29. Cross-modal Comparative Syntax

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1. Introduction

Throughout this handbook, authors offer comparative perspectives on selected morphosyntactic and syntactic phenomena, such as tense, agreement, *wh*-constructions, or anaphoric dependencies, drawing on data from typologically diverse spoken languages. The present chapter takes a somewhat different approach to the subject of comparative syntax by focusing not a on specific phenomenon, but rather on a specific group of languages, namely sign languages. Sign languages are visual-spatial languages, which do not only recruit the hands for the transmission of lexical, grammatical, and pragmatic information but also non-manual articulators such as the head, face (e.g., the eyebrows), and upper body (Pfau & Quer, 2010; Wilbur, 2021). In sign language linguistics, one commonly speaks of the "modality" of signal transmission (i.e., signal production and perception), thus contrasting languages in the visual-spatial modality with languages in the oral-auditive modality (viz. spoken languages).[1] Taking this modality difference as point of departure, we offer a cross-modal comparison of selected syntactic phenomena – including phenomena that are addressed in other chapters from the perspective of spoken languages – and we highlight properties that are likely shaped by the modality, that is, properties that are modality-dependent.

In other words, as compared to other chapters, the scope of the present chapter is at the same time narrower, as its typological coverage is limited to a specific group of languages, and broader, as we address a wide range of grammatical phenomena. It is important to point out, however, that sign languages neither constitute a single language family nor a homogenous typological group. As for language families, it has been demonstrated that there are genealogical and historical relationships between some sign languages, often resulting from colonial history and/or language contact due to educational policies (Woll et al., 2001; McBurney, 2012). For instance, both American Sign Language and Russian Sign Language have been argued to belong to the French Sign Language family (Wittmann, 1991), while Australian Sign Language and New Zealand Sign Language are members of the British Sign Language family (Johnston, 2003). On the typological side, it may well be the case that sign languages are more similar to each other than spoken languages, given certain characteristics afforded by the visual-spatial modality (e.g., iconicity and the use of space for grammatical purposes) (Woll, 2003; Meier, 2012). Still, as will also become evident in the sections to follow, sign languages differ from each other typologically in various respects (de Vos & Pfau, 2015;

[1] Tactile sign languages, that is, sign languages used in communication with and between deaf-blind individuals, are sometimes considered a third modality, the haptic-spatial modality (e.g., Mesch, 2001; Edwards & Brentari, 2020).

Zeshan & Palfreyman, 2017). Given the above reasoning, it should be clear that dedicating a chapter to sign languages is not like dedicating a chapter to, e.g., Romance languages. A more appropriate comparison would be a chapter focusing on creole languages, as creole languages also (i) constitute neither a language family nor a homogenous group, (ii) are characterized by shared sociolinguistic features and circumstances of emergence, and (iii) have been argued to be strikingly similar with respect to certain grammatical features (although this view is hotly debated; e.g., Aboh, 2016).

An obvious question that emerges from the comparison of signed and spoken languages – and one that has kept sign linguists busy since the 1970s (e.g., Fischer, 1974[2008]; Liddell, 1980) – is whether theoretical models that have been developed based on spoken language can be applied to sign languages. Not surprisingly, there is no consensus among scholars regarding this question. Researchers working within the Generative tradition generally assume that – certain modality-specific adaptations notwithstanding – the basic architecture and derivational processes are shared between modalities. In contrast, analyses couched within a cognitive framework tend to focus more on modality-specific aspects, such as iconicity (in lexicon and grammar), the use of space for grammatical purposes, and possible interfaces with co-speech gesture (see, e.g., Liddell, 2003; Wilcox, 2004, 2019; Ferrara & Hodge, 2018). Throughout this chapter, the phenomena we selected for comparison are either discussed in theory-neutral terms or with reference to formalizations within the Generative model, in order to highlight, whenever possible, the modality-independent nature of this model.

Two types of comparison will be offered: on the one hand, we compare sign languages to each other (intra-modal comparison) in order to showcase differences among them; on the other hand, at various points, we also compare structures across modalities (cross-modal comparison) in an effort to identify and evaluate possible modality-specific properties. We start in Section 2 by addressing selected issues of linearization, focusing first on phenomena related to the identification of basic constituent order (Section 2.1), then on intriguing linearization solutions as observed in the productions of bimodal bilinguals (Section 2.2). In Section 3, we then turn to *wh*-questions, in particular the debate on possible modality-specific patterns in *wh*-movement. The realization of different types of complex sentences is the topic of Section 4, where we address instances of recursion (Section 4.1) and coordination (Section 4.2). Section 5 concludes the chapter.

2. Issues of Linearization

2.1 Constituent Order and Factors Influencing Constituent Order

Constituent order (also commonly referred to as "word order") is a domain of grammar that has been studied since the early days of sign language research (e.g., Fischer, 1975; Friedman, 1976; Volterra et al., 1984). Applying established modality-independent criteria for the identification of basic constituent order, such as frequency and pragmatic neutrality (Dryer, 2007), a basic constituent order has indeed been identified for certain sign languages. As might

be expected, based on the typological distribution reported for spoken languages, the most frequent orders that have been identified are SVO and SOV (see Kimmelman [2012] and Leeson & Saeed [2012] for discussion).[2] American Sign Language (ASL), for instance, has been argued to display the former basic order (1a), while German Sign Language (DGS) has been claimed to favor the latter (1b). Note that the order in (1a) aligns with that of English, the surrounding spoken language, while the one in (1b) differs from the one attested in German main clauses.[3]

(1) a. JOHN LIKE CHOCOLATE
'John likes chocolate.' [ASL – Neidle et al., 2000: 81]

b. MARJOLAINE BEER LIKE
'Marjolaine likes beer.' [DGS – Bross, 2019: 83]

In the following subsections, we discuss various factors that may impact (basic) constituent order across sign languages. Some of these factors apply in sign languages just as in spoken languages, i.e., they are modality-independent; among these are morphosyntactic marking on the verb (Section 2.1.1) and information structure (Section 2.1.2). We then turn to structures that present us with potentially modality-specific order solutions, namely simultaneous structures (Section 2.1.3) and locative sentences (Section 2.1.4).

2.1.1 Variations on Basic Order

Obviously, the identification of a basic constituent order does not preclude the availability of alternative, non-basic orders. Based on an examination of data reported for 42 sign languages, Napoli and Sutton-Spence (2014) come to the conclusion that all sign languages allow for SOV order. Specifically, they put forward the generalization that "[i]f an argument affects the phonological shape of the V, it precedes V" (Napoli & Sutton-Spence, 2014: 3). In order to appreciate this claim, we need to introduce the difference between plain verbs and spatially modifiable verbs. All sign languages that have been studied to date feature verbs that cannot be modified depending on features of one of their arguments; these are the so-called plain verbs,

[2] The third typologically most common basic constituent order, VSO, has not been described for any sign language to date. Minoura (2008) states that the VSO order is attested (as one of multiple orders) in Malagasy Sign Language, but adds that this order is likely the result of an influence from written Malagasy.

