Can't you see the difference?
Sources of variation in sign language structure

Pamela Perniss, Roland Pfau, and Markus Steinbach

1. Introduction

Signed and spoken languages are produced and perceived in radically different ways. While spoken languages are produced by the vocal tract and perceived by the auditory channel, signed languages are produced by the hands, but also other non-manual articulators like the head, face, and body, and are perceived visually. Sign linguistic research in the past decades (see Section 2 for a brief overview of the history of sign language research) has proven beyond a doubt that natural language exists in two modalities, and thus, that signed and spoken languages share basic linguistic properties on the levels of phonological, morphological, and syntactic structure.

Still, modality plays an important part in shaping the expression of linguistic structure. With respect to how modality can influence linguistic structure, the role of iconicity or visual motivation is of particular importance. The visual-gestural modality affords a much higher potential for iconic representation than the auditory-vocal modality. The force of iconicity is evident, for example, in indexical reference (see Cormier, this volume), the use of space to represent location and motion of referents (see Johnston et al., this volume), and referential shift (see Pyers and Senghas, this volume). In addition to the role of iconicity, the nature of the visual-gestural modality also affects other parts of linguistic structure. For example, it provides the possibility of, and seems to favor, non-concatenative morphology (Klima and Bellugi 1979, Aronoff et al. 2005).

Meier (2002) lists three other prominent differences between the two language modalities that may cause differences in the linguistic structure of signed and spoken languages: the different nature of the articulators used for language production, the different nature of the perceptual systems used for language comprehension, and the comparative youth of signed languages. Thus, modality may affect linguistic structure, and indeed properties of the visual-gestural modality have been argued to create a homogenizing effect in sign languages, leading to less variation overall in

sign language structure compared to the variation found across spoken languages (Newport and Supalla 2000, Aronoff et al. 2005).

Until recently, research on sign languages was limited to American Sign Language (ASL) and a number of European sign languages as, for example, French, German, British, Swedish, and Danish Sign Language (cf. also Section 2). The current research climate is testimony to a surge of interest in the study of a geographically more diverse range of sign languages. This volume reflects that climate and brings together work by scholars engaging in comparative sign linguistics research. Before we can truly answer the question of whether modality effects do indeed cause less structural variation in sign languages as compared to spoken languages, it is necessary to investigate the differences that exist between sign languages in more detail and, especially, to include in this investigation less studied (often non-Western) sign languages (see Zeshan 2004a, 2004b, 2006 for pioneering work in this area).

In this spirit, the focus of the present volume is variation within the modality of sign. The various contributions concentrate not on a specific domain, but rather cover a range of different areas, including word pictures, negation, auxiliaries, constituent order, sentence types, modal particles, and role shift. One question that arises is whether the range and extent of variation differs between linguistic domains, and, if yes, whether the differences are attributable to properties of the modality. For example, modality may affect some grammatical domains to a greater extent than others. Likewise, the iconicity of signs and grammatical constructions may decline over time, and different domains may be variously affected by such processes.

Before turning to possible sources of variation at different linguistic levels in Section 3, we will briefly sketch important developments in the history of sign language linguistics in Section 2. Finally, Section 4 gives an outline of the content of this volume.

2.   Developments in sign language linguistics

In order to situate the discussion below as well as the contributions to the present volume in a historical context, we will first say a few words about important developments in sign language research. Obviously, the picture sketched in this section is very much simplified. Still, we believe that the research endeavours undertaken in the area of sign language linguistics

since the 1960's can roughly be divided into three periods characterized by different theoretical objectives.[1]

In the first period of the study of signed language, researchers focused on the underlying identity between spoken and signed languages. Woll (2003) calls this period, which started in the middle of the twentieth century, the "modern period". Determined to prove the linguistic status of sign languages against widely held prejudices and misconceptions that communication between the deaf was based on pantomime and gesture, early sign linguists de-emphasized the role of iconicity in sign language (see, for instance, Klima and Bellugi 1979). This was the case for lexical signs, but also notably for the system of classifiers. Studies have shown that many lexical signs are characterized by an arbitrary form-meaning mapping, and that the meanings of lexical signs cannot easily be guessed by naïve non-signers (cf. Pizzuto and Volterra 2000). The predominant sign language investigated in this period was ASL. As a consequence, there was little typological research.

In the post-modern area starting in the 1980's, researchers first turned to the issue of modality and investigated similarities and differences between signed and spoken languages. In this period, researchers were interested in the influence of modality on linguistic structure, in modality-specific properties of signed and spoken languages, and in modality-independent linguistic universals. Starting from the observation that sign languages seem to be typologically more homogenous than spoken languages, many grammatical properties of sign languages have been related to specific properties of the visual-gestural modality discussed in Section 1 above (Meier 2002). In both the modern and the post-modern period, sign language research mainly focused on the comparison of sign languages to spoken languages. Cross-linguistic studies on sign languages have been rare. However, the hypothesis that sign languages are typologically more similar than spoken languages has to be taken with caution until more (non-related) sign languages have been investigated (Woll 2003).

Only once non-Western sign languages entered the stage, it became clear that sign languages show more variation than originally predicted. This third period, which approached sign language typology more seriously, started at the end of the 1990's. Today, we can observe an increasing interest in comparative studies on sign languages at all linguistic levels that also include less studied (Western and non-Western) sign languages. In this context, researchers also develop new methodological and technological tools for the elicitation, collection, and documentation of

sign language data (see Johnston et al., this volume). Still, more comprehensive documentations and typological studies of different sign languages are necessary for a better understanding of the similarities and differences between sign languages in particular and signed and spoken languages in general. In the long term, sign language typology is expected to make an important contribution to a better understanding of the nature of human language.

3.   Sources of variation

Obviously, the research endeavors undertaken by the authors of this volume belong to the third of the above-mentioned periods: the documentation of similarities and differences between sign languages. In this section, we briefly sketch a number of linguistic areas in which variation has been found in order to give the reader a first impression of what forms sign language variation may take. Many of the aspects tackled in this section will be discussed in much more detail in contributions to this volume. The list of topics presented in the following sections is by no means exhaustive. However, we take the aspects we selected to be illustrative of the types of variation found across sign languages. We shall look at three linguistic levels of description in turn, considering first phonological (Section 3.1), then morphological (Section 3.2), and finally syntactic variation (Section 3.3). More examples from these three domains as well as the issue of lexical variation are discussed in Hohenberger (this volume).

3.1. Phonology

Since Stokoe's (1960) seminal work on sign language structure, it is a well-known fact that signs are not holistic units but are composed of smaller phonological units often referred to as phonological parameters ('cheremes' in Stokoe's terminology). While Stokoe himself identified three parameters – handshape, location, and movement – later research proved the importance of two further aspects, namely orientation and non-manuals.[2] In this section, we first discuss cross-linguistic variation in some of the phonological parameters. We then turn to a phonological rule that has been shown to be subject to language-specific constraints: weak hand drop (see

Hohenberger, this volume, for discussion of variation in minimal syllable sonority).

3.1.1. Phonological parameters

Clearly, the phonological building blocks of language are modality-specific: consonants are simply not attested in sign languages and handshapes do not play a role in spoken language phonology. Still, researchers have shown that the internal and external organization of these building blocks follows modality-independent principles; see, for example, Sandler (1989) and Brentari (1998) for feature hierarchies and Perlmutter (1992) for syllable structure.

Spoken languages vary considerably with respect to their phoneme inventories. The question therefore arises: how much and what type of variation exists in the phonological parameter inventories of sign languages? In this section, we will briefly consider handshape, location, movement, as well as non-manuals.[3]

The hand can be in various configurations, depending on whether and how many fingers are selected, and on whether the selected fingers are extended, bent, hooked, or curved. Different sign languages have different inventories of handshapes. Variation in handshape inventories can be due to two factors. First, while all known sign languages share a number of handshapes – including at least the so-called 'unmarked handshapes' (cf. Sutton-Spence and Woll 1999: 162) – there are some complex handshapes that are only attested in few sign languages. Note that in this context, the notion 'complex' refers to featural complexity, which is defined as the number of distinctive features necessary to describe a handshape (cf. Sandler 1996). The complex handshapes shown in Figure 1, for instance, are infrequent.

