
2 Prosody

Summary 2.1 The lexical level. – 2.2 Above the lexical level. – 2.3 Intonation. – 2.4 Interaction.

The domain of prosody includes linguistic phenomena such as intonation, rhythm, stress, and prominence. It thus concerns the suprasegmental features that co-occur with phonemic segments [PHONOLOGY 1].

In human languages, prosodic markers can be used to encode: i) grammatical functions such as the force of the utterance (e.g., declarative, interrogative, imperative, [SYNTAX 1]), ii) broader communicative functions (e.g., irony, sarcasm, emphasis), iii) the emotional state of the signer (e.g., surprise, anger, satisfaction). Given this variety of functions, prosody constitutes a complex interface. To illustrate these functions, below we provide a short utterance accompanied with different prosodic contours. Being the lexical unit (almost) the same in the four examples, we can isolate the contribution of different prosodic markers. These can be realised manually through sign modification or non-manually through facial expressions, head and body movements.

a. TABLE CLEAN

'The table is clean.' (declarative)



 ht-f
 re

b. TABLE CLEAN

'Is the table clean?' (polar interrogative)



 we
 md

c. TABLE PE CLEAN_[prolonged]

'This table is so clean!' (ironic)



 we
md ht-f

d. TABLE CLEAN

'The table is clean!' (surprised)




Examples (a) and (b) show that in LIS a declarative sentence is distinguished from a polar interrogative by means of non-manual markers. Specifically, neutral eyebrows and neutral head position mark the declarative, whereas raised eyebrows (re) and forward head/body lean (ht-f) mark the polar interrogative. In such instances, non-manual markers function as prosodic markers in defining the illocutionary force of a sentence. When irony is applied to a sentence, we observe a clash between the literal evaluation expressed by the signs (positive or negative) and the signer's attitude (compliment or criticism). In the ironic sentence shown above (c), irony is signalled by specific prosodic markers: the prolonged articulation of the evaluative manual sign (CLEAN) and non-manual markers such as wide-open eyes (we) and mouth-corners down (md). The fact that the line of the lips turns down indicates that the signer wants to convey criticism. This is clearly in contrast with the positive evaluation expressed by the sign CLEAN. This clash between mouth position and manual sign triggers the ironic interpretation.

Sentence (d) demonstrates that prosody can convey emotional states, too. In this case, the signing production is accompanied by initial mouth-corners down (md) and then forward head tilt (ht-f) and wide-open eyes (we). These non-manual cues taken together convey surprise.

As shown in the examples above, prosodic markers do not necessarily occur one after the other, but they can be produced simultaneously in a layering fashion. This possible overlapping distribution is a typical feature of sign language prosody.

In sign languages, prosody can be conveyed in different ways and with different articulators. An important distinction that must be acknowledged is that between manual and non-manual prosodic markers. If we look at the prosody conveyed by the hands, the main manual prosodic features are: the movement component, the spreading of the non-dominant hand, and hand switching. Movement includes features, such as rhythm, length or duration, and tension. Even absence of movement (i.e. pauses) can convey important prosodic information, for example the boundary between prosodic constituents. The non-dominant hand used in two-handed signs [PHONOLOGY 1.4.2] may be maintained in the following signs. This spreading phenomenon usually marks a precise prosodic domain. It can also produce a semantic contribution as in the case of buoys [LEXICON 1.2.3]. Hand switching (i.e. the reversal from one hand to the other) can represent an indicator of prosodic boundary. Prosodic markers realised non-manually may involve facial expressions (eyebrows, eye aperture, eye gaze, cheeks, mouth, lips, chin position), mouthing and mouth gestures, head position, shoulder position, and body posture.

Prosodic markers can also be classified according to what is actually marked. This categorisation distinguishes between boundary markers (or edge markers), which mark either the beginning or the end of prosodic constituents, and domain markers, which spread over the entire extent of prosodic constituents. Below, we show a LIS sentence to illustrate the distinction between boundary and domain prosodic markers and also the layering distribution of different markers.

_____	sq	eb	
_____	re	hn	
'donna'	[pe]	'prima'	[lavo]
WOMAN PE _a	FIRST IX _a	WORK BANK _b	INSIDE _b
			'banca'
			

'The woman who is first (on the list) works in a bank.'