[3] Notation conventions: Sign language examples are glossed in English SMALL CAPS, the gloss being an approximation of the meaning of the respective sign; when multiple words are necessary to gloss a single sign, they are separated by a period (e.g., BE.LOCATED). The sign glossed as INDEX or IX is a pointing sign (usually articulated with extended index finger) that may fulfil locative and pronominal functions. '++' indicates reduplication. Subscript numbers or letters accompanying INDEX or verb signs refer to loci in the signing space: '1' is used for first person, while '3/3a' and subscript letters refer to third person referents; whenever the same subscript appears twice in one example, this implies that the accompanying signs are articulated at the same location. Lines above the gloss line indicate the presence of a simultaneously articulated grammatically relevant non-manual marker (e.g., brow raise or eye gaze); the length of the line indicates the scope of the respective marker. Abbreviations for non-manual markers will be introduced in the context of the relevant examples. The convention SIGN----- is used when a sign is held in space while the other hand articulates one or more other signs.

the verb LIKE being a typical example, as it is articulated in contact with the signer's body (see Figure 1a). In contrast, in many sign languages, other verbs may undergo phonological changes based on features of one or more of their arguments. These changes come in two types: (i) change in location, movement, and/or orientation of the hand(s) in order to target spatial loci associated with one or more of the arguments – verbs belonging to this group are referred to as 'agreeing' or 'indicating' verbs (for recent discussion of different analyses of the phenomenon, see Pfau et al. [2018] and Quer [2021]); (ii) change in handshape to spell out certain semantic features of one of the arguments – verbs that may undergo this kind of change are commonly referred to as 'classifier predicates' (Zwitserlood, 2012; Tang et al., 2021). In both cases, the form of the verb is affected by features of one (or more) of its arguments, and therefore, if one of these arguments is an object, the verb is predicted to appear clause-finally.

a. plain verb LIKE b. agreeing verb $_1$VISIT$_{3a}$ c. classifier predicate TAKE

Figure 1. Examples of different verb types (from Sign Language of the Netherlands): (a) the plain verb LIKE (the 'x' indicates initial contact with the body); (b) the agreeing verb VISIT – in this case, moving from a locus close to the signer's body (locus 1) to a locus towards the right side of the signing space (locus 3a), thus expressing 'I visit her/him'; (c) the classifier predicate TAKE – in this case, modified for a large object (namely, a cat, which is moved from one location to another) (video stills from NGC, 2002).

It has indeed been observed that agreeing verbs and classifier predicates may appear in clause-final position, even in sign languages that are claimed to be underlyingly SVO, such as ASL (Chen Pichler, 2001) and Brazilian Sign Language (Libras; Lourenço & de Quadros, 2020). In (2), we illustrate this pattern with examples from Libras. In (2a-i), the plain verb LIKE intervenes between subject and object, while in (2b-i), the agreeing verb WATCH appears clause-finally – as predicted by Napoli and Sutton-Spence's generalization. Crucially, however, both verbs may also appear in the other position, as shown in the respective corresponding examples in (2a-ii) and (2b-ii) (see also de Quadros, 2003).[4] Napoli and Sutton-Spence seem to be aware of these alternative orders, as they write (in relation to Libras) that "agreeing verbs *can* also

[4] For (2b-i) and (2a-ii), Lourenço & de Quadros (2020: 134f) explicitly state that the non-manual marker (eye gaze – 'eg'), which accompanies the verb phrase or object, is obligatory, as it "seems to identify, along with the agreement in the verb, the object of the sentence". Without this non-manual, the sentence would be ungrammatical. In contrast, with plain verbs, eye gaze is optional.

come in final position" (2014: 4; our emphasis). Still, the attested structural variation suggests that their generalization is a tendency at best.[5]

(2) a. SVO order

i. JOHN LIKE SOCCER
'John likes soccer.'

ii. $\underline{\text{eg}}$
JOHN$_a$ $_a$WATCH$_b$ TV$_b$
'John watches TV.'

iii. JOHN LIKE MARY
'John likes Mary.'

b. SOV order

i. $\underline{\text{eg}}$
JOHN$_a$ TV$_b$ $_a$WATCH$_b$
'John watches TV.'

ii. JOHN SOCCER LIKE
'John likes soccer.'

iii. *JOHN MARY LIKE
'John likes Mary.'

[Libras – Lourenço & de Quadros, 2020: 133f]

Lourenço & de Quadros (2020) further show that the constituent order is more constrained in sentences with plain verbs containing two animate arguments, i.e., when the situation is in principle reversible. Reversibility has been identified as a factor impacting constituent order in various sign languages (see Leeson & Saeed, 2012), a common explanation being that SVO order is preferred in reversible sentences, as it allows for a clearer disambiguation of grammatical roles. In fact, for Libras, Lourenço and de Quadros claim that only the SVO order is grammatical in such cases, as shown by the contrast between (2a-iii) and (2b-iii). Given that only the SVO order is available without restrictions, they conclude that SVO is the underlying constituent order in Libras.

Another morphological operation that has been shown to interact with constituent order is aspectual marking. Napoli and Sutton-Spence briefly address this phenomenon, but obviously, aspectual marking falls outside their generalization, as it does not involve an argument affecting the phonological shape of the verb. The role of aspectual inflection is evident in so-called 'verb sandwich' constructions, which have been studied quite extensively for ASL (Fischer & Janis, 1990; Matsuoka, 1997; Braze, 2004). In such a construction, the lexical verb appears twice within a clause. once in unmodified form in its canonical position, and once in aspectually modified form in clause-final position, yielding an SVOV$_{[asp]}$ structure like the one in (3a) (for Russian Sign Language, see Kimmelman 2012). Authors agree that the first instance of the lexical verb cannot also be marked for aspect (3b), and Matsuoka (1997) further notes that it can be deleted, giving rise to an SOV$_{[asp]}$ order (3c).[6] Analyses offered for

[5] Similarly, Neidle et al. (2000) report SVO order for clauses involving agreeing verbs in ASL. Conversely, other authors report SVO order with plain verbs for sign languages that are claimed to have basic SOV order. For instance, Bross (2019) argues that next to the order in (1b), DGS also allows for SVO (e.g., MARJOLAINE LIKE BEER). Yet, he maintains that "SOV orders represent the clear majority" (Bross, 2019: 83).

[6] Opinions differ, however, with respect to an alternative realization in which the verb appears in aspectually modified form only in its base position, as in (i). According to Matsuoka (1997: 131, fn. 5), this structure is not grammatical (or "could be a result of influence from English word order"), while Braze (2004) asserts that it is well-formed (i.e., readily accepted by his consultants).

(i) BOY EAT$_{[cont]}$ APPLE

this construction differ, but there is consensus that the verb raises overtly to an aspectual head on the right in order to satisfy the Stranded Affix Filter (Lasnik, 1995), followed by optional deletion of the lower copy of the verb. Adopting Nunes' (2004) copy theory of movement, both copies of the verb may be spelled out (3a), since after morphological fusion with the aspectual head, the final copy of the verb is distinguishable from the other copy, and thus becomes invisible to Chain Reduction, which would usually delete all but one copy of a moved element (see Nunes & de Quadros [2008] for an account along similar lines for focus doubling in ASL and Libras; see also Section 3).

(3) a. BOY EAT APPLE EAT$_{[cont]}$
'The boy ate apples (for a long time).' [ASL – Braze, 2004: 34]

b. * BOY EAT$_{[cont]}$ APPLE EAT$_{[cont]}$
'The boy ate apples (for a long time).' [ASL – Braze, 2004: 35]

c. BOY APPLE EAT$_{[cont]}$
'The boy ate apples (for a long time).' [ASL – after Matsuoka, 1997: 136]

The examples discussed so far suggest that a basic constituent order can be identified for at least some sign languages, taking into account modality-independent criteria like frequency and simplicity. For examples in which morphological marking on the verb impacts the order, it can be maintained that the order with less marked or unmarked verb is the basic one, given Dryer's (2007) criterion of morphological markedness, according to which the constituent order that involves the least morphologically marked forms should be considered basic (also cf. Hawkins, 1983). Our brief discussion also implies that claims in the literature that a certain sign language would lack a basic or dominant word order (e.g., Friedman, 1976; Bouchard, 1997) should be taken with a grain of salt. Oftentimes, a closer inspection may reveal that constituent orders that co-exist in one and the same language, are not in free variation – as would be expected in a language that lacks a dominant word order[7] – but rather are motivated by morphosyntactic or semantic factors.

2.1.2 Information-structural Considerations

Beyond the factors just mentioned, pragmatic factors may also play an important role. For some sign languages, it has been claimed that the order of clause constituents is better captured in terms of information structure, that is, that they can be characterized as topic-prominent languages and should thus not be described in terms of grammatical roles, but rather in terms of topic-comment (e.g., Coulter [1979] and Janzen [1995] for ASL; Deuchar [1984] for British Sign Language; Morales Lopez et al. [2003] for Spanish Sign Language).

'The boy ate apples (for a long time).'

[7] In Dryer's (2013a) sample of 1,376 spoken languages, 189 (13.7%) lack a dominant word order; in these languages, "there is no one order that is the dominant order in terms of frequency of usage or pragmatic neutrality".

