

26. Information structure – theoretical perspectives

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1. Introduction

Information structure is a field of linguistics covered in numerous books and articles. Information structure in sign languages has also been investigated almost from the first days of sign linguistics; however, as is often the case, most of the available studies focus on a very small number of sign languages, and among these, American Sign Language (ASL) is the one most prominently represented. Nevertheless, some interesting results have been obtained that can be relevant for the theory of information structure in general.

In this chapter, we are going to use the terminology commonly used in the information structure literature: in particular, topic, focus, contrast, and emphasis. More specific terms are explained throughout the chapter. A reader not familiar with the field of information structure is encouraged to consult Krifka (2008) for a concise and accessible overview.

Recently, two handbook chapters devoted to information structure in sign languages have appeared: Wilbur (2012) and Kimmelman & Pfau (2016). Moreover, Kimmelman (2019) is a book-length study of information structure in sign languages, investigating information structure notions based on corpus data from Sign Language of the Netherlands (NGT) and Russian Sign Language (RSL). In this chapter, we thus try to avoid overlap with these works to the extent possible and report new results and new perspectives on the topic. In addition, we go beyond previous overviews by also addressing generative approaches to certain aspects of information structure in sign languages. In Section 2, we discuss topic and focus marking in sign languages. Section 3 is devoted to recent studies that shed light on a number of particularly interesting phenomena, some of which appear to be modality-specific. In Section 4, we offer a brief overview of experimental research on information structure. Section 5 concludes the paper.

2. Information structure: Description and formalization

We start by providing an overview of how different types of topics (Section 2.1) and foci (Section 2.2) are marked in different sign languages. To that end, we address syntactic position, non-manual (prosodic) marking, and for foci also manual marking. As for syntactic positioning, we further address, in Section 2.3, how the distribution of topic and focus has been accounted for within a hierarchically organized phrase structure.

2.1. Strategies for topic marking

Topic marking is quite common and salient in sign languages, and this probably explains why topic marking has been described from the early days of sign linguistics, first for ASL (Friedman 1976; Ingram 1978) and later also for other sign languages. However, as is also the case for spoken languages, some terminological confusion has emerged in the literature.

The most confusing term is the term ‘topic’ itself, which is sometimes used to refer to the pragmatic function, but, at the same time, is often used to refer to the syntactic operation of topicalization, whereby a constituent is moved to the sentence-initial position, but which pragmatically can be used to mark either topic or (contrastive) focus (see, for instance, Chen Pichler (2010) as an example of such use of the term ‘topic’). The term ‘topicalization’ itself is confusing due to the natural implication that topicalization marks topics, which, however, is not necessarily the case. In this chapter, we use the term ‘topic’ without further explanation to refer to the pragmatic function only.

Many sign languages have been shown to mark topics by means of syntactic and prosodic strategies, and the markers seem strikingly similar across different sign languages: sentence-initial position, a prosodic break separating the topic from the rest of the sentence (this can be a change of non-manuals, a manual pause/hold, and/or an eye blink, Nespor & Sandler (1999)), and specific non-manual markers, typically eyebrow raise and head movement (see Sze (2011) for a comparison of non-manual markers across different sign languages). The combination of various markers is illustrated in (1) from Israeli Sign Language (ISL).¹

- br
squint
hf
blink
- (1) CAKE, IX₁ EAT.UP DEplete
‘I ate the cake completely.’ (ISL, adapted from Nespor & Sandler 1999: 165)

An important theoretical issue is the relation between these three types of markers. Topics that are in the sentence-initial position are also always prosodically isolated from the rest of the sentence. It is not clear whether in situ topics can also be prosodically isolated; a crucial example would be an object topic in situ separated by a prosodic boundary from the rest of the sentence, but such examples do not seem to occur. Non-manual marking, however, is not a necessity. For several sign languages (ASL: Todd 2008; Hong Kong Sign Language (HKSL): Sze 2008; RSL and NGT: Kimmelman 2015; Italian Sign Language (LIS): Calderone 2020), it has been shown that topics are not always marked with raised eyebrows, although they might be. Finally, if a topic is marked by a non-manual marker, this automatically implies that it is prosodically isolated, since the marker accompanies the topic only and thus distinguishes it from the rest of the sentence.

Semantically, a common distinction is between aboutness topics and scene-setting topics (Sze 2008; Kimmelman 2014). Despite the functional differences – aboutness topics are typically old information and refer to the argument of the verb, and scene-setting topics are

often new information and adjuncts – they are marked by similar markers at least in some sign languages.

Syntactically, a distinction is often made between three types of topics (similar to spoken languages): hanging topics, left dislocation, and topicalization (see Wilbur (2012) for further discussion). Hanging topics are not integrated syntactically into the rest of the sentence, and often refer to a hypernym of an element within the sentence (e.g., *As for vegetables, I like tomatoes*). Left-dislocated topics are also not syntactically integrated, but are co-referent with a pronoun within the sentence (e.g., *Tomatoes, I like them*). In the case of topicalization, the topic is co-referent with a gap in the sentence (e.g., *Tomatoes, I like \emptyset*). As already mentioned, at least topicalization and probably also left dislocation is also used for pragmatic functions other than topics. Since hanging topics and left-dislocated topics are not integrated into the rest of the sentence, they are usually analyzed as being base-generated in sentence-initial position, while topicalized topics are usually analyzed as moved, leaving behind a trace in their original sentence-internal position. It is worth noting that it has been claimed for ASL (Aarons 1996) and German Sign Language (DGS; Bross 2018) that base-generated and moved topics are accompanied by different non-manual markers. Elaborate syntactic analyses postulating separate functional projections to host different types of topics and foci exist in the literature (e.g., Lillo-Martin & de Quadros 2008); these will be addressed in Section 2.3.

Another interesting syntactic way of marking topics is topic-copying, discussed for NGT in Crasborn et al. (2009). In this language, a sentence-final pronoun can be used to refer back to the topic of the sentence. Importantly, Crasborn et al. (2009) demonstrated that this pronoun can refer to both subject (2a) and object (2b) aboutness topics, and also to scene-setting topics. Therefore, this pronoun is indeed an instance of topic marking and not a subject pronoun copy, as had previously been proposed for NGT by Bos (1995).

- (2) a. GIRL IX_{left}, IX_{left} BOOK THROW.AWAY IX_{left}
‘That girl, she threw away the book.’
b. BOOK IX_{right}, IX_{left} THROW.AWAY IX_{right}
‘He threw the book away.’ (NGT, adapted from Crasborn et al. 2009: 359)

A theoretically important issue concerning topics in sign languages is whether (some) sign languages can be considered topic prominent (Li & Thompson 1976). The question is debatable because there is no universally accepted definition of topic prominence, also for spoken languages. For some sign languages, it has been argued that they are topic prominent (ASL: McIntire 1982), for others that they are not topic prominent (HKSL: Sze 2008, RSL and NGT: Kimmelman 2019). Jantunen (2013) argued that Finnish Sign Language (FSL) is discourse-oriented, which is a different notion not centered around topic marking and might better describe other sign languages as well.

