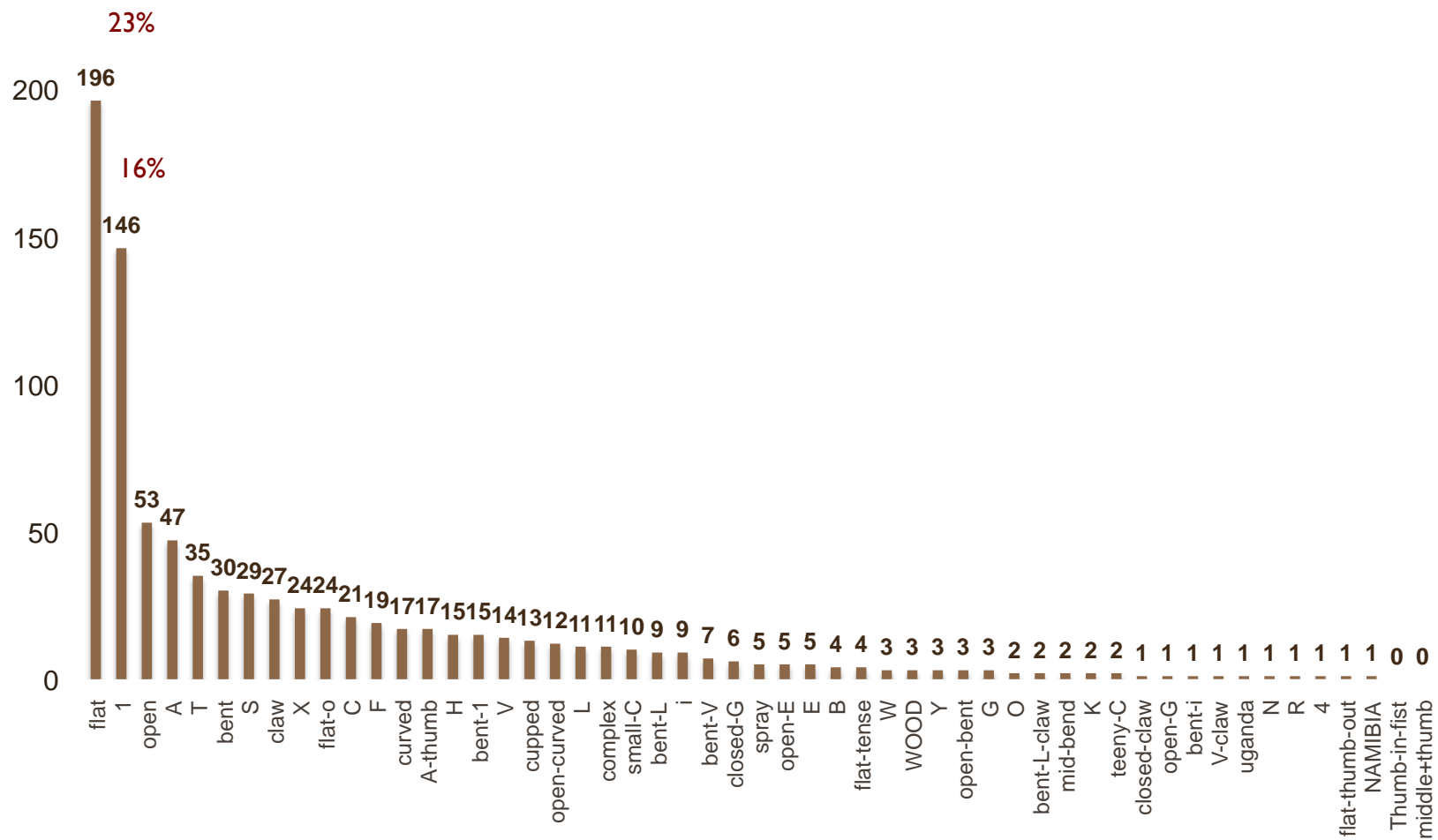
Distribution in other sign languages Rozelle (2003)

(3-36) ASL: handshape rank-frequency graph
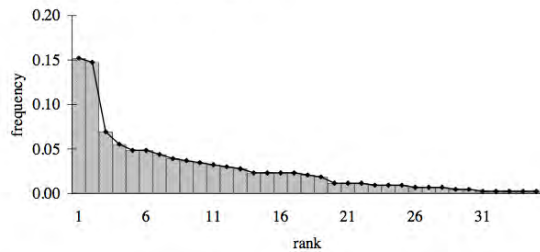
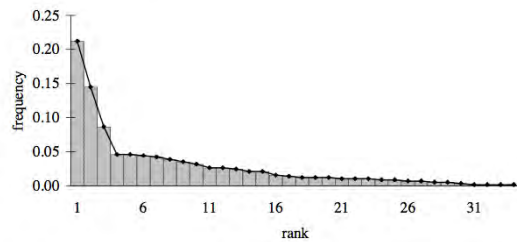American Sign Language

