Simultaneity in sign language: some observations from Japanese Sign Language

This paper shows that modality-specific phonological constraints on simultaneity in sign language can be derived from a general linguistic principle, providing evidence from Japanese Sign Language.

Formal properties. Sign languages, unlike spoken languages, employ more than one articulator, two hands and non-manual makers (**NMM**) such as head nods and eye movements, which are physiologically independent. It is therefore possible that multiple articulators are used to sign words and phrases simultaneously, as illustrated by example (1) from Hong Kong Sign Language (HKSL).

(1) Right hand: CL:PLANE-FLY -
    Left hand: HAVE MANY BIRD   CL:MANY-BIRDS-FLY-BY (CL:*classifier*)
    'The plane flew (in the sky). Many birds flew together with the plane.'   (Tang *et al*. 2007)

In this example, the right hand perseverates the sign 'plane,' a classifier morpheme, while at the same time, the left hand continues signing to describe the event. It is not, however, the case that simultaneous articulations are always permitted. It has been pointed out that the independent and simultaneous movement to produce two lexically distinct signs—"full simultaneity" (Vermeerbergen *et al.* 2007)—is less common than the cases of perseveration as in (1), where one hand holds the end state of a sign without moving, while the other continues signing (cf. Miller 1994). Rather, researchers argue that simultaneity is restricted in a certain way, proposing phonological conditions as in (2)–(3).

(2) *Battison's (1978) Dominance Condition (American Sign Language)*
    (a) If the hands of a two-handed sign do not share the same specification for handshape (i.e., they are different), then (b) one hand must be passive while the active hand articulates the movement, and (c) the specification of the passive handshape is restricted to one of a small set: A, S, B, 5, G, C, O.

(3) *Hendricks's (2007) Phonological Rule for Simultaneity (Jordanian Sign Language)*
    Manual simultaneity can only take place when at least one of the hands makes no lexically specified movement, or when the movement of the two hands is symmetrical.

Simply put, these conditions ban bimanual articulations with lexically specified active movements, i.e. full simultaneity. However, counter-examples exist in the literature. Consider (4) in HKSL.

(4) Right hand: DRINK …
    Left hand: DRIVE …   '(The man) was drinking while driving.'   (Tang *et al*. 2007)

In this example, two hands move actively to produce two distinct signs, hence violating (2) and (3). Another violation case is found in a British Sign Language (BSL) poem, where a signer expresses three propositions using two hands plus an NMM, each encoding a different word and phrase.

(5) NMM: *The signer puts her head back and opens and closes her mouth.*   SNORING HUMAN
    Right hand: DOG
    Left hand: BIRD   'Dog dozes, I doze, bird dozes.'   (Napoli *et al*. 2010)

Thus, further analysis seems to be called for to explain the distribution of bimanual simultaneity.

Functional properties. Along with these formal properties, researchers propose a functional description concerning manual simultaneity. Miller (1994), based on examples from Quebec Sign Language, suggests that one important function of manual simultaneity is to encode the distinction between foregrounded and backgrounded information. In a similar vein, Perniss (2007) provides a list of functions of bimanual simultaneous constructions: i) to express locative information; ii) to express the temporal and locative simultaneity of events; iii) to express temporal simultaneity of events or states; iv) topic-comment structure; v) enumeration; and vi) an index sign and its related signs.

Interestingly, the examples in (4)–(5), which do not follow the phonological rules in (2)–(3), depict temporally simultaneous events, hence, falling into the functional descriptions of manual simultaneity above. It is thus not surprising that as suggested by Tang *et al*. (2007), temporal embedding of clauses as in (4), where different predicates are subsumed under the same event, can be "sites for potential violations." However, the questions still remain: Why the observed instances of simultaneity carry these specific functions?; And why only this type of manual simultaneity is allowed, not others?

Proposal. I propose a syntactic account of the distribution of simultaneous constructions. Syntactically, functional properties of linguistic elements described above are typically represented by temporal, locative, and topic adverbial phrases/clauses, and enumeration and indexing morphemes that modify their associated words, which all involve adjunct structures. Now, according to the recent theory of labeling, syntactic objects should be visible to the labeling algorithm (Chomsky 2013), but importantly, adjuncts need not resort to labeling to be licensed (Hornstein 2009). I claim that this absence of labels explains the availability of simultaneous constructions in sign language, based on the assumption that the constituents of an unlabeled syntactic object, which are unspecified for linear

order, may be realized simultaneously at the phonology if a language permits this type of articulations.