2.2. Strategies for focus marking

Focus marking in sign languages has been studied somewhat less well than topic marking. However, some general patterns have been identified, and again, different sign languages show interesting similarities as well as variation when it comes to the details of focus realization (see, for instance, Wilbur 1996; Crasborn & van der Kooij 2013; Herrmann 2015; Kimmelman 2019). In general, and similar to what we observed for topics, focus in sign languages can be marked syntactically and prosodically. In addition, focus particles can be used to express focus-related meanings (see Volk & Herrmann, [Chapter 22](#), for further information).

Syntactically, focus can be marked by topicalization (fronting), as mentioned in the previous section. For instance, in (3) from ASL, the topicalized constituent receives contrastive focus.

- ____top
- (3) JOHN NOT-LIKE JANE. MARY, IX₃ LOVE
'John doesn't like Jane. *Mary*, he loves.'
(ASL, adapted from Aarons 1996: 76)

Another common syntactic strategy for focus marking attested in various sign languages are cleft-like constructions where focus and background are expressed by separate clauses in a bi-clausal structure, as in (4).² The first clause, which includes a *wh*-element, contains background information; it is accompanied by brow raise and followed by a prosodic break. The focus constituent appears in the second clause (with empty copula). Note, however, that there is disagreement about the syntactic as well as pragmatic status of such constructions, which we address in Section 3.3.

- _____br
- (4) IX₁ DISLIKE WHAT / LEE POSS TIE
'What I dislike is Lee's tie.'
(ASL, Wilbur 1996: 210)

In fact, Petronio (1991) and Wilbur (1999) have argued that focus in ASL has to move to a specific position to receive prosodic prominence (see Section 3.1), namely to the final position in a clause. Clefting is a strategy that a signer can use to place any constituent in the final position (while the background becomes the free relative clause). However, Schlenker et al. (2016) have demonstrated that in ASL, prosodic marking of the focused constituent can also happen in situ, thus arguing against obligatory movement for focus. In situ focus marking is also clearly attested in French Sign Language (Schlenker et al. 2016), DGS (Herrmann 2015), NGT (Crasborn & van der Kooij 2013), and RSL (Kimmelman 2019).

Furthermore, in some sign languages, focus (more specifically, emphatic focus) can be marked by doubling the relevant constituent; for other sign languages, the relation between focus and doubling has been argued to be more complicated. We return to this issue in Section 3.4.

Focus in sign languages can also be marked prosodically, be it by non-manual markers and/or prosodic modifications of manual signs (see Fenlon & Brentari, Chapter 4). Concerning non-manual markers, two aspects are of interest. First, there is some overlap between non-manual markers for topic and for focus. For instance, both in ASL (Wilbur & Patschke 1999) and in NGT (Crasborn & van der Kooij 2013), eyebrow raise is used in both functions. This has led Wilbur & Patschke (1999) to argue that eyebrow raise in ASL does not mark topics or foci but is instead a result of A'-movement (also see Wilbur, Chapter 24, for discussion). However, there are also markers that are used for foci but not for topics. For instance, forward and backward body leans have been found to mark focus in ASL and NGT (Wilbur & Patschke 1998; van der Kooij et al. 2006). Second, as for focus, cross-linguistic variation in the extent to which non-manual markers are used has been observed. Kimmelman (2019) demonstrated that NGT uses a larger set of non-manuals than RSL to mark focus, and that non-manual marking in NGT is employed more frequently. For instance, NGT, unlike RSL, uses eyebrow raise and head tilt for focus marking. Head nods are attested in both sign languages, but while NGT uses head nods for different types of focus, RSL only uses them to mark contrastive focus (see also Section 3.4).

Concerning manual prosodic marking, all sign languages described so far modify signs in focus for them to be more stressed or prosodically prominent. For instance, focused signs in RSL may be longer, contain more repetitions, and a larger amplitude, and may be articulated higher than unfocused productions of the same signs (Kimmelman 2019). For ASL, different researchers reported different prosodic correlates of focus: for instance, Coulter (1990) found focused signs to be shorter, while Wilbur (1999) found them to be longer, and, according to Schlenker et al. (2016), focused signs are signed faster (which can potentially make them shorter) but also contain longer holds (which can potentially make them longer).

Furthermore, various researchers noted that there is no unique manual prosodic marker that is used to mark focus in all cases. For instance, Kimmelman (2019) found that, in RSL and NGT, no single manual prosodic marker is obligatory, and that the presence of prosodic markers is influenced by phonology (i.e., whether the sign contains path or hand-internal movement) and focus type, as well as some other factors that are currently unknown.

2.3. Information structure and the left periphery

Since the seminal work by Rizzi (1997, 2001), many scholars working in the Generative tradition (Chomsky 1981, 1995) have assumed that three types of structural layers should be distinguished within a hierarchical phrase structure: a lexical layer (where lexical elements are merged), an inner functional layer (for functional categories like aspect and negation), and an outer functional layer. The latter layer has also been referred to as the 'left periphery' of the clause, and is argued to constitute the interface between a propositional content and the superordinate structure (i.e., a higher clause or the discourse). The hierarchically organized functional projections it contains replace what had previously been labelled Complementizer

Phrase (CP). The fine structure of the left periphery is illustrated in Figure 1 (see also Figure 1 in Wilbur, Chapter 24, for a structure involving all three layers).

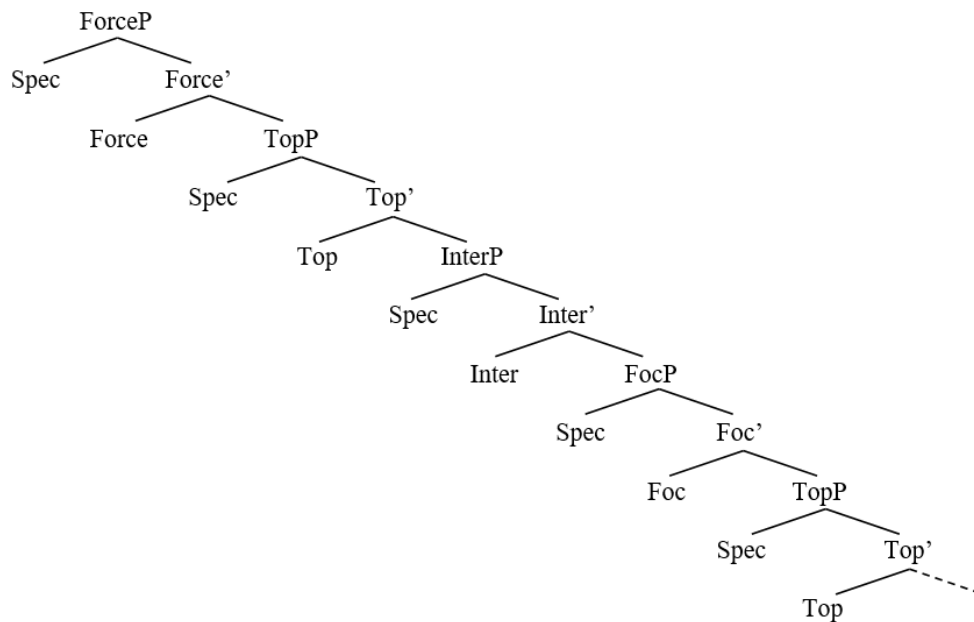


Figure 1. Fine structure of the left periphery (based on Rizzi 1997, 2001)