(3-42) NZSL: handshape rank-frequency graph
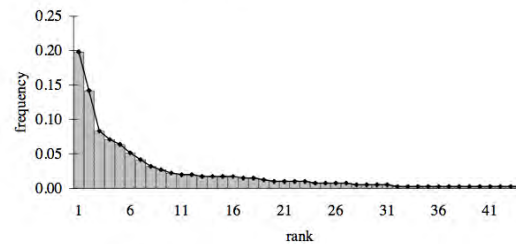
New Zealand SL

(3-50) NGT: handshape rank-frequency graph
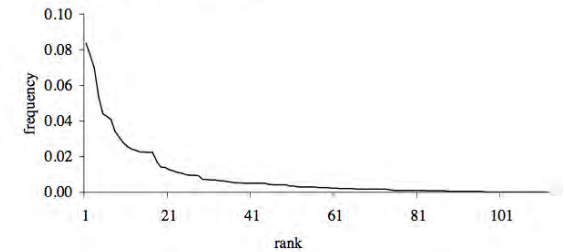
SL of the Netherlands (NGT)
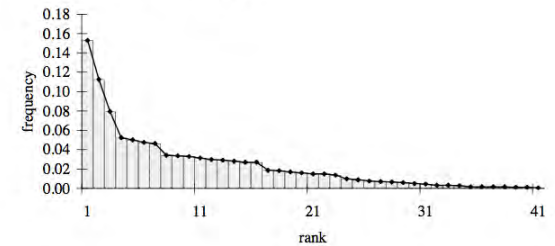
(3-45) SVK: handshape rank-frequency graph

Finnish Sign Language
(SVK)

(3-39) KSL: handshape rank-frequency graph

Korean Sign Language

(3-52) LIS: handshape rank-frequency graph

Italian Sign Language (LIS)

Data & images from Rozelle (2003)

Symmetry & Dominance Conditions
(Battison 1978)

- Govern combinatory possibilities of the two hands in two-handed signs:

  - When both hands involved in a sign, what combinations of handshape, movement, & location are possible for each hand?

- Constrain phonological complexity of signs.

- Generally have held up in cross-linguistic studies.

The Symmetry Condition

(a) if both hands of a sign move independently during its articulation, then

(b) Both hands must be specified for the same location, the same handshape, the same movement (whether performed simultaneously or alternatingly)

"Type 1 signs" (Battison 1978)

The Dominance Condition

(a) if the hands of a two-handed sign do not share the same specification for handshape (i.e. they are different), then

(b) one hand must be passive while the active hand articulates the movement and

(c) the specification of the passive handshape is restricted to be one of a small set: A, S, B, 5, G/1, C, O. [*unmarked set* of handshapes]

"Type 3 signs" (Battison 1978)

Two criteria for the non-dominant hand:

- *passive* (not moving)
- *shape is restricted*

KSL Sign Types (Battison's typology)

Sign Type	Description	In KSL Dictionary:	
Type 0	1-handed; neutral space	148	39% 1-handed
Type X	1-handed; contact body	221	
Type 1	2-handed; handshape & movement matched	310	
Type 2	2-handed; handshape matched, movement unmatched	65	48% 2-handed
Type 3	2-handed; handshape & movement unmatched	91 — 80	
Compounds	[mixed]	131	13% compounds
		958 Total	

Symmetry Condition in KSL

All two handed signs in which both hands move independently have the same handshape, except:

- Two lexical entries that violate both conditions:

START
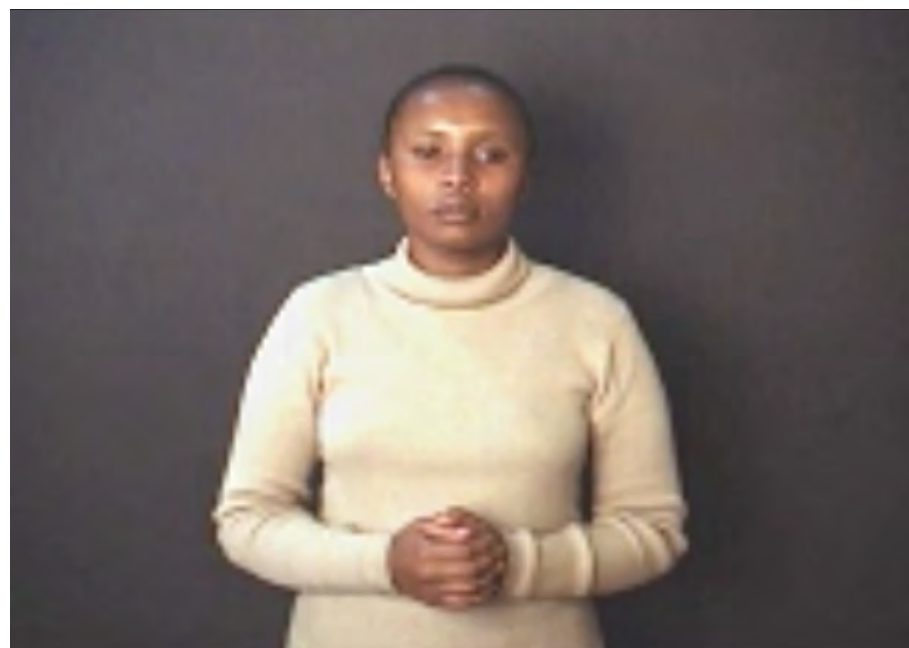
PROBLEM

Dominance Condition in KSL

Two criteria for the non-dominant hand:
- *passive* (not moving)
- *shape is restricted*