From a syntactic perspective, this example is composed by a relative clause (WOMAN PE FIRST IX) followed by a main clause (WORK BANK INSIDE). These two larger prosodic domains are differentiated by the presence/absence of domain prosodic markers: squinted eyes and raised eyebrows (i.e. the typical non-manual markers of relative clauses, [SYNTAX 3.4.6]) spread over the first domain, whereas neutral facial expressions mark the second one. Moreover, the two prosodic domains are separated by specific boundary prosodic markers, namely a signing pause, an eye blink, and a head nod. Another observation concerns the spreading of mouthing. Specifically, we find that *prima*, 'first', spreads over the signs FIRST and the adjacent indexical IX.

A similar case is the spreading of *banca* 'bank' over the signs *BANK* and the adjacent preposition *INSIDE*. Both cases are interesting from a prosodic perspective because they show that mouthing is used as a domain marker signalling the presence of a small prosodic constituent (i.e. prosodic word, [PHONOLOGY 2.2.1]).

Prosodic descriptions usually deal with two types of domains, which are reflected in the structure of this chapter: i) domains at the lexical level, such as syllable and foot [PHONOLOGY 2.1] and ii) domains above the lexical level, such as prosodic word, phonological phrase, intonational phrase, and phonological utterance [PHONOLOGY 2.2]. The remainder of the chapter addresses the issues of intonation [PHONOLOGY 2.3] and interaction [PHONOLOGY 2.4]. For further details about interaction in LIS, the reader is referred to [PRAGMATICS 10].

2.1 The lexical level

Between the phonemic level (i.e. the set of phonemes used in a language) and the lexical level (i.e. single lexical entries belonging to the lexicon of the language) we find two prosodic constituents: the syllable [PHONOLOGY 2.1.1] and the foot [PHONOLOGY 2.1.2]. Therefore, the prosodic hierarchy included in this (sub-)lexical level is the following: (phonemic level) - - - syllable - - - foot - - - (lexical level).

2.1.1 Syllable

The movement component [PHONOLOGY 1.3] plays a very important role in the articulation of signs because it determines the dynamic flow and allows the other formational parameters (handshape, orientation, and location) to change during the signing production. The importance of movement is also sustained by the observation that signs must include at least one movement. If they lack movement, they are considered ill formed. To repair an ill-formed sign, an epenthetic movement needs to be inserted [PHONOLOGY 3.2.1]. Given the prominent role of movement in sign articulation, many scholars consider it as the nucleus of the sign syllable.

The syllable is defined as an intermediate prosodic unit between the phoneme and the foot. The number of syllables contained in a sign is determined on the basis of the number of sequential movements produced. If the sign contains one movement segment only, as *LIFE* (a), it is considered a monosyllabic sign. Conversely, if it contains two movement segments, as *LIVE* (b), it is considered a disyllabic sign.

a. LIFE



b. LIVE



Interestingly, the two examples above show a minimal pair of signs that are distinguished by syllable number only (one vs. two syllables).

The movement component also determines syllable weight. Like in other languages, in LIS, syllables can be of two types: light and heavy. A light syllable can be recognized by the presence of a simple movement, which can be a primary movement (a) (otherwise known as path movement, [PHONOLOGY 1.3.1], or a secondary movement [PHONOLOGY 1.3.2], be it a handshape change (b) or an orientation change (c).

a. STREET



b. SWITCH_ON



c. OPEN



These three examples count as monosyllabic signs, and each one includes one light syllable. On the other hand, a heavy syllable is characterised by a complex movement, which is defined as the simultaneous combination of two movements. In LIS, it is possible to combine: i) a path movement with a handshape change, as in COPY (a), ii) a path movement with an orientation change, as in FIRST_TIME (b), and iii) a handshape change with an orientation change, as in CASE (c).

a. COPY



b. FIRST_TIME



c. CASE



These three examples count as monosyllabic signs and each one includes one heavy syllable.

