Issues of Linguistic Typology in the Study of Sign Language Development of Deaf Children

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This chapter stands outside of the theme of “advances in sign language development of deaf children.” Those advances are admirably documented in the rest of this volume; and the development of sign languages has been illuminated by other recent collections as well (see Baker, van den Bogaerde, & Crasborn, 2003; Chamberlain, Morford, & Mayberry, 2000; Morgan & Woll, 2002). Indeed, this decade has begun with a flowering of crosslinguistic and interdisciplinary attention to signing children and their caregivers. The task of this chapter is twofold: first to consider some lessons that have been learned from the crosslinguistic study of hearing children and their acquisition of a range of spoken languages (Berman & Slobin, 1994; Slobin, 1985a, 1985b, 1985c, 1992, 1997b, 1997c; Strömqvist & Verhoeven, 2004), and then to attempt to situate the study of sign languages in a typological framework. My focus is thus on issues of linguistic analysis, with special attention to *typology* (Slobin, 1997e). The languages of the world—spoken and signed—present a kaleidoscopic array of diversity. Although linguists have striven, for centuries, to find an underlying uniformity, it now seems that the most interesting universals are revealed in systematic patterns of constrained variation, rather than in surface deviations from a single preordained formal structure. These universals are a collection of dimensions or parameters, making it possible to classify languages according to their positions on such dimensions—that is, to deal with *types* of languages.¹

Crosslinguistic studies of child language seek to compare the acquisition of comparable and contrasting languages in order to discover the mechanisms and processes that drive the course of development in general. A basic problem facing such investigation is to define the appropriate dimensions and comparison sets of languages. Many cautionary tales can be drawn from the history of linguistics and of developmental psycholinguistics. The relatively new field of sign language linguistics can learn from such tales when drawing comparisons between signed and spoken languages.

Perhaps the most elementary problem is to be aware of the presuppositions that the investigator brings from knowledge of a particular language or class of languages. We have learned to ridicule the early attempts of European explorers and missionaries to apply the terms of classical Greek and Latin grammar to the exotic languages they encountered in their new colonies. Even English was submitted to such analyses, as can

¹ I will use the term “dimension,” rather than “parameter,” as principles of constrained variation are central to both principles-and-parameters and functionalist-typological approaches.
be seen, for example, in a table of “declinations” provided in a Portuguese grammar of English from 1809 (Table 1; from da Silva, 1809, p. 40):

Table 1.
Declensions of English Nominals (from da Silva, 1809, p. 40)

<table>
<thead>
<tr>
<th>Case</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominative</td>
<td><em>a King</em></td>
<td>Kings</td>
</tr>
<tr>
<td>Genitive</td>
<td><em>King’s, of a King</em></td>
<td><em>of Kings</em></td>
</tr>
<tr>
<td>Dative</td>
<td><em>to a King</em></td>
<td><em>to Kings</em></td>
</tr>
<tr>
<td>Accusative</td>
<td><em>a King</em></td>
<td><em>Kings</em></td>
</tr>
<tr>
<td>Vocative</td>
<td><em>ó King!</em></td>
<td><em>ó Kings!</em></td>
</tr>
<tr>
<td>Ablative</td>
<td><em>with, from, or by a King</em></td>
<td><em>by Kings</em></td>
</tr>
</tbody>
</table>

How far have we come from the use of such traditional molds in the analysis of spoken languages, let alone sign languages? We still use many familiar classical categories in the description of English and other languages, albeit with increasing questioning of the universal applicability even of such time-worn notions as “noun,” “verb,” and “subject.” Grammars of sign languages also run the risk of uncritical recourse to familiar linguistic terms and analyses. But just as English doesn’t have a vocative case—even though classical languages did—ASL, for example, may not have “pronouns” or “agreement” simply because these are found in descriptions of the language of the surrounding hearing community and the languages studied by English-speakers. This is not the place for a detailed critique of linguistic analyses of sign languages; for example, see Liddell (2003) and Taub (2001) for thoroughgoing and insightful attempts to take a fresh approach to the grammar of ASL, as well as papers in Emmorey (2003) for concerns about the applicability of the category of “classifier” to signed languages.

