Dispelling prescriptive rules in ASL fingerspelling: the case of -E-

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Using a corpus of ASL fingerspelling, we have determined that there is variation in the types of -E-s that are used by Deaf, native signers. The choice of open or closed (see figure 1) shows both inter- and intra-signer variation, conditioned on the surrounding context of the -E-, as well as position in the word, and the local transition times around the -E-.

Method

Segment Identification

1. We recorded 3 native ASL signers and 1 early learner fingerspelling a total of 4,800 words and 21,613 Segments resulting in a total of 1,640 -E- tokens.

2. We coded the video by identifying the segment of each letter that was fingerspelled. We defined segment as the time when the velocity of the articulators approached zero.

3. We extracted still images, then hand coded -E-contact for each of these segments.

Open-E- or Closed-E- Annotation

We defined an -E- as having contact if the tips of any of the fingers touched any part of the thumb. Images of segments were presented with no information about them.

Results

We have found that both open-E- and closed-E- are used by native ASL signers in fingerspelling. The percentage of open-E- variants ranges among the signers from 12% to 52%.

Using a mixed effects logistic regression model, we found statistically significant differences in predictors based on the context of the -E-:

1. There are more closed-E- variants as the local transition time increases.

2. Some signers use more open-E- variants than others.

3. There are more open-E- variants when they immediately precede handshapes that are completely closed (-A-, -O-, -N-, -M-, -T-, -S-, or -X-). This serves to enhance the contrast between the -E- and the following letter through dissimilation of the joint configuration.

4. There are more open-E- variants at word edges as the local transition time decreases.

5. There are more open-E- variants at the end of the word, when the immediately preceding handshape is closed.
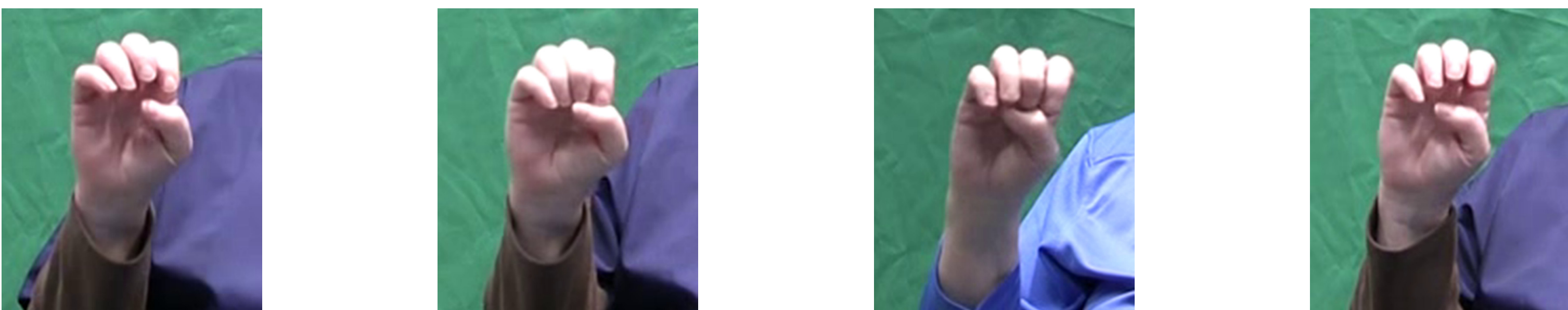

Figure 1: images of -E-s from two signers (open, closed, closed, open; respectively)
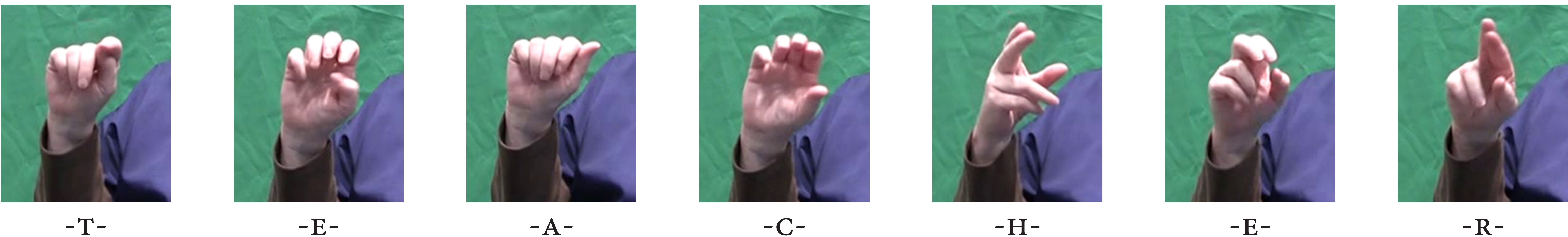
Sometimes you'll see people do an "e" with an opening between the fingertips and the thumb. I don't recommend that method at all. I call that a "screaming E" or a "[adult, second language learner]'s E."

www.lifeprint.com/asl101/pages-layout/handshapes. htm accessed 25 July 2012.