Syllables in LIS may also differ in terms of visual sonority. The degree of sonority depends on movement prominence, in particular on the kind of articulatory joint used to produce the movement. The closer the joint is to the signer's body, the higher the sonority of the relevant syllable. For sign language syllables, the following sonority hierarchy has been identified: shoulder > elbow > wrist > base joints > non-base joints (from the most to the least prominent joint). To illustrate, we present five LIS signs, ordered from the highest to the

lowest level of sonority: ADULT (shoulder), THANK_YOU (elbow), SPRING (wrist), DUCK (base joints), and TITLE (non-base joints).

a. ADULT



b. THANK_YOU



c. SPRING



d. DUCK



e. TITLE



2.1.2 Foot

A foot is a prosodic constituent that dominates the syllable and is itself dominated by the prosodic word. So, a foot is composed of syllables and, in turn, feet compose prosodic words. The discussion about this intermediate prosodic level is relevant to this chapter because, contrary to other sign languages (which show a tendency toward monosyllabic signs), LIS shows a tendency for signs to be at least disyllabic, and hence to be internally more complex.

To provide an inventory of LIS rhythmic structure, it is worth looking at the patterns that are attested in the language. The possible combinations of syllables are the following: light + light (with repetition), light + light (with no repetition), heavy + heavy (with repetition), heavy + heavy (with no repetition), light + heavy, and heavy + light. Below, one example for each pattern is provided and discussed.

By definition, the light + light syllable alternation includes two simple movements. These can be of the same type and repeated twice, as in STUPID, which requires the repetition of an orientation change.

STUPID



Note that the same type of movement can be produced twice with a change in the angle of the second movement. For example, the sign TABLE_CLOTH is articulated with two path movements interpolated with a 90° angle change: as a consequence, the first one is straight and horizontal, while the second one is straight and vertical.

TABLE_CLOTH



A similar case, which however is obtained through a 180° angle change, is the sign TENNIS.

TENNIS



Another (less frequent) possibility is light + light with no repetition: it combines two simple movements that look different. One such case is the sign LEAGUE, which displays a circular path movement followed by a straight horizontal path movement.

LEAGUE



The heavy + heavy syllable alternation includes two complex movements, which again can be the repetition of the same kind of movement, as in DIRTY (a) or two different movements, as in DISREGARD (b).

a. DIRTY



b. DISREGARD



The sign DISREGARD includes two different complex movements: a path movement combined with handshape change (closing from curved open L to closed G) followed by a path movement combined with handshape change (opening from closed G to L).

Heavy and light syllables can also be combined together, even if such configurations are not frequent in the LIS lexicon. We can find both the light + heavy and the heavy + light patterns. An example of light + heavy is the sign IMPORTANT, which is composed by a downward path movement followed by an upward movement combined with handshape change (opening from A to L handshape).

IMPORTANT



An example of heavy + light is the idiomatic sign MAKE_FUN_OF, which is realised in the first syllable with forward path movement and handshape change (closing from curved open L to closed G) and in the second syllable with a circular path movement.

MAKE_FUN_OF



The variation between light and heavy syllables determines prominence in the signing flow.

2.2 Above the lexical level

The remainder of the chapter deals with the prosodic domains above the lexical level. In particular, we discuss the prosodic markers attested in the prosodic word [PHONOLOGY 2.2.1], in the phonological phrase [PHONOLOGY 2.2.2], in the intonational phrase [PHONOLOGY 2.2.3], and in the phonological utterance [PHONOLOGY 2.2.4]. To sum up, the prosodic hierarchy relevant to this section is the following: (lexical level) - - - prosodic word - - - phonological phrase - - - intonational phrase - - - phonological utterance.

2.2.1 Prosodic word

The prosodic word is the constituent that dominates the foot and is dominated by the phonological phrase. In most of the cases, it corresponds to one single lexical sign, as in the monosyllabic sign FOOTBALL.

FOOTBALL

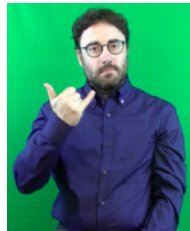


However, there are also cases in which prosodic words involve more than one sign: compounding and cliticisation. As we will see, prosodic words in LIS may be marked by mouthing and other non-manuals as domain markers and may involve phonological phenomena aimed at reducing contrastive features, such as different handshapes or different movements.