As is evident, this structure contains dedicated positions for topics and focus. The assumption is that features hosted in the heads of TopP/FocP attract topic and focus constituents into their specifiers (in situ focus, as discussed in the previous section, has to be accounted for in a different way). This is what we observe in (2) and (3) above. For some sign languages, it has been argued that the non-manual markers involved are actually the overt realization of syntactic features residing in functional heads (e.g., Neidle et al. 2000; Pfau 2016; Bross 2018), and that they associate with the constituent in their specifier under Spec-head agreement. The above structure also suggests that clause-initial topic and focus constituents can be combined, and this is indeed what we observe in the ASL example in (5a). The Gungbe (Kwa, Benin) example in (5b) shows the same order, but in this language, the Top and Foc heads are lexicalized by dedicated particles.

- (5) a. top / foc
 FRUIT / BANANA / JOHN LIKE MORE
 ‘As for fruit, John likes *bananas* best.’
 (ASL, Lillo-Martin & de Quadros 2008: 169)
- b. [...] [dàn ló] **yà** [Kòfí] **wé** ún hù-ì ná
 snake SPF_[+def] TOP Kofi FOC 1SG kill-3SG for
 ‘(I said that,) as for the specific snake, I killed it for *Kofi*.’
 (Gungbe, adapted from Aboh 2004: 291)

Moreover, the structure also allows for multiple topics, that is, topic stacking, an option that is illustrated in (6). In the NGT example in (6a), a left-dislocated topic precedes a spatial scene-

setting topic (also note the clause-final pronoun referring back to the former topic), while in the DGS example in (6b), a base-generated (hanging) topic precedes a moved topic (topicalization).

- (6) a. $\frac{\text{neutral}}{\text{IX}_{\text{right}}}$ PERSON $\frac{\text{tilted}}{\text{TOMORROW AT.HOME,}}$ $\frac{\text{nod}}{\text{IX}_{\text{right}}}$ $\frac{\text{neutral}}{\text{NEWSPAPER READ}}$ $\frac{\text{neutral}}{\text{IX}_{\text{right}}}$
 ‘The man, tomorrow at home, he will read the newspaper.’
 (NGT, Crasborn et al. 2009: 359)
- b. $\frac{\text{base-top}}{\text{VEGETABLES}}$ $\frac{\text{moved-top}}{\text{PEPPER}_i, \text{ PAUL } t_i \text{ LIKE}}$
 ‘As for vegetables, as for pepper, Paul likes (it).’ (DGS, Bross 2018: 62)

Certain constraints on the combination of topics have been proposed in the literature. Clearly, such constraints have implications for the nature of the topic phrases involved, which may have to be further specified with regard to what types of topic they can host (also note that Rizzi (1997) assumes that both TopPs in Figure 1 are recursive). We shall not go into details here, but only point out that for both ASL and DGS, it has been claimed (i) that two base-generated topics may co-occur (6a), and (ii) that base-generated topics must precede moved topics (Aarons 1996; Bross 2018), that is, the reverse order in (6b) would yield an ungrammatical result. Bross (2018: 63) concluded that “the observations are in line with the idea that base-generated frame setters are structurally higher than moved aboutness topics” (cf. Lillo-Martin & de Quadros (2008); see also Calderone (2020) for a recent discussion of the left periphery in LIS).³

Rizzi (2001) introduced an interrogative phrase into the left periphery (see Figure 1), the specifier of which is claimed to attract interrogative clauses. The NGT examples in (7) illustrate that topics may precede different types of interrogatives, as predicted. In (7b), the manual question particle occupies the head of InterP, the entire clause moves to SpecInterP, and subsequently, the argument topic BOOK moves further to the specifier of the higher TopP (see Bross (2018) for DGS).⁴

- (7) a. $\frac{\text{top}}{\text{HORSE INDEX}_3, \text{ INDEX}_2}$ $\frac{\text{y/n}}{\text{STROKE}_3 \text{ DARE}^{\wedge} \text{INDEX}_2}$ (NGT, Pfau 2016: 48)
 ‘As for the horse, do you dare to stroke it?’
- b. $\frac{\text{top}}{\text{BOOK, STEAL}}$ $\frac{\text{wh}}{\text{WHO Q-PART}}$
 ‘As for the book, who stole it?’ (NGT)

A final issue we briefly address is the presence of a full-fledged left periphery within embedded clauses. The Gunge example in (5b) shows that complement clauses in this language may feature topics and foci. Similarly, embedded topics are allowed in ASL (8a) and NGT complement clauses. As for adjunct clauses, however, there is an ongoing debate on whether they contain a full-fledged left periphery or not. For instance, while Maki et al. (1999) argue that embedded argument topicalization is impossible in (English and Japanese) adjunct clauses, Haegeman (2003) demonstrates that it is possible in certain types of English conditional clauses.

The NGT example in (8b) suggests that embedded topicalization is indeed allowed in conditional clauses. Given that the conditional clause is introduced by the conjunction SUPPOSE, it is clear that the (moved) topic BOOK is located within the conditional clause (it may also precede the conditional clause). Note that conditional non-manual marking in NGT also commonly involves raised eyebrows (Klomp 2019); the topic may additionally be marked by a head nod.

- (8) a. $\overline{\text{top}}$ TEACHER REQUIRE MOTHER_i, JOHN MUST LIPREAD t_i
 ‘The teacher requires that mother, John must lipread.’ (ASL, Aarons 1996: 97)
- b. $\overline{\text{cond}}$ SUPPOSE BOOK INDEX_{3i} INDEX₂ t_i READ, $\overline{\text{neg}}$ SLEEP CAN^NOT
 ‘If this book you read, you won’t be able to sleep.’ (NGT)

3. Information structure in the visual-gestural modality: New directions

We now turn to recent studies that investigate specific aspects of the realization of information structure across sign languages: the relation between focus and prominence, the realization of contrast, the analysis of question-answer pairs (also known as wh-clefts and rhetorical questions), doubling and its functions, as well as weak hand holds and their relation to discourse. An important component of our discussion is the impact of the visual-gestural modality on the syntactic and prosodic encoding of information structure. While some of the phenomena we address are clearly modality-specific (e.g., weak hand holds), others may also be attested in spoken languages but be typologically less common (e.g., doubling).