Figure 1. Infrequent handshapes

Secondly, sign languages vary in the size of their handshape inventories. For example, compared to a sign language like ASL, Adamorobe Sign Language (AdaSL), a village sign language in Ghana, has a very small handshape inventory (Nyst 2007).

Signs can have fixed points of articulation on the face or body or can be executed in neutral space, that is, in the area of space in front of the body. The chest, the shoulders, the arm, the wrist, the neck, and different parts of the head and face, including the ear, the mouth, the eye, the nose, the forehead, the side of the head, and the top of the head are all places of articulation for signs. Differences between sign languages in place of articulation have been suggested by Klima and Bellugi (1979) in a comparison of signs in Chinese Sign Language (CSL) and ASL.

Some signs involve movement of the hand and/or of the fingers. The hand(s) can move in a straight or arc-shaped path and can be executed in different directions such as sideways, forwards, or contralaterally across the body. Local movements of the fingers can be, for instance, wiggling or bending, opening or closing. Klima and Bellugi (1979) also give examples of movement values, both movement of the hands and internal movement of the fingers or wrist, that differ between Chinese and ASL.

Sign languages also differ in the size of signing space, that is, in the size of the space in front of and around the body in which signs are executed. Generally, signing space is taken to extend vertically from the top of the head to the waist, and horizontally slightly past the shoulders on each side and forward to about arm's reach. Sign languages like AdaSL or Kata Kolok, a village sign language in Bali, for example, have a much bigger signing space than do Western Sign Languages. In these sign languages, the arms extend maximally to all sides, including points behind the body. This is probably related to the use of an absolute reference frame (co-opted from the surrounding spoken language and gestural systems) and a focus on the "here and now". This variability in the size of sign space is different from the expansion or restriction of sign space that is found in "shouting" or "whispering" in sign language, respectively (Crasborn 2001; Liddell 2003; Uyechi 1996).

Finally, the use of phonological non-manual elements differs between sign languages. These are typically mouthings derived from the surrounding spoken language that accompany signs.[4] The use of mouthings in ASL, a sign language generally considered to make only little use of phonological mouthings, is the subject of the investigation by Nadolske and Rosenstock (this volume). In contrast to what has been claimed for ASL,

German Sign Language (*Deutsche Gebärdensprache*, DGS) is known to make frequent use of mouthings. In DGS, mouthings occur obligatorily, for example, with nominal signs and can disambiguate between different meanings of an identical sign (the DGS signs for PAINT, BUTTER, and MARMELADE, for instance, differ only in the accompanying mouthed element). DGS also uses mouthings to differentiate between types of things for which the manual sign provides the basic level identification. Different types of birds, for example, can be distinguished on the basis of the mouthing alone, whereby the manual sign remains the same (Keller and Rech 1993).

3.1.2. Constraints on two-handed signs and weak-hand drop

We now turn to two-handed lexical signs. It has been shown that two-handed lexical signs are subject to two phonological well-formedness conditions: the symmetry condition and the dominance condition (Battison 1974). The first condition specifies that when both hands move in a two-handed sign – be it symmetrically or in alternation – they must have the same handshape (balanced sign). Conversely, the second condition states that when the two hands do not share the same specification for handshape (unbalanced sign), then one of them must be stationary/passive and, moreover, the specification of the passive hand is restricted to one of a small set, the articulatorily simple, unmarked handshapes shown in Figure 2. These phonological constraints seems to be valid across sign languages,[5] although they might not hold in the same way for some Southeast Asian sign languages like, for example, Korean Sign Language (KSL) (Kang Suk Byun, personal communication).
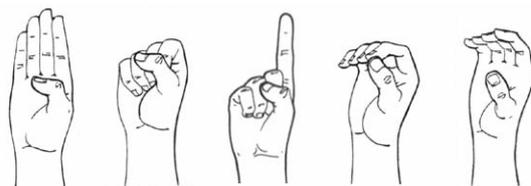
Figure 2. Frequent, unmarked handshapes

Sometimes, two-handed signs can be signed without the non-dominant (or weak) hand; this type of phonological deletion process is referred to as

'weak drop' (Padden and Perlmutter 1987). While this phenomenon is attested across many sign languages, recent research has shown that the types of signs that can undergo weak drop differ from sign language to sign language. Comparing the weak drop patterns of ASL and Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT), Van der Kooij (2001) finds that two phonological specifications that block weak drop in ASL, namely [alternating movement] and [crossing] (that is, one or both hands crossing the midsagittal plane), do not always block weak drop in NGT. That is, the NGT signs in Figure 3, MATCH with alternating movement as well as AUSTRIA, in which both hands cross the midsagittal plane, do both allow weak drop. In contrast, in ASL, similar signs cannot be signed with only the dominant hand (Battison 1974).[6]

MATCH   AUSTRIA
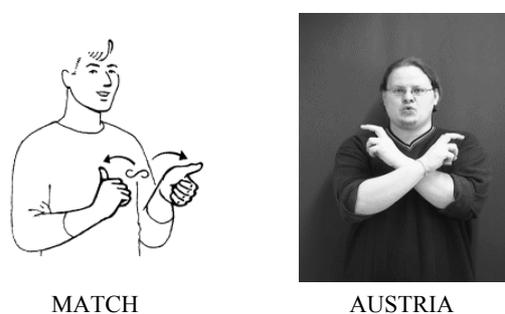
Figure 3. NGT signs that allow weak drop

Moreover, and also in contrast to ASL, Van der Kooij reports that weak drop in NGT is acceptable in most unbalanced signs. This discussion shows that a phonological rule that appears to be part of the phonological system of many sign languages may still be subject to language-specific conditions of application.

3.2. Morphology

In sign languages, the phonological and the morphological component closely interact, since virtually every phonological parameter can function as a morpheme by itself. That is, morphological processes tend to involve stem-internal changes rather than affixation. In the domain of inflection, handshapes can function as classifier morphemes (Section 3.2.1), movement alterations can express aspectual meaning, and with some verbs

changes in orientation and/or direction of movement can indicate the Source and Goal of the action expressed the verb (see Section 3.3.2 below). Moreover, non-manual markers (e.g. puffed cheeks, pursed lips) are capable of supplying adjectival or adverbial meaning. Besides these stem-internal changes, reduplication has been shown to be a productive morphological process in sign languages. Interestingly, in sign languages, reduplication expresses the same meanings as it does in spoken languages (Moravcsik 1978; Pfau and Steinbach 2006): aspectual modification (e.g. habituality and iteration), plurality (see Section 3.2.2), and reciprocity (Pfau and Steinbach 2005a). As far as derivation is concerned, for instance, conversion processes have been described that only affect the movement component (manner and frequency) of a stem (see Section 3.2.3). In addition to pluralization, classification, and derivation, we will also highlight some cross-linguistic differences in pronominalization (Section 3.2.4)

3.2.1. Classifiers

Classifier predicates are complex predicates that consist of handshape and movement morphemes that combine in certain (morphosyntactically constrained) ways to express information about the size and shape, handling, location, and motion of referents. The handshape reflects salient visual-geometric properties of a referent, and thereby 'classifies' the referent with respect to inherent properties of size and shape or, in some cases, semantic class. Two main types of sign language classifiers are entity classifiers, where the hand represents a referent as a whole and encodes salient features of the entity's size or shape, and handling classifiers, where the hand represents the handling or manipulation of a referent (e.g, Engberg-Pedersen 1993; Emmorey, 2003).

The use of classifier predicates has been described for the majority of sign languages studied so far (see Schembri (2003) for a comprehensive overview). However, the existence of classifier predicates seems to hold primarily for urban sign languages. AdaSL, for example, exhibits a limited use of handling classifiers, and does not use entity classifiers, at all (Nyst 2007).

Though classifiers are used in similar ways in the sign languages in which they exist, the specific classifiers themselves differ between sign languages. The correspondences between classifier handshape and visual-

geometric properties of the referent exist per convention, and thus vary from sign language to sign language. For example, in DGS, a B-hand (see Figure 4 below) held horizontally with the palm down is used to represent the semantic class of four-wheeled vehicles such as cars, buses, and trucks; two-wheeled vehicles such as bikes and motorcycles, on the other hand, are represented with a vertically-held B-hand. In ASL, an even broader semantic class of vehicles, including water vehicles, is represented with a single handshape (see Figure 4). Finally, a third, altogether different handshape is used in Jordanian Sign Language (*Lughat il-Ishaara il-Urdunia*, LIU) for the semantic class of vehicles (Hendriks 2004).