Here I will present some small case studies to demonstrate how child language research over the past decades has been forced to move away from the impulse to take a familiar language—generally English—as representing the child’s initial assumptions about the nature of language. These case studies have implications for the description and analysis of children’s acquisition of signed languages. The problem, in each instance, is to select an appropriate linguistic exemplar as the starting point for crosslinguistic comparison and generalization. Over time, American investigators have learned that English is not the best starting point for predicting patterns of child language

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2 Wolfgang Klein, a German linguist, points out somewhere that linguists must be wary of expecting to find familiar grammatical categories in unfamiliar languages. He takes issue with the general assumption of Western linguists that there must be verbs in Chinese, because we are used to languages with verbs. In a telling analogy, he suggests that Germans know that every cuisine includes potatoes, thus it is no surprise to find that the Chinese cuisine also relies on potatoes. It’s just that their potatoes come in small grains and grow differently.
development overall. Rather, English has come to be seen as an exemplar of a particular type of language—or, better, as an exemplar of the interplay of particular points on universal dimensions of variation. With regard to the investigation of sign languages—as suggested later in the chapter—the entire collection of comparison languages has been skewed, due to the fact that the sign languages that have been described differ in fundamental typology from the structures of the surrounding speaking communities in Eurasia and the Americas.

**Selecting appropriate starting points for the prediction of patterns of language development**

**Starting point: the primacy of word order**

It is hard to escape the illusion that patterns of native-language thinking for speaking directly reflect the structure of human cognition. In the early years of American psycholinguistics, it was assumed that English subject–verb–object (SVO) word order follows the underlying logic of thought. For example, Osgood and Tanz proposed: “Our intuition about the nature of simple cognitions is … that they have an SVO structure. … Regardless of the dominant-order type, in the process of language development in children there is initially a relatively fixed SVO ordering in ‘sentence’ productions” (1977, pp. 539-540). And Bruner suggested “that a concept of agent–action–object–recipient at the pre-linguistic level aids the child in grasping the linguistic meaning of appropriately ordered utterances involving such case categories as agentive, action, object, indirect object and so forth” (1975, p. 17).

These intuitions led to crosslinguistic studies of early word order in children’s production and comprehension, with the expectation that early stages of development would be characterized by fixed word order, and that the dominant early order would be SVO. The strategy of such comparative research is to pick languages that contrast on the relevant dimension. For example, in one study (Slobin, 1982; Slobin & Bever, 1982) we selected three SVO languages (English, Italian, Serbo-Croatian) and one SOV language (Turkish). The choice of languages reflected another principle of typologically-oriented research—namely, the interaction of several dimensions. The four languages lie on a scale of increasing flexibility in word order, due to the availability of inflectional cues to verb-argument structure, as shown in Table 2. The English-based expectation was that children in all four languages would begin with reliance on a fixed word order, probably reflecting the dominant order in the input, and that inflectional marking of grammatical relations would be a later development.
Table 2.
Grammatical Features of Four Languages

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Italian</th>
<th>Serbo-Croatian</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>basic word order</strong></td>
<td>SVO</td>
<td>SVO</td>
<td>SVO</td>
<td>SOV</td>
</tr>
<tr>
<td><strong>degree of word-order flexibility</strong></td>
<td>low</td>
<td>medium</td>
<td>high</td>
<td>very high</td>
</tr>
<tr>
<td><strong>rich verbal inflection (person/number)</strong></td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>case-inflectional morphology</strong></td>
<td>no</td>
<td>no</td>
<td>yes (synthetic)</td>
<td>yes (agglutinative)</td>
</tr>
<tr>
<td><strong>nominal case inflection</strong></td>
<td>no</td>
<td>no</td>
<td>sometimes</td>
<td>always</td>
</tr>
</tbody>
</table>

Briefly stated, these expectations were not confirmed. Turkish, with its transparent and regular agglutinative inflectional morphology, allows for all six orders of S, V, and O; children as young as 2;0 had already mastered the case markers, used pragmatically appropriate word-order variation in their production, and comprehended all six orders. Serbo-Croatian has a complex, synthetic, and only partially reliable casemarking system; still, children of 2;0 had extracted the principle of casemarking in their speech, and correctly comprehended SVO sentences—but only if appropriate casemarking was present. To our surprise, English- and Italian-speaking children did not reliably use word order as a comprehension cue until 2;6. The message of these findings is that children are sensitive to both word order and affixes on individual words; that perceptually salient affixes attract attention; and that such “local cues” (Ammon & Slobin, 1979) can guide sentence interpretation early in development. In brief, young learners are sensitive to many types of devices for encoding meaning.