As for compounds [MORPHOLOGY 1], the two stems constitute a potential single prosodic word. It has been observed a tendency to reduce phonological contrasts between the stems, for example through assimilation [PHONOLOGY 3.1.1] or non-dominant hand spread. By making the stems look more similar, a more well-formed prosodic word is produced. For example, in the citation form of the compound HEAD^CL(Y): 'a_lot' (meaning 'intelligent'), the stems display very different handshapes: G and Y. In a widespread variant of this compound, shown below, regressive handshape assimilation is observed: the handshape of the first stem, G, assimilates the selected fingers of the handshape of the second stem (i.e. extended thumb and extended pinky).



HEAD
'Intelligent'



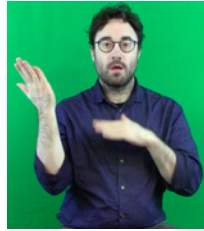
CL(Y): 'a_lot'

The stem *HEAD* is thus produced with a complex handshape, which is phonologically more similar to the handshape of the second stem. The reduction of phonological contrast between the two stems results in a more well-formed prosodic word.

In cliticised forms, a functional sign such as a weak pointing sign attaches to a lexical host. In this configuration, handshape assimilation [PHONOLOGY 3.1.1] or coalescence [PHONOLOGY 3.1.2] may occur. The example below shows a prosodic word formed by a lexical sign, *HOUSE*, and a cliticised determiner, *IX(B)*, which has undergone progressive assimilation.



HOUSE
'That house'



IX(B)

Prosodic words formed by more than one sign may also include a negative sign. In the example below, the negative sign *EXIST.NOT* attaches to the predicate *NEED*. The prosodic word is accompanied by a slight side-to-side headshake, which is the typical non-manual marker conveying negation [SYNTAX 1.5.2]. In this case, it spreads regressively from the negation to the predicate, thus functioning as a domain prosodic marker.

hs
NEED ^ EXIST.NOT
'It's not necessary.'



According to their citation forms, *NEED* is articulated with S handshape and *EXIST.NOT* with L handshape. When the two signs form a prosodic word, we may observe two phonological processes. Some signers produce *NEED* with L handshape, thus realising regressive assimilation. Other signers produce a handshape change opening from closed G handshape to L handshape, as shown above.

A similar example is the prosodic word formed by the predicate *SEE* and the negative sign *NEVER*. In their citation forms, *SEE* is articulated with V handshape, while *NEVER* requires I handshape. To reduce the phonological distance between the two handshapes, the first

one is reduced from V to G (i.e. from extended index and middle finger to extended index only). The movement component also undergoes assimilation: while in the two basic forms two different path movements are produced (forward in SEE and ipsilateral in NEVER), the prosodic form displays one movement only.

SEE[^]NEVER
'I've never seen it.'



Another example of prosodic word formed by two signs is WOMAN PERSON. In this case, the lexical sign WOMAN is followed by a functional sign localising the referent in the signing space. The insertion of the sign PERSON is functional to verb agreement, as shown by the indexes in the glosses.

'donna'
WOMAN PERSON₃ FLIRT₁
'The woman is flirting with me.'



An effect of the prosodic word is that the movement repetition required by the citation form of the sign WOMAN disappears. Interestingly, the mouthing associated with WOMAN, 'donna', spreads over the whole prosodic word. In this case, mouthing functions as domain marker.

2.2.2 Phonological phrase

Phonological phrases are composed of one or more prosodic words. They generally correspond to syntactic constituents, such as nominal phrases, prepositional phrases, and verbal phrases. As we will see, phonological phrases in LIS may be marked by non-dominant hand spreading as domain marker, as well as by head nod, eye blink, movement repetition, final hold, and phrase-final lengthening as right-edge markers.

It may happen that after the articulation of a two-handed sign, the non-dominant hand remains in place until the end of the phonological phrase. This phenomenon, known as *non-dominant hand spreading*, functions as domain prosodic marker. It can be observed in the example below. The phonological phrase starts with the symmetric two-handed sign BOOK, articulated with B handshape. The non-dominant hand in B handshape is maintained through the whole phonological phrase, while the dominant hand articulates another sign, IX(dem).

\underline{hn}
 dom: BOOK IX(dem) INTERESTING
 n-dom: BOOK B-----
 'That book is interesting.'