DGS   ASL   LIU
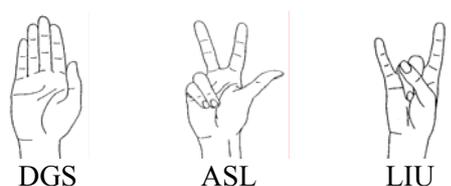
Figure 4. Entity classifiers for vehicles

In general, there is more variation between entity classifiers across sign languages, as they tend to be more arbitrary, and more strongly conventionalized. Handling classifiers tend to be more iconic, representing the relevant action (i.e. the handling of the relevant object) more directly. Cross-linguistic evidence suggests that across sign languages, the subsystem of entity classifiers is more strongly grammaticalized than that of handling classifiers (see Zeshan 2003 for Indopakistani Sign Language, IPSL).

Finally, some sign languages, especially Asian sign languages, have classifiers that mark gender (see Fischer and Osugi 2000 on Japanese Sign Language – *Nihon Syuwa*, NS). In gender classifier systems, a separate handshape is used for male and female referents. In NS, like in other Asian sign languages, an extended upright thumb is the classifier form used for males, while an extended upright pinky is used for females (cf. also Section 3.2.4).

3.2.2. Pluralization of nouns

Browsing through some of the available grammatical descriptions of sign languages, we find striking similarities when it comes to the pluralization

of nouns. In most of the studies, reduplication is mentioned as a common pluralization strategy. One possible exception in this respect is IPSL where – according to Zeshan (2000) – only the sign CHILD is reduplicated with some frequency, while for other nouns, no morphological distinction is made between singular and plural forms.

In a typological study on pluralization, Pfau and Steinbach (2006) show that while reduplication is indeed a common strategy in pluralization, it is subject to a number of phonological constraints (see Hohenberger, this volume, for details). The nature of these constraints, however, may differ from sign language to sign language. In DGS, for instance, body-anchored nouns cannot be reduplicated. That is, the plural form of a body-anchored sign like GLASSES (Figure 5) is realized by zero marking and the plural interpretation either has to be inferred from the context or has to be expressed by a numeral or quantifier.

Figure 5. The DGS body-anchored noun GLASSES

It appears that in NGT and ASL, the application of plural reduplication is less constrained. In both these sign languages, the sign GLASSES (which is phonologically similar to the sign given in Figure 5) can be reduplicated. While in NGT, this is done with only the dominant hand performing a short repeated movement towards the body location, in ASL, the reduplication can be performed with both hands moving in alternation.

In other words: a brief look at nominal plurals might lead us to conclude that they are realized in a similar way across sign languages. Closer inspection, however, reveals that while the basic means of realizing plurality (reduplication and zero marking) may be the same, their applicability is clearly subject to language-specific phonological constraints.

3.2.3. Derivation

While various inflectional processes in sign languages, such as aspectual, number (see Section 3.2.1 above), and spatial inflection (see Section 3.3.2 below), are well-described, comparatively little is known about derivation in sign languages. From the available research, it appears that derivational processes – in particular, sequential ones – are scarce in general.

Aronoff et al. (2005) describe some sequential derivational processes in ASL and Israeli Sign Language (ISL). For ASL, they report an agentive suffix grammaticalized from the noun PERSON that may attach to various verbs as, for example, in TEACH^AGENTIVE ('teacher'). They point out that although the suffixed forms may reduce to a single movement contour (which corresponds to one syllable), "the hand configuration and place of articulation of each of the two morphemes are usually retained" (Aronoff et al. 2005: 312).[7] In ISL, they discovered a set of 'sense prefixes' which consist of pointing to a sense organ (or the head or mouth). Many of the resulting prefixed forms can be glossed as 'to X by seeing (eye)/hearing (ear)/thinking (head)/intuiting (nose)/saying (mouth)'. An example given by the authors is the combined form EYE^SHARP meaning 'to discern visually'. This derivational process appears to be unique to ISL.

For both ASL and ISL, Aronoff et al. (2005) describe a negative suffix. Form and use of the two suffixes, however, differ between the two sign languages. The ASL suffix ZERO probably originates from the phonologically similar sign NOTHING; it is signed with one hand in which the fingers form the shape of a zero and it usually attaches to verbs (SEE^ZERO 'not see at all'). In contrast, the ISL suffix NOT-EXIST attaches to adjectives (INTERESTING^NOT-EXIST 'of no interest') and has two allomorphs – a one-handed and a two-handed one – the choice of which depends on the form of the base sign (see Hendriks, this volume, for discussion of a similar suffix in LIU).

From this brief discussion, we can conclude that some variation is attested in the few sequential derivational processes described to date. The same holds for simultaneous processes. While diminutive formation by means of non-manual marking (pursed, rounded lips), for instance, is probably found in all sign languages, other processes appear to be sign language-specific. A case in point are the ASL 'characteristic adjectival rule' and the 'ISH adjective rule' described in Padden and Perlmutter (1987) both of which involve a change in movement pattern such as repetition of movement and/or tense movement.

Supalla and Newport (1978) found that in ASL, a change in movement pattern also characterizes a fair amount of noun-verb pairs. In particular, they show that verbs can have simple or repeated movement and moreover, the movement may either end in a hold or be continuous. The noun-verb pair SIT is an example for the former, while FLY is an example for the latter. In the corresponding nouns, however, movement is repeated and tense ('restrained' in their terminology), as can be seen in the noun signs CHAIR and PLANE in Figure 6.

    SIT   CHAIR   FLY   PLANE
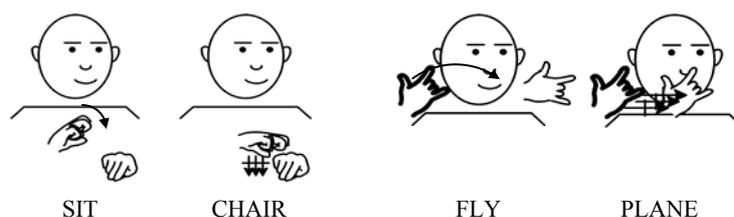
Figure 6. Verb-noun pairs in ASL

Recent research into noun-verb pairs in NGT has shown that in NGT the patterns are not as clear as in ASL (Schreurs 2006). Many verbs and corresponding nouns appear to be identical in form. Interestingly, for the few standardized signs for which a systematic difference was found (for example CIGARETTE/SMOKE and PLANE/FLY), the pattern is exactly the opposite of the one described for ASL: the movement of the verb is tense and repeated while the noun has continuous movement.[8]

3.2.4. Pronominal systems

As opposed to pronominal systems in spoken languages, pronominal systems in sign languages seem to be quite uniform (McBurney 2002). The pronominal systems of sign languages are determined to a large degree by iconicity in the sense of indexicality, or actual pointing to their referents. In the case of physically present referents, pronominal or indexical signs do literally point to their referents, e.g. the signer points to her/his own chest to indicate "I" and points to her/his interlocutor's chest to indicate "you", and can likewise point to other animate or inanimate referents in the physical context of the utterance. Non-present discourse referents can be pronominally referred to by associating them with, and then pointing to, particular locations in sign space.

In Western sign languages, singular pronominal reference seems to be made with an index finger point. These sign languages do not mark gender on pronouns. By contrast, gender distinctions can be found in the pronominal system of Asian sign languages, which incorporate gender classifiers to distinguish between female and male pronouns (cf. McBurney 2002 and Section 3.2.1 above). In addition, the paradigms of plural pronouns seem to show variation across sign languages with respect to the degree of indexicality, the number and type of plural pronouns that exist, and the types of plural inflection, i.e. movement modifications such as a sweeping arc, that exist (see the comparison of first person plural pronouns in ASL and British Sign Language (BSL) by Cormier (this volume)).

In addition to variation in the systems of personal pronouns, sign languages also appear to exhibit considerable variation in their paradigms of possessive pronouns. Again, variation exists in the number and type of possessive pronouns that exist, in their syntactic distribution, as well as in marking such distinctions as alienable vs. inalienable (cf. Neidle et al. 2000 and Sutton-Spence and Woll 1999).