3.1. Focus and prominence

In spoken languages, focus is almost universally associated with prosodic prominence (Zimmermann & Onea 2011). Gussenhoven (2004) offers an explanation for this pattern by formulating three biological codes, including the Effort Code, which states that speakers, in order to signal that the information they are conveying is important, use greater effort in articulation resulting in greater precision and wider excursion of pitch movement. This general tendency can be grammaticalized as prosodic (pitch-related) marking of focus in spoken languages.

Various researchers have argued that the same biological motivation applies to prosodic marking in sign languages (e.g., Pfau & Steinbach 2006; Sandler 2011). While the notion of pitch does not apply, signers can also use greater effort to articulate signs which will lead to higher velocity, larger amplitude, clearer boundaries, etc., and this effort can be interpreted as relating to new and important information, that is, focus. Crasborn & van der Kooij (2013)

argue that this applies to both manual and non-manual markers of focus in NGT: the presence of both types of markers requires more effort, which is why they are used to mark focus.

However, it is not clear that all focus markers can be explained directly by the Effort Code. Schlenker et al. (2016) note that forward leans or head nods used for focus are not a direct manifestation of greater effort (in comparison to, e.g., backward leans and head shakes which could have been used instead). Even more strikingly, Herrmann (2015) shows that, in DGS, the focused constituent is sometimes de-accented, that is, while the rest of the sentence is accompanied by non-manual markers, the focused constituent is not, as in (9). While this type of marking clearly helps the addressee to identify the focus, it does not fit the proposal that focus has to be articulated with greater effort (ht-f = head tilt forward, aff-hn = affirmative head nod).

ht-f,hn aff-hn
 (9) TIM ALSO BANANA EAT
 ‘Also Tim eats a banana.’ (DGS, Herrmann 2015: 289)

To sum up, while Gussenhoven’s Effort Code can explain the general connection between prosody and focus in both modalities, it does not explain the details of language-specific realization of focus in all cases in sign languages (which, by the way, is also true for spoken languages, see Gussenhoven 2004: 86–88).

3.2. Contrast

One of the theoretical questions that sign languages can contribute to is whether contrast is a notion orthogonal to focus, or whether all focus is contrastive to some degree (see, e.g., Repp 2016). Data from sign languages is relevant because some sign languages have dedicated markers of contrast, and yet, sometimes the difference between focus and contrast seems to be a matter of degree.

The dedicated contrast markers described for several sign languages include the use of contrastive spatial location, realized as contrastive localization of referents, sideward body leans, and dominance reversal (Wilbur & Patschke 1998; van der Kooij et al. 2006; Kimmelman 2019; Navarrete-González 2019). Crucially, these markers of contrast often spread over the whole contrasted clauses, and not only over the constituent in focus, as shown in (10), and they can thus be disassociated from focus.

left body lean right body lean
 (10) CAT BITE [BOY]_{Focus} IX DOG [BITE GIRL]_{Focus}
 ‘The cat bites the boy while the dog bites the girl.’ (RSL, Kimmelman 2019: 179)

However, there are several complications with the interpretation of this phenomenon. First, it is unclear whether this type of marking can be applied when more than two alternatives are

contrasted. Second, since this strategy is clearly modality-specific, it is questionable whether it can be used as an argument for the separateness of contrast in spoken languages, too.

In addition, it has been shown that contrastive and non-contrastive focus can be marked by the same manual and non-manual markers, the difference being one of degree (Herrmann 2015; Kimmelman 2019). For instance, in RSL and NGT, both types of focus can be marked by ellipsis and by several manual prosodic markers, even though their frequency differs (Kimmelman 2019: 244). These findings are more in line with the theory that contrastive focus is a subtype of focus, and not a combination of two independent information structural phenomena (but see Navarrete-González (2019), who argues that contrast in Catalan Sign Language (LSC) is marked by dedicated non-manual markers).

Legeland et al. (2018) further explored the realization of contrast in coordinated structures in NGT, based on corpus data. A basic assumption they make is that conjuncts in coordinate structures have a full-fledged left periphery (see Section 2.3), as has also been argued by Zorzi (2018) for LSC. Thus, in the LSC gapping example in (11), the contrastive subject topics occupy SpecTopP, while the contrastive foci are realized in SpecFocP.

- (11) [C.TOPIC MARINA] [C.FOCUS COFFEE] PAY [C.TOPIC JORDI] [C.FOCUS CROISSANT]
 ‘Marina paid for a coffee and Jordi for a croissant.’ (LSC, Zorzi 2018: 78)

Coordination in (11) is asyndetic, that is, no overt coordinator is used. Note that the two conjuncts are symmetric with respect to word order (the verb in the second conjunct being elided). In fact, symmetry (or parallelism) has been argued to be an important constraint on the structure of coordinations (e.g., Goodall 1987). Legeland et al. (2018: 60) therefore introduce a parallel structure constraint (PSC), which requires that “conjuncts must have a syntactically, semantically, and prosodically parallel structure”. As for syntactic parallelism, this rules out English structures like **Mary goes to the market but to the mall Jack*. However, the NGT corpus data reveal that asymmetric coordination – albeit the exception – is attested in this language. In the asyndetic coordination in (12), for instance, constituent order is VO in the first conjunct, but OV in the second (CI = cochlear implant, S-H = fingerspelled representation of *slechthorend* ‘hard-of-hearing’).

- (12) CI [GO^{++3a} S-H SCHOOL] [HEARING SCHOOL GO^{3b}]
 ‘Because of CI, (children) go to a hard-of-hearing school (or) go to a hearing school.’
 (NGT, Legeland et al. 2018: 61)

Legeland et al. claim that in this case, the word order asymmetry results from focus movement in the second conjunct, as shown in Figure 2 (note that they follow Munn (1993), according to whom coordination has a binary structure, called BP, which is headed by a ‘boolean’ element B, the coordinating element). In this particular example, the two conjuncts share a topic (CI) which appears outside the coordination, and the head of the BP is empty.