**Starting point: the inaccessibility of passive constructions**

Beginning again with English, it has long been noted that passives are a relatively late acquisition, appearing in speech around age 3;6, and presenting comprehension problems as late as age 5 (Pinker, Lebeaux, & Frost, 1987; Maratsos, Kuczaj, Fox, & Chalkley, 1979). For example, long after children can correctly manipulate toys in response to instructions such as “the horse kicks the cow,” they are confused by passive equivalents such as “the cow is kicked by the horse.” To account for this phenomenon, nativist

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3 In an agglutinative morphological system, elements of meaning line up with separate elements of form, and are “glued together” in a series. For example, the Turkish nominal suffix –ler indicates PLURAL: turist-ler ‘tourists’; -i indicates ACCUSATIVE: turist-i ‘tourist-ACCUSATIVE; in combination: turist-ler-i ‘tourists-ACCUSATIVE. In Serbo-Croatian, each case suffix is a synthetic form that combines case, gender, animacy, and number in a single form: turist-a ‘tourist-ACCUSATIVE:MASCURINE:ANIMATE:SINGULAR, turist-e ‘tourist-ACCUSATIVE:MASCURINE:ANIMATE:PLURAL.
theorists proposed that the relevant syntactic principle did not mature until some time after age 3;6 (Borer & Wexler, 1987). However, the picture is quite different in children’s acquisition of Sesotho, a Bantu language studied by Demuth (1992). At around age 2;8, Sesotho-speaking children show good control of passives in both production and comprehension. Because it is unlikely that their biological maturation has been speeded up in comparison with American children, it is necessary to seek alternative explanations. Passives are highly frequent in Sesotho because they serve salient discourse functions. Sesotho is a topic-oriented language in which the subject position in a sentence is restricted to topical information—that is, information that is given or old. Therefore, the only way to ask questions is to use a passive or a cleft construction, since it is the function of questions to focus on what is not given. Thus, for example, it is ungrammatical to say the equivalent of “Who wants the food?” The only option is to ask, “The food is wanted by who?” or “It’s who that wants food?” Accordingly, children are exposed to many passive constructions and must learn them early on in order to carry out basic speech functions. The message of these findings is that one can’t generalize across languages on the basis of morphology and syntax alone; rather, one must attend equally to frequency of occurrence of constructions and to the discourse functions that they serve. These factors influence the accessibility of linguistic forms and construction types.

**Starting point: the accessibility of general-purpose verbs**

In many languages, first verbs in children’s vocabularies include general-purpose verbs such as go, do, make, and put, with early uses extended across a range of specific purposes (e.g., Clark, 1978, for English, Finnish, French, Japanese, Korean; Hollanbrandse and van Hout, 1984, for Dutch; Ninio, 1999, for Hebrew). For example, when an English-speaking 2-year-old says “make” followed by a noun, make could mean write, draw, move, cut out, build, and so on, depending on the noun and the context. We might expect, then, that early lexical acquisition is facilitated by the use of a few verbs with general meanings, leaving the specific meanings to be inferred from the possible or ongoing actions with objects in the situation. Again, however, crosslinguistic comparison is necessary, because there are languages that “specialize” in a more “granular” analysis of high frequency semantic domains—that is, languages which have many specific verbs where familiar languages can get along with nonspecific, general-purpose verbs. Such a language, for example, is the Mayan language Tzeltal (Brown, 2001). Tzeltal verbs in many domains remind one of “classifier verbs” in sign languages. For example, instead of a general verb meaning ‘carry’ or ‘hold’, Tzeltal cares about how something is supported by use of the body, as shown in (1); instead of a general eating verb, Tzeltal cares about what kinds of substances are being eaten and in what way, as shown in (2), and so forth (Brown, 2001, p. 529).

(1) **Tzeltal verbs of carrying/holding**
- *pet* ‘in both arms’
- *kuch* ‘weight on head/back’
- *k’ech* ‘weight across shoulders’
- *lik* ‘in hand, supported from top’
- *tuch* ‘vertically extending from hand’
tzak ‘grasp in hand’

...etc.

(2) Tzeltal verbs of eating
lo’ ‘bananas, soft thing’
k’ux ‘beans, crunchy things’
we’ ‘tortillas, bread’
tz’u’ ‘sugarcane’
uch’ ‘corn gruel, liquids’

...etc.