3.3. Syntax

Not surprisingly, variation amongst sign languages is most striking when we enter the realm of syntax. After all, the merging of a syntactic phrase structure is highly abstract and independent of phonological properties of the items to be inserted – no matter whether your theory involves movement operations or not. Still, in this area, too, there are intriguing similarities such as, for instance, the use of space for establishing syntactic relations and the use of non-manual markers to distinguish sentence types. In this section, we will discuss variation in constituent order (Section 3.3.1), in the use of agreement auxiliaries (Section 3.3.2), in the expression of sentential negation (Section 3.3.3), in the realization of questions (Section 3.3.4) and relative clauses (Section 3.3.5), and in the use of signing space (Section 3.3.6).

3.3.1. Constituent order

It is a well-known fact that many of the sign languages investigated so far allow for a fairly flexible constituent order. This has led some researchers

to claim that constituent order in sign languages is relatively free (see Friedman 1976 for ASL) or even that sign languages in general are not characterized by an underlying hierarchical phrase structure (Bouchard and Dubuisson 1995).

Others, however, have argued that once the existence of clause-external material, such as topics and right-dislocated pronominals, and null arguments is taken into consideration, it is very well possible to identify an underlying, unmarked sign order. Consider, for instance, the examples in (1). In the ASL example (1a), the object has been topicalized (as indicated by the non-manual marker) and the resulting sign order is OSV (Neidle et al. 2000: 50). In the NGT example in (1b), the surface sign order is OVS; this order, however, is due to pronominal right dislocation of the subject pronoun accompanied by pro drop. Crucially, full arguments cannot appear in post-verbal position.

(1)   a. $\overline{\text{JOHN}_i, \text{ MARY LOVE } t_i}^{\text{top}}$ [ASL]
            'John, Mary loves.'
      b.   *pro* BOOK BUY INDEX$_{3a}$ [NGT]
            'He buys a book.'

Other factors that have been shown to have an impact on the order of signs in a sentence are the semantic reversibility of arguments (Coerts 1994) and morphosyntactic characteristics of the verb, such as aspectual and spatial inflections labelled "reordering morphology" by Chen Pichler (2001).

Once the influence of these factors is acknowledged, it turns out that ASL has an underlying SVO-order while the basic order in NGT is SOV. That is, sign languages may obviously differ from each other with respect to constituent order. Other sign languages that are claimed to display SVO-order include Brazilian Sign Language (*Língua de Sinais Brasileira*, LSB), Hong Kong Sign Language (HKSL), and Swedish Sign Language (SSL); other sign languages of the SOV-type are DGS, IPSL, and Italian Sign Language (*Lingua Italiana dei Segni*, LIS) (see Johnston et al., this volume, for discussion of constituent order in Australian Sign Language, Flemish Sign Language, and Irish Sign Language; see Hohenberger, this volume, for comparison of ASL and LSB). Note that so far no sign language with an underlying VSO-order has been found – in contrast to spoken languages where this order is not uncommon (Tagalog and Irish are two examples for VSO-languages).[9]

Moreover, even within the SVO- and SOV-group, sign languages may differ from each other with respect to constituent order at the clause level. Two sign languages that are both SOV, for instance, may display differences in the positioning of modals (second position vs. post-verbal), negative particles (see Section 3.3.3), or wh-signs (see Section 3.3.4).[10]

3.3.2. Agreement auxiliaries

Virtually all sign languages studied so far make a basic distinction between agreement verbs (also called directing or indicating verbs) and plain verbs (Padden 1988).[11] Verbs of the first type can change phonological properties (orientation and/or direction of movement) in order to signal which participant is subject and object of the sentence (or, in terms of thematic roles, Source and Goal of the action described by the verb). This option is not available for verbs of the second type which are incapable of adapting their form to the location of participants in that way.

In many sign languages, constituent order can be indicative of what argument is the subject or object of the clause in case the clause contains a plain verb. Some sign languages, however, have developed an alternative strategy for indicating the grammatical role of arguments: they make use of an auxiliary-like element that expresses the grammatical relations whenever the lexical predicate is not capable of doing so. Consider the two examples in (2) for illustration. The Taiwan Sign Language (TSL) verb LIKE is a plain verb; in (2a), the auxiliary AUX2 moves in space from the locus of the subject WOMAN towards the signer (Smith 1990: 220). Similarly, in the DGS example (2b), the auxiliary glossed as PAM (person agreement marker) accompanies the adjectival predicate ANGRY, thereby showing who is angry with whom.

(2)   a.   THAT FEMALE $_3$AUX2$_1$ LIKE   [TSL]
           'That woman likes me.'

$$\overline{\hspace{8cm}\text{y/n}}$$
      b.   YESTERDAY INDEX$_2$ TEACHER INDEX$_{3b}$ ANGRY $_2$PAM$_{3b}$ [DGS]
           'Were you angry with the teacher yesterday?'

Other sign languages that make use of similar auxiliary elements include Catalan Sign Language (*Llengua de Signes Catalana*, LSC), Argentine Sign Language (*Lengua de Señas Argentina*, LSA), and Greek Sign

Language (GSL), while ASL, HKSL, and BSL are examples of sign languages that do not have such an element available to them (see Steinbach and Pfau, this volume, for details on the form, use, and grammaticalization of agreement auxiliaries across sign languages).

3.3.3. Negation

As is true for other properties discussed in previous sections, the similarities amongst sign languages are quite conspicuous when it comes to the expression of sentential negation. A characteristic that has been noted repeatedly in the literature is the combination of a manual negation sign with a non-manual marker, viz. a side-to-side headshake. Based on this observation, some researchers have argued that from a typological point of view, these sign languages exhibit split negation where one element is a particle and the other one a non-manual affix (Pfau 2002; Pfau and Quer, this volume).

More recently, some interesting differences between sign languages have been noted (Pfau and Quer 2002; Zeshan 2004a). On the one hand, the position of the manual negative sign in the clause may vary from sign language to sign language. It appears that, to some extent, the position of this element is influenced by the basic sign order: in SOV languages, there is a strong tendency for the manual negator to occupy the post verbal position.[12] On the other hand, and this is the more intriguing observation, sign languages may also differ from each other with respect to the co-occurrence of the manual and the non-manual element. Two aspects are relevant here; since both of these are addressed in more detail in papers in this volume, we will only mention them briefly.

First, the exact position of the headshake, its spreading characteristics, is subject to different constraints across sign languages. For instance, while in some sign languages, it is possible to have headshake on the manual negative sign only, as illustrated in the HKSL example in (3a), in others the headshake must at least extend over the predicate (for example, DGS; see Pfau and Quer, this volume). Secondly, while in many sign languages, it is possible, and actually quite common, to drop the manual sign and to negate a proposition by means of a headshake only, in other sign languages, the reverse pattern is observed: the manual negator is obligatory while the headshake is optional. HKSL, LIS, and Turkish Sign Language (*Türk İşaret Dili,* TİD), for instance, have been claimed to make use of such "manual-

dominant" (Zeshan 2006) systems. For that reason, the HKSL utterance in (3b) with non-manual negation only is ungrammatical (Tang 2006: 217; also see Hendriks, this volume).

$$$$

(3)   a. $\overline{hs}$
          INDEX₃ TOMORROW FLY NOT   [HKSL]
          'It is not true that he is flying tomorrow.'
      b. * $\overline{hs}$
          YESTERDAY NIGHT FATHER FAX FRIEND
          'Father didn't fax his friend last night.'

Note finally that, while the use of a negative headshake – be it obligatory or optional – has been attested in all sign languages investigated so far, some sign languages also make use of backward head tilts to signal negation (Zeshan 2004a; Hendriks, this volume). Clearly, we are dealing with the grammaticalization of a culture-specific gesture here.

3.3.4. Question formation

Just as sentential negation discussed in the previous section, questions also combine manual and non-manual marking (Petronio and Lillo-Martin 1997; Neidle et al. 2000). Again, manual marking seems to show more variation than non-manual marking. This is confirmed by Zeshan's (2004b) extensive cross-linguistic study on question formation in thirty-five sign languages. While the use of non-manual markers in questions is very similar across all sign languages investigated in this paper, the use of manual markers (question particles), the structure of question-word paradigms, and word order in interrogatives show more variation.

