

Phonological Constraints on Handshape Mapping in ASL : Evidence from Articulatory Compensation

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Background

• **Articulatory Compensation:** how language production is altered by physically impeding the articulators

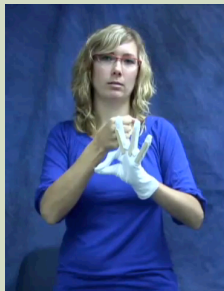
• **Selected Finger Constraint (SFC):** a sign selects a set of fingers, which are the only ones that can be specified for position, movement, or contact (Mandel, 1981)

Research Questions

- Do phonological features of the non-dominant hand affect articulatory compensation?
- Are these effects due to phonological knowledge or general physiological principles?

Methods

- Deaf native signers, hearing non-signers (both n=12)
- **Handblock:** specially crafted glove that restricts the non-dominant hand to an F handshape



The ASL sign IMPACT with the handblock glove

Stimuli

- 83 signs, match/mismatch finger selection and selected finger extension of F handblock (Fig. 1)
- Excluded signs that allow Weak Drop

(Padden & Perlmutter, 1987)

Task

- **Deaf:** produced target signs from a written list while wearing handblock on non-dominant hand
 - **Hearing non-signers:** learned a subset of 20 signs; trained on word list; repeated with handblock
- Dependent measure: Violation of Selected Finger Constraint (SFC), i.e., contacting the middle, ring, or pinky fingers

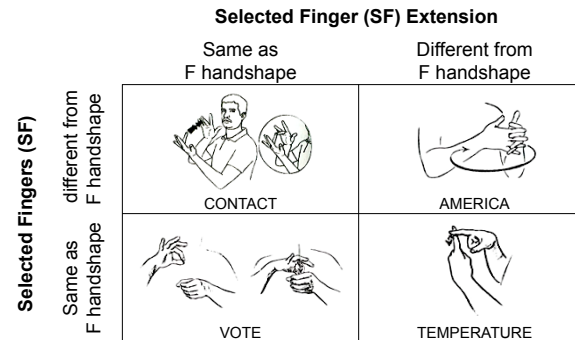
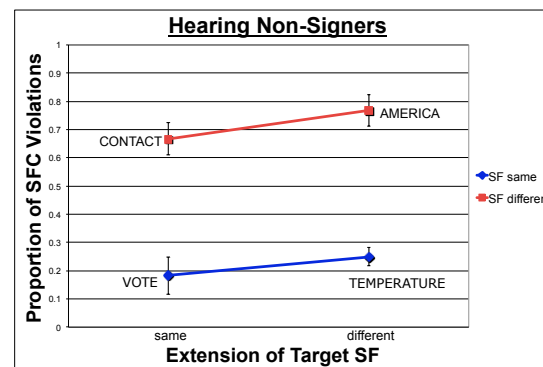
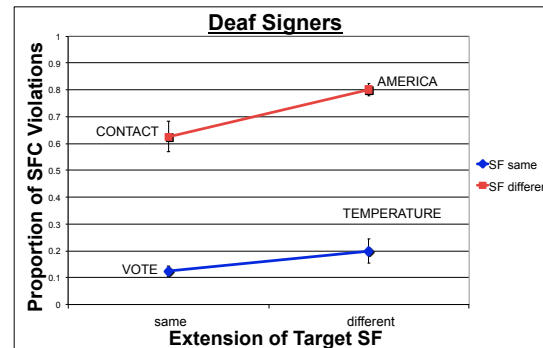


Figure 1. Stimuli were selected based on similarity of the finger selection and finger extension features of the target sign to those of the F handshape, per Brentari (1998).



ANOVA Results (p<.001)

	Deaf Signers	Hearing Non-Signers
Main Effect: SF Selection	✓	✓
Main Effect: SF Extension	✓	✓
Interaction: Selection × Extension	✗	✗

No significant difference between Deaf and hearing groups

Conclusions

1. Signers map a target handshape onto a constrained articulator if its physical configuration greatly diverges from its phonological specification.
2. General physiology constraints account for the results rather than phonological knowledge.
 - A “preserve finger contact” heuristic would behave much like the Selected Finger Constraint: only selected fingers can make contact.
 - This suggests that the Selected Finger Constraint is strongly motivated by physiological properties of the articulators.

References

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- Mandel, Mark. (1981). Phonotactics and morphophonology in American Sign Language. PhD dissertation. University of California, Berkeley.
- Padden, Carol & Perlmutter, David. (1987). American Sign Language and the architecture of phonological theory. *Natural Language and Linguistic Theory*, 5, 335–375.

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