

\*\*\*\*\*ASL sign lowering as target undershoot: a corpus study

Many ASL signs that are made on the face or head in citation form are often made with a lower location in connected signing (Figure 1). One obvious analysis is that signers are undershooting the targets of the gestures, just as speakers often do in spoken language (e.g., Lindblom 1963, Browman and Goldstein 1992, Kirchner 1997). Indeed, laboratory studies using optical tracking have shown that undershoot is happening in at least some ASL signs made on the face or head (Mauk et al., 2004; Mauk and Tyrone 2007). At the same time, sociolinguistic studies in the variationist tradition have found many social and linguistic influences on such sign lowering (Lucas et al., 2002; Schembri et al., 2009). Unfortunately, neither approach alone can establish undershoot as a general explanation for sign lowering. It is uncertain whether findings from the artificial tasks and narrow linguistic contexts used in the laboratory will generalize to natural discourse. The variationist studies do not make fine-grained enough measurements to establish that what they're counting are even cases of undershoot. A fuller picture requires combining the natural discourse and wide variety of contexts of the variationist studies with the precise and continuous (not artificially dichotomized) measurements of the laboratory studies.

The corpus for this research consisted of one hour each from ten native ASL signers engaged in free conversation and telling personal narratives. Within this corpus, all tokens of signs with canonical positions on the face or head were identified. For each token, the video frame where the selected fingers came the closest to the canonical location (the attainment point) was identified, and the vertical displacement and the euclidean distance (in pixels) between the canonical position and the attainment point was measured – this is considerably less exact than infrared tracking, but likely at least as precise as using acoustic measurements to infer the position of vocal articulators.

Mixed-effects regression modelling is used to account for the amount of reduction as a function of a number of linguistic predictors. Sign frequency is estimated from a panel of native signers' subjective frequency ratings (which have been shown to correlate strongly with log-frequency in spoken languages). Other potential predictors included are lexical category of the sign (noun, verb, etc.); the previous and next locations that the contacting hand is required to be at in the present sign and (if different) the preceding/following sign; whether the sign occurs before/after a pause; the number of previous uses of that sign in the discourse and the time since the most recent use; and whether the sign co-occurs with non-manual topic marking.

Preliminary results based on a portion of the corpus suggest a strong effect of frequency on reduction for verbs (in particular those high-frequency verbs with grammatical/discourse-marking functions, such as KNOW, SEE, THINK, SUPPOSE), but a much smaller effect of frequency for nouns; a strong effect of non-manual topic marking encouraging reduction; and the expected effect of a lower location in the preceding/following sign encouraging reduction.

While there is clearly plenty of undershoot, as in the Mauk studies, some patterns are more difficult to square with the idea that articulatory undershoot is the only factor that underlies sign lowering. Very many lowered signs continue to contact the face – which would suggest that in those tokens the hand is successfully reaching a lower target rather than undershooting a higher target. Some of the more frequently lowered signs have clear secondary clusters of attainment points (e.g., a cluster of tokens with contact at the cheek in addition to a cluster at the canonical position of the forehead). This would suggest that signs' lexical entries contain more than a monolithic phonological representation – e.g., multiple abstract representations (cf. Connine 2004), exemplars, or non-Gaussian distributions of contact locations.

**Figure 1:**

The highest point reached by the signer's hand during token of the sign TEACHER, the canonical location of which is on the forehead.

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