Let us turn to non-manuals in interrogatives first. Sign languages use various non-manual means to indicate interrogatives, for instance eyebrow position, eye contact with the addressee, and change in head and body posture. Although all sign languages seem to use non-manuals to indicate polar and wh-question, we also find some variation in this area. First, different sign languages may use different kinds of non-manuals in questions (see, for example, Šarac et al., this volume). Second, in many sign languages, the non-manuals used in polar questions differ from the non-manuals used in wh-questions. DGS, for example, uses raised eyebrows for polar questions and lowered eyebrows for content or wh-

questions. However, some sign languages, as for example HKSL, use the same facial expression for both kinds of questions (Zeshan 2004b: 22). Third, sign languages may differ in the scope of non-manuals. Both examples in (4) are wh-questions without a wh-expression. Similar examples can be found in many sign languages. In the NGT example in (4a), the non-manual marker takes scope over the whole clause (Coerts 1992). By contrast, the NS example in (4b) shows that NS uses a specific non-manual marker in clause-final position (Fischer and Osugi 1998).

		$\overline{\qquad\qquad\text{wh}\qquad}$	
(4)	b.	MY SUITCASE	[NGT]
		'Where's my suitcase?'	
		$\overline{\qquad\text{wh}\qquad}$	
	a.	COLOR LIKE	[NS]
		'What color do you like?'	

Note finally that variation also results from the fact that some sign languages do not only use non-manual means but also manual question particles, while others have only non-manual question means at their disposal. Zeshan's study shows that between a fourth and a third of all sign languages use question particles.

Question particles lead us to the issue of manual question markers in sign languages. In a number of sign languages, a palm-up gesture is used as a question particle. However, some sign languages have developed other kinds of question particles. Spanish Sign Language (*Lengua de Senãs Espanõla*, LSE), for example, uses the question particle SI/NO, which is performed with an extended index finger signing first SI and then NO. Some sign languages have even more than one question particle. HKSL, for instance, distinguishes between the existential question particle HAVE-NOT-HAVE and its non-existential counterpart GOOD-NOT-GOOD. While most sign languages that have question particles use them only in polar questions, some sign languages, like NGT, use them also in wh-questions. The NGT question particle PALM-UP optionally appears in sentence-final position in yes/no-questions (5a) and wh-questions (5b) (Coerts 1992; Aboh and Pfau, in press).

		$\overline{\qquad\qquad\qquad\qquad\text{y/n}\qquad}$	
(5)	a.	INDEX$_3$ PARTY CANCEL INDEX$_3$ **PALM-UP**	[NGT]
		'Is the party cancelled?'	

<div style="text-align:center">wh</div>

b.   MARKET BUY WHAT **PALM-UP**   [NGT]
     'What did you buy at the market?'

According to Zeshan (2004b), cross-linguistically the preferred position for this particle is the clause-final position, but in some sign languages, it may also appear sentence-initially or in both these positions.

A similar range of variation can be found in the syntactic distribution of wh-expressions. In most sign languages, wh-words can appear in clause-initial position, in clause-final position or in both positions simultaneously (see also Šarac et al., this volume). By contrast, in IPSL, the placement of the general question word is much more restricted. The general wh-sign G-WH only occurs in sentence-final position (cf. Aboh et al. 2005).

Wh-word paradigms are another source of variation ranging from very simple paradigms to highly complex ones. Interestingly, even sign languages with complex wh-word paradigms usually have a general wh-sign basically meaning 'what'. Zeshan (2004b) therefore distinguishes three different types of languages: (i) the general interrogative covers the whole wh-word paradigm (type A), (ii) the general interrogative covers part of the wh-word paradigm (type B), and (iii) the general interrogative exists alongside a complex wh-word paradigm (type C). IPSL belongs to type A since it has only the general wh-sign G-WH, which can be combined with non-interrogative signs to derive more specific complex wh-expressions such as, for example, FACE + G-WH meaning 'who'. LSB is a type B language with three specific wh-signs ('how', 'why', and 'how many'). Finally, type C languages with complex wh-word paradigms are, for example, ASL and DGS.

3.3.5. Relative clauses

In spoken languages, relative clause constructions are known to show considerable variation (Keenan 1985; Lehmann 1986). Among others, the following parameters distinguish relative clauses across languages: (i) position of head: externally vs. internally headed relatives, (ii) type of relative construction: relative clauses vs. correlatives, and (iii) the use of specific markers: relative pronouns, relative complementizers, or resumptive pronouns.

Although so far, relative clauses have only been investigated in detail for three sign languages, ASL, LIS, and DGS, the same range of variation has been found as in spoken languages. While in all three sign languages, a non-manual marker (raised eyebrows) is used to indicate relative constructions, the syntactic properties of relative constructions differ from sign language to sign language. Head-internal relative clauses, for example, are attested in ASL. In (6a) the head noun DOG is clearly part of the relative clause, as evidenced by the fact that the adverbial precedes the head noun and the non-manual marker extends over the head noun (Liddell 1978). Note that the sentence is ambiguous: while it is clear that the dog chased the cat, it is not clear which of the two animals came home. DGS, on the other hand, uses head-external relative clauses, as illustrated in example (6b), in which the head noun WOMAN appears outside the relative clause. The relative clause itself is introduced by the relative pronoun RPRO-H and the non-manual extends only over the relative pronoun (Pfau and Steinbach 2005b).[13]

(6) a. [RECENTLY DOG (THAT$_a$) CHASE+ CAT] COME HOME   [ASL]
         'The dog which recently chased the cat came home.'
         'The cat which the dog recently chased came home.'
     b. WOMAN [RPRO-H$_{3a}$ MAN IX$_{3b}$ $_{3a}$HELP$_{3b}$] KNOW $_{3a}$PAM$_1$ [DGS]
         'The woman who is helping the man knows me.'
     c. [YESTERDAY HOUSE$_i$ MARIA SEE PROREL$_i$] TODAY BURN   [LIS]
         'The house Maria saw yesterday burnt today.'

Yet another type of relative construction has been described for LIS. Cecchetto et al. (2006) analyze LIS relative constructions such as (6c) as head-internal correlative constructions containing the clause-final correlative marker PROREL.[14] According to these authors, the extension of the non-manual marker (not given for (6c)) is variable.

The above examples also exemplify another domain of variation in sign language relative clauses: the use of manual relative markers. Sign languages, like spoken languages, may use relative complementizers, relative pronouns, and zero marking. According to Liddell (1978), relative complementizers are attested in certain relative clauses in ASL (the optional marker THAT$_a$ in (6a)). Relative pronouns and a correlative marker

are used in DGS and LIS, respectively, whereas relative clauses without a manual marker are found in LSB and in ASL.

3.3.6. The use of signing space

As already noted in section 3.2.1 above, the location, orientation, and motion of classifier predicates in sign space can indicate the location, orientation, and motion of objects in the real world. That is, the locations of classifiers in sign space schematically correspond to the locations of objects in the environment or event space being described. This topographic use of sign space is one of the most unique features of the visual-gestural modality, and is taken to be a general affordance of this modality.

In addition to the use of classifier forms, the way spatial relationships are represented in sign space is dependent on the viewpoint or perspective the signer takes. On the one hand, signers can assume a global viewpoint and oversee the entire environment or event space from an external perspective. On the other hand, the signer can take an event-internal perspective by assuming the role of a participant within the event (as in role shift or constructed action, cf. Liddell and Metzger 1998). These two types of mapping have been described by numerous researchers using different terminologies: Liddell (2003) distinguishes between "depictive space" and "surrogate space"; Morgan (1999) uses the terms "fixed referential framework" and "shifted referential framework"; Schick (1990) describes the use of "model space" and "real-world space"; Emmorey and Falgier (1999) distinguish the use of "diagrammatic space" and "viewer space"; and Perniss and Özyürek (in press) use the terms "observer perspective" and "character perspective", respectively.