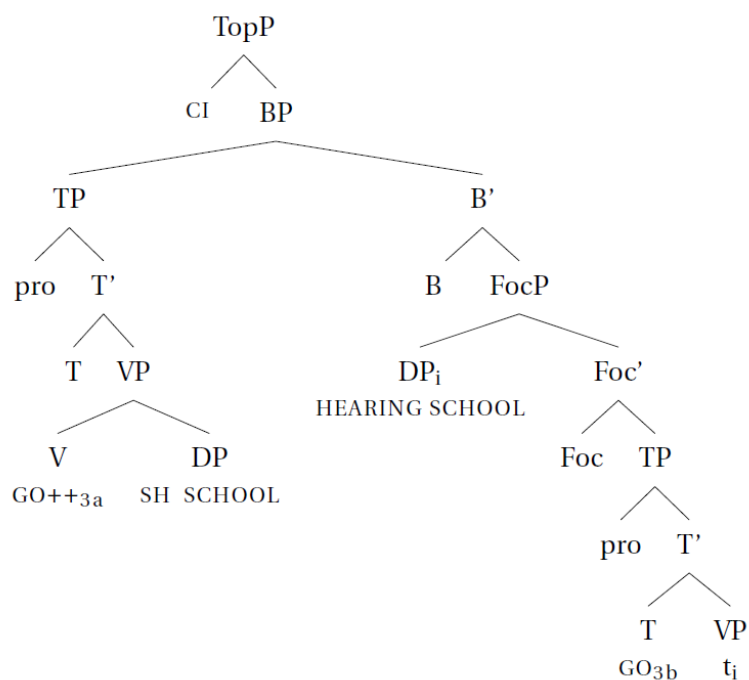


Figure 2. Asymmetric coordination structure for the NGT example in (12), resulting from focus movement in the second conjunct (Legeland et al. 2018: 64)

Remember from the discussion in Section 2.2 that focus in NGT, including contrastive focus, can also be marked in situ (Crasborn & van der Kooij 2013). Legeland et al. (2018) assume that occasionally, in situ focus marking may not be considered strong enough for establishing the desired contrast across conjuncts, and that fronting of the focused constituent to SpecFocP yields a stronger marking, which may be perceived as being more compatible with the contrastive focus interpretation by some NGT signers. Apparently, in such contexts, the PSC may be violated. Further research is necessary in order to find out whether other sign languages allow for similar asymmetries in coordination.

3.3. Question-answer pairs

In Section 2.2, we mentioned that focus in some sign languages can be expressed by cleft-like constructions; an ASL example has been given in (4), in (13) we provide another one. However, this construction type in ASL, as well as in other sign languages, has been analyzed in different ways, which is also relevant for its information-structural function.

- (13) $\overline{\text{br}}$
 KIM SEE STEAL TTY WHO LEE
 ‘Kim saw that the one who stole the TTY was Lee.’ (ASL, Wilbur 1996: 218)

For ASL, three different syntactic accounts have been put forward, all of which argue against earlier accounts in terms of ‘rhetorical questions’ (Baker-Shenk 1983). Wilbur (1996) argued

that structures like (13) are wh-clefts, basing her argument, among other things, on non-manual marking (which is different from wh-marking) and the fact that the wh-cleft can be embedded – as is true for (13). Hoza et al. (1997) claimed that this construction consists of two independent clauses: the question and the answer, showing, for instance, that (parenthetic) material can intervene between the question- and the answer-part. More recently, Caponigro & Davidson (2011) proposed an intermediary analysis: they analyze this construction as a single sentence containing an embedded question (Q-constituent) and an embedded answer (A-constituent). A crucial argument that they provide against the wh-cleft analysis is that the first part of this construction does not have to resemble a wh-question, as in (4) and (13), but can be a polar question instead. Furthermore, they show that the A-constituent, which often looks like a constituent smaller than a clause, can (optionally) actually be a full declarative clause. Both these properties are illustrated in (14).

- _____ br
- (14) JOHN HAVE MOTORCYCLE, NO (HE NOT HAVE MOTORCYCLE)
 ‘John doesn’t have a motorcycle.’ (ASL, Caponigro & Davidson 2011: 336)

As for syntax of the construction, Wilbur (1996) assumed that the underlying structure of a cleft like (13) contains a small clause with the focused phrase (LEE) as subject and the wh-clause (STEAL TTY WHO) as predicate. The subject then moves to SpecIP and the wh-clause to SpecCP, yielding the order in (13). In contrast, Caponigro & Davidson (2011) propose that the entire question-answer clause (QAC) is a declarative clause (IP). This IP includes a silent copula (e_{BE}), which takes the Q-constituent as its subject and the A-constituent, an IP with possibly elided material, as its complement. The structure in Figure 3 accounts for the embedded-like behavior of both the Q- and the A-constituent, as they are analyzed as the two arguments of the silent copula (note that the copula is always silent in ASL and other sign languages).

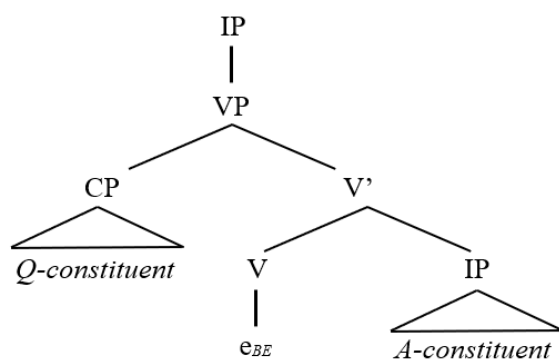


Figure 3. Structure of a question-answer clause, according to Caponigro & Davidson (2011: 341)

For other sign languages, various analyses have been proposed as well. Branchini (2014) showed that a similar construction in LIS has properties different from ASL and is thus more directly amenable to the wh-cleft analysis (e.g., unlike ASL, relative clauses in LIS can have wh-signs as complementizers, which removes one of the arguments against analyzing the Q-

constituent as a relative clause; furthermore, LIS has predicational wh-clefts as well), and Hauser (2018) provided similar arguments for French Sign Language. Based on naturalistic corpus data, Kimmelman & Vink (2017) recently demonstrated that the same phenomenon in NGT might actually represent a range of structures with different degrees of clause integration: from a discourse-level combination of sentences (à la Hoza et al.) to a single-sentence syntactic construction (à la Wilbur and Caponigro & Davidson), and that the variable properties of QACs are reflective of an ongoing process of grammaticalization.

The syntactic status of this construction type is crucial for determining its information-structural function. If one believes, following Hoza et al. (1997), that the construction represents a discourse-level combination of sentences, it clearly cannot express focus vs. background, as both sentences must have their own information structures (i.e., both must at least contain foci – similar to what we argued for coordination structures above). In Caponigro & Davidson’s (2011) account, information structure does play a role, but they argue that it is not simply focus that is marked with this construction. Rather, they suggest that “[p]ragmatically, a QAC instantiates a topic/comment structure, with the Q-constituent expressing the topic as picking out a sub-question under discussion and the A-constituent expressing the comment as the answer to that sub-question” (Caponigro & Davidson 2011: 324). One can also follow Kimmelman & Vink (2017) in analyzing some of the (more integrated) instances of this phenomenon as marking (contrastive focus) and others as marking discourse-structural relations between sentences.

Given the continuing debates around this phenomenon within one language (ASL), as well as the observed variation in its properties across sign languages, more research on this construction type is necessary.

3.4. Doubling

Doubling has been observed in many sign languages (see Kimmelman (2014: 33) for references), but is also attested in a variety of typologically diverse spoken languages (Kandybowicz 2007). However, just as with question-answer pairs, different researchers have proposed different syntactic analyses of doubling in sign languages.