It is certainly true that arguments are commonly topicalized in most of the sign languages studied to date, giving rise to, e.g., OSV order (e.g., Friedman, 1976; Aarons, 1996; Sze, 2008; Kimmelman, 2019). Across sign languages, topics are often accompanied by a specific set of non-manual markers, such as brow raise ('br') and head tilt, as illustrated by the example in (4a) from Sign Language of the Netherlands (NGT). In these cases, the non-manual marking, often in combination with a prosodic break, indicates that we are dealing with a derived constituent order that is motivated by information-structural considerations. Yet, topics need not always be marked non-manually. For instance, for NGT and Russian Sign Language (RSL), Kimmelman (2015, 2019) observes that non-manual marking of topics is actually not very frequent, and is, for the most part, restricted to shifted topics. For Malagasy Sign Language, Minoura (2008) reports the example in (4b) and points out that for all OSV examples in their data set, "there is the feeling that the objects are probably topicalized although the NMS [non-manual signal] for topicalization has not been identified clearly yet" (Minoura, 2008: 55). In the absence of non-manual and prosodic markers, it may be tempting to analyze an OSV order as an alternative non-derived order.

(4) a. br
INDEX$_1$ / INDEX LOOK$_1$
'They look at me.' [NGT – adapted from Kimmelman, 2019: 56]

b. WOMAN SMART INDEX$_1$ LIKE
'I like smart women.' [Malagasy SL – adapted from Minoura, 2008: 55]

Sze (2008) criticizes some of the criteria used to determine topic-prominence in previous studies on sign languages – most importantly, criteria put forward by Li and Thompson (1976), such as lack of dummy subjects and passive constructions – and concludes that the sign language she investigated, Hong Kong Sign Language, cannot be classified as topic-prominent (see also Sze, 2015). Kimmelman (2015) comes to the same conclusion when analyzing data from RSL and NGT, emphasizing also the fact that topics are not always marked as such. Obviously, whether or not a sign language complies with the criteria for topic-prominence has to be decided on a case-by-case basis, but Sze's meticulous re-assessment of Li and Thompson's criteria suggests that previous claims regarding other sign languages may also have to be reconsidered.

From a cross-modal comparative perspective, it is worth noting that in various studies on information structure in sign languages (see Kimmelman & Pfau [2021] for a recent overview), the distribution and combination of topic and focus constituents is accounted for in a modality-independent way, that is, by assuming dedicated positions for topic and focus within the left periphery of the clause (Rizzi, 1997). As predicted, the fine structure of the left periphery allows for the combination of topic and focus constituents, as illustrated by the ASL example in (5a) and the DGS example in (5b). (Note that in these examples, the non-manuals are glossed according to their function, not their form, and that Bross [2019] distinguishes between base-generated and moved topics.)

top foc

(5) a. FRUIT / BANANA / JOHN LIKE MORE
'As for fruit, John likes *bananas* best.'
[ASL – Lillo-Martin & de Quadros, 2008: 169]

base-top moved-top

b. VEGETABLES PEPPER$_i$ PAUL t$_i$ LIKE
'As for vegetables, as for pepper, Paul likes it.' [DGS – Bross, 2019: 63]

c. […] [dàn lɔ́ **yà**] [Kòfí **wɛ́**] 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]

In (5c), we complement the sign language examples with an example from Gungbe (Kwa, Benin), which displays an order of topic and focus that parallels the order in (5a). Whereas in Gungbe, the heads of TopP and FocP are lexicalized by particles, in ASL (and DGS), these heads host syntactic features (see Figure 2). Non-manual markers, when present, are then assumed to be the overt realization of these syntactic features, associating with material in the specifiers of TopP and FocP under Spec-head agreement (Neidle et al., 2000; Pfau, 2016b). (In Figure 2, we also include the interrogative phrase, InterP, as this projection will become relevant in our discussion in Section 3.)

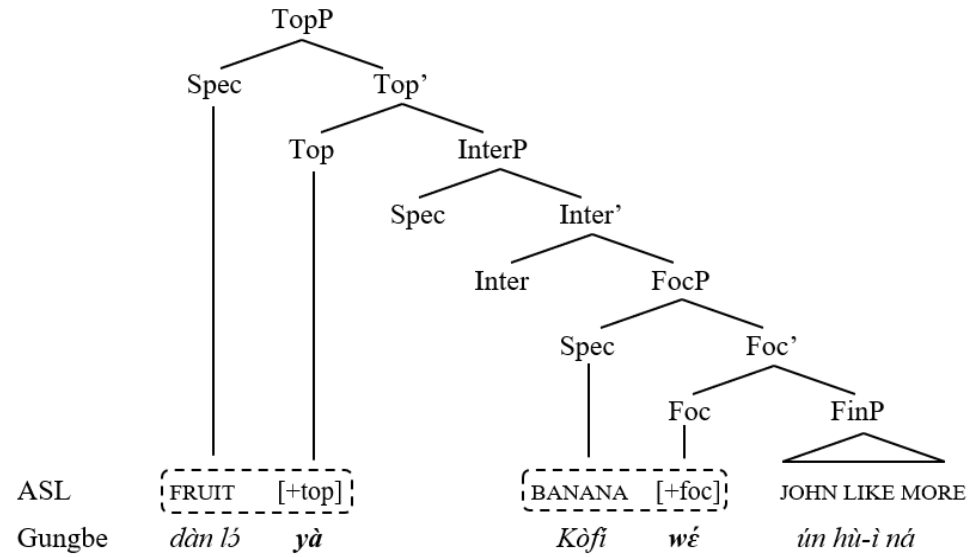

Figure 2. The left periphery of the clause in ASL example (5a) and Gungbe example (5c); in Gungbe, Top° and Foc° are occupied by dedicated particles; in ASL, Top° and Foc° host syntactic features which are spelled out by non-manual markers that associate with material in their specifiers under Spec-head agreement (indicated by the barred squares).

2.1.3 Simultaneity

The properties we discussed in the previous section – that is, existence of a basic constituent order, availability of alternative orders, and impact of information structure – are modality-independent, as they may characterize sign languages in the same way as spoken languages. Obviously, this does not exclude the possibility that one or the other property is more likely to be found in one of the modalities (see Zeshan & Palfreyman [2020] for an insightful discussion of absolute and relative modality effects). We now address a property that might impact constituent order and that is clearly specific to the visual-spatial modality: the use of simultaneous structures, which is afforded by the availability of two manual articulators, the two hands. As the two articulators can, in principle, express linguistic information independently of each other, we might encounter situations in which two sentence constituents are articulated simultaneously, thus making it impossible to determine the constituent order. For the sake of illustration, consider the NGT example in (6a), in which the right and left hand are glossed on separate tiers. The structure is clearly subject-initial, but then the verb (right hand) and a classifier (CL) handshape representing the direct object (left hand) are articulated fully simultaneously at the same location in the signing space, making it impossible to determine whether we are dealing with SVO or SOV order.

