

Rates of fingerspelling in American Sign Language

David Quinto-Pozos

Department of Linguistics, University of Texas-Austin
TISLR 10; Purdue University



Introduction

Fingerspelling used often in American Sign Language (ASL)

- Morford & MacFarlane (2003); corpus of 4,111 signs (27 signers)
 - 8.7% of signs in casual signing
 - 4.8% of signs in formal signing
 - 5.8% of signs in narrative signing
- Padden & Gansauls (2003)
 - 10% - 15% of signs in discourse
 - > 50% of native signers fingerspelled 20% of time
 - non-native signers: lower frequency of fingerspelling

Fingerspelling is used for various purposes

- For the introduction of a spoken/written language term into the signed segment
- To communicate particular aspects of the English word that is fingerspelled (Padden & Gansauls, 2003)
- As a teaching strategy within the use of *chaining* (Humphries & MacDougal, 1999/2000)
 - *Chaining*: "a technique for connecting texts such as a sign, a printed or written word, or a fingerspelled word" (90)

Even though fingerspelling constitutes an important aspect of ASL, there are few accounts of the rates at which words are fingerspelled in naturalistic discourse.

Previously reported rates of fingerspelling

- Zakia & Harber (1971): 6.17 ltr/sec (162 milliseconds (ms)/ltr)
- Wilcox (1992): 4.69 ltr/sec (213 ms/ltr)
- Jerde et al., (2003): 3-4 ltr/sec (250-333 ms/ltr)
- Hanson (1982): 5.88 ltr/sec (170 ms/ltr)

However, there are no studies of fingerspelling rates across diverse items (i.e., different types of words) or relatively large sets of items.

Additionally, studies of fingerspelling rate have not considered the role of word length, a variable which has been shown to be meaningful for speaking rates (Ferguson et al., 2002; Yuan et al., 2008).

Finally, the role of audience influence also has not been considered.

Research Questions:

- 1) Do signers differ from each other in fingerspelling speed?
- 2) Are short words fingerspelled at different rates than long words?
- 3) Do signers vary fingerspelling speed based on whom they are addressing (e.g., school-aged children versus adults)?
- 4) Does formality of a setting (e.g., less formal vs. more formal) influence fingerspelling rate?

Methodology

Signers: 2 deaf native users of ASL (Kevin & James)

Task: deliver an ASL narrative (originally created in English) about the life of a Deaf leader in the US Deaf community (Don Petingill)

Three audiences per signer: school children (ages 9-10) plus two audiences of adults

Information in the text (examples of items that were fingerspelled):

- Where Don lived (various states and cities such as Idaho, Indiana, and Dallas) and worked (e.g. Gallaudet University, Model Secondary School for the Deaf, etc.)
- Don's involvement in the Deaf community including advocacy work (e.g. for the Texas Commission for the Deaf)
- Anecdotes about Don's life (e.g., Don's joke-telling & humor)

General Description of the Data:

- 55 minutes of ASL narratives (total)
- 471 fingerspelled words (total)
- 240 short words (3 or fewer letters)
- 271 long words (4 or more letters)
- Kevin: 249 words; James: 222 words

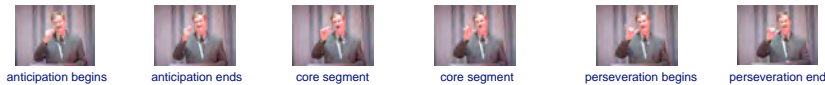
Reasons for "short" vs. "long" cutoff:

- prevalence of three-letter words in corpus (e.g., acronyms & protagonist's name)
- various lexicalized fingerspelled words contained 3 letters

Data coding: (reliability computed for 25% of items: 94.6% across coders)

- counted video frames of uncompressed video (30 frames per second)
- established parameters for coding three "segments" for each word:
 - word-initial segment; articulation of the first handshape (anticipation)
 - core segment of word; all the letters of the word
 - word-final segment; the holding of the final handshape (perseveration)

Still video frames of the fingerspelled item G-A-R-Y, including anticipation & perseveration

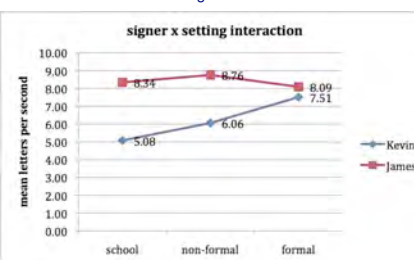


Statistics:

mixed-model Signer (2) X Setting (3) X Word Length (2)

- main effect for **Signer** ($F(1, 459) = 35.67, p < .0001$) letters per second: James = 8.41, Kevin = 6.39
- main effect for **Word Length** ($F(1, 459) = 12.02, p < .001$) letters per second: long = 7.65, short = 7.08
- no main effect for **Setting** ($F(2, 459) = 2.54, p = .079, N.S.$) non-formal = 7.1, formal = 7.75, and school = 7.22
- significant interaction between Signer and Setting ($F(2, 459) = 9.09, p < .001$); [see Figure 1]
- pair-wise comparison on Signer X Setting interaction
 - **school Settings differed:** $t(459) = 5.71, p < .0001$
 - **non-formal Settings differed:** $t(459) = 4.44, p < .0001$
 - formal Settings did **not** differ: $t(459) = 0.08, p = .93, N.S.$

Figure 1:



values represent letters per second calculations

pair-wise comparisons signer X setting interaction

| signer | setting 1 | setting 2 | DF | t value | p value |
|--------|------------|------------|-----|---------|-------------|
| Kevin | school | non-formal | 459 | 2.25 | .0248 |
| | non-formal | formal | 459 | 2.08 | .0385 |
| James | school | formal | 459 | 3.97 | <.0001 |
| | school | non-formal | 459 | 0.74 | 0.4609 N.S. |
| James | non-formal | formal | 459 | -2.26 | 0.0245 |
| | school | formal | 459 | -1.73 | 0.0839 N.S. |

Main points

- Faster rates than previously reported
Means: 5-8 letters per second (125 – 200 ms/ltr)
- Signers can differ in rates: Some signers are faster fingerspellers than other signers
- "Long" words are fingerspelled faster than "short" words
- A setting or audience does not necessarily have an effect on fingerspelling rate, but it can for some signers
- Signers in this study fingerspelled at a similar rate (7.5 – 8 ltrs/sec) in the formal setting (an interesting result)

Future questions

- Would other signers pattern within the fingerspelling rate ranges reported here?
- Is there a comparison that can be made between rates of fingerspelling and rates of speaking (e.g., syllables per second)?
- Is rate of fingerspelling a marker than can be used to identify a "formal" register of ASL?

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Acknowledgements

This research was supported in part by the National Science Foundation Science of Learning Center Program, under cooperative agreement number SBE-0541953. Any opinions, findings, and conclusions or recommendations expressed are those of the authors and do not necessarily reflect the views of the National Science Foundation.

The author wishes to express gratitude to the signers for their willingness to participate and also to his collaborators on this analysis: Lisa Mellman & Amy DeVries. Thanks to Caroline Hernandez for her coding support.