Investigating lexical frequency in American Sign Language (ASL)

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Introduction

Lexical frequency is an important variable in language processing (e.g. word recognition). For spoken languages, there are many resources that researchers can use to control for frequency and other lexical variables in their experiments (e.g. *SUBTLEX*). For American Sign Language (ASL), no large corpora or normative datasets are available.

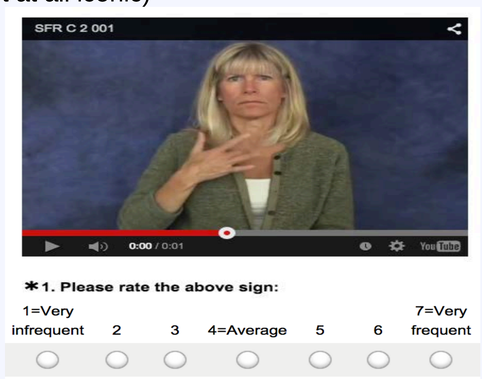
ASL-LEX: database of 1,000 ASL signs.
- Signs are rated for frequency and iconicity and coded for grammatical class & phonological properties (handshape, location, movement)
- ASL-LEX will be accessible online; users can search the database contents and access the sign videos using pre-defined search criteria

Participants

- Frequency ratings: Each sign was rated by 25-31 Deaf ASL signers (39 native & 30 "early" signers who acquired ASL before age 7)
- Iconicity ratings: Each sign was rated by 24-37 hearing non-signers

Task & Materials

- Signs were drawn from several existing resources (e.g. *Mayberry et al., 2014*) and modeled by a deaf native ASL signer
- Sign videos were presented via an online survey tool; four surveys (~250 signs) were created
- Signs were repeated to check for consistency
- Signs were rated on a 1-7 scale based on how often the sign appears in everyday conversation (*1 = very infrequently*) and how transparent the sign meaning is given the English translation (1 = not at all iconic)



Example of a video presented in the rating survey: ASL FEEL

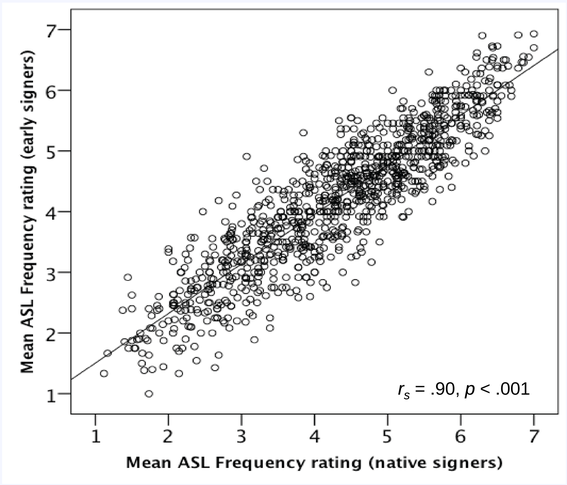
Questions

- **Does age of ASL acquisition influence subjective frequency ratings of ASL signs?**
  - Native & second language speakers provide similar judgment about word frequency (*Arnaud, 1990*).
- **What is the relationship between ASL sign frequency, iconicity and length?**
  - In other sign languages (e.g. British Sign Language, *Vinson et al., 2008*), frequent signs were more iconic although this relationship was weak.
  - Frequent words tend to be shorter than less frequent words (Zipf's law).
- **What is the relationship between sign frequency and word frequency of their English translations?**
  - We obtained word frequency (log10) from SUBTLEX for each sign's English translation

Results

Native vs. early signers' frequency ratings

- Subjective frequency ratings are relatively stable across Deaf people who are proficient signers.



