

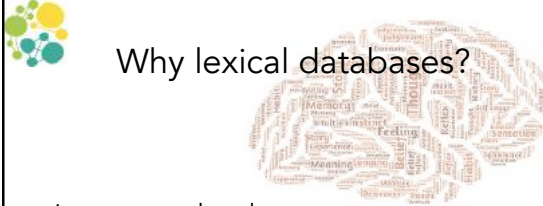


ASL-LEX
Lexical database for American Sign Language

Zed Sevcikova Sehyr
Naomi Caselli
Ariel Cohen-Goldberg
Karen Emmorey

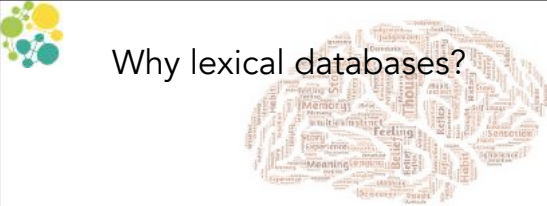
LLCN
LABORATORY FOR LANGUAGE AND COMMUNITY RESEARCH

LSA Summer Institute, University of Kentucky, July 2017



Why lexical databases?

- Language development
- Language processing
- Teaching resource
- Comparative tool
- Language preservation and documentation



Why lexical databases?

- Empirical research
 - Meticulous manipulation
 - Careful stimulus selection
 - Data sharing
 - Replication



Lexical databases for spoken/written languages

BRITISH NATIONAL CORPUS

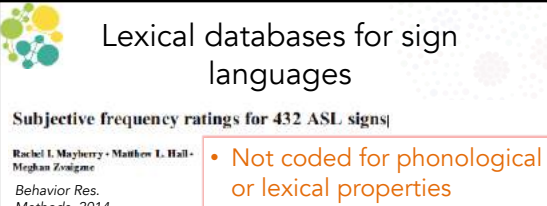
- 100 million spoken and written words

English Lexicon Project Web Site

- English Lexicon Project: 40,000 English words

Lexique 3

- LEXIQUE: 135,000 French words, 55,000 lemmas



Lexical databases for sign languages

Subjective frequency ratings for 432 ASL signs

Rachel I. Mayberry • Matthew L. Hall • Meghan Zwigone
Behavior Res. Methods, 2014

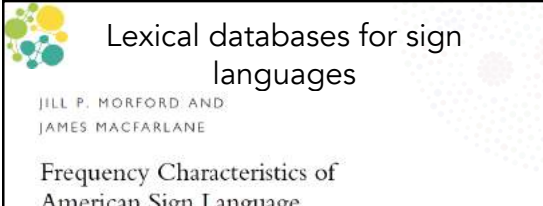
- Not coded for phonological or lexical properties
- Data available online to authorized users

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Abstract Given the importance of lexical frequency for psycholinguistic research and the lack of comprehensive frequency data for sign languages, we collected subjective estimates of lexical frequency for 432 signs in American Sign Language (ASL). Our participants were 59 deaf signers who first began to acquire ASL at ages ranging from birth to 14 years old and who had a minimum of 10 years of experience. Subjective frequency estimates were made on a scale ranging from 1 = rarely see the sign to 7 = always see the sign.

Keywords Sign language • Lexical frequency • Subjective frequency • Age of acquisition • ASL • Psycholinguistics

Lexical frequency is known to influence linguistic processing and, when uncontrolled, can confound the results of psycholinguistic experimentation. Lexical frequency is also used to model how the mental lexicon is acquired, organized, and processed (Bock & Griffin, 2000; Dixon, Magnuson, & Tanenhaus, 2001; Dell, 1990; Gauthier, Rottkopf, Lapan, &



Lexical databases for sign languages

JILL P. MORFORD AND JAMES MACFARLANE

Frequency Characteristics of American Sign Language
Sign Lang. Studies, 2003

- Subjective frequency for 4,111 ASL signs
- Sign types (classifier, indexical, frozen, etc.)
- Not publicly available.