The use of these devices, especially the use of classifier predicates, has been assumed to be similar across sign languages due to the assumption of modality effects driven by the iconic properties of sign languages (Meier 2002; Talmy 2003; Aronoff et al. 2005). However, there has been little research on the way referent location, motion, and action is represented in sign space using classifier predicates, as well as other spatially modifiable signs like index signs and indicating verbs.

In a preliminary study comparing the use of classifier predicates and perspective in event representations in DGS and TİD), Perniss and Özyürek (in press) show that these two sign languages appear to impose different linguistic or discourse constraints on the use of space to depict referent

location, motion, and action. For example, contrary to what was observed for TİD signers, DGS signers seem to disprefer the use of handling classifiers in a spatial representation from an observer's perspective. Overall, the results indicate that this domain, where modality effects are widely considered to create similarities in the use of space across sign languages, may exhibit more variation than previously thought. The results of the study comparing referential shift marking in ASL and Nicaraguan Sign Language (NSL) presented by Pyers and Senghas (this volume) likewise suggest that sign languages can conventionalize a range of different devices and use space in various ways within this system.

4.   Content of this book

The articles in this volume take up many of the topics discussed in the previous sections and also add new topics. They discuss data from many different sign languages (for an overview see section 2 of the notational conventions) and cover a wide range of topics from different areas of grammar including phonology (word pictures), morphology (pronouns, negation, and auxiliaries), syntax (word order, interrogative clauses, auxiliaries, negation, and referential shift) and pragmatics (modal meaning and referential shift). In addition to this, one paper addresses psycholinguistic issues (slips of the hand) and three papers deal with aspects of language change (grammaticalization). In addition to this, many papers discuss issues concerning data collection in sign languages and provide methodological guidelines for further research. Although some papers use a specific theoretical framework for analyzing the data, this volume clearly focuses on empirical and descriptive aspects of sign language variation.

The paper by *Marie A. Nadolske* and *Rachel Rosenstock* is the only one in the volume that looks at, or rather reconsiders, phonological variation. In their study, the authors investigate the occurrence of mouthings in ASL. Mouthings are mouth movements which resemble spoken words and accompany manual signs. In the past, it has been claimed that ASL uses mouthings to a much lesser degree than European sign languages. Nadolske and Rosenstock, however, provide evidence that mouthings are frequently used in ASL across various discourse situations. Additionally, they show a relationship between the occurrence of mouthings and word classes.

In her investigation of pronoun indexicality, *Kearsy Cormier* explores a domain in which the potential of the visual-gestural modality for iconic representation plays a strong role. The article compares first person plural pronouns in ASL and BSL and investigates the extent to which these pronouns actually index (point toward) the locations associated with their referents. Cormier looks at both inclusive and exclusive contexts and shows that first person plural pronouns in the two sign languages exhibit variation with respect to indexicality. She discusses the loss of indexicality in exclusive pronouns, in particular, and offers explanations based on both linguistic and motor factors. The paper is an important contribution to our understanding of the ways in which the form of iconic or highly visually motivated signs can be constrained within a conventionalized linguistic system.

Bernadet Hendriks' contribution adds to our understanding of the variation in the expression of sentential negation by discussing data from an as yet under-investigated sign language, namely Jordanian Sign Language (*Lughat il-Ishaara il-Urdunia*, LIU). She reports on the distribution of various manual negative signs (including negative concord), on morphological negation by means of a suffix, and on the use of non-manual markers in negation. A comparison to negative structures in other sign languages (ASL, CSL, DGS, and LSC) reveals interesting cross-linguistic differences with respect to the obligatory presence of a manual negator, the nature and use of non-manual markers, and the possibility of negative concord.

The second paper dealing with negative structures is the one by *Roland Pfau* and *Josep Quer*. They add to the findings of an earlier comparative study on sentential negation in DGS and LSC by reporting on the use and distribution of negative modals in the two sign languages. It turns out that while DGS and LSC – both SOV-languages – show fine-grained differences in the distribution of the negative headshake in clauses with lexical predicates, they pattern alike in negative clauses containing modals. Pfau and Quer propose a generative grammar analysis to account for the observed similarities and differences.

Trevor Johnston, Myriam Vermeerbergen, Adam Schembri, and *Lorraine Leeson* present a cross-linguistic study of constituent ordering in Flemish Sign Language (VGT), Irish Sign Language (ISL), and Australian Sign Language (Auslan). In addition to providing valuable data about sign language variation in this central syntactic domain, their paper discusses important issues concerning data collection and analysis. Based on an

overview of previous studies on constituent order and their own small-scale cross-linguistic study, the authors point out difficulties for cross-linguistic comparisons due to different methodology and terminology, even when the same elicitation materials are used. Their own comparison is dedicated to ensuring comparability and accessibility of language data, and provides clear methodological guidelines.

In contrast to most areas of sign language linguistics, the syntax of questions is a field that is comparably well studied from a theoretical and typological point of view (cf. section 3.3.4). Still, more sign languages need to be investigated to yield a more fine-grained picture of possible interrogative constructions in sign languages. In their paper, *Ninoslava Šarac*, *Katharina Schalber*, *Tamara Alibašić*, and *Ronnie B. Wilbur* focus on interrogatives in two less studied European sign languages, Croatian Sign Language (*Hrvatski Znakovni Jezik*, HZJ) and Austrian Sign Language (*Österreichische Gebärdensprache*, ÖGS), and compare them to interrogatives in ASL. The paper addresses manual and non-manual interrogative markers. In all three sign languages, polar and wh-questions are marked non-manually and different markers for polar and wh-questions are used. Moreover, the wh-sign can occur in sentence initial, sentence final, or in both positions. Interestingly, HZJ and ÖGS use the same non-manual marker, which differs from the marker used in ASL, whereas only ASL and HZJ have an additional manual marker for polar question at their disposal.

In her paper, *Annika Herrmann* breaks new ground by considering variation within the expression of pragmatic aspects of utterances. She discusses the expression of the speaker's attitude towards the utterance (which is often called modal meaning) in two spoken (English and German) and two signed languages (DGS and Irish Sign Language, ISL). Herrmann's study reveals that the two sign languages show less variation in the expression of modal meaning than the two spoken languages. Nevertheless, it also turns out that the extent of variation between the two sign languages is greater than expected. Whereas in both sign languages, non-manual features are the basic means of indicating the speaker's attitude, ISL also uses various manual and gestural expressions to mark modal meanings. Moreover, Herrmann shows that the non-manual features used in ISL differ from the ones used in DGS.

The contribution by *Jennie E. Pyers* and *Ann Senghas* compares the system of referential shift in ASL, a well-established sign language, and Nicaraguan Sign Language (NSL), a young, emerging sign language. The

authors show that there are differences between the two sign languages in the devices used to mark referential shift, and in the maintenance of discourse cohesion through spatial mapping. The differences found between ASL and NSL are discussed in light of the relative youth of NSL, as the differences in the use of devices by NSL signers of different ages suggest that this young sign language is in the process of developing a more strongly conventionalized means of marking referential shift. In addition, the authors address the possible influence of the gestural systems of the surrounding spoken languages on the development of the ASL and NSL systems of referential shift.

Markus Steinbach and *Roland Pfau* investigate the diachronic development of a sign language-specific kind of auxiliary, so-called agreement auxiliaries. As opposed to common auxiliaries found in spoken languages, agreement auxiliaries do not encode tense, aspect, or modality but subject and object agreement (cf. section 3.2.2 above). The authors show that (i) agreement auxiliaries are attested in many (unrelated) sign languages and (ii) that sign languages use modality-specific grammaticalization paths for the development of auxiliaries. In sign languages, unlike in spoken languages, auxiliaries develop not only from verbal sources but also from nominal and pronominal ones. Steinbach and Pfau argue that this difference between spoken and signed languages results from spatial (phonological) and certain semantic properties of agreement in sign languages. Pronouns and certain nouns provide optimal sources for the grammaticalization of agreement auxiliaries.

In the final paper of this volume, *Annette Hohenberger* addresses the issue of possible variation between sign languages from a more theoretical point of view. Before turning to attested variation in several linguistic domains (phonology, morphology, syntax, and lexicon), she discusses possible determinants of linguistic variation in general: (i) general cognitive properties of representation and processing, (ii) general task properties, (iii) principles and parameters of Universal Grammar, (iv) typology, and (v) modality. She adds to the picture the results of research into sign language processing, that is, slip of the hand data from DGS and ASL. She suggests to draw on a comprehensive theory of the human language faculty such as generative grammar which claims universal representations and processes that allow for an abstract model-theoretic characterization of the structure and the processing of a language.