Early research on doubling focused on verb doubling in ASL. Fischer & Janis (1990) argued that verbs in ASL are syntactically and morphologically restricted; in particular, they cannot at the same time be marked for aspect and license an object (15a). Consequently, whenever a transitive verb with overt object requires aspectual modification, doubling is used to rescue the derivation: the initial copy of the verb is then responsible for licensing the object and the final copy for the realization of aspectual marking, as shown in (15b) (see also Kegl 1985; Liddell 2003).

- (15) a. * S-A-L-L-Y TYPE^[asp: unrealized inceptive] T-E-R-M PAPER
 ‘As Sally is typing her term paper ...’

- b. SALLY THERE HMM TYPE T-E-R-M PAPER TYPE^[asp: unrealized inceptive]
 ‘As Sally is typing her term paper ...’ (ASL, Fischer & Janis 1990: 281, 283)

Later research on doubling, in particular in ASL and Brazilian Sign Language (Libras), showed that not only verbs, but also modal verbs (16a), negators, quantifiers, nouns, and wh-words can be doubled; moreover, doubling of transitive verbs is attested even in the absence of aspectual marking (16b). Researchers suggested that in such cases, doubling has information structure-related functions, namely focus in general (ASL: Petronio 1993) or emphatic focus (ASL and Libras: Lillo-Martin & de Quadros 2008; Nunes & de Quadros 2008). Note that in both cases, focus is non-manually marked by a head nod on the clause-final instance of the doubled element.

- (16) a. $\overline{\text{hn}}$
 IX₁ CAN GO PARTY CAN
 ‘I CAN go to the party.’
- b. $\overline{\text{hn}}$
 IX₁ LOSE BOOK LOSE
 ‘I LOST the book.’ (Libras, adapted from Nunes & de Quadros 2008: 178, 180)

Kimmelman (2014) argued that in RSL and NGT, doubling is also used for information structure-related functions, but proposed that the functions of doubling are better described as foregrounding. This type of analysis allows unifying doubling as described in this section and topic-copying discussed in Section 2.1, example (2).⁵

Petronio (1993) originally suggested that the focused element is base-generated in the head of a head-final [+focus] CP. Among other things, this allows her to account for the fact that only heads, but not phrases, can be doubled (also, there can only be one double per clause). Nunes & de Quadros (2008) point out a number of conceptual and empirical problems with Petronio’s account and offer an alternative analysis based on Nunes’ (2004) copy theory of movement. A prerequisite for their account is the process of Chain Reduction, which, triggered by linearization considerations (i.e., Kayne’s (1994) Linear Correspondence Axiom (LCA)), usually deletes all but one copy of a moved element. However, after morphological fusion, an adjoined element may become invisible to the LCA and thus to Chain Reduction. As for the example in (16b), the derivation would then proceed as follows (see Figure 4 for illustration): (i) the focused verb LOSE moves to and fuses with the head of an emphatic focus phrase (E-FocP), which will be overtly realized by head nod; (ii) the TP, including the lower copy of the verb, then moves to the specifier of a higher topic phrase; (iii) when it comes to spell-out, the final copy will be distinguishable from the other copy due to morphological fusion with the E-Foc head, and Chain Reduction does not apply, that is, both copies of the verb will be pronounced; the lower TP, however, will be deleted in accordance with the LCA.⁶

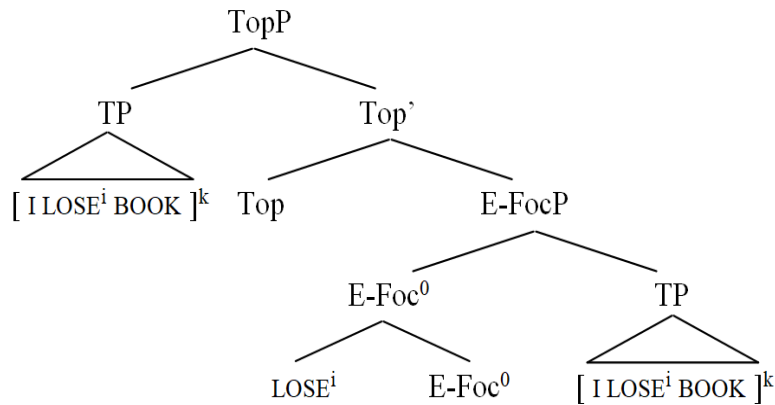


Figure 4. Emphatic focus doubling in the Libras example (16b): after adjunction to E-Foc, both copies of the verb LOSE are pronounced (Nunes & de Quadros 2008: 185)

Bross (2018) briefly addresses focus doubling in DGS, and offers a slightly different account. Discussion of the example in (17) leads him to assume that the focus phrase, the head of which hosts the final double, is right-headed in DGS; the TP remains in situ, and SpecFocP can be occupied by a contrastive focus. If TP had moved to SpecTopP, as in Figure 4, then it should have preceded the contrastively focused pronoun.

- (17) A: Did Paul buy the beer yesterday?

 B: INDEX₂ SHOULD BEER BUY SHOULD
 ‘It was YOU who SHOULD have bought the beer!’

Note that all the researchers mentioned here analyze doubling as a grammatical (syntactic) process, and not as mere repetition. However, the grammatical status of similar constructions in spoken languages has been questioned (Stolz et al. 2011), and therefore, further research is needed.

3.5. Buoys and related strategies

Another strategy that is claimed to be related to information structure in sign languages is clearly modality-specific, namely buoys, or more generally, weak hand holds, whereby one hand is being held stationary in the location and configuration of a previously produced sign, while the other is used to produce one or more other signs. The relevant question here is what information is coded by means of this strategy.

Liddell (2003: 223), for instance, argued that buoys “help guide the discourse by serving as conceptual landmarks as discourse continues”. He discussed several types of buoys: (i) the list buoy where a numeral handshape is held on the weak (non-dominant), and different referents are associated with different fingers; (ii) the theme buoy where a raised index finger is held to represent an important referent; (iii) the pointer buoy where a pointing sign directed


towards an important referent is held; and (iv) the fragment buoy where a part (i.e., a fragment) of a two-handed sign referring to an important concept is maintained in the signing space. The common function of the theme, pointer, and fragment buoys is thus that an important referent is emphasized. One can analyze this as a strategy for discourse topic marking: an element which is important not just for one sentence, but for an episode, is being highlighted. List buoys are usually used to identify several referents at once (e.g., family members), but their function is generally similar.

Another common type of weak hand holds occurs in locative constructions where the weak hand is representing the Ground in a Figure-Ground locative relation; in the RSL example in (18), this is the opened window. Although this hold is also used to emphasize the Ground and its location with respect to the Figure (the grandmother), it does not seem reasonable to analyze the Ground as a discourse topic, as it is often used sentence-internally and is not necessarily relevant for a longer episode (h1 = right hand, h2 = left hand).