THE PRIMARY factor affecting speed of individual words is the frequency of occurrence. In a word recognition task, listeners respond to words (e.g., dog) faster than to infrequent ones (e.g., albatross). Similarly, speakers make fewer errors with frequent words than low-frequency ones in a lexical decision task (Scott and Hellige 1998). A typical sign language learner involves replacing frequent ones (Lennon 1998). Word frequency and grammatical processing. For example, high-frequency words with grammatical suffixes (e.g., -ed, -ing) are processed as a single

View the entire lexicon

Filter to view signs that select 'index' finger only

Access information for ASL sign FURNITURE

<http://asl-lex.org>

Reference video clips

English ID gloss and Lemma

Sign data

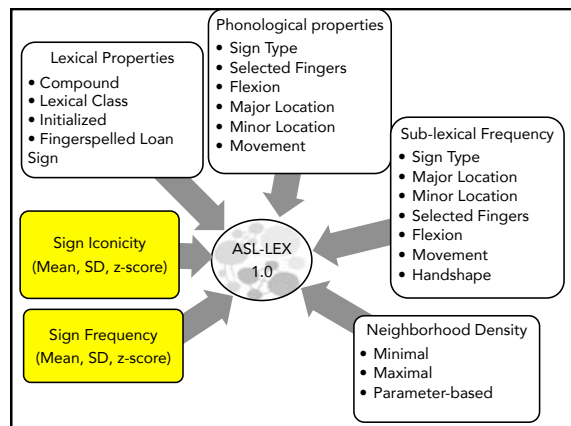
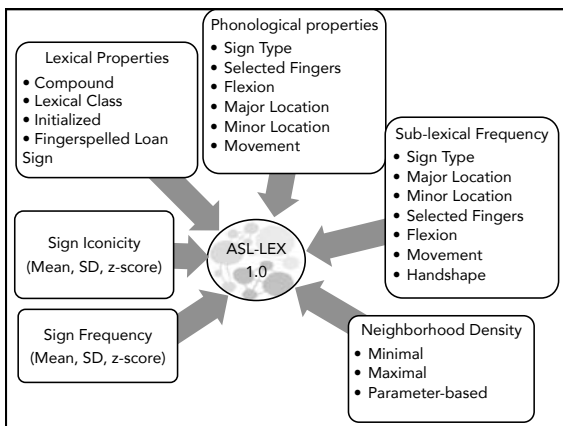
EntryID: FURNITURE
LemmaID: FURNITURE

English ID gloss and Lemma

- Entry ID = uniquely identify each video in ASL-LEX database
- Lemma ID = identify each lemma in ASL-LEX grouping phonological & inflectional variants

✓ Compatible with a machine-readable corpus of ASL (e.g., controlled vocabulary) and language corpora

Sign data



Lexical frequency

- Subjective frequency correlates with corpus counts in signed & spoken language
- Longer lexical decision and naming times for low vs. high frequency items
- Similar brain response (ERPs) to low vs. high frequency signs / words

— Low Frequency
— High Frequency

400 ms

Fenlon et al. (2014); Balota et al. (2001); Carreiras et al. (2008); Emmorey et al. (2013)

Sign Frequency

- 69 deaf signers (45 female, M age = 34, 39 native signers)
- 25-31 signers rated each sign
- 1-7 scale based on how often the sign appears in everyday conversation (1 = very infrequent; 7 = very frequent)

1. Please rate the above sign:

1 2 3 4 Average 5 6 7

1 = very infrequent 2 = 3 = 4 = Average 5 = 6 = 7 = very frequent

Progress: 4%

Play Next

<http://asl-lex.org/>

EntryID: FURNITURE
LemmaID: FURNITURE

Sign Frequency

Sign Frequency (M): 3.261
Sign Frequency (SD): 1.789
Sign Frequency (Z): -0.678053352
Sign Frequency (N): 23

Sign Frequency (M, Native): 3.308
Sign Frequency (SD, Native): 2.057
Sign Frequency (Z, Native): -0.764370007
Sign Frequency (N, Native): 13

Iconicity

- Resemblance between form and meaning
- Sound symbolism (onomatopoeia) in spoken lgs.
- Complex relationship with sign phonology, semantics and syntax
- Influences sign language acquisition / learning
- With frequent use, do signs move away from iconic origins? Are iconic signs more or less frequent?