(6) a. right: WOMAN CUT_{3b}
left: $CL(thread)_{3b}$
'The woman cuts the thread.' [NGT – Coerts, 1994: 78]

b. right: MONKEY DESIRE
left: MONKEY----------
'The monkey wants it very much.' [RSL – Kimmelman et al., 2016: 221]

However, as also pointed out by Kimmelman (2012), true simultaneity of the type in (6a) is actually rare. What is more common are structures involving so-called 'weak hand holds', where a sign is articulated, and is then held in space while the other hand articulates another sign (or multiple signs). This phenomenon is illustrated by the Russian Sign Language (RSL) example in (6b). Here, the subject MONKEY is glossed on two lines, as it is a two-handed sign. The left hand is then held in its final location (on the signer's body) while the signer articulates the verb with the right hand. That is, despite the simultaneity observed in the example, the constituent order can still be identified as SV (see Sáfár & Kimmelman [2015] for different types of weak hand holds, and Kimmelman (2017) for a formal account of some types of weak hand holds in RSL inspired by the multi-dominance approach developed by de Vries [2009] for spoken languages).[8]

[8] However, beyond constituent order at the clause level, there are other types of order phenomena where true simultaneity may exist, namely when it comes to the realization of certain modifiers, that is, adverbials and adjectives. Such modifiers can be realized by lower-face non-manuals involving the mouth, tongue, or cheeks that are articulated simultaneously with the sign they modify, yielding meanings like, for instance, 'walk leisurely' or 'huge house'; cf. Liddell (1980) for non-manual adverbials in ASL and Fornasiero (2023) for non-manual

Note also that the predicate-object simultaneity observed in (6a) is iconically motivated: actually, the verb CUT mimics the movement of scissors, and the cutting event affects the object represented by the classifier. Even if such fully simultaneous constructions were common in a sign language, it is safe to assume that it would always be possible to determine the constituent order based on transitive clauses in which this type of iconicity is not at play. Take, for instance, a signed clause expressing the meaning 'The woman buys an apple'. In NGT, the signs APPLE and BUY are one-handed and would therefore in principle allow for simultaneous articulation; however, such simultaneous articulation is highly unlikely given that, in this case, the action, i.e., the buying event, does not directly affect the theme argument, and therefore, the simultaneous production of verb and object would not iconically depict the event in a comparable way.

2.1.4 Locative Sentences

We now turn to a sentence type, the realization of which appears to be shaped to some extent by modality-specific factors: locative sentences that express the spatial relation between a Figure and a Ground. Summarizing findings from studies on constituent order in various sign languages, Leeson and Saeed (2012: 254) conclude that "results from many of these studies suggest that locative sentences favor a different word order, namely Ground – Figure – locative predicate, a pattern that is likely to be influenced by the visual modality of sign languages". In other words, the preferred order in such sentences is OSV – without the object (necessarily) being topicalized. In such contexts, sign languages only rarely make use of spatial adpositions (comparable to *on*/*under*/*next to*); rather, the spatial relationship is expressed in the signing space. Perniss (2007: 77) refers to this realization as the "canonical structure" of locative descriptions. In Figure 3, we provide a prototypical example from NGT. The signer introduces the Ground argument CHAIR, localizing it towards the right side of the signing space, before signing the Figure CAT. In the rightmost still, we see him localizing the Figure in relation to the Ground by using a classifier predicate. Crucially, the locus at which the predicate is signed (glossed as 'loc3a') coincides with the locus at which the Ground has been established. The predicate involves a short downward movement ending in a hold, and it is articulated with a classifier handshape referring to the semantic class of four-legged animals. Note that, when articulating the predicate, the signer has the option to add the other hand (also referred to as 'non-dominant hand') with a flat handshape representing the (surface) of the Ground; the downward movement would then end in contact with the back of the non-dominant hand.

adjectives in Italian Sign Language. However, for these simultaneous modifiers, it cannot be excluded that they are actually (featural) affixes.

CHAIR$_{loc3a}$ CAT BE.LOCATED$_{top\text{-}of\text{-}loc3a}$

'A cat is sitting on (top of) the chair.'

Figure 3. A locative sentence in NGT, displaying the order Ground – Figure – locative predicate (i.e., OSV) (video stills from NGC, 2002; example reproduced from Pfau & Aboh, 2012: 94).

Locative sentences may also involve simultaneous constructions of the type introduced in Section 2.1.3. In the RSL example in (7), the Ground CHAIR is introduced by the left hand; it is then held stationary in space while the right hand signs the locative predicate in relation to the Ground, i.e., the right hand is placed above the left hand (note that in this example, the Figure CAT has previously been introduced).

(7) right: BE.LOCATED$_{top\text{-}of\text{-}loc3}$
left: CHAIR$_{loc3}$----------
'The cat sits on the chair.' [RSL – adapted from Kimmelman, 2012: 20]

Ground-initial serializations like the one in Figure 2 are, of course, also available in many spoken languages. In English, for instance, 'The book lies on the table' (SVO) alternates with 'On the table lies a book' (OVS). In this case, however, the latter order is certainly not the preferred one, and it also is likely the result of information-structural considerations. The fact that the visual-spatial modality favours the Ground-initial order is probably due to the spatial encoding of the relationship between Figure and Ground. Specifically, in order to appropriately localize the Figure in space, the location of the Ground first has to be established. Note that this is crucially different from Napoli and Sutton-Spence's generalization that we discussed in Section 2.1.1: the arguments of agreeing verbs may well affect the phonological shape of the verb (e.g., by determining the begin and end location of the verb's movement trajectory), but their localization does not reflect their actual spatial relation with respect to each other. In fact, it has been observed that the Ground-initial order is also favored by non-signers when describing spatial configurations in pantomime (Laudanna & Volterra, 1991), which suggests that this pattern is determined by more general cognitive mechanisms.[9]

These apparent modality-specific realization notwithstanding, Pfau and Aboh (2012) put forward a modality-independent account for spatial expressions in NGT, making use of a

[9] Interestingly, Kimmelman (2012) observes for RSL that locative sentences may also display the common SVO order – but only when the signer does *not* localize the referents in the signing space, that is, only when the Figure is not spatially localized in relation to the Ground.

proposal developed by Aboh (2010) for languages like Gungbe in which spatial expressions systematically involve two adpositions, one expressing path/goal (P_1) and the other expressing part of the Ground (P_2).[10] Here, we can only sketch the implementation for NGT. As for the predicate in Figure 3, Pfau and Aboh argue that the final hold indirectly represents part of the Ground (i.e., the surface of the chair), that is, it functions as P_2; as mentioned, P_2 may optionally be overtly realized by a surface classifier on the non-dominant hand in such cases. P_1, on the other hand, is argued to be realized by a zero movement. Clearly, the short downward movement in BE.LOCATED is not semantically motivated; rather, the authors assume that it is a (phonetic) default movement that has to be inserted in order to articulate the final hold.

2.3 Bimodal Bilingual Utterances

How hierarchical syntactic structures get linearized into sequential speech has been an important domain of inquiry in the generative tradition (see Chesi [in press]; Idsardi & Raimy [in press]), but its scope has been constrained by the limitations imposed on the articulatory system of spoken languages. Sign languages, owing to the availability of multiple articulators (essentially, two hands, distinct facial articulators, head, and torso), raised new questions about how utterances get linearized by articulators that can function simultaneously and independently from each other, as discussed in Section 2.1.3. A logical question arises in this respect as to what happens when both language modalities, namely sign and speech, are available to the same individual. Only relatively recently has a new type of population attracted the attention of researchers: bimodal bilinguals, i.e., bilingual individuals that are users of (at least) a sign language and a spoken language. This language profile is either the result of having been born as a hearing person into a family where sign language is the default language used at home (they are known as CODA's, children of Deaf adults) and having acquired the ambient spoken language from the surrounding hearing society naturally (simultaneous bilingualism), or else the consequence of having learned a sign language as a hearing person at a later stage in life, as in the case of many sign language interpreters (sequential bilingualism). We know that bilinguals combine their languages in their production, a phenomenon known as code-switching, so we expect bimodal bilinguals to show something comparable, but the question is whether the possible interaction of the two types of articulators may lead to a different type of output.

Since bimodal bilinguals can coarticulate sign and speech at the same time, the type of code-mixing they produce actually exploits this affordance, and it typically involves partial production of utterances in both modalities, in particular in interactions with other bimodal bilinguals. This type of mixing has been labelled code-blending (Emmorey et al., 2008), and it can be classified into the following main three types (based on Baker & van den Bogaerde [2008]), illustrated below with examples from Branchini and Donati (2016) that involve Italian

[10] P_2 is further argued to commonly grammaticalize from nouns; e.g., in Gungbe the nouns meaning 'forehead' and 'heaven' (cf. English bipartite prepositions like inside).

and Italian Sign Language (LIS). In the examples, the alignment of LIS glosses with the Italian utterance gives an indication of how signs are simultaneously articulated with words.

(i) Speech-based blend: the spoken string is complete and well-formed (SVO), while the signed string follows the sequence of the spoken one (note that LIS has SOV order).