- (18) h1: WINDOW.OPEN GRANNY IX
 h2: WINDOW.OPEN-----
 ‘The window opens. The granny is there.’ (RSL, Kimmelman 2019: 94)

Brentari & Crossley (2002) also described forward-referencing holds which are characterized by the fact that a final sign from one phrase is being held while the signer already starts producing the next phrase (19). In this way, the semantic relation between the two sentences is emphasized. Kimmelman et al. (2016) also discussed similar holds in RSL and NGT.

- (19) h1: IX₃ DISTRIBUTE-ALL-OVER. IX₁ DARN
 h2: DISTRIBUTE-ALL-OVER-----
 ‘She distributed (the advertisement) all-over. (There I was,) “Darn!”’
 (ASL, adapted from Brentari & Crossley 2002: 122)

Kimmelman (2017) proposed a unified syntactic analysis for most types of weak hand holds, arguing that they all involve multi-dominance in syntax (as proposed for spoken languages by, for instance, de Vries (2009)), and that multi-dominant structures themselves trigger the hold. For instance, in the case of a list buoy, illustrated in (20), the sign THREE.LIST (articulated with a -hand) is a topic (Frame Setting) constituent shared by the three clauses, and as such, it has several parents (see Figure 5). This syntactic construction triggers the activation of the second hand, on which the multi-dominated constituent THREE.LIST is realized, that is, this constituent is only spelled out once. Note that the three pointing signs point to the thumb (IX_a), index finger (IX_b), and middle finger (IX_c) of the list buoy.

- (20) h1: IX_a DAVIDENKO. IX_b N-A-D-I-A. IX_c R-I-T-A
 h2: THREE.LIST-----
 ‘Of the three of them, the first one was Davidenko, the second one Nadia,
 and the third one was Rita.’ (RSL, Kimmelman 2017: 30)

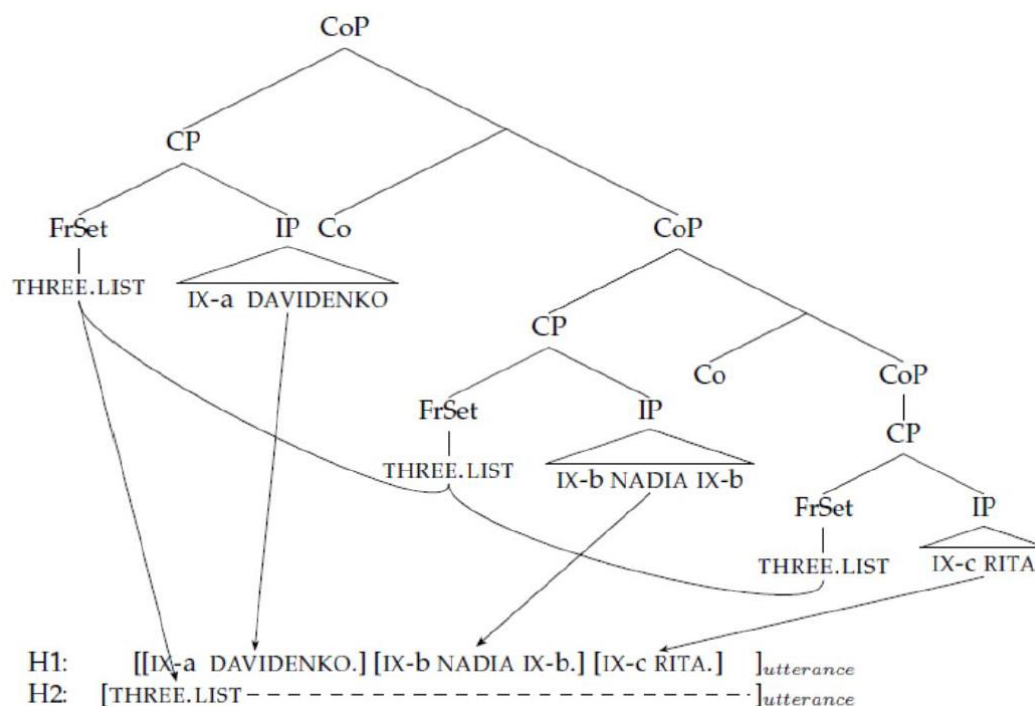


Figure 5. Multidominance analysis of a list buoy in example (20) (Kimmelman 2017: 44). FrSet stands for Frame Setting, a topical constituent in the left periphery.

Note that not all weak hand holds have information structure-related functions, or make any semantically or pragmatically relevant contributions at all. Some holds are used for phonetic reasons, and others might be used to mark syntactic and/or prosodic domains; see Kimmelman (2019) for further details.

4. Experimental research

Although this chapter is devoted to theoretical approaches to information structure, in this section, we will briefly discuss experimental studies in this domain, which primarily concern this acquisition of topic and focus marking. Chen Pichler (2012), in a handbook chapter on the acquisition of sign languages, also discusses this topic, so the interested reader is advised to consult her chapter and the references mentioned there.

In the experimental/acquisitional studies of sign languages, one can observe a tendency which we have already alluded to in previous sections, namely that it is not always clear what exactly is being studied: the pragmatic notions of topic and focus, or syntactic operations, such as topicalization, which can fulfill different functions. A related uncertainty concerns the role of non-manuals: it is not always clear whether they are analyzed as obligatory topic/focus markers. Finally, note that most if not all the studies so far are based on very small groups of children or even on a single case.

Acquisition of topics in ASL has been studied by Reilly et al. (1991) and Chen Pichler (2001, 2010). Reilly et al. (1991) considered eyebrow raise to be the topic marker in ASL, and found that this marker did not emerge in their data until 3;0, while eyebrow raise was used to mark yes/no-questions already around 1;9. Chen Pichler (2001, 2010), however, noticed that Reilly et al. (1991) had identified examples with fronted objects, but had not analyzed those as topics due to the lack of non-manuals. Chen Pichler (2010) also reported examples of object fronting without eyebrow raise but with some prosodic marking in the data produced by one of the four children that she studied in the period between 20 and 30 months. For instance, in (21), produced by a 25-months old child, the whole sentence is marked with eyebrow raise because it is a yes/no-question, but the topic GRANDMOTHER is prosodically separated from the comment by a hold. Chen Pichler (2010) hypothesized that the syntactic operation of topicalization might in fact be independent of eyebrow raise, and thus that topicalization for pragmatic purposes might actually emerge very early in ASL.⁷

_____ br

(21) GRANDMOTHER, WANT
 ‘Is it grandmother you want?’ (ASL, Chen Pichler 2010: 171)

Note that from the translation of example (21), it is clear that the function of the fronted constituent GRANDMOTHER is contrastive focus, not topic. Chen Pichler (2010) also acknowledged this fact and compared her findings to those reported by Lillo-Martin & de Quadros (2005), to which we now turn.