BUT – small scale observations due to lack of lexical DB!

Brentari (2007), Wilbur (2003), Frishberg (1975), van der Kooij (2002)

Sign Iconicity

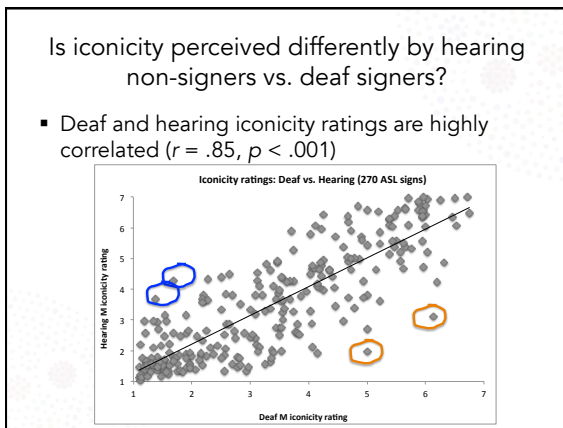
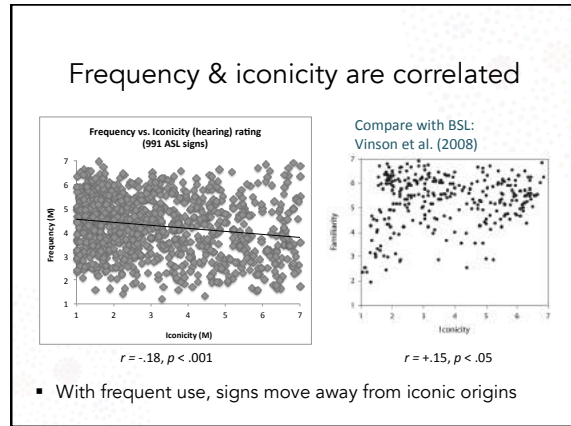
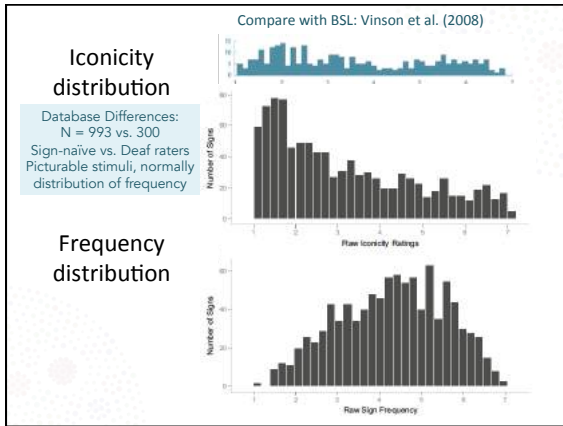
- 21-27 hearing non-signers (English speakers) rated each sign (via Mechanical Turk)
- Signs were rated for how transparent the sign meaning is given the English translation (1 = not at all iconic; 7 = extremely iconic)

COMB **CRACKER**

<http://asl-lex.org/>

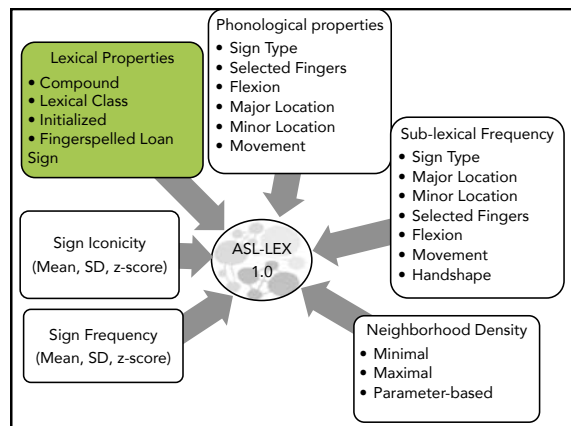
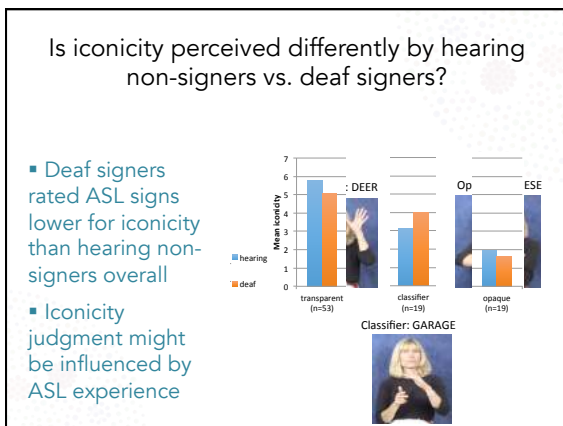
Iconicity