If children begin with nonspecific or general concepts of basic activities, a language like Tzeltal (or ASL) might present problems; perhaps the strategy would be to pick one high-frequency verb from a set and use it in a general fashion. This is not what Brown found for Tzeltal. Many specific verbs are found in children’s first vocabularies, in the age range 1;3–2;2. For example, early lexical items for one Mayan child included appropriate uses of we’ ‘eat tortillas’ vs. lo’ ‘eat soft things’, pet ‘carry in arms’ vs. tzak ‘grasp in hand’, and so forth. Early verbs in the acquisition of sign languages often show similar specificity, as we have been finding in studies of early acquisition of ASL (Lindert, 2001) and SLN (Sign Language of the Netherlands) (Slobin et al., 2003). Explanations have been proposed on the basis of factors of iconicity and gestures that simulate motor activities. However, although those mimetic factors may well play a role, verb specificity is apparently accessible to beginning learners of spoken languages as well.

Brown suggests that children develop expectations about the level of semantic granularity that is encoded in lexical items in their language—that is, a particular sort of verb-learning bias arises as the result of learning more and more verbs in a language. As a result, patterns of early language come to reflect typological characteristics of the exposure language. In this instance, the relevant dimensions are semantic, rather than morphological or syntactic, but the underlying message is the same: It is necessary to attend to relevant typological dimensions in picking a set of spoken languages to be used as standards of comparison for the development of particular sign languages.

From crosslinguistic findings to acquisition mechanisms

Crosslinguistic findings such as these lead to the postulation of learning strategies that may account for contrasting developmental patterns: “operating principles” (Peters, 1985, 1997; Slobin, 1973, 1985a), “procedures” (Pinker, 1984), and a large collection of “constraints” proposed by various theorists. For example, on the basis of earlier mastery of suffixes than prefixes, holding semantic content roughly constant, I proposed that child learners “pay attention to the ends of words” (Slobin, 1973). Pye (1992) went on to refine this proposal, demonstrating that the critical factor in acquisition is a morpheme’s perceptual saliency, finding that syllabicity and stress are more important than utterance-final position. Peters (1997) refined the perceptual dimension further, proposing a systematic set of prosodic and phonological dimensions that influence morphological
acquisition. Again, generalizations require data from a range of contrasting languages—in this instance, contrasting on acoustic, rather than syntactic or semantic dimensions.

**From acquisition mechanisms to typology**

Perceptual saliency and frequency, along with dominant construction types and semantic patterns, all work together to reinforce the overall typological characteristics of the language being acquired by the child. As more and more morphemes and constructions and lexical items come to require the same kinds of processing, the typology of the language begins to emerge as a sort of “habit” in acquisition—that is, the learner is predisposed to apply familiar patterns to new instances. For example, research on a number of Indo-European suffixing languages led to the generalization that children will select a stem and overgeneralize a dominant affix, such as English-speaking children’s past-tense and plural regularizations (e.g., *falled*, *breaked*; *sheeps*, *mans*) or Russian-speaking children’s use of a single case suffix for all nouns (e.g., a uniform accusative or instrumental or dative marker across genders), although the input provides distinct suffixes on the basis of gender. Bantu languages such as Sesotho provide an important counterexample. In these languages, there are a number of noun classes (15 in Sesotho) as compared with the two or three genders of Indo-European languages (masculine, feminine, and sometimes neuter). The classes are marked by prefixation, and there are no free-standing nouns—that is, there is no parallel model to English *chair / chair-s* or Dutch *stoel / stoel-en*. For example, the noun stem *-tho* ‘person’ does not stand on its own, but requires either the singular prefix *mo-* forming *mo-tho* ‘person’, or the plural prefix *ba-* forming *ba-tho* ‘persons’. Similarly, for other noun classes, there are pairs such as *mo-sé* ‘dress’ / *me-sé* ‘dresses’, *se-fate* ‘tree’ / *di-fate* ‘trees’, and so on, across an array of noun classes. The prefix that marks a particular noun class is repeated on lexical elements throughout a clause to mark agreement with that noun: prefixes occur on nouns, demonstratives, adjectives, possessives, and so forth. For example, the *se-* prefix indicates a singular for a noun that belongs to Class 7 (one of the “gender” classes in Sesotho), such as *se-fate* ‘tree’. That prefix is repeated across morphemes in a construction that makes reference to a noun belonging to that class: *se-* SUBJECT, *-se- OBJECT, *se-se-* ADJECTIVE, *sena* DEMONSTRATIVE PRONOUN, *se* RELATIVE PRONOUN, and more. The utterances that a Sesotho-learning child hears always include repeated instances of the same type of prefixed morpheme throughout a clause. Demuth (1992) found that children quickly identified the role of prefixes in the language. At first they isolated noun stems, then began adding prefixes, and by about 2;6 used distinct prefixes for both singular and plural. That is, they did not follow the Indo-European model of using a bare noun stem for singulars and adding an affix to indicate plural; rather, they worked on the entire system, adding both singular and plural prefixes.

