THE TIMING OF ASL FINGERSPELLING

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INTRODUCTION
1. Describe the temporal properties of ASL fingerspelling
2. Show variation in the temporal properties of fingerspelling
Timing properties

There has been relatively little phonetic work on ASL generally, and fingerspelling specifically.

Most studies of the temporal properties of fingerspelling have been limited because they

- measured rate as duration of word/number of letters
- analyzed data from manually coded English settings
- measured a small number of words with limited formational properties
Reported fingerspelling rates have considerable variation (Quinto-Pozos, 2010; Bornstein, 1965; Hanson, 1981; Wilcox, 1992; Geer, 2010):

- a lower bound of $\sim 125$ msec per letter
- an upper bound of $\sim 300$ msec per letter
  - $\sim 100$ msec for holds
  - $\sim 200$ msec for transitions

Reich and Bick (1977) are the only to use a segment based analysis which showed word medial letters are fingerspelled quicker than initials or finals. Although this was on manually coded English.
Questions about fingerspelling timing

1. How long are segments on average?
2. Do they vary by position?
3. Do they vary by (letter) identity?
4. Do they vary by signer?
METHODS
Data collection

- 4 native signers, 1 early learner (4 coded so far) produced
- 600 unique words
- repeating each word twice
- being recorded by 2 or 3 video cameras
- recording at 60 FPS
- for a total of 21,453 letters
**Holds and transitions**

- *Holds* the time periods where the entire hand configuration is stable
- *Transitions* the time periods between holds
Holds and transitions

- C- 149ms
- O- 83ms
- S- 116ms
- T- 166ms
C-O-S-T again
Descriptive data
Letter Based Variation

![Box plot diagram showing variation in letter holds across different letters of the alphabet.](image)

- **Methods**
- **Holds**
- **Transitions**
- **Conclusions**
TRANSITIONS
All Transitions

position14
position13
position12
position11
position10
position9
position8
position7
position6
position5
position4
position3
follGroupside
follGroupmovement
follGroupdown
prevGroupside
prevGroupmovement
prevGroupdown
wordtypenonEnglish
wordtypename
signers4
signers3
signers2
(Intercept)
Hold/Transitions ratio

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**Word length**

**Proportion of hold**

**Graph**

The graph shows the hold/transition ratio across different word lengths for subjects s1, s2, s3, and s4. The proportion of hold decreases as the word length increases, with a clear trend indicated by the blue line for each subject.
CONCLUSIONS
Conclusions

- holds are ~40msec
- transitions are ~100msec
- first and last letters are significantly longer
- for the medial letters, they tend to be held for less time in later positions in words
- letters with movement and orientation changes are held longer
- signers vary greatly
Future implications

Timing information is important for

- Language learning and acquisition norms
- Perception studies
- Input into models of fingerspelling production