Iconicity (M): 1
Iconicity (SD): 2.025
Iconicity (Z): -0.854
Iconicity (N): 27



Is iconicity perceived differently by hearing non-signers vs. deaf signers?

- New study: Is the perception of iconicity in ASL impacted by language-specific knowledge?
- Iconic categories:
 - Transparent
 - Metonymic
 - Metaphorical
 - Classifier-based
 - Opaque



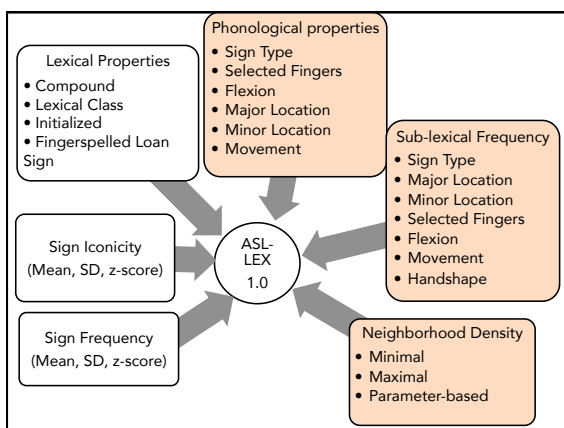
Lexical Properties

- **Compound**
 - e.g. HOMEWORK, BLOOD
- **Lexical Class**
 - 605 nouns
 - 186 verbs
 - 108 adjectives
 - 23 adverbs
 - 78 closed-class items
- **Fingerspelled Loan Sign**
 - #STAFF (includes letters 'S' and 'F')
 - #BACK (includes all four letters)
- **Initialized**
 - WATER (signed with an initial "W" handshape)



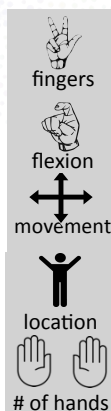
Activity 1

- Does sign iconicity facilitate acquisition of ASL signs as L2 differently in deaf signers (signed L1) and hearing non-signers (spoken L1)?
- Control for factors known to affect learning:
 - frequency
 - lexical class
- Exclude initialized and FS signs



Phonological properties

- Goal: identify major formal properties of signs and capture dependencies
- Based on the Prosodic Model of sign language phonology (Brentari, 1998)
- 6 phonological properties (uniquely capture about 52% of signs)

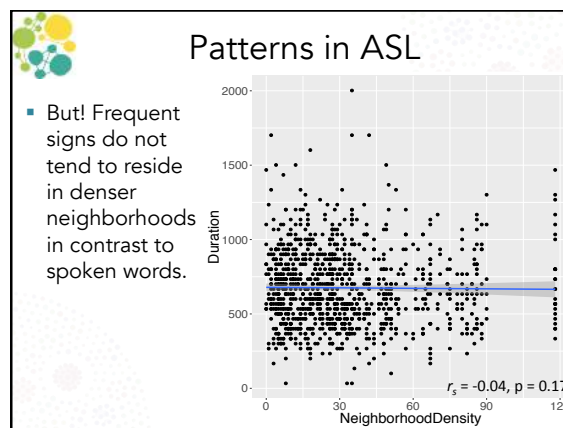
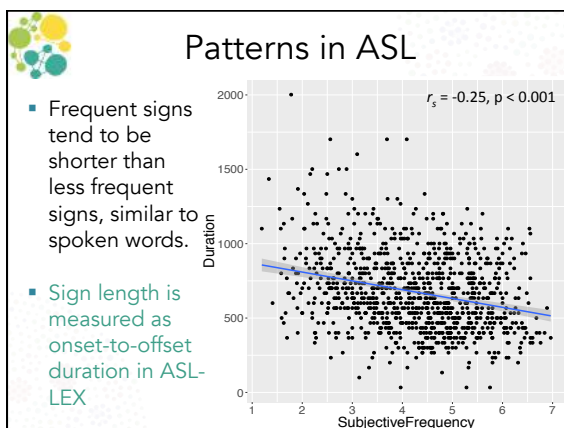