(8) It. Una bambina va allo zoo
a child go.3SG to.the zoo
LIS GIRL GO ZOO
'A girl goes to the zoo.' [Italian and LIS – Branchini & Donati, 2016: 11]

(ii) Sign-based blend: the signed string is complete and well-formed, while the spoken string follows the sequence of the signed one (SOV order, functional elements like conjunction and preposition missing).

(9) It. Zio zia vero Roma abita
uncle aunt actually Rome live.3SG
LIS UNCLE AUNT REAL ROME LIVE
'My uncle and aunt actually live in Rome.'
[Italian and LIS – Branchini & Donati, 2016: 10]

(iii) Incongruent blend: each language string follows its own basic word order, constituting two independent full and grammatical strings (neg = negative headshake).

(10) It. Non ho capito
not have.1SG understand.PTCP
neg
LIS UNDERSTAND NOT
'I don't understand.' [Italian and LIS – Branchini & Donati, 2016: 11]

Blend types (i) and (ii) do not usually involve a fully-fledged utterance in the dependent language which may even even feature a single-item blend. The items in the dependent language string tend to be aligned with the utterance in the dominant language, although there are examples of slight misalignment due to different onset or offset of a particular item across strings. What seems clear is that in speech- and sign-based blends, there is a unique syntactic derivation driven by the dominant language, with (often partial) simultaneous insertion of the equivalent items from the dependent language. In this respect, this kind of blends do not challenge the usual model of production based on a single derivation, beyond the assumption that terminal nodes can be lexicalized simultaneously from two lexicons in bimodal bilinguals. An account along these lines has been put forward by Branchini and Donati (2016) and by Lillo-Martin et al. (2012, 2016). The latter group of authors propose the Language Synthesis model, which adapts MacSwan's (2000) model of bilingual competence and integrates ideas

of Distributed Morphology such as late insertion (Halle & Marantz, 1993). Of particular interest is the fact that in congruent blends like (i) and (ii), the dependent string presents impoverished morphology and defective prosody, indicating that no full representation is involved (Branchini & Donati, 2016; Donati, 2021).

However, this approach cannot account for cases of incongruent blends (iii) because they involve disharmonic basic word orders, as observed between Italian (head-initial) and LIS (head-final, where *wh*-elements, negative and aspectual marking also appear clause-finally). Incongruent blends may not be the most common ones, but they do occur naturally in production. As expected, they are much rarer when the pair of languages involved share basic word order/headedness, as in the case of ASL/English and Portuguese/Libras bilinguals. To account for them, double vocabulary insertion does not suffice, and it seems unavoidable to assume two independent representations, one for each language, as Branchini and Donati (2016) do.

Even more challenging are the less frequently attested cases of bimodal utterances where neither of the strings constitutes a complete sentence, and the proposition expressed is partially encoded in both modalities. In (11), for instance, the subject is only encoded in LIS, the verb is expressed in LIS and Italian simultaneously, and the object is only encoded in Italian. Still, such productions were judged as grammatical by adult bimodal bilinguals, and their comprehension by children was complete, thus pointing to the conclusion that these are not deviant utterances due to performance.

(11) It. Parla con Biancaneve
talk.3SG with Snow White
LIS TALK HUNTER
'The hunter talks with Snow White.'
[Italian and LIS – Branchini & Donati, 2016: 21]

It is clear that this type of productions cannot be accounted for under a one-derivation vs. two-derivation perspective, unless additional assumptions are made about representation and linearization.

3. *Wh*-questions

One area that has attracted quite some attention in the study of the structure of sign languages is *wh*-syntax. Probably the most striking property of *wh*-interrogatives in languages in the visual-spatial modality is that when the *wh*-sign does not appear in situ, there is a strong tendency for it to occur on the right edge of the clause as the most unmarked option, as illustrated in the Catalan Sign Language (LSC) example in (12), contrary to what we robustly

observe in spoken non-in situ languages almost without exception (i.e., leftward movement)[11] (Zeshan, 2004, 2006; Cecchetto, 2012). As we will see shortly, this feature has been considered a clear candidate for a modality effect on the structure of sign languages. The question is why, and it has no univocal answer.

(12) JOHN STEAL wh WHAT
'What did John steal?' [LSC – Alba, 2016: 98]

However, one of the best studied languages in this domain of syntax, ASL, has received conflicting analyses of the directionality of *wh*-movement, one arguing for leftward movement to a left-branching [Spec, CP] (Petronio & Lillo-Martin, 1997) and the other for rightward movement to a right-branching [Spec, CP] (Neidle et al., 2000, for an overview). The basic reason of the disagreement resides in the characterization of the crucial data. For a recent summary of the arguments for each position, see Kelepìr (2021). Wilbur and Patschke (1999) and Wilbur (2011) align with the leftward movement analysis mainly on the basis of the behavior of non-manual markers (see below). Abner (2011) offers a more articulated analysis of the different structures attested in ASL, by distinguishing different interpretations for each one. In her view, the basic *wh*-question formation strategy in ASL is *wh*-in situ (cf. Neidle, 2002). Right-edge *wh*-questions, on the other hand, constitute instances of clefted questions (with the *wh*-phrase in [Spec, FocP] and the remnant being moved up to [Spec, TopP]; cf. Figure 2), while doubling *wh*-structures encode emphatic focus. This characterization of ASL content questions brings in a second feature that often characterizes *wh*-questions in sign languages: doubling of the interrogative sign, as in the Libras example in (13).

(13) JOHN SEE WHO YESTERDAY WHO
'Who exactly did John see yesterday?' [Libras – Nunes & de Quadros, 2006]

The analyses differ as to where each interrogative sign is sitting, and as to which role they play in the structure, but one is taken to be in the canonical target position of *wh*-movement [Spec, CP]), while the other one is occupying a peripheral position for information-structural reasons. For example, the rightward-movement analysis of ASL proposes the first *wh*-sign to be a base-generated topic, and the second one to have moved to [Spec, CP] (Neidle et al., 2000), while the leftward movement analysis takes the first *wh*-sign to be the result of movement to a [Spec, CP] on the left and the second one to be a base generated double sitting in C^{o} on the right to check its [+focus] and [+wh] features (Petronio & Lillo-Martin, 1997). For LIS, Branchini et al. (2013) propose that the second *wh*-element has undergone rightward movement, while the first one is sitting in a left-branching [Spec, FocP], thus creating two chains. For Libras, Nunes

[11] According to Dryer (2013b), "[a] few [spoken] languages exhibit at least a weak tendency to place interrogative phrases at the end of sentences". The case he mentions is Tennet, a Nilo-Saharan language from Sudan, where the interrogative subject is placed at the end of the sentence, despite the basic VSO order.

and de Quadros (2006) subsume *wh*-doubling under the broader phenomenon of emphatic focus duplication and propose leftward movement of the *wh*-sign to an emphatic focus head E-Foc^{o}, subsequent leftward movement to [Spec, TopP] and pronunciation of the two copies of the *wh*-chain (the lower copy is not affected by Chain Reduction because it does not apply word-internally, that is to the WH+E-Foc^{o} head).

Wh-interrogatives have been also shown to be built with a general question particle in Indian Sign Language (IndSL), glossed as G-WH (Aboh et al., 2005; Aboh & Pfau, 2010), that appears at the end of the sentence and clause-types it as a question. It can occur on its own, as in (14a), or combine with nouns such as PLACE, NUMBER, or FACE, as in (14b), thus restricting the interpretation of the general interrogative sign to the meanings of 'where', 'how many', or 'who', respectively. This associated noun can appear stranded or right before G-WH.

(14) a. INDEX$_2$ FRIEND SLEEP G-WH (wh)
'Where does your friend sleep?' [IndSL – Aboh & Pfau, 2010: 107]

b. INDEX$_3$ ASK FACE G-WH (wh)
'Who did s/he ask?' [IndSL – Aboh et al., 2005: 24]

The question particle is argued to occur in the head of the Interrogative Phrase (InterP) in the left periphery (ForceP > TopP > InterP > FocP > FinP; see Figure 2). For a simple interrogative like (14a), the authors argue that no FocP is present, and that FinP moves to [Spec, InterP], thus leaving G-WH in final position. In cases like (14b), with the restricting noun next to the particle (IndSL is head-final), they take FocP to project; the noun FACE moves to [Spec, FocP] and then to [Spec, InterP], and subsequently the complement of InterP moves to [Spec, TopP]. In cases where the noun appears stranded in situ, it is argued to be bound by an operator in [Spec, FocP]; movement of the complement of Inter^{o} to its specificer results in the third kind of linear order observed.