Clearly, repetitive use of a principle across lexical items and constructions makes the principle itself salient—in the case of Sesotho, the principles of prefixing and agreement. Children are not learning isolated pieces of a linguistic system; rather, they seem to make use of a sort of “typological bootstrapping” (Slobin 1997d) to identify new constructions as similar to already learned constructions. Construction types become available patterns or templates for the learner. Thus the Sesotho-learning child begins to
expect repeated use of noun class prefixes to mark agreement through a construction; the Turkish-learning child comes to expect that suffixes will carry grammatical information; and the Yucatec Mayan child will look for highly specific verb meanings. Repeated solutions of linguistic problems by using a particular strategy thus reinforces the typological consistency of the language. That is, with increasing mastery of morphosyntactic and semantic patterns, a sense of the overall typology of the exposure language begins to play a role in guiding acquisition.

This line of research emphasizes that one cannot pull out one system from a particular language—prefixes or suffixes, casemarking, agreement, word order, general verbs, etc.—and compare that system across languages. Each individual language presents its own “ecological balance” of grammatical forms and lexical patterns, and crosslinguistic comparisons must pay close attention to the interaction of sets of dimensions in acquisition. Note, too, that languages differ with regard to their placement on individual typological dimensions. For example, looking back at Table 2, Serbo-Croatian and Turkish are both casemarking inflectional languages, but the former is SVO and the latter is SOV; the former relies on synthetic morphology and the latter on agglutinative morphology. English, Italian, and Serbo-Croatian are all SVO languages, but they differ considerably in pragmatic word-order flexibility. One cannot draw generalizations, for example, about the acquisition of SVO languages, or casemarking inflectional languages, without paying attention to a network of cross-cutting construction types.

The caution for researchers investigating the acquisition of signed languages is to be very careful in drawing generalizations from the literature on spoken languages, and to carefully pick appropriate comparisons on typological dimensions of morphosyntax, lexical organization, and pragmatics. The second part of this chapter, therefore, proposes some typological dimensions that seem to be particularly relevant to the analysis of signed languages—as well as some that seem to have been uncritically transferred from some spoken languages. To begin with, though, it will be necessary to critically examine the sort of information that is presented by conventions of transcription and glossing, since the format and content of linguistic examples and transcribed discourse influence the conclusions that can be drawn from the data. As Elinor Ochs succinctly phrased the problem many years ago: “Transcription is theory” (Ochs, 1979). That is, there is no “objective” or theory-neutral way in which to represent linguistic data.

**Glossing and translating: explicit and implicit analysis**

**How linguists deal with foreign language examples**

The field of linguistics has established generally accepted standards for presenting linguistic examples in publications, with only minor variation between journals, theorists, and countries. (See, for example, the style sheet of any linguistics journal.) A simple example will demonstrate how many choices are made at the levels of transcription, glossing, and translation. Consider the German sentence in (3):
The first line is an orthographic transcription. This is already a theoretical decision, because it could have been a phonetic transcription, and it could have included prosodic information (if it were a sentence from a spoken discourse, rather than a written example). The second line is a morpheme-by-morpheme gloss, using standard linguistic abbreviations for grammatical forms and English translations of lexical items. This line is rich with theory-relevant decisions. For example, the first article, die, is glossed as DEFINITE ARTICLE FEMININE SINGULAR NOMINATIVE, but, in fact, die could also be an ACCUSATIVE form. Here the fact that the second article in the clause, den, is ACCUSATIVE means that the first article, die, can be glossed as NOMINATIVE. Glossing thus requires knowledge of the grammar and attention to other items in a construction. The third line gives a free translation into English. In both the second and third lines, frau is translated as ‘woman’, rather than ‘wife’, and mann is translated as ‘man’ rather than ‘husband’. But this sentence could also mean ‘the wife loves the husband’. In brief: How much information is given in the choices of grammatical glosses and English equivalents, and how much is presupposed at the level of glossing?