FIRST CRITERION:

All two handed signs with the unmatched handshapes have a passive non-dominant hand, except one:
- START

Dominance Condition in KSL

Two criteria for the non-dominant hand:

- *passive* (not moving)
- *shape is restricted*

SECOND CRITERION:

Approaches to handshape restriction:

1. Battison's set of 7 handshapes will apply to all languages

2. Language-specific sets (Rozelle 2003; Eccarius & Brentari 2007: 1178)

3. A universal unmarked set: /, , / (Sandler/Lillo-Martin 2006, Rozelle 2003)

4. Markedness across both hands, not just non-dominant hand (Eccarius & Brentari 2007)

Type 3 signs in KSL

Handshapes on the non-dominant hand in Type 3 signs:

Battison:	Picture	Name	# Signs	%
*		flat/B	58	64 %
*		S	9	10 %
*		5	8	9 %
*		1	5	5 %
*		A	4	4 %
		thumb-T	2	2 %
		complex	2	2 %
*		C	1	1 %
		claw	1	1 %
		V	1	1 %

Universal Unmarked Set

Total = 91 Type 3 signs (includes signs in compounds)

What do these odd cases tell us?

- ASL also has cases that violate handshape restriction:
  - Eccarius & Brentari (2007: 1180) – **4.1%** of Type 3 signs
  - Napoli & Wu (2003: 128) – **3.6%** of Type 3 signs
    - e.g., **THEN**, **SKIP-CLASS**, **CHOOSE**, etc.

- **Three hypotheses for the KSL cases**:
  1. These handshapes are in a KSL-specific unmarked set
  2. Conform to featural constraints *across both hands*
  3. Another phonologically explanation?

  ➢ *Rare cases with no pattern/generalization*

Language-specific "unmarked set" ?

- Rozelle 2003; Eccarius & Brentari 2007

- Are the handshapes on the non-dominant hand in Type 3 signs "unmarked" in KSL?

- Frequency as measure of markedness (Greenberg 2005)

CONCLUSION: A language-specific set does not explain these handshape.

Picture	Handshape	Count	Base Frequency
	flat/B	58	0.224
	S/A	13	0.087
	open/5	8	0.061
	I	5	0.167
	thumb-T	2	0.000
	[complex]	2	0.000
	claw	1	0.031
	V	1	0.027
	C	1	0.024

HYPOTHESIS 2:
Featural constraints on both hands?

- Is the restriction on the complexity across both hands, not just the non-dominant hand?

- Eccarius & Brentari (2007):
  - Markedness score on each hand for _selected fingers_ and _joint specification_.
  - Maximum possible = 4 marked features.
  - Constraint: of two marked features across both hands

- **Results**: All Type 3 signs have a score of 2 or less.

CONCLUSION: featural constraints across the hands account for all of the Type 3 signs in KSL.

Another phonological generalization

- In Type 3 signs, the ☝ handshape becomes the most frequent on the **dominant hand**:

ALL SIGNS

Handshape	Base Frequency
✋	0.224
☝	0.167
✊ / ✊	0.087

TYPE 3 SIGNS

Universal unmarked	Type 3 Frequency (H1)	Type 3 Count
▶ ☝	0.252	23/91
✋	0.032	3/91
✊ / ✊	0.021	2/91

(showing only the most common handshapes)

Another phonological generalization

The seven signs show a pattern on the dominant hand:

Name of sign	H1	H2
1. RUSSIA		
2. POTATO		
3. START		
4. CONDUCTOR		
5. HOW-MANY		
6. CLITORIS		
7. FEMALE-CIRCUMCISION		

Hand interaction effect?

When H2 is marked (infrequent), the H1 must be a 1 handshape ( ).

HYPOTHESIS 3:
Another phonological generalization

Battison (1978: 36)

"the reduction of from approximately 45 handshapes to a mere 7 greatly reduces the complexity of the sign and increases the redundancy, since a specification of one hand from among seven possibilities requires less information than a specification among 45 possibilities."

Information structure constraint?

Prefer the most common (least marked) handshape in a complex sign (e.g., Type 3). When that is not possible, choose the next most common (least marked) handshape.

Summary of Findings

- KSL has sub-lexical structure similar to other SLs:

    - A phonetic inventory of approx. 52 handshapes.

    - The frequency distribution of handshapes in the lexicon in an exponential decay curve, similar to other sign languages.

    - Handshape is constrained in two-handed signs (Symmetry & Dominance Condition).

- KSL has a preference for the ☝ handshape on the dominant hand in Type 3 signs.

- When non-dominant hand (H2) is marked, the dominant hand (H1) will surface as a ☝ handshape.

Thank you!

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