Notes

1. This rough division of research is, of course, not meant to imply that all studies on sign language in one period follow the respective predominant paradigm. Also note that we confine ourselves to core linguistic aspects only. We will not consider psycho- and neurolinguistic as well as social and institutional issues (for a more detailed discussion of the history of sign language linguistics, see Woll 2003).
2. In some models, handshape (selected fingers and position of fingers) and handorientation are subsumed under a handconfiguration node (see, for instance, Sandler 1989 for ASL).
3. At present, we are not aware of variation that would concern orientation (of the fingers and palm).
4. For variation in other kinds of non-manuals see section 3.3 below.
5. See, for instance, Pfau (1997) for DGS, van der Kooij (2001) for Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT), and Sutton-Spence and Woll (1999) for British Sign Language (BSL).
6. The sign MATCH is taken from www.gebarencentrum.nl, the sign AUSTRIA from www.effathaguyot.nl. Note that the ASL sign AUSTRIA is identical to the NGT sign given in Figure 3.
7. A similar element is attested in German Sign Language (*Deutsche Gebärdensprache*, DGS) and NGT; still, for these two sign languages, it is not clear at present whether the morphological process is one of derivation or compounding.
8. Schreurs (2006) also found a difference in the non-manual component of standardized NGT nouns and verbs: while almost all nouns are accompanied by a mouthing (i.e. a silent articulation of (part of) a Dutch word), almost all of the verbs are accompanied by a mouth gesture (i.e. a mouth movement that is not related to the spoken language). See Nadolske and Rosenstock, this volume, for further discussion of mouthing.
9. The fact that no known sign language exhibits an underlying order in which the object would precede the subject (VOS, OVS, or OSV) is less surprising since these orders are also very rare across spoken languages.
10. Sign languages also differ from each other with respect to the sign order in the nominal domain, that is the position of determiners, adjectives, numerals, and quantifiers vis-à-vis the head noun. We will not go into this issue here.
11. Kata Kolok, a village-based sign language of Bali, seems to be an exception to this generalization. Marsaja and Kanta (2005) point out that the only verbs in the sign language that are used directionally with some frequency are the verbs GIVE and TAKE.

12. As pointed out by Zeshan (2004a), sign languages also differ with respect to the size of their paradigm of clause negators. While all sign languages appear to have a negative particle that conveys basic clause negation, some have at their disposal other manual negators with a more specialized meaning, such as negative existentials, negative modals, negative completives, or negative imperatives.
13. Note that DGS has two relative pronouns: RPRO-H is used for human referents and RPRO-NH for non-human referents.
14. But see Branchini and Donati (in press) whose analysis of relative constructions in LIS slightly differs from the analysis proposed in Cecchetto et al. (2006). Branchini and Donati argue that LIS relative constructions are best analyzed as internally headed relative clauses, although they share many properties with correlatives.

References

Aboh, Enoch and Roland Pfau
   in press   What's a wh-word got to do with it? In *The cartography of CP*, Paola Benincà and Nicola Munaro (eds.). Oxford: Oxford University Press.
Aboh, Enoch, Roland Pfau, and Ulrike Zeshan
   2005   When a wh-word is not a wh-word: The case of Indian Sign Language. In *The Yearbook of South Asian languages and linguistics 2005*, Tanmoy Bhattacharya (ed.), 11-43. Berlin: Mouton de Gruyter.
Aronoff, Mark, Irit Meir, and Wendy Sandler
   2005   The paradox of sign language morphology. *Language* 81: 301-344.
Battison, Robbin
   1974   Phonological deletion in American Sign Language. *Sign Language Studies* 5: 5-19.
Bouchard, Denis and Colette Dubuisson
   1995   Grammar, order and position of wh-signs in Quebec Sign Language. *Sign Language Studies* 24: 99-139.
Boyes Braem, Penny and Rachel Sutton-Spence (eds.).
   2001   *The hands are the head of the mouth - the mouth as articulator in sign languages*. Hamburg: Signum Press.
Branchini, Chiara and Caterina Donati
   in press   Italian Sign Language relatives: correlatives, internally headed,or free relatives? In *Correlatives. Theory and typology*, Aniko Lipták (ed.). Amsterdam: Elsevier.

Brentari, Diane
  1998   *A prosodic model of sign language phonology*. Cambridge, MA:
            MIT Press.
Byun, Kang Suk
  2004   Gender marking in South Korean Sign Language. Paper presented at
            the Max Planck Institute for Psycholinguistics, Nijmegen, July 2004.
Cecchetto, Carlo, Carlo Geraci and Sandro Zucchi
  2006   Strategies of relativization in Italian Sign Language. *Natural
            Language & Linguistic Theory* 24: 945-975.
Chen Pichler, Deborah
  2001   *Word order variation and acquisition in American Sign Language*.
            Ph.D. thesis, University of Connecticut.
Coerts, Jane
  1992   Nonmanual grammatical markers: An analysis of interrogatives,
            negations and topicalisations in Sign Language of the Netherlands.
            Ph.D. dissertation, University of Amsterdam.
Crashborn, Onno
  2001   *Phonetic implementation of phonological categories in Sign
            Language of the Netherlands*. Utrecht: LOT Publication.
Emmorey, Karen
  1996   The confluence of space and language in signed languages. In
            Language and space, Paul Bloom, Mary A. Peterson, Lynn Nadel,
            and Merrill F. Garrett (eds.), 171-209. Cambridge, MA: MIT Press.
Emmorey, Karen (ed.)
  2003   *Perspectives on classifier constructions in sign languages*. Mahwah,
            NJ: Lawrence Erlbaum.
Emmorey, Karen and Brenda Falgier
  1999   Talking about space with space: Describing environments in ASL. In
            Storytelling and conversation: Discourse in Deaf communities,
            Elizabeth Winston (ed.), 3-26. Washington, DC: Gallaudet
            University Press.
Engberg-Pedersen, Elizabeth
  1993   *Space in Danish Sign Language: The semantics and morphosyntax
            of the use of space in a visual language*. Hamburg: Signum Press.
Fischer, Susan D. and Yutaka Osugi
  1998   Feature movement in WH-questions: Evidence from sign languages.
            Poster presented at the 6th International Conference on Theoretical
            Issues in Sign Language Research, Washington, DC.
  2000   Thumbs up vs. giving the finger: Indexical classifiers in NS and
            ASL. Paper presented at the 7th International Conference on
            Theoretical Issues in Sign Language Research (TISLR), Amsterdam,
            July 2000.

Friedman, Lynn A.
  1976   The manifestation of subject, object, and topic in the American Sign
            Language. In *Subject and topic*, Charles N. Li (ed.), 125-148. New
            York: Academic Press.
Hendriks, Bernadet
  2004   *An introduction to the grammar of Jordanian Sign Language*. Salt
            (Jordan): Al-Balqa Applied University.
Keenan, Edward L.
  1985   Relative clauses. In *Language typology and syntactic description.
            Vol. II: Complex constructions*, Timothy Shopen (ed.), 141-170.
            Cambridge: Cambridge University Press.
Keller, Jörg and Trixi Rech
  1993   Gegen Vorurteile: Gebärdensprache. *Sprache und Kognition* 12:
            130-144.
Klima, Edward and Ursula Bellugi
  1979   *The signs of language*. Cambridge MA: Harvard University Press.
Kooij, Els van der
  2001   Weak drop in Sign Language of the Netherlands. In *Signed
            languages: Discoveries from international research*, Valerie Dively,
            Melanie Metzger, Sarah Taub, and Anne Marie Baer (eds.), 27-42.
            Washington, DC: Gallaudet University Press.
Lehmann, Christian
  1986   On the typology of relative clauses. *Linguistics* 24: 663-680.
Liddell, Scott K.
  1978   Nonmanual signals and relative clauses in American Sign Language.
            In *Understanding language through sign language research*, Patricia
            Siple (ed), 59-90. New York: Academic Press.
  2003   *Grammar, gesture, and meaning in American Sign Language*.
            Cambridge: Cambridge University Press.
Liddell, Scott K. and Melanie Metzger
  1998   Gesture in sign language discourse. *Journal of Pragmatics* 30: 657-
            697.
Marsaja, I Gede and Ketut Kanta
  2005   Kata Kolok: An introduction to a deaf village in Bali and its sign
            language. Talk given at the Max Planck Institute for Psycho-
            linguistics, Nijmegen, April 2005.
McBurney, Susan
  2002   Pronominal reference in signed and spoken language: Are
            grammatical categories modality-dependent? In Richard P. Meier,
            Kearsy Cormier, and David Quinto-Pozos (eds.), 329-369.