Example (3) was invented to simply set forth the standard three lines of a linguistic example: foreign language form, morpheme-by-morpheme gloss, and free translation (sometimes also called gloss). As soon as we move beyond “simple” examples, the terrain gets very rocky indeed. Example (4a) is from a paper written in Spanish about a Mesoamerican called Lowland Chontal (O’Connor, to appear). I’ve picked this example intentionally to make a point that will become important in considering the glossing of sign language examples. Lowland Chontal is spoken in Mexico, where the surrounding language is Spanish, and it seems unexceptional to find it glossed and translated in Spanish. In similar fashion, sign language examples tend to be glossed and translated in the spoken language of the surrounding community (English for ASL, Dutch for SLN, and so forth). Many types of problems arise. Compare (4a) with my English version in (4b):

(4a) iyasa -k’o -may -pa
1SG.AGT -V.POS:boca.abajo -V.DIR:quedar -PFV.SG
‘Yo me embroqué en el suelo.’

(4b) iyasa -k’o -may -pa
1SG.AGT -V.POS:face.down -V.DIR:remain -PFV.SG
‘I lay face down on the ground.’

Fortunately, there is a fairly “universal” system of grammatical glossing, still in progress, but quite well established over the past century or so. So we do not have to translate the grammatical glosses, which stand for: 1ST.SINGULAR.AGENT, VERB.POSTURE, VERB.DIRECTIONAL, and PERFECTIVE.SINGULAR. Linguists are pretty good at reading across and between the three lines of an example, trying to build up an impression of
what the foreign language example might mean, and how it is constructed. But note that there are some differences between the English and Spanish glosses, and we have no further access to the original meanings without further information from the linguist (often provided elsewhere in the paper, or in related publications). Here O’Connor glossed the postural verb as boca.abajo ‘mouth.down’ in Spanish, and I assumed that this verb describes a posture that we would call face down in English. The Chontal example is a polymorphemic verb (like a sign language verb), and this is lost in both the English and Spanish third lines—because both languages are of a different type (discussed further, below). The Spanish verb, embrocarse, means something like ‘put oneself in an inverted position’; I picked lie face down as an English equivalent. And both the Spanish and English versions add information about the location: en el suelo, on the ground. But this is not the structure of the Chontal verb, which has a directional verb form that O’Connor glosses as qued’ar ‘remain’. The best I can make out is that this particle means to move in a direction in which one then remains—and in a face-down posture. But the directional element disappears in both the Spanish and English versions, because neither of these languages has a simple way of saying something like lie down onto the ground. Note, too, that the final Chontal particle indicates the tense/aspect of the verb, PERFECTIVE.SINGULAR. Both of these features are maintained in the Spanish embroqué, which happens to mark both perfective aspect and number on the verb (but also adds person); but they are lost in English, which provides only a simple past.

The purpose of this long example is to raise several critical issues for the comparative study of sign languages in general, and particularly, here, of the acquisition of sign languages.

**Problems of transcribing and glossing sign language**

Without making use of line drawings or videoclips, consider a simple example from ASL (and its equivalents in many other sign languages). The hand is placed palm down with an inverted V pointing downward; the hand moves forward while wiggling the fingers. Clearly, the sign means something like ‘two-legged being walks forward’. But how can we preserve this example for subsequent linguistic analysis? We could decide to gloss it as WALK, following the familiar shortcut of capital letters, with a subscript indicating direction, such as WALK\textsubscript{forward}. This gives us the illusion that ASL has a verb that is parallel to the English verb walk, and that it can take a directional adverb, parallel to walk forward in English. But, of course, there’s no reason that ASL can only be glossed in English. ASL can just as well be described by Spanish or Dutch or Japanese linguists, in their spoken/written languages—in the same way that an investigator of Lowland Chontal can choose to gloss that language into Spanish, or English, or whatever the language of the investigator may be—or, more precisely, the language of the publication. (O’Connor is an English speaker who publishes about Chontal in both Spanish and English.) This simple ASL example could best be glossed into Spanish as AVANZAR CAMINANDO ‘advance walking’. This is because the typology of Spanish prefers that the main verb
indicate direction and that manner be specified by a nonfinite adjunct, in this case a gerund.\textsuperscript{4}

