

Chicago Linguistics Society 50

12 April 2014

HOLDS OR TRANSITIONS: WHICH IS MORE IMPORTANT?

Jonathan Keane and Leah Geer

University of Chicago and The University of Texas at Austin



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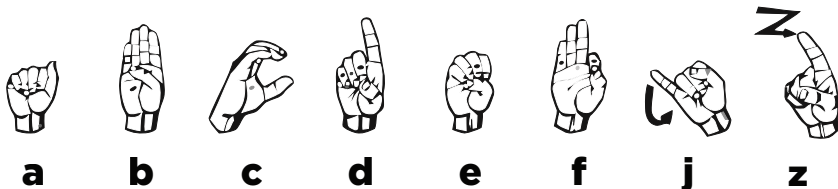
Goals of this talk

1. Take a new look at the perception of fingerspelling
2. Propose a methodology for testing the relative importance of different parts of the fingerspelling signal
3. Determine which part of the fingerspelling signal (the holds or transitions) is more important for successful fingerspelling perception by early second language learners

What is fingerspelling?

A basic description of fingerspelling

- ▶ Simple: a set of static (except for -j- and -z-) handshapes strung together sequentially, where each maps on to one letter in an English word.
- ▶ Many (Wilcox, 1992 and Akamatsu, 1985) note that this description is not quite accurate. Rather signers perceive overall contours, not individual handshapes.
- ▶ Fingerspelling makes up anywhere from 12–35% of ASL discourse. Padden (1991); Padden and Gunsauls (2003)



What fingerspelling looks like



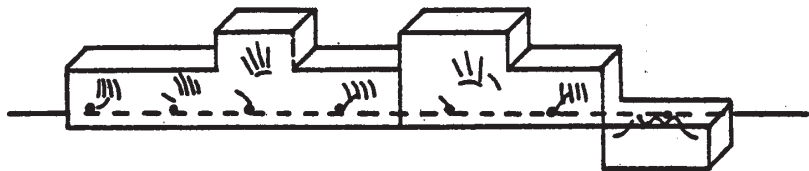
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Misconceptions about the timing and
perception of fingerspelling

Perception of fingerspelling

There has been little work on the perception of fingerspelling.

- ▶ Akamatsu (1985) proposes that perception is based on movement envelopes.



- ▶ Wilcox (1992) claims that the transitions are the most important part of fingerspelling perception because they are temporally longer.

Stimuli 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 4,800 words, and 21,453 letters

C-O-S-T



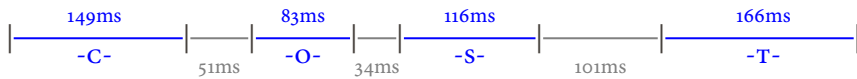
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Holds and transitions

Holds the time periods where the entire hand configuration is stable

Transitions the time periods between holds

Holds and transitions



C-O-S-T again

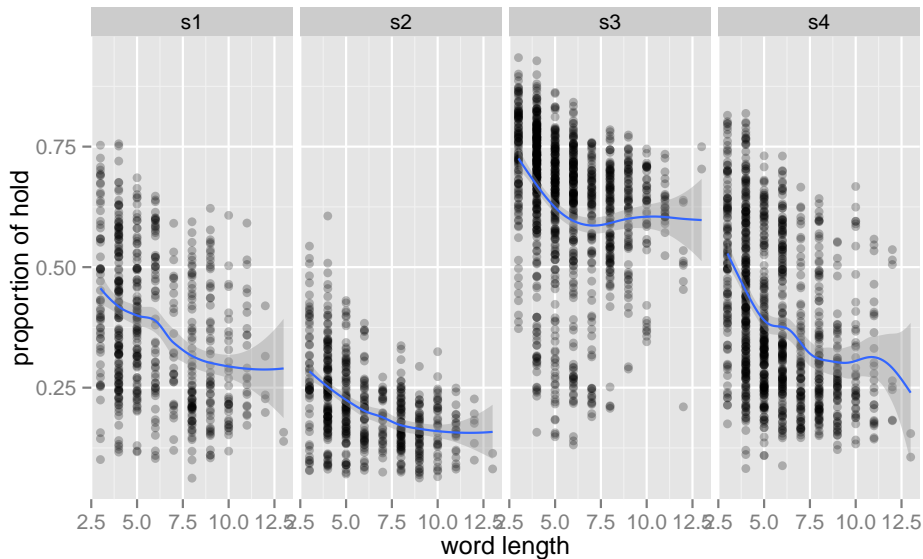


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timing properties (Keane et al., 2013, 2014)