At the right edge of the phonological phrase, a head nod is produced. In the rightmost periphery of phonological phrases, we may also find other boundary markers. For instance, final lengthening is a common prosodic phenomenon occurring at the end of LIS nominal expressions. In particular, the duration of postnominal modifiers tends to be longer than that of prenominal modifiers. The adjective *BEAUTIFUL* is one of the few adjectives in LIS that can occur before or after the noun [SYNTAX 4.5.1], as shown in (a) and (b), respectively.

a. TRAVEL AMERICA IX(LOC) BEAUTIFUL EXPERIENCE
 'My travel to the States was a beautiful experience.'

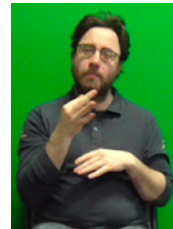


b. TRAVEL AMERICA IX(LOC) EXPERIENCE BEAUTIFUL
 'My travel to the States was a beautiful experience.'



The screenshots below show that, under the same context and semantic interpretation, the distribution of the adjective *BEAUTIFUL* has an effect on its duration. When it is produced before the noun (a), the path movement is shorter and therefore the sign duration is shorter. Moreover, the sign in phrase-final position, *EXPERIENCE*, exhibits three forward movements, while in its citation form only two movements are required.

Table 2 Prenominal adjective



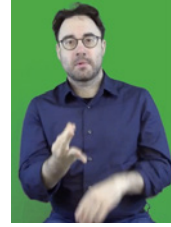
	BEAUTIFUL	EXPERIENCE
duration	shorter	longer
movement	x 1	x 3

When *BEAUTIFUL* is produced after the noun (b), the path movement is longer and thus the sign is characterised by longer duration. As for


the noun *EXPERIENCE*, being in phrase-initial position, the sign exhibits two movements only.

Table 3 postnominal adjective

	EXPERIENCE	BEAUTIFUL
duration	shorter	longer
movement	x 2	x 1



The final lengthening observed at the end of the phonological phrase is generally perceived as a hold in the final sign. Final lengthening at the end of the phonological phrase is also observed when this domain does not appear in sentence-final position, as can be observed in the example below.

$\underline{\text{eb}}$
 HOUSE INSIDE BOOK ZERO 
 'There isn't any book in the house.'

The phonological phrase *HOUSE INSIDE* is marked by final lengthening and movement repetition on the rightmost sign (the preposition *INSIDE*), as well as eye blink right after it. As for movement repetition, it is important to note that, in its citation form, *INSIDE* is articulated with a single downward movement. Conversely, in the example above, this sign is characterised by movement reduplication (i.e. two downward movements).

2.2.3 Intonational phrase

Intonational phrases constitute a larger prosodic domain, composed of one or more phonological phrases. They generally correspond to syntactic constructions, such as topicalisation [SYNTAX 2.3.3.3], parentheticals, restrictive and non-restrictive relative clauses [SYNTAX 3.4]. Layering of different non-manual markers in this prosodic domain is expected.

As in other sign languages, the boundaries of intonational phrases

es in LIS are often marked by signing pauses, lowering of the hands, eye blinks, and head nods. Manual signs and gestures with discourse function (e.g., *WELL* and *PALM_UP*, shown below) may also occur at the beginning or at the end of this prosodic domain.

a. *WELL*b. *PALM_UP*

As for domain markers, main clauses usually appear with neutral non-manuals and differ from embedded clauses, which conversely display marked non-manuals spreading over the whole clause. The type of non-manual domain markers depends on the type of embedded clause (for an overview, see [PHONOLOGY 2.3]). To illustrate, we present below a case of topicalisation [PRAGMATICS 4.2].

	<u>hn</u>	
	<u>eb</u>	
<u>sq</u>		<u>hs</u>
CAKE IX(dem)	FLOUR EMPTY	

'This cake, it has no flour.'



The topicalised constituent, *CAKE IX(dem)*, is separated from the rest of the sentence by two boundary markers produced right after the pointing sign: head nod and eye blink. The two parts of the sentence are further distinguished by domain markers, in that the topicalised constituent is marked by squinted eyes, while the rest of the sentence is not. Note that the side-to-side headshake co-occurring with

the negative quantifier *EMPTY* is not a prosodic marker, but the typical non-manual associated with negative signs.

