Signed language phonology

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adapted in part from Sections 3.8 and 4.10 of Anderson et al. 2022

Learning objectives. After reading these notes, you should be able to:
- identify dynamic and static states in a sign;
- explain the similarities and differences in syllables between signed and spoken languages;
- identify examples of phonological constraints in signed languages; and
- identify examples of phonological rules in signed languages.

1 Phonological representation

Stokoe's insight that signs can be decomposed into smaller atomic parameters that can be recombined in different ways is parallel to the decomposition of spoken words into syllables, syllables into segments, and segments into features. But the parallel is not exact. Signed language parameters seem to be most like spoken language features, but parameters combine directly to form signs, whereas features combine to form segments, which typically do not form full words on their own; in some languages, a word can consist of only a single vowel and no consonants, as in French *ou* [u] 'where' and *eau* [o] 'water', but they still participate in the metrical system as full syllables, not isolated vowels.

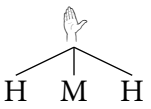
This has led to an approach to signed language phonology based on dividing signs into sequential units with hierarchical syllable-like structures, rather than treating them as indivisible unitary segment-like structures. However, it's important to note that the phonology of signed languages is not derived from spoken language phonology. Whatever parallels or analogies we find are incidental, or perhaps derived from some deeper, more abstract cognitive principles of linguistic organization. Importantly, we cannot just directly import the theories and structures of spoken language phonology into signed language phonology. We have to take into account the differences in modality.

A common analysis of the phonological structure of signs is to treat them as sequences of two types of units: static states (sometimes called **holds (H)**, *positions*, or *postures*, roughly equivalent to location), and dynamic states (sometimes called *transitions*, roughly equivalent to movement (M)) (Liddell 1984, Liddell and Johnson 1986, 1989, Johnson and Liddell 2010, Sandler 1986, 1989, 1993, Perlmutter 1992, van der Hulst 1993). The exact nature and composition of these units varies from model to model, but they share the same basic division between static and dynamic units.

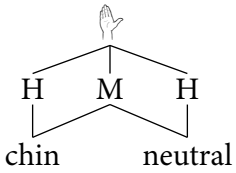
Further, there is widespread recognition that the dynamic unit is more "sonorous" (Brentari 1990, Corina 1990, Perlmutter 1992, Sandler 1993). In this view, the static units are like syllabic onsets and codas (and thus, like consonants), while the dynamic units are like syllabic nuclei (and thus, like vowels). The prototypical sign syllable is HMH (like ASL THANK-YOU, which starts with a hold at the chin and moves out to a hold in neutral space), and depending on the analysis, others are possible.

Note that incidental movement does not usually count as part of the sign. For example, if ASL YOUR immediately after signing some other sign that ends in neutral space, the hand does not need to re-move into neutral space. Contrast this with a sign like THINK, which requires movement to the forehead, even if the hand is already there from a previous sign.

Drawing inspiration from autosegmental phonology and making use of the observation that handshape often remains stable during a sign (Mandel 1981), researchers developed models of sign structure with multiple tiers: holds and movements on the skeletal tier, and other properties, such as handshape, as autosegments on other tiers, associated to the skeletal tier. For example the ASL sign THANK-YOU uses the  handshape throughout the movement from chin to neutral space. This idea can be represented by having handshape on a separate autosegmental tier, associated to the sign's starting and ending holds as well as to the movement between them.



In addition, the nature of the movement can be represented by doubly-linking the M autosegment to the location, which are also linked to the holds.



As with feature geometry, signed language autosegments can also be decomposed further into various levels and features. There are many different proposals and no solid consensus on what these levels and features are. Many proposals try to account for certain descriptive patterns and tendencies found in ASL and other signed languages called **constraints** (in fact, constraints exist in spoken languages, too, and we will talk more about them in the next unit). Note that constraints are not absolutes, just strong tendencies. Exceptions can be found, but they are rare and usually highly marked.

Two early notable constraints that were described in (Battison 1978) concern the behaviour of two-handed signs, in which both hands are used. The **dominance constraint** restricts the handshape of the nondominant hand when it serves as an immobile location rather an actively moving articulator. In this case, the handshape of the nondominant hand must either be one of the unmarked handshapes or match the handshape of the dominant hand. For two-handed signs in which both hands move, the **symmetry constraint** restricts the signs to being symmetric in movement, location, and handshape. The two hands cannot generally do completely different things.

The **selected finger constraint** (Mandel 1981) restricts a basic sign from having more than one group of **selected fingers**, which are the fingers that are phonologically active. These may be the index finger in  , the index finger and thumb in  , the pinky in  , etc. Two superficially similar handshapes may have exactly the opposite selected fingers, as in  versus  . Even though both handshapes have the pinky, ring finger, and middle finger extended, and the index finger and thumb touching, the selected fingers are different. The difference in how the index finger and thumb make contact distinguishes these. In  , the index finger and thumb are selected and pinched firmly together, while in  , they are unselected, with index finger is tucked more loosely behind the thumb. Determining what counts as selected or unselected can be difficult, but it is often clarified by other aspects of the sign, due to other constraints.

For example, the **internal movement constraint** (Mandel 1981) restricts movement of the fingers. Only the selected fingers can move, and if any of them move, they all move. Thus, in a sign articulated with  , we would not expect the extended fingers to move, but in  , they could.

The **unselected finger constraint** (Corina 1993) restricts the shape of the unselected fingers based on the shape of the selected fingers. If the selected fingers are closed together, then the unselected fingers must be closed. If the selected fingers have some other shape (clawed, bent, etc.), then the unselected fingers must be open. Thus, for a handshape similar to  and  , but with the three extended fingers clawed, the index finger and thumb must be unselected. That is,  would be a valid handshape, since the extended fingers are selected, and thus can be clawed, but the counterpart of  with clawed extended fingers would not be valid, since the index finger and thumb are selected, so the unselected extended fingers can only be open.

These and other constraints on the articulation of signs have led researchers to posit different kinds on internal hierarchical structure, just as feature geometry has particular structural considerations to account for certain patterns (e.g. [±cons] and [−son] being inside the ROOT node, and [±strid] being dependent on [−son] but not [+son]). There are still many unknowns and many different models to choose from, but it is not hard to derive some possible structures. For example, given the internal movement and unselected finger constraints, we might want a feature geometry of sign to have features for finger shape and internal movement be dependent on a node for selected fingers, so that unselected fingers would be uninvolved and be predictably either open or closed depending on the shape of the selected fingers.

Additionally, given the dominance and symmetry constraints, we might want a feature geometry of signs to have the dominant and nondominant hands separated, with the dominant hand having a full range of handshapes and movements available, which can be shared with the nondominant hand. But if there is no such sharing, the nondominant hand must be immobile and have only unmarked handshapes available.

2 Phonological rules

Signed languages can have a variety of phonological rules as well. This is an expansive topic beyond the scope of this unit, but we find many of the same types of processes we have seen in spoken languages: deletion (especially of a hold between two signs), shifts in location (especially lowering or centralization), epenthesis (especially of transitional movements between signs), assimilation (spreading of handshape, movement, location, etc. from one sign to another, either progressive or regressive), and other featural changes, such as **distalization** (when the articulation is shifted from a proximal joint to a move distal joint), **weak hand freeze** (when the nondominant hand in a two-handed sign becomes immobile), or **weak hand drop** (when it is left out entirely).

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