Phonological properties

- **Sign Type (5):** Symmetry of the hands according to Battison
 - one-handed, symmetrical, symmetrical-or-alternating, asymmetrical-same-handshape, asymmetrical-different-handshape, other
- **Selected Fingers (13):** move or foreground the first morpheme
 - index, middle, ring, pinky, thumb
- **Flexion (9):** aperture of selected fingers of DH at sign onset
 - coded as 1-7 and stacked, crossed. E.g. 1 = fully open no joints flexed,..
- **Major Location (6):** general location of DH at sign onset
 - head, arm, body, hand, ...
- **Minor Location (34):** specific location of DH at sign onset
 - head (top), forehead, eye, cheek/nose, upper lip, mouth..
- **Movement (6):** path of movement of the first morpheme
 - straight, curved, back-and-forth, circular, none...

SELECTED FINGERS	DEFINITION	EXAMPLE
imrp	index, middle, ring, pinky finger	CONCEPT
imr	index, middle, ring finger	WATER
mpr	middle, ring, pinky finger	DIAMOND
im	index, middle finger	DUCK
lp	index, pinky finger	KID
mr	middle, ring finger	STARBUCKS
mp	middle, pinky finger	NA
rp	ring, pinky finger	NA
i	index finger	APPLE
m	middle finger	FEEL
r	ring finger	NA
p	pinky	IDEA
thumb	thumb	BAR

FLEXION	GLOSSARY	EXAMPLE
1	Fully open: no joints of selected fingers are flexed	U
2	Bent (closed): non-base joints are flexed	X
3	Flat-open: base joints flexed less than 90%	LIGHT-SHINE
4	Flat-closed: base joints flexed equal to or more than 90%	Q
5	Curved open: base and non-base joints flexed without contact	C
6	Curved closed: base and non-base joints flexed with contact	O
7	Fully closed: base and non-base joints fully flexed	S
Stacked	Flexion of selected fingers differs	K
Crossed	Crossed	R



The future is bright...

- ✓ Add 1,500 signs
- ✓ Update phonological coding for all 2,500 signs
- ✓ Update phonological Neighborhoods and sublexical frequencies
 - ✓ second minor location, handshape change (internal mov.), non-dominant handshape, second morpheme...
- ✓ Deaf signers' iconicity ratings
- ✓ Build a database of nameable pictures

The future is bright...

- ✓ Test predictions using psycholinguistic experiments
 - ✓ Picture naming (with Motion Kinect)
 - ✓ Sign likeness study
 - ✓ Sign transparency
 - ✓ Gating experiment

Activity 3: ASL-LEX Scavenger Hunt

One laptop per team


Go to <http://asl-lex.org/>

Search for the items on the next slide

Write down your answers

The first team to finish with the correct answers wins!

Activity 3: ASL-LEX Scavenger Hunt

1. a symmetrical sign produced on the arms
2. a fingerspelled loan sign that is a verb
3. a sign with low frequency (mean: 1-2), high iconicity (mean: 6-7), and circular motion
4. an initialized, asymmetrical sign with different handshapes and native high frequency (mean: 6-7)
5. how many signs in ASL-LEX contain  handshape and are ≤ 2 in iconicity? (ignore thumb selection)

Thank you!

- Cindy O'Grady Farnady
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Questions?