As similarly observed at the end of phonological phrases, the right edge of intonational phrases is also marked by final lengthening. This prosodic phenomenon has been found in particular on sentence-final *wh*- signs (e.g. *WHAT*, *HOW*, *WHO*) and with sentence-final aspectual marker *DONE*, but it is likely to be a general phrase final lengthening effect.

2.2.4 Phonological utterance

The phonological utterance represents the largest prosodic domain. It may include one or more intonational phrases. Being this prosodic domain an interface with other aspects of linguistic and non-linguistic communication, phonological utterances allow to observe a variety of discourse phenomena: coherence [PRAGMATICS 5.1], cohesion [PRAGMATICS 5.2], reference tracking [PRAGMATICS 2], turn regulation [PRAGMATICS 10.2].

2.3 Intonation

Intonation represents the prosodic contour spreading through the whole utterance. It is a complex interface phenomenon since it closely interacts with other linguistic domains, such as syntax, semantics and pragmatics.

All human languages are endowed with intonational patterns, which are superimposed on segmental material. There is general consensus on the functional parallelism between intonational melodies in spoken languages and visual patterns in sign languages. In signed discourse, strings of manual signs are accompanied by non-manual features creating intonational patterns.

Crucially, different facial expressions often co-occur in a layering fashion, thus realising bundles of non-manual markers. In the polar interrogative shown below, we can observe a polar intonation realised by simultaneously combining raised eyebrows and forward head tilt.

_____ ht-f
 _____ re

 HOUSE IX BUY
 ‘Have you bought the house?’



The intonational contours characterising the different syntactic constructions in LIS are discussed in detail in the relevant sections in the Syntax Part [SYNTAX]. To illustrate, we present here an overview of the non-manual markers associated with the main syntactic constructions in LIS.

Table 3 Overview of different non-manual markers, their grammatical function and spreading domain

Syntactic constructions	Non-manual markers	Spreading domain
Polar question [SYNTAX 1.2.1]	Raised eyebrows	Whole domain (highest peak at the end)
	Forward head/body lean	Especially at the end of the domain
Wh- question [SYNTAX 1.2.3]	Lowered eyebrows	Interrogative <i>wh</i> - sign or the whole interrogative sentence
Restrictive relative clause [SYNTAX 3.4]	Raised eyebrows	Whole domain (highest peak over the sign PE) or over PE only
	Squinted eyes	Whole domain (highest peak over the sign PE) or over PE only
	Head nod	Right edge
	Eye blink	Right edge
Non-restrictive relative clause [SYNTAX 3.4.7]	Head nod	Left and right edge
	Eye blink	Left and right edge
Conditional clause [SYNTAX 3.5.1]	Raised eyebrows	Whole domain
	Chin down	Right edge
Contrastive focus [PRAGMATICS 4.3.1]	Raised eyebrows	Whole domain
	Wide-open eyes	Whole domain
Aboutness topic [PRAGMATICS 4.3.2]	Raised eyebrows	Whole domain
	Squinted eyes	Whole domain
	Eye blink	Right edge
	Head nod	Right edge

2.4 Interaction

For details on the cues that are used by LIS signers to regulate interaction, the reader is referred to the Chapter on Communicative Interaction [PRAGMATICS 10].

2.4.1 Turn regulation

To be developed.

2.4.2 Back-channeling

To be developed.

Information on Data and Consultants

The descriptions in this chapter are based partially on the references below and on the elicitation of new data. The linguistic data illustrated as images and video clips have been checked through acceptability judgments and have been reproduced by Deaf native-signing consultants.

Authorship Information

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References

- Branchini, C.; Cardinaletti, A.; Cecchetto, C.; Donati, C.; Geraci, C. (2013). “Wh-duplication in Italian Sign Language (LIS)”. *Sign Language & Linguistics*, 16(2), 157-88. [2.2.3]
- Geraci, C. (2009). “Epenthesis in Italian Sign Language”. *Sign Language & Linguistics*, 12(1), 3-51. [2.1]
- Mantovan, L. (2017). *Nominal Modification in Italian Sign Language (LIS)*. Berlin; Boston: De Gruyter Mouton. [2.2.2] (142-53)