It should be obvious, though, that the signed example corresponds neither to \textit{WALK\textsubscript{forward}} nor to \textit{AVANZAR CAMINANDO}. It is, rather, more like a Mayan verb, with a collection of meaning elements that, taken together, mean something like ‘two-legged figure move forward in a walking manner’. How can this be rendered in a format that allows for crosslinguistic and developmental analysis—both between sign languages and in comparison to spoken languages? Glosses in any given spoken language are misleading. The only solution is to follow the lead of linguistics and agree upon ways to break signs down into meaning components and to gloss them in a theory-neutral and language-neutral way. One such attempt is the Berkeley Transcription System (BTS) that a group of us has developed over the past decade, in working with transcription of sign language videotapes in several different sign languages.\textsuperscript{5} This is not the place to lay out how BTS works, but simply to give one example that is parallel to the Lowland Chontal example. This will then provide a bridge to examine the typology of sign languages with regard to complex verb constructions.

BTS treats verbs as polycomponential, with a separate symbol for each type of component and its realization in a particular verb. For this example, we will need the following BTS components (including only manual components). The sign has a “classifier” handshape—referred to as “property marker” in BTS. (For a justification of this reanalysis of classifiers, see Slobin et al., 2003.) This handshape is in a particular posture; follows a particular path; and demonstrates a particular movement pattern. Each of these types of meaning component (“morpheme”) is indicated by a lower-case abbreviation in BTS: \texttt{pm} = property marker, \texttt{pst} = posture, \texttt{pth} = path, \texttt{mvt} = movement. These are the kinds of elements out of which sign language verbs are constructed. The “lexical” instantiations of these components are indicated by associated

\textsuperscript{4} In Talmy’s (1985, 1991, 2000) terms, Spanish is a \textit{verb-framed} language and English is \textit{satellite-framed}. This distinction has widespread consequences for cognition and discourse (Slobin, 1996, 1997a, 2000, 2002). Independent analysis is required to determine if Chontal or ASL falls into one of these typological categories, or represent a different sort of typology (Slobin, 2004; Slobin & Hoiting, 1994).

\textsuperscript{5} Current versions and continuing discussion of BTS are available on a website organized by Brenda Schick (\url{http://www.Colorado.EDU/slhs/btsweb/}). The rationale for BTS can be found in Slobin et al. (2001), along with the transcription manual; an introduction is provided in Hoiting and Slobin (2002). The system is still under construction, but the following examples will give some idea of the level of granularity that is used in BTS transcriptions. Property markers distinguish a large collection of meaningful handshapes, such as shape (\texttt{pm’CIR} = circular object, \texttt{pm’STK} = stick-like object), handling configuration (\texttt{pm’BO} = baby O, \texttt{pm’FF} = flattened F), and tracing handshape (\texttt{CS} = curved surface, \texttt{TUBE} = tube). A range of movement patterns are distinguished, such as \texttt{mvt’BOUNCE} and \texttt{mvt’JAB}. Many path types are transcribed, such as \texttt{pth’A} = arc and \texttt{pth’Z} = zigzag.
capital letters: **TL** = two legs, **ERC** = erect, **F** = forward, **WIG** = wiggle. Putting all of this together, the example takes the form presented in (5).

(5) pm’TL-pst’ERC-pth’F-mvt’WIG

‘walk forward’

Note that this format does not require any capital letter glosses into English words (and the formal components of BTS have been translated into Dutch to provide exactly equivalent transcriptions of ASL and SLN). The transcription in (5) can be read, in English, as, for example, “inverted V handshape moves forward wiggling.” In similar fashion, the Lowland Chontal example in (4) can be read, in English, as “first person agent moved into a face-down posture, remaining there.” I suggest that transcriptions and analyses on this level—although certainly prone to various kinds of errors and misinterpretations—provide a clearer idea of the nature of languages like ASL and Chontal.

BTS representations make it clear that sign language verbs are not at all like the verbs of English or Dutch or German or French—that is, they are not at all like the verbs of the surrounding spoken languages. Capital-letter glosses, even with subscripts and superscripts, mask the deep typological differences between the sign languages that have been studied and the spoken languages of the community—be they Indo-European, Chinese, Japanese, or Turkish. All of those spoken languages belong to one typological class; but this is not due to modality. We have already seen that one Mayan verb looks quite different from the structure of these familiar spoken languages. The next step, therefore, is to explore the relevant typological dimension and its consequences for analyses of sign languages and their acquisition.