- ▶ 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

Proportion of holds to transitions



Predictions

Because duration and visual cues are orthogonal, duration of holds/transitions is not the only predictor of successful fingerspelling perception. Thus, we hypothesize:

When given only holds or only transitions, the holds will yield more successful perception, especially when the holds/transitions are approximately equal in duration.

Methods

What stimuli look like



-S-

S-O

-O-

O-R

-R-

R-T

-T-



-S-

S-O

-O-

O-R

-R-

R-T

-T-



-S-

S-O

-O-

O-R

-R-

R-T

-T-

What stimuli look like: control

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-S-

S-O

-O-

O-R

-R-

R-T

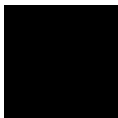
-T-

What stimuli look like: holds only

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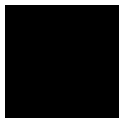
-S-



S-O



-O-



O-R



-R-



R-T



-T-

What stimuli look like: transitions only

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-S-

S-O

-O-

O-R

-R-

R-T

-T-

Experimental data collection

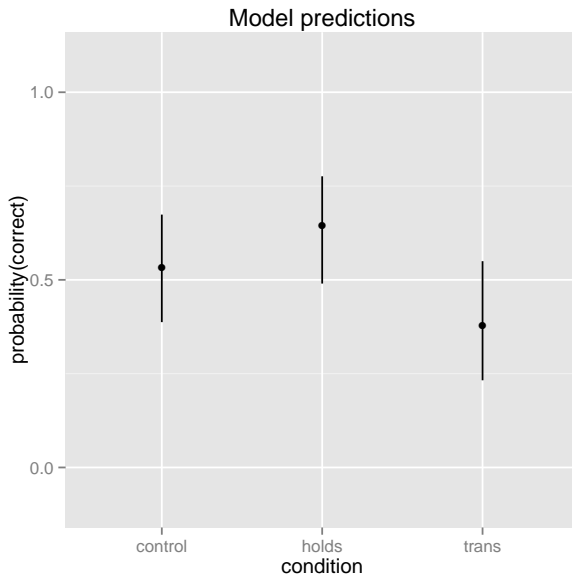
- ▶ To make the stimuli, the words were slowed down to half speed and repeated twice.
- ▶ 16 ASL 2 students from UT were presented with stimuli using PsychoPy:
 - ▶ in a quiet room
 - ▶ starting with 4 practice items
 - ▶ followed by three blocks: control, holds only, transitions only.
 - ▶ stimuli were presented
 - ▶ the participants were prompted to type the word
- ▶ Only responses that matched the stimulus exactly were counted as correct.

Results

Results (Geer and Keane, forthcoming)

- ▶ Overall, accuracy is about 50%
- ▶ *Holds only* condition had significantly more accurate responses than *transitions only*
- ▶ There is a slight trend for the *holds only* condition to be more accurate than the control condition.

Model predictions



Conclusions

- ▶ previous work (*eg* by Wilcox) suggests transitions provide more rich information because they are temporally longer
- ▶ when this confound is controlled for, we see transitions are not in fact privileged with more perceptual information
- ▶ the holds in fingerspelling convey the most perceptual information for the student perceiver

Future directions

- more participants
- randomizing stimuli across blocks
- randomizing the experimental blocks
- varying language backgrounds

We must also acknowledge the contributions of many who contributed in ways big and small:

Experiment participants

ASL students at The University of Texas at Austin.

Fingerspelling data

Andy Gabel, Rita Mowl, Drucilla Ronchen, and Robin Shay

Main advisors

David Quinto-Pozos, Diane Brentari, and Jason Riggle

Support

NSF Doctoral Dissertation Research Improvement Grant

Coarticulation and the phonetics of fingerspelling BCS 1251807 and the Rella I Cohn fund for graduate student research

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