Meier, Richard P.
  2002   Why different, why the same? Explaining effects and non-effects of modality upon linguistic structure in sign and speech. In Richard P. Meier, Kearsy Cormier, and David Quinto-Pozos (eds.), 1-25.
Meier, Richard P., Kearsy Cormier and David Quinto-Pozos (eds.)
  2002   *Modality and structure in signed and spoken languages*. Cambridge: Cambridge University Press.
Moravcsik, Edith A.
  1978   Reduplicative constructions. In *Universals of human language. Vol.3: Word structure*, Joseph H. Greenberg (ed.), 297-334. Stanford, CA: Stanford University Press.
Morgan, Gary
  1999   Event packaging in BSL discourse. In *Storytelling and conversation: Discourse in Deaf communities,* Elizabeth Winston (ed.), 27-58. Washington, D.C.: Gallaudet University Press.
Neidle, Carol, Judy Kegl, Dawn MacLaughlin, Benjamin Bahan and Robert G. Lee
  2000   *The syntax of American Sign Language. Functional categories and hierarchical structure*. Cambridge, MA: MIT Press.
Newport, Elissa and Ted Supalla
  2000   Sign language research at the millenium. In *The signs of language revisited. An anthology to honor Ursula Bellugi and Edward Klima*, Karen Emmorey and Harlan Lane (eds.), 103-114. Mahwah, NJ: Lawrence Erlbaum.
Nyst, Victoria
  2007   A descriptive analysis of Adamorobe Sign Language (Ghana). Ph.D. dissertation, University of Amsterdam.
Nyst, Victoria and Pamela Perniss
  2004   Classifiers or generic directionals: Motion in Adamorobe SL and German SL. Paper presented at the European Science Foundation workshop "Modality effects on the theory of grammar: A cross-linguistic view from sign languages of Europe", Barcelona, November 2004.
Padden, Carol A.
  1988   *Interaction of morphology and syntax in American Sign Language*. New York: Garland.
  2002   How the alphabet came to be used in a sign language. In *Progress in sign language research: In honor of Siegmund Prillwitz*, Rolf Schulmeister and Heimo Reinitzer (eds.), 31-46. Hamburg: Signum.
Padden, Carol A. and David M. Perlmutter
  1987   American Sign Language and the architecture of phonological theory. *Natural Language and Linguistic Theory* 5: 335-375.

Perlmutter, David M.
    1992   Sonority and syllable structure in American Sign Language. *Linguistic Inquiry* 23: 407-442.
Perniss, Pamela and Aslı Özyürek
    in press   Representations of action, motion, and location in sign space: A comparison of German (DGS) and Turkish (TİD) Sign Language narratives. In *Signs of the time. Selected papers from TISLR 2004*, Josep Quer (ed.). Hamburg: Signum.
Petronio, Karen and Diane Lillo-Martin
    1997   WH-movement and the position of Spec-CP: Evidence from American Sign Language. *Language* 73: 18-57.
Pfau, Roland
    1997   Zur phonologischen Komponente der Deutschen Gebärdensprache: Segmente und Silben. *Frankfurter Linguistische Forschungen* 20: 1-29.
    2002   Applying morphosyntactic and phonological readjustment rules in natural language negation. In Richard P. Meier, Kearsy Cormier, and David Quinto-Pozos (eds.), 263-295.
Pfau, Roland and Josep Quer
    2002   V-to-Neg raising and negative concord in three sign languages. *Rivista di Grammatica Generativa* 27: 73-86.
Pfau, Roland and Markus Steinbach
    2005a   Backward and sideward reduplication in German Sign Language. In *Studies on Reduplication*, Bernhard Hurch (ed.), 569-594. Berlin: Mouton de Gruyter.
    2005b   Relative clauses in German Sign Language: Extraposition and reconstruction. In *Proceedings of the North East Linguistic Society (NELS 35), Vol. 2*, Leah Bateman and Cherlon Ussery (eds.), 507-521. Amherst, MA: GLSA.
    2006   Pluralization in sign and in speech: A cross-modal typological study. *Linguistic Typology* 10, 135-182.
Pizzuto, Elena and Virginia Volterra
    2000   Iconicity and transparency in sign languages: A cross-linguistic cross-cultural view. In *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*, Karen Emmorey and Harlan Lane (eds.), 261-86. Mahwah, NJ: Lawrence Erlbaum.
Sandler, Wendy
    1989   *Phonological representation of the sign. Linearity and nonlinearity in American Sign Language*. Dordrecht: Foris.
    1996   Representing handshapes. In *International review of sign linguistics*, William H. Edmondson and Ronnie B. Wilbur (eds.), 115-158. Mahwah, NJ: Lawrence Erlbaum.

Schembri, Adam
    2003   Rethinking 'classifiers' in signed languages. In Karen Emmorey (ed.), 3-34.

Schick, Brenda
    1990   Classifier predicates in American Sign Language. *International Journal of Sign Linguistics* 1(1): 15-40.

Schreurs, Linda
    2006   The distinction between formally and semantically related noun-verb pairs in Sign Language of the Netherlands (NGT). Master's thesis, University of Amsterdam.

Smith, Wayne H.
    1990   Evidence for auxiliaries in Taiwan Sign Language. In *Theoretical issues in sign language research. Vol.1: Linguistics*, Susan D. Fischer and Patricia Siple (eds.), 211-228. Chicago: University of Chicago Press.

Stokoe, William C.
    1960   *Sign language structure. An outline of the visual communication systems of the American Deaf.* Studies in Linguistics Occasional Papers 8. Buffalo: University of Buffalo Press.

Supalla, Ted
    1986   The classifier system in American Sign Language. In *Noun classes and categorization*, Colette Craig (ed.), 181-214. Amsterdam: Benjamins.

Supalla, Ted and Elissa L. Newport
    1978   How many seats in a chair? The derivation of nouns and verbs in American Sign Language. In *Understanding language through sign language research*, Patricia Siple (ed.), 91-132. New York: Academic Press.

Sutton-Spence, Rachel and Bencie Woll
    1999   *The linguistics of British Sign Language*. Cambridge: Cambridge University Press.

Talmy, Leonard
    2003   The representation of spatial structure in spoken and signed language. In Karen Emmorey (ed.), 169-196.

Tang, Gladys
    2006   Questions and negation in Hong Kong Sign Language. In: Ulrike Zeshan (ed.), 198-224.

Uyechi, Linda
    1996   *The geometry of visual phonology*. Stanford: CSLI Publications.

Woll, Bencie
    2003   Modality, universality and the similarities among sign languages: an historical perspective. In *Cross-linguistic perspectives in sign*

language research. Selected papers from TISLR 2000, Anne Baker, Beppie van den Bogaerde, and Onno Crasborn (eds.), 17-27. Hamburg: Signum.

Zeshan, Ulrike
    2000   *Sign language in Indo-Pakistan: A description of a signed language*. Amsterdam: Benjamins.
    2003   'Classificatory' constructions in Indo-Pakistani Sign Language: grammaticalization and lexicalization processes. In Karen Emmorey (ed.), 113-141.
    2004a   Hand, head, and face: Negative constructions in sign languages. *Linguistic Typology* 8: 1-58.
    2004b   Interrogative constructions in sign languages: Cross-linguistic perspectives. *Language* 80: 7-39.

Zeshan, Ulrike (ed.)
    2006   *Interrogative and negative constructions in sign languages.* Nijmegen: Ishara Press.

Zwitserlood, Inge
    2003   *Classifiying hand configurations in Nederlandse Gebarentaal*. Utrecht: LOT.