Wh-questions have been long characterized by specific non-manual markers that in principle distinguish them from yes-no/polar questions. Although their nature is essentially prosodic, they have been taken to reflect important aspects of the syntactic structure of the clause. *Wh*-signs are often assumed to be lexically marked by certain non-manuals that can be coarticulated only with them (cf. Wilbur, 2011, though), or spread over other constituents of the interrogative or the full clause, to the exclusion of topics. In *wh*-doubling constructions, non-manuals spread over the manual material between the two *wh*-signs or phrases, what is known as perseverance. Typical markers of *wh*-questions are brow furrowing, backward head position and chin down. *Wh*-non manuals were initially analyzed as a bundle that marked the structure as a content interrogative, but later work has singled out specific non-manuals for particular functions in a particular language. For instance, Watson (2010) identifies brow lowering as the primary marking of content questions in ASL. For Turkish Sign Language, Göksel and Kelepir (2013) decompose the non-manuals seen in content interrogatives: head

tilt, which is obligatory and spreads over the whole clause, marks it as interrogative, while backward position of the head tilt is the value that signals it as a content question.

Cecchetto et al. (2009) crucially attribute to non-manual markers the role of overtly marking after linearization the syntactic dependency between the base position of the interrogative sign and the C^{o} that carries the *wh*-feature. Adopting the Probe-Goal Theory, they establish that the *wh*-feature in C probes into [Spec, CP], its Goal. In LIS, if overt movement occurs, spreading of the non-manual marking of the dependency is optional (on the *wh*-sign only or over the dependency domain). When the interrogative element is in situ, non-manual spreading up to C^{o} is obligatory. From these basic ideas they derive the property that in sign languages, to the extent that they display *wh*-movement, movement is to the right. While specifiers are overwhelmingly to the left across languages because of the linearization algorithm, sign languages have the affordance of marking dependencies through non-manuals, thus being able to override the need to for *wh*-signs to move leftwards and forcing the specifier of CP to be on the right: having a head final C, if *wh*-elements moved to the left in LIS, the non-manual marking would be unable to cover it and would fail to mark the dependency. Theirs is the only attempt to link the use of non-manual markers with the consistent rightward wh-movement across sign languages, thus identifying a modality effect in this domain.

4. Complex Sentences: Recursion and Coordination

4.1 Subordinate Clauses

Recursion, a mechanism that generates an infinite set of hierarchically organized expressions from a finite set of elements, is commonly considered to be one of the core properties of natural language. In fact, it has been argued that the faculty of language (in the narrow sense) "only includes recursion and is the only uniquely human component of the faculty of language" (Hauser et al., 2002: 1569). Hauser et al. (2014) emphasize that recursion should not be equated with embedding; still, all sorts of embedding employ the generative procedure of recursion, as they involve the creation of hierarchical structure.

Among the first studies on subordination in a sign language is Thompson's (1977) investigation of ASL. He addresses the realization of relative clauses, embedded questions, indirect speech, and certain types of complement clauses and concludes that "there is no syntactic subordination in ASL" (Thompson 1977: 181). Evidence for his claim comes from (i) the fact that he could not identify conjunctions (such as complementizers or *wh*-elements introducing relative clauses) and (ii) his observation that pauses commonly intervene between what could be considered the main and the subordinate clause. However, since then, a plethora of studies – starting already with Liddell (1978, 1980) and Padden (1983[2017]) on ASL – have demonstrated that many sign languages do feature dedicated subordination strategies. In

the two subsections to follow, we will present some evidence offered in these studies, limiting the discussion to complementation and relativization.[12]

4.1.1 Complementation

Given the lack of grammatical marking of subordination, Thompson (1977: 190) suggests that constructions including complement-taking verbs like TELL, SEE, THINK, and KNOW are really coordinate structures in which the "so-called main verb is merely a context establishing comment on the important part, the reported act, speech, or thought which follows". That is, an example like (15) should better be translated as 'I think the following: You ought to stop eating meat' (the dash '/' in the example indicates a pause of more than one second).

(15) ME THINK / INDEX BETTER STOP EAT MEAT
'I think you ought to stop eating meat.' [ASL – Thompson, 1977: 190]

A survey of the available studies on complementation confirms that, indeed, the sign languages investigated to date generally do not employ manual complementizers.[13] Yet, there are other ways to demonstrate that a given clause combination involves complementation and not coordination. One of the syntactic tests described by both Liddell (1980) and Padden (1983[2017]) is topicalization. They observe that the Coordinate Structure Constraint (CSC, Ross 1967), which has been established based on spoken languages, also applies to ASL. That is, while it is impossible to topicalize an argument out of the second conjunct of a coordinate structure (16a), topicalization out of a complement clause is – as expected – possible (16b). Looking again at example (15), it may well be the case that in this particular example, the rather extensive pause is indicative of a coordination structure. Liddell and Padden, however, were able to demonstrate that next to such examples, ASL allows for structures that clearly involve subordination.[14]

top
(16) a. * MOTHER, $_1$HIT$_i$ SISTER INDEX$_j$ TATTLE$_k$
'His mother, I hit my sister and he told.' [ASL – Padden, 1983[2017]: 93]

[12] For work on adverbial clauses, including conditionals, see, e.g., Liddell (1986) and Wilbur (2016) on ASL, Dachkovsky (2008) on Israeli SL, Klomp (2019) on NGT, and Paulus (2021) on DGS and Libras; for embedded polar questions in ASL, see Davidson and Caponigro (2016); for the emergence of conjunctions in various types of complex clauses, see Rodrigues and Pfau (2023).
[13] RSL is a noteworthy exception. As recently described by Khristoforova (2023), full CP complements in RSL are often introduced by the (optional) complementizer sign WHAT, as in example (18a). Clearly, this use of a question word is reminiscent of the pattern familiar from Romance languages.
[14] Further syntactic tests for distinguishing complementation from coordination are (i) subject pronoun copy and (ii) spreading of non-manual markers associated with the main clause. Work by Van Gijn (2004) on NGT and by Tang & Lau (2012) on Hong Kong Sign Language suggests that not all of these tests apply across sign languages in the same way.

top

b. TICKET, INDEX$_1$ $_1$TELL$_2$ $_2$GIVE$_i$
'Those tickets, I told you to give to him.' [ASL – Padden, 1983[2017]: 91]

top

c. ORANGE$_i$, MOTHER LIKE t$_i$, FATHER DISLIKE t$_i$
'Oranges, mother likes (and) father dislikes.' [HKSL – Tang & Lau, 2012: 346]

It is also worth noting that the restriction imposed by the CSC is lifted when the extraction applies across-the-board, i.e., when the same constituent is extracted from both conjuncts – again, similar to what has been described for spoken languages (Williams, 1978). In (16c), this phenomenon is illustrated with an example from Hong Kong Sign Language (HKSL), where the object ORANGE is topicalized out of both conjuncts (see Lillo-Martin, 1991, for ASL). For further discussion of coordination, see Section 4.2.

Furthermore, some recent studies reveal a syntactic difference between different types of complement clauses, in particular full CP complements vs. control clauses. For instance, in LIS, an SOV language, object complement clauses selected by the speech-act verb TELL must appear clause-finally (17a); the alternative realization with the CP complement in its canonical object position, i.e., center-embedded, is ungrammatical (17b). In contrast, control clauses selected by, e.g., BEGIN or FORGET, may occupy the canonical object position, i.e., they may be center-embedded, as shown in (17c).[15] Now, for (17a), it might, in principle, still be argued that we are dealing with a coordinate structure, as has been suggested by Thompson (1977) for similar cases in ASL (i.e., 'Gianni said (something): Piero fell off the bike'). However, the same line of reasoning clearly cannot be applied to (17c), where the subordinate clause intervenes between the matrix subject and the matrix verb. Similar observations regarding the position of full CPs vs. control clauses have been made for Turkish Sign Language (Göksel & Kelepir, 2016) and RSL (Khristoforova, 2023).