References:
Arnaud, P.J.L. (1990). Subjective word frequency estimates in L1 and L2. Paper presented at the 9th WCAL. Thessalonki.
Mayberry, R. I., Hall, M. L., & Zvaigzne, M. (2014). Subjective frequency ratings for 432 ASL signs. *Beh.Res.Methods*, 46(2)
Vinson, D. P., Cormier, K., Denmark, T., Schembri, A., & Vigliocco, G. (2008). The British Sign Language (BSL) norms for age of acquisition, familiarity, and iconicity. *Beh.Res.Methods*, 40(4)
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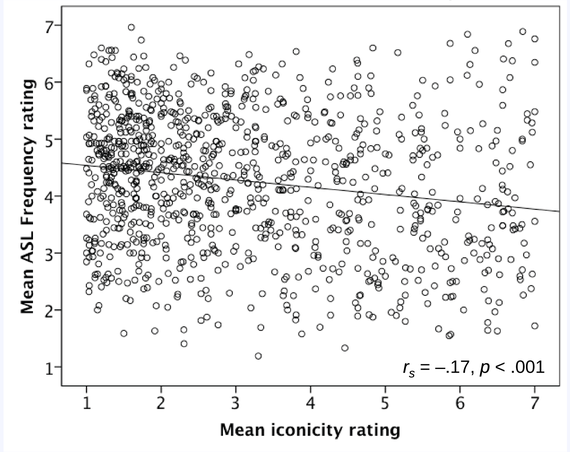
Sign frequency & iconicity

- There was a weak tendency for frequent signs to be rated as less iconic, but this relationship was weak.



M_{FREQ} = 7
M_{ICON} = 1.6

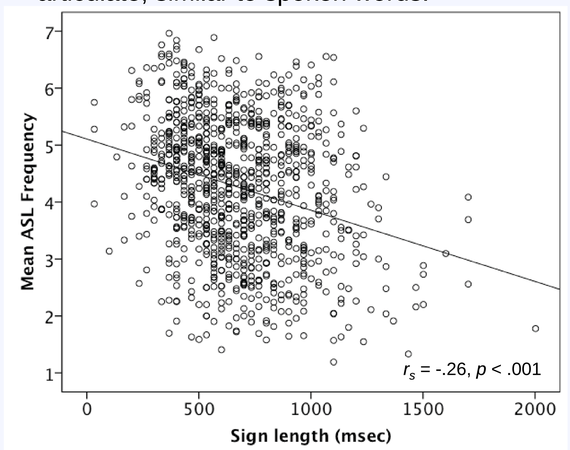
M_{FREQ} = 6.8
M_{ICON} = 6.1

M_{FREQ} = 2
M_{ICON} = 1.2

M_{FREQ} = 1.3
M_{ICON} = 4.5

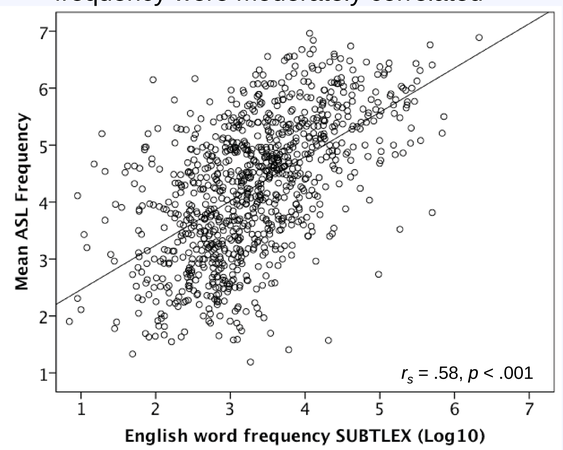
Sign frequency & sign length

- More frequent signs tend to take less time to articulate, similar to spoken words.



Sign & English word frequency

- ASL sign frequency and English word frequency were moderately correlated



Discussion

- Despite the fact that age of ASL exposure varies across Deaf signers, these proficient signers had similar intuitions about frequency of ASL signs.
- The relationship between iconicity and frequency was weak and negative (contra *Vinson et al., 2008*). Thus, frequency and iconicity are not highly confounded.
- Similar to speech, sign length decreased with frequency, but this tendency was weak compared to speech. This difference may be due to the high frequency of short function words in speech.
- ASL sign and English word frequency were not highly correlated. Thus, using spoken language corpora to determine sign frequency may not be entirely appropriate.
- ASL-LEX can be used for designing tightly controlled psycholinguistic experiments and teaching materials, as well as contribute to clinical assessments for the deaf population.