Implications

Signers using more open-E-s before closed handshapes supports the MAXIMIZE APERTURE CHANGE constraint proposed by (Brentari, 1998). This constraint prefers handshape changes from open to closed (or vice versa), rather than closed-closed or open-open. Thus, the variation in -E-s makes fingerspelled sequences more compatible with the phonology proposed for the core ASL lexicon. Similar phenomena have been documented for fingerspelled loansigns (Battison, 1978; Brentari, 2001; Cormier et al. 2008), this work shows that this phonological constraint is not limited to loansigns, but puts pressure on fingerspelling generally to conform to more native ASL-like parts of the ASL lexicon.
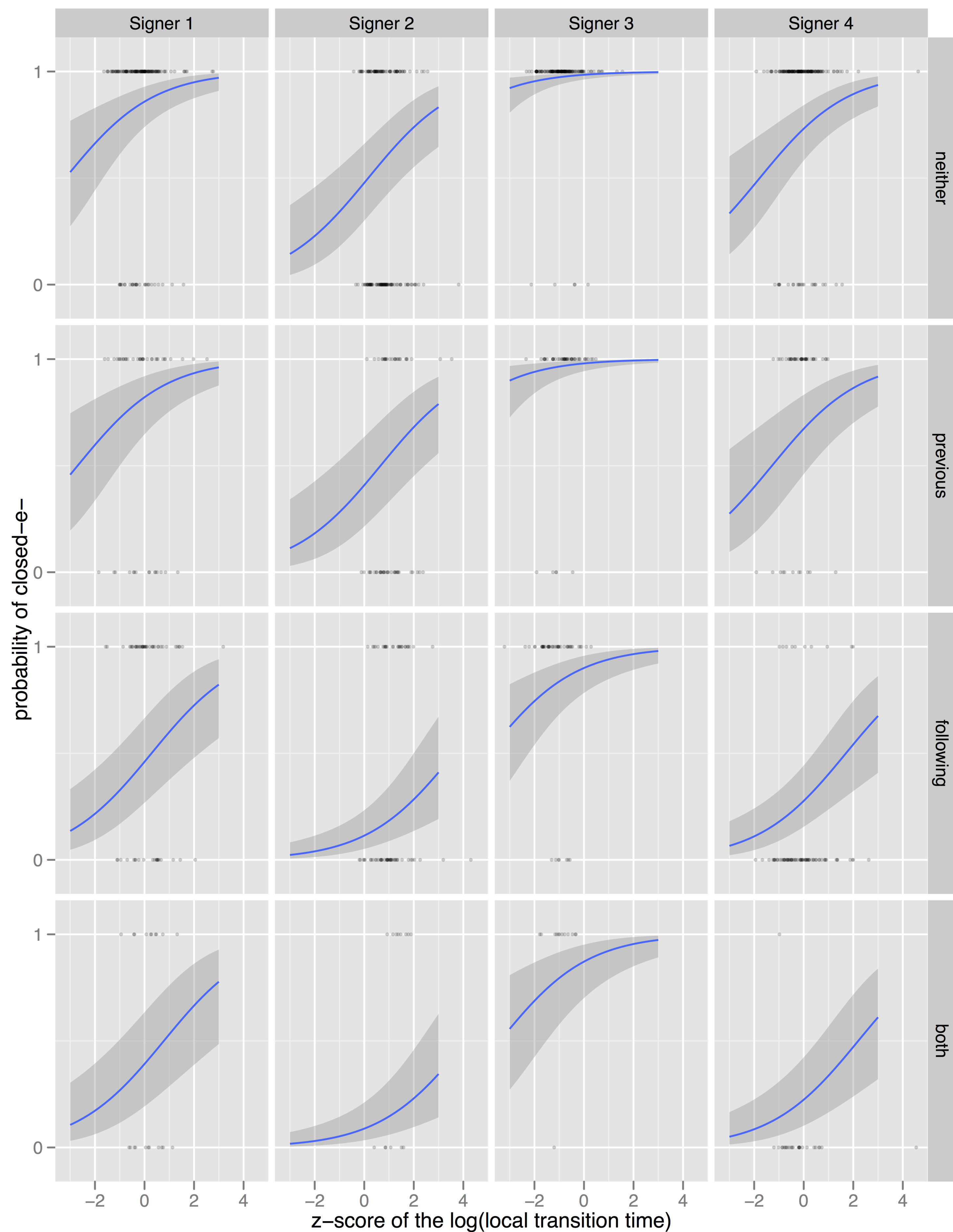

Figure 2: model predictions for word-medial letters based on the mixed effects logistic regression model broken down by signer across the top, and by position of a closed handshape across the side. The x-axis is the z-score of the log of the local transition time, where negative numbers are faster than the mean, and positive numbers are slower than the mean. The y-axis is the probability of a closed-E-. The lines are the model prediction, with the shaded areas representing 95% confidence.

-T- -E- -A- -C- -H- -E- -R-

Figure 3: images from the word T-E-A-C-H-E-R

Battison, R. (1978). Lexical Borrowing in American Sign Language. Linstock Press, Inc., Silver Spring, Maryland.   Brentari, D. (1998). A prosodic model of sign language phonology. The MIT Press.
Brentari, D. and Padden, C. (2001). Foreign vocabulary in sign languages: A cross-linguistic investigation of word formation, chapter Native and foreign vocabulary in American Sign Language: A lexicon with multiple origins, pages 87–119. Lawrence Erlbaum, Mahwah, NJ.   Cormier, K., Schembri, A., and Tyrone, M. E. (2008). One hand or two? nativisation of fingerspelling in ASL and BANZSL. Sign Language & Linguistics, 11(1):3–44.