(17) a. GIANNI TELL [PIERO BIKE FALL]
'Gianni said that Piero fell off the bike.'

b. * GIANNI [PIERO BIKE FALL] TELL

c. GIANNI [CONTRACT SIGN] FORGET
'Gianni forgot to sign the contract.' [LIS – Geraci & Aristodemo, 2016: 103–5]

[15] A similar phenomenon is attested in German subordinate clauses, which display SOV order. Both full CP complements and control clauses within a subordinate clause may appear preverbally or be extraposed. However, for full CP complements, the preverbal position is clearly dispreferred (i), or even judged as ungrammatical, while control clauses may appear in the canonical object position (ii).

(i) ? […] weil ich [dass er Spanisch spricht] weiß
[…] because I that he Spanish speaks know
'… because I know that he speaks Spanish.'

(ii) […] weil ich [das Problem zu verstehen] versuche
[...] because I the problem to understand try
'… because I try to understand the problem.'

For RSL, Khristoforova (2023) further observes that the two types of complement clauses also differ in their agreement properties: if a full CP complement contains an agreeing verb, then this verb may display the full paradigm of subject agreement. In the CP complement in (18a), for instance, the verb COME agrees with the embedded subject WOMEN (as well as a first-person object). In contrast, in control clauses, where the covert subject is co-referential with the matrix subject, subject agreement is reduced to the form identical to first-person subject marking (which actually cannot be distinguished from the begin point of the verb's citation form). Reduced subject agreement is evident in (18b), where the embedded verb GIVE would be expected to agree with the locus of the (zero) third-person matrix subject; yet, its movement actually starts at a locus in front of the signer's body (marked by subscript '1'). Tense marking is not available as an indication of (non-)finiteness in sign languages, but Khristoforova likens the reduced paradigm of subject agreement in control clauses to marking of non-finiteness in spoken languages.

(18) a. INDEX_1 THINK [WHAT WOMEN $_{3a}\text{COME}_1$]
'I thought that women would come to me.'

b. WANT [WIFE $_1$GIVE$_{3a}$ BEAUTIFUL FLOWER]
'(He) wants to give beautiful flowers to his wife.' [RSL – Khristoforova, 2023]

4.1.2 Relativization

As for relative clauses (RCs), Thompson (1977: 183) notes that "no regularities in clause order, word order, or deletion can be observed which might signal some syntactic paradigm similar to relativization in English". After discussing ASL examples that are translation of English (restrictive and non-restrictive) RCs, he concludes that "ASL simply uses two or more coordinate, syntactically equal sentences where English uses a single sentence containing two clauses, one syntactically subordinate to the other" (Thompson, 1977: 187; cf. also Coulter, 1983).

This claim was soon challenged by Liddell (1978, 1980), who argues that Thompson overlooked crucial non-manual markers that commonly accompany RCs (most importantly, brow raise) as well as dedicated manual signs that signal relativization. His analysis of the relevant ASL structures leads him to conclude that ASL features head-internal RCs. In example (19a), two pieces of evidence suggest that the head noun DOG indeed sits within the relative clause. First, the temporal adverbial RECENTLY, which precedes the head noun, scopes over the embedded verb and must therefore be contained within the RC. Second, the non-manual markers brow raise ('br') and backward head tilt ('bht') extend over the adverbial and the head noun, thereby indicating that the first four signs form a clausal constituent. Liddell (1978) also shows that the same string without the non-manual marker would be interpreted as a coordinated structure ('The dog recently chased the cat and came home'). The LIS example in

(19b) displays properties similar to (19a): as before, the adverbial scopes over the embedded predicate, and the non-manual signals that the head noun MAN is part of the RC ('te' = tensed eyes). In contrast to ASL, LIS RCs feature a determiner-like element glossed as PE[16], which systematically appears at the right edge of the clause; PE is coreferential with the head noun and may spatially agree with the locus associated with the head noun. Branchini and Donati (2009) argue that PE is base-generated next to the head noun and then moves to the C° position of the RC (on the right), thus endowing the RC with nominal features and turning it into a DP (see Wilbur [2017] for a discussion of head-internal RCs in ASL and other sign languages; see Branchini [2021] for a general overview of properties and accounts of sign language RCs).

(19) a. br+bht
[RECENTLY **DOG** CHASE+ CAT]$_{RC}$ COME HOME
'The dog which recently chased the cat came home.'
[ASL – adapted from Liddell, 1978: 66]

b. br+te
[TODAY **MAN**$_i$ PIE BRING PE$_i$]$_{RC}$ YESTERDAY (IX$_i$) DANCE
'The man that brought the pie today danced yesterday.'
[LIS – adapted from Branchini & Donati, 2009: 164]

c. [tənay **ʔəwa:ø** ʔəwu:w-pu-L^y]$_{RC}$ ʔciyawx
yesterday house-DO 1.SG.saw-DEF-in 1SG.FUT.sing
'I will sing in the house that I saw yesterday.'
[Diegueño – adapted from Keenan, 1985: 162]

Typological variation in the realization of RCs is a prominent topic in linguistic typology, and internally-headed RCs are known to constitute a cross-linguistically rather common type. In order to demonstrate the modality-independent nature of the structure, we complement the sign language examples with an example from Diegueño in (19c). Obviously, non-manual markers are not at play here, but just as in the ASL and LIS examples, the adverbial, which precedes the head noun *ʔəwa:ø* ('house'), is interpreted within the RC. Further note that, similar to LIS, Diegueño RCs also feature a determiner-like element (glossed as DEF) at the right edge of the RC.

Next to internally-headed RC, head-external RCs are also attested in sign languages. Actually, ASL has been shown to feature both types. A head-external ASL RC is presented in (20a). Note that in this case, the non-manual marker does not extend over the head noun DOG. Also, according to Liddell (1978, 1980), RCs in sentence-final position obligatorily include the RC complementizer THAT$_c$, which is accompanied by a head nod.[17] Post-nominal head-external RCs have also been described for DGS. What makes DGS special from an intra-modal typological perspective is the fact that RCs are commonly introduced by a relative pronoun

[16] The gloss is motivated by a silent articulation, a labial stop, co-occurring with the sign. The sign is realized manually with an extended index finger that is shaken downwards.
[17] The availability of both internally-headed and externally-headed RCs in a language has also been described for Quechua (Cole, 1987), LIS (Brunelli, 2011), and Turkish Sign Language (Kubuş, 2016).

(which agrees with the nominal head in the feature [±human]). Actually, the mere fact that DGS features a relative pronoun strongly suggests that RCs are externally-headed since, as pointed out by Keenan (1985), relative pronouns are never observed in internally-headed RCs. In (20b), the relative pronoun (RPRO-H) is-co-referential with the [+human] head noun MAN; it is signed with an upright extended index finger, which is a classifier handshape referring to persons. Pfau and Steinbach (2006) claimed that in DGS, only the relative pronoun is accompanied by brow raise, but later research showed that the brow raise may optionally spread over the entire RC. Crucially, however, the head noun (as well as the optional indexical sign following it) are outside the scope of the non-manual. Moreover, the temporal adverbial preceding the head noun can only modify the matrix clause – in contrast to what we observed in the examples in (19).

(20) a. ASK$_3$ GIVE$_1$ **DOG** [[URSULA KICK]$_{RC}$ THAT$_c$]
br
'I asked him/her to give me the dog that Ursula kicked.'
[ASL – adapted from Liddell, 1980: 162]

b. YESTERDAY [**MAN** (IX$_{3a}$) [RPRO-H$_{3a}$ CAT STROKE]$_{RC}$]$_{DP}$ ARRIVE
br
'The man who is stroking the cat arrived yesterday.'
*'The man arrives who stroked the cat yesterday.'
[DGS – adapted from Pfau & Steinbach, 2006: 513]

c. YESTERDAY **MAN** IX$_{3a}$ *t*$_{RC}$ ARRIVE [RPRO-H$_{3a}$ CAT STROKE]$_{RC}$
br
'The man arrived yesterday who is stroking the cat.'