Lillo-Martin & de Quadros (2005) studied the acquisition of focus marking in ASL and Libras. They analyzed longitudinal data from two ASL-acquiring and two Libras-acquiring children, for each child within different periods between 1;1 and 3;0. The purpose was to find out at what age the children would acquire fronting of new information (contrastive focus), and at what age they would acquire emphatic focus doubling (see Section 3.4) as well as the realization of sentence-final emphatic focus, which they analyze as resulting from the same syntactic operation, but different from fronting. It turned out that contrastive focus fronting was acquired significantly earlier by all children than emphatic focus doubling and focus-final realization, confirming Lillo-Martin & de Quadros’ (2005) hypothesis that focus doubling and focus-final realizations are underlyingly the same operation, distinct from fronting. Note again that focus fronting in their data was not accompanied by eyebrow raise.

Wood (2013) investigated the perception of topic marking in Libras by native signers, late learners, and homesigners. Her main theoretical question was which parts of the grammar are innate (‘rooted’ in her terminology) and thus would also emerge in homesigners, who do not receive any sign language input. She hypothesized that topic marking would be a feature that is not completely innate and predicted that it would not emerge in homesigners. The participants were presented with sentences with and without topicalization, and their comprehension of these sentences was tested through picture matching. It turned out that late learners of Libras indeed showed high performance on sentences without topicalization and lower performance on sentences with topicalization, demonstrating that topicalization is a

syntactic feature that is difficult for late learners. However, homesigners were at chance level for perception of both types of sentences, so the results with respect to topic marking are inconclusive specifically for this group.

Finally, in one experimental study, researchers looked at manual prosodic marking of focus in ASL (Gökgöz et al. 2016). In a production study, they found that children acquiring ASL in the age range of 4–8 years produced contrastively focused signs with longer duration, higher articulation speed, more repetitions, and proximalization in comparison to the same signs in non-contrastive focus positions. Note, however, that this study did not address the issue of development of such marking, and it therefore possible that even at the age of 4, children already show adult-like performance.

Taken together, our brief survey reveals that although there are some studies of topicalization, doubling, and prosodic marking of focus, they are mostly small-scale, and sometimes inconclusive. It is definitely necessary to conduct further research in this domain to come up with theoretically important conclusions.

5. Conclusions

In summary, the encoding of information structure in sign language has been investigated from various perspectives and for several sign languages, and based on the available studies, some preliminary conclusion can be drawn. First, sign languages, similar to spoken languages, can mark topics and foci; however, as is also the case in spoken languages, topics and foci are rarely marked unambiguously and by specialized markers. Rather, information-structural notions are expressed through a complex interplay of syntactic and prosodic markers (including manual and non-manual prosody).

Concerning recent directions in research on information structure in sign languages, several things can be noted. First, sign languages can contribute to research on the relation between prominence and focus, as they follow the general tendency identified for spoken languages – yet, they also present us with details of focus expression that do not fit the expected pattern. Second, sign languages can make an important contribution to the debate on the status of contrast in relation to focus, as at least some types of contrast have dedicated markers in sign languages that have been studied in this respect.

Furthermore, some constructions related to information structure that are common across sign languages are of interest, namely the so-called *wh*-clefts and doubling. While both construction types also exist in spoken languages, their syntactic properties as well as their pragmatic functions in sign languages appear to be different.

While the bulk of this chapter is devoted to theoretical research, we also briefly discussed the few available experimental or psycholinguistic studies on information structure in sign languages. So far, most such studies have focused on the acquisition of topic and focus marking. Clearly, much more research is needed in this domain.

Given the current state of research, several domains can be identified in which more research on information structure in sign languages is expected to lead to new and exciting

results. On the one hand, more research on the relation between focus and prominence and focus and contrast (as discussed above) is necessary. On the other hand, doubling and wh-cleft-like constructions should be studied for more sign languages, and their syntactic and pragmatic functions should be identified with more precision.

Given that information structure is most visible when sentences are analyzed as a part of discourse, and given the recent increase in the development of sign language corpora, much more research in this field should be done using naturalistic corpus data. In addition, there are some promising developments in automatic annotation tools (Karppa et al. 2012; Puupponen et al. 2015) that can be applied to manual and non-manual prosody, which opens up the possibility of conducting reliable large-scale studies on information structure.

Finally, it is clear that more sign languages must be investigated, also on questions related to information structure. To date, no real typological studies in this domain exist. In addition, most existing descriptions focus on Western urban sign languages, while village sign languages (de Vos & Pfau 2015) have not been investigated at all. We thus have to keep in mind, that the limits of variation that emerge from already existing research might not be representative of the true diversity present in sign languages.

Notes

- ¹ Glossing conventions: we follow common conventions for glossing sign language examples. Abbreviations: / – prosodic break, IX – index (pointing sign); non-manual markers: br – brow raise, hf – head forward, hn – head nod, top – topic, foc – focus, wh – wh-question, y/n – yes/no-question.
- ² Wilbur (2012) also discusses other cleft-like constructions in ASL. However, unlike the so-called wh-clefts that have been described for many sign languages, the other constructions appear to be less common.
- ³ Puglielli & Frascarelli (2007) suggest that the topic types distinguished by Aarons map onto the three types distinguished by Frascarelli & Hinterhölzl (2007) for spoken languages, i.e., aboutness-shift, familiar, and contrastive topics, which are arranged in the left periphery in the hierarchical order: ShiftP > ContrP > FocP > FamP* > IP (* indicates that FamP is recursive).
- ⁴ An issue that we leave aside in our discussion of the left periphery is the role of focus in wh-questions. It has been argued, at least for ASL and Indian Sign Language (IndSL), that these languages distinguish focused from non-focused wh-questions. Neidle (2002) claims that clause-final wh-phrases move through SpecFocP in ASL. Aboh & Pfau (2010) suggest that IndSL does not employ proper wh-signs but only a general wh-particle G-WH occupying the head of the interrogative phrase, which may combine with an associate phrase that moves to SpecFocP (e.g., PLACE GH-W ‘where’); see Kelepir (Chapter 11) for some discussion.
- ⁵ It is worth noting that Crasborn et al. (2012) argued that topic-copying in NGT is at least partially prosodically motivated in that it is used to create heavy elements in terms of syllable structure in the phrase-final position. Other instances of doubling might also be partially motivated by similar reasons.
- ⁶ Nunes (2004), citing Koopman (1984), provides verb doubling examples from Vata, a Niger-Congo language spoken in Ivory Coast, that can be accounted for along similar lines, i.e., by assuming the phonetic realization of multiple copies after morphological reanalysis.

⁷ Note that Chen Pichler (2010) mentioned ISL, where topics were not consistently marked by eyebrow raise, but were instead marked by a sudden change of several non-manual markers at the boundary between the topic and the rest of the sentence (Nespor & Sandler 1999); this sudden change can also be seen in her ASL data. Hence, two interpretations are possible: either eyebrow raise on topics is not obligatory in ASL either, contrary to what has been claimed in some previous research, or children acquiring topic marking first acquire the syntactic operation and the change in non-manuals, and only later the eyebrow raise as a non-manual specifically associated with topics.

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