To illustrate, let us take (4) from HKSL, which contains a secondary verbal predicate. The example is analyzed as in (6), where the embedded predicate is adjoined to the matrix predicate.

(6)　　　　vP

　　　the man　drink　drive

$[_{vP}$ [the man] ^ [drink]]
　　　　　　^ [drive]

In this structure, the two predicates are simply concatenated (notated with ^) without being labeled, thus, unordered in syntax. This is why the simultaneous production of the two signs in (4) is permitted in this language. Similarly, we saw that the example in (5) from BSL, in which three propositions are signed simultaneously, is well-formed. This fact also follows from my proposal. In this example, the three clauses are simply juxtaposed without forming a constituent, and hence, just as adjuncts, they lack a fixed linear order. This explains the possibility of expressing three propositions simultaneously.

The current proposal correctly captures the absence of simultaneous constructions other than those described above if the functional account is correct. Simultaneous articulations of syntactic items are permitted when the precedence relation between the items is unspecified, as I assume. However, such instances are generally disallowed. Consider the concatenated constituents in [H^H]/[XP^YP] below:

(7)　　a.　$[_Z Z$ ^ [H^H]]　　　b.　$[_Z Z$ ^ [XP^YP]]

They lack a linear order, and thus can potentially exhibit co-articulation. However, [H^H] and [XP^YP] structures, without a label, pose a problem by being invisible to the labeling algorithm. This accounts for the limited distribution of simultaneous constructions as described in previous research.

Japanese Sign Language (JSL).　JSL provides an interesting piece of evidence to support this proposal. Consider the structure of DP-coordination in (8), where two conjuncts and a coordinator are concatenated in a hierarchically flat manner (Goodall 1987, de Vries 2005).

(8)　　$[_{vP}$ [he^and^you] ^ come]

JSL uses an NMM, the head nod (hn), to represent the coordinator (cf. Kotani 2009) (see (9) below) and therefore, it is potentially possible that the three elements in the coordinate structure in (8)—two DPs and the coordinator—are signed by three independent articulators—two hands and the head nod—simultaneously. With this in mind, observe (9) in JSL, representing (8).

(9)　　*　NMM　　　　hn　　　　　　cf.　NMM　　　　hn
　　　　　Right hand:　HE　　COME　　　　Right hand:　HE　YOU　COME
　　　　　Left hand:　　YOU　　　　　　　　'He and you came.'
　　　　　'intended: He and you came.'

The result is unacceptable. This is expected under my proposal, since the coordinate structure in (8) is unlabeled, thus invisible to the labeling algorithm, creating an interpretation problem. There is another evidence that supports my proposal. Recall that in example (4) from HKSL, the co-articulated two predicates express temporally overlapping two events. Now, consider a similar example from JSL.

(10)　　NMM　　　　　　　　TOP
　　　　　Right hand:　ASAKUSA　EAT
　　　　　Left hand:　　　　　　WALK　　　'At Asakusa, (I) was eating while walking.'

The co-articulated two predicates in (10), just like those in (4), describe temporally simultaneous two events. Crucially however, my informants concurred that from this example, it is not possible to get a more conflated, co-event interpretation in which there is no temporal dependency between the two events (as in the Japanese V-V compound *tabe-aruku* 'to make an eating tour'). This contrast follows from my proposal. The available single-event reading comes from an adjunct structure as in (6), which is licensed without resort to labeling. By contrast, the co-event reading is assumed to arise from a structurally lower, non-adjunct V-level concatenate in $[_{VP}$ I^[eat^walk]], which is unlabeled. We therefore expect that the example creates a problem of interpretation, and this is what we observe.

To sum up, in this paper I put forth the hypothesis that modality-specific phonological conditions concerning simultaneity in sign language proposed in previous studies can be derived from a modality-independent requirement on labeling. Further research needs to examine this hypothesis.

Selected references. Battison, R. 1978. *Lexical borrowing in American Sign Language*. Silver Spring, MD: Linstok.| Hendriks, B. 2007. Simultaneous use of the two hands in Jordanian Sign Language. In *Simultaneity in signed language: Form and function*. 237-255.| Miller, C. 1994. Simultaneous constructions in Quebec Sign Language. In *Word-order issues in sign language*.18-22.| Tang, G. *et al.* 2007. Acquisition of simultaneous constructions by deaf children of Hong Kong Sign Language. In *Simultaneity in signed language: Form and function*. 283-316.| Vermeerbergen, M. *et al.* 2007. *Simultaneity in Signed Language: Form and Function*. Amsterdam: Benjamins.