Let us finally address the position of the RC. The available evidence suggests that externally-headed RCs generally appear in situ, following the external head. In addition, at least in DGS, the RC may be extraposed to clause-final position, as is shown in (20c). In this case, it is more common to use the pointing sign adjacent to the head noun (IX$_{3a}$), which serves to localize the referent in space. In contrast, internally-headed RCs show a clear tendency to be placed in sentence-initial position, cf. (19a,b). For LIS cases like the one in (19b), Branchini and Donati (2009) argue that the RC is first merged within the main clause and then moved to a left-adjoined position, and Branchini (2021: 331) characterizes the landing site as [Spec, TopP]. Optionally, the trace of the RC may be spelled out by a resumptive pronoun, as indicated in (19b). Brunelli (2011) offers an alternative account for LIS RCs, following Kayne's (1994) antisymmetric framework, but he also assumes that the brow raise accompanying the RC is in fact a topic marker (while the dedicated non-manual marker for RCs are tensed eyes). Wilbur (2011, 2017) offers an alternative account for brow raise in ASL, arguing that various uses of brow raise (which is also found to accompany, e.g., polar questions and conditionals) are "associated with a dyadic, that is, restrictive, operator reflecting a special operator-variable relationship between the RC and its head" (Wilbur, 2017: 13).

4.2 Coordinated Clauses

In Section 4.1.1, we already alluded to the fact that, in the absence of manual and non-manual markers, certain syntactic tests may be applied for determining whether a given structure involves subordination or coordination. Yet, the few available studies, which focus mostly on conjunctive and disjunctive coordination, also indicate that certain manual and non-manual markers actually do exist and, additionally, that material may be elided in one of the conjuncts (see, e.g., Davidson [2013] for ASL; Cecchetto et al. [2015] for LIS; Zorzi [2018] for Catalan Sign Language; Hartmann et al. [2021] for NGT).

Let us consider manual marking first. Davidson (2013) presents the ASL example in (21a), in which both conjuncts are preceded by a manual sign glossed as COORD-L. COORD-L is a two-handed sign involving a handshape with two extended fingers (e.g., index and middle finger) on the non-dominant hand, and the index finger of the dominant hand pointing first to one of the extended fingers (COORD-L_1) and then to the other one (COORD-L_2). Given that both conjuncts are marked, this can be considered an instance of bisyndetic coordination of the type 'co-A co-B' (Haspelmath, 2007). Davidson also demonstrates that ASL employs 'general use coordination', that is, depending on the context, a complex sentence involving COORD-L can be interpreted as conjunction or disjunction (see Asada [2019] for Japanese Sign Language). In the NGT coordination in (21b), an example extracted from the Corpus NGT, the manual conjunction PLUS (both index fingers forming a '+') intervenes between the conjuncts – this is thus an instance of syndetic coordination.

(21) a. **COORD-L_1** [$POSS_3$ PARENTS WILL BUY $POSS_3$ CAR] **COORD-L_2** [$INDEX_3$ WILL TRAVEL]
'Her parents will buy her a car, and (then) she will travel.'
'Her parents will buy her a car, or she will travel'
[ASL – adapted from Davidson, 2013: 7]

b. EVENING [SCARY STORY TELL] **PLUS** [WALK DARK]
'In the evening, (we) told scary stories and (we were) walking in the dark.'
[NGT – Legeland et al., 2018: 61]

As for non-manual markers, it has been observed that the two conjuncts may be accompanied by body leans or head tilts towards contrasting sides of the signing space. Davidson (2013) refers to this strategy as 'COORD-SHIFT', and she observes that the two strategies may also be used in combination. In (22), we provide an example from LSC that illustrates this spatial strategy: part of the first conjunct is accompanied by body shift ('bs') and head shift ('hs') to the contralateral side of the signing space, while the second conjunct is signed with simultaneous body/head shift to the ipsilateral side.[18] In the literature, coordinations of this type are commonly referred to as 'asyndetic' because they lack a manual conjunction (Zorzi, 2018;

[18] Zorzi (2018) further observes that individual signs contained within the two conjuncts may also be articulated at opposing sides. This is true for the verbs in (22), and we indicate this with the subscripts 'C' and 'I".

Hartmann et al., 2021). However, if we consider the non-manual(s) as dedicated markers of syntactic coordination, then cases like (22) might as well be analyzed as bisyndetic coordination.

(22) a. MARC MATH TEACH$_C$ MARINA WRITE.ON.BOARD$_I$
(bs+hs contra; bs+hs ipsi)
'Marc is teaching math, and Marina is writing on the board.'
[LSC – adapted from Zorzi, 2018: 110]

b. COCHLEAR.IMPLANT [GO++$_{3a}$ S-H SCHOOL] [HEARING SCHOOL GO$_{3b}$]
(bl-3a; bl-3b)
'Because of the cochlear implant, (children) go to a hard-of-hearing school (or) go to a hearing school.' [NGT – Hartmann et al., 2021: 16]

The NGT example in (22b) displays similar properties: no manual conjunction is used, and the two conjuncts are (partially) accompanied by body leans ('bl') to opposing sides of the signing space. However, analyzing naturalistic data extracted from Corpus NGT, Hartmann et al. (2021) make an additional interesting observation: they find that NGT allows for asymmetric coordination, whereby the word order differs in the two conjuncts. Such asymmetry is observed in both (21b) and (22b); in the former example, the order in the conjuncts is OV–VO, in the latter, we find VO–OV. The authors emphasize that asymmetric coordination is typologically unusual, as it violates a constraint that governs coordinated structures in spoken languages, the Parallel Structure Constraint (cf. English **Jim is going to school, and to college, Susan goes*). They argue that the asymmetry occasionally observed in NGT results from the application of an ex-situ focus strategy in the second conjunct; that is, in case available in-situ focus strategies are considered not to be strong enough, a constituent in the second conjunct may be fronted to [Spec, FocP] in order to express a contrast between the two conjuncts.

5. Conclusion

In this chapter, we have offered a discussion of a limited, yet representative, sample of syntactic phenomena that figure prominently in comparative approaches to the structure and typology of spoken languages and at the same time show some effect of the visual-gestural modality. The existing scholarship on sign languages – mainly those works taking a formal perspective, and in particular Generative syntax – has shown that, in broad terms, the same representational and derivational formalization tools (e.g., phrase structure rules, merge, Spec-head agreement) can be applied successfully irrespective of the language modality. This applies not only to well-studied structures such as dependent clauses or syntactically determined information-structural packaging, but also, for instance, to the encoding of locative sentences or coordination, domains in which, as we have seen, use of space is central in sign languages and which thus crucially exploit the affordances of the visual-spatial modality. In this necessarily selective overview, many other equally relevant topics for comparative research had to be put aside, like

word order within the NP (e.g., Zhang, 2007; Mantovan, 2015), the expression of negation, where non-manual marking also plays an important role (e.g., Pfau, 2016a; Quer, 2020; Gökgöz, 2021), or the structures used for reported discourse, known as role-shift (Steinbach, 2021; Maier & Steinbach, 2022), among many others.

At the same time, research into sign languages has offered new evidence and insights into topics that had been long debated in the spoken language literature. Let us mention the encoding of discourse referents in space, touched upon in the brief discussion of verb agreement in this chapter. The meticulous study of referential loci, used also in the pronominal system, in possessives, etc., has provided overt evidence, for instance, regarding the nature of referential indices in syntax (see, e.g., Kuhn [2021] for an overview). Another such contribution is the study of non-manual markers, which made multiple appearances throughout the chapter and which are also often taken to mark syntactic domains or dependencies. Other analyses interpret the same facts as prosodic marking that interfaces with syntax, and precisely addressing the question of the interface between syntax and prosody in a different modality can only but sharpen the arguments about the structure of grammar.

As more and more sign language data from an increasing number of sign languages enter the stage of linguistic description and analysis, we may hope to advance our knowledge about the abstract properties of the faculty of language and the facets that are influenced or determined by the language modality.

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