**Dependent-marked and head-marked languages**

“Dependent-marked” and “head-marked” are relatively unfamiliar terms in sign language linguistics (Hoiting & Slobin, 2003). This typological dimension was introduced by Nichols (1986) and plays an important role in her typological and historical explorations of spoken languages (Nichols, 1992). Nichols (1986, p. 57) defines the **head** as “the word which governs, or is subcategorized for—or otherwise determines the possibility of occurrence of—the other word. It determines the category of its phrase.” For example, a predicate is the head of its phrase and the arguments and adjuncts are dependents; a noun is the head of its phrase and modifying adjectives are dependents. Syntactic relations such as subject or object can be morphologically marked on the **dependent** (noun) or on the **head** (verb) of a construction. Of most relevance to us here is marking on the verb—because I will argue that sign languages are head-marked, in distinction to the dependent-marked languages of the surrounding speaking worlds. I will focus on clause relations—that is, the relations of the arguments of a verb (the dependents) to the verb (the head). As an example, consider a simple transitive clause of the standard SVO variety in English. I will first use examples with pronouns, because these are the only forms in
English with casemarking, and then will replace a pronoun with a noun. Begin with the sentence in (6):^6

(6)  He see -s me.
    3SG.MASC.PRO.SUBJ  see -3SG.PRES  1SG.PRO.OBJ

The dependents are the two pronouns, and those elements bear the casemarking (that is, *he* rather than *him, me* rather than *I*). The verb does not indicate the argument roles, but only indicates inherent characteristics of the arguments (in this case, the singularity and person of the subject). With regard to clause relations, (6) is consistently dependent-marked.

The same is true of Turkish—a language which is otherwise typologically quite different from English, in that it is an SOV language with agglutinative morphology and no gender. But with regard to dependent-marking, (7) is identical to (6):^7

(7)  O ben -i gör -iycyor
    3SG.PRO.NOM  1SG.PRO -ACC see -PRES

‘He/she sees me.’

The word order is different, and the realization of casemarking is different. In Turkish it is the agglutinative suffix –i on the first-person pronoun *ben* that indicates the role of that argument in the clause. Nonetheless, Turkish is a dependent-marked language, as are all of the Germanic and Romance languages, Japanese, Chinese, and many others. (Head-marked languages are common in the Americas and elsewhere in the world, but they are not common in the standard linguistic approaches to morphosyntax that sign language linguists rely upon.)

Yucatec—another Mayan language—is presented in (8). Like Lowland Chontal, and ASL, all of the grammatical indicators of argument roles (the equivalents casemarking on noun arguments in dependent-marked languages) occur as elements of the verb.

(8)  k -uty -il -ik -en
    HAB -3SG.ACTOR -see -INCOMPL -1SG.UNDERGOER

‘He/she sees me.’

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^6 ACC = accusative case, HAB = habitual aspect, INCOMPL = incompletive aspect, MASC = masculine, NOM = nominative case, OBJ = object, PRO = pronoun, SG = singular, SUBJ = subject, TOP = topic

^7 Turkish is a “pro-drop” language—that is, a language with usual subject ellipsis unless the subject is in focus. (Accordingly, the designation “null-subject” language would be more appropriate for pro-drop languages that do not use head-marking to mark argument relations on the verb.) Thus (7) is not strictly parallel to (6); either the subject pronoun, *o*, should be elided, or the English subject pronoun *he* in (6) should receive contrastive stress. (The lack of consistent prosodic notation for written languages has caused serious misunderstandings with regard to their syntax, which is primarily based on written examples.)
The corresponding ASL construction is formally parallel to (8). It consists of a horizontal V-handshape, indicating the gaze, moving from a locus established for a third person (in discourse or the physical setting) and moving towards the face of the signer. Beyond this description, there is no standard way of notating such a construction in publications of sign language linguistics. What we find are variants of \(_{he}\)LOOK-AT\(_{me}\) and/or pictures. A BTS transcription reveals the head-marked character of the ASL verb. The following symbols are used in (9): \(\text{pm} = \) property marker (“classifier”) \(\text{GAZE} = \) horizontal V-handshape indicating act of looking, \(\text{ori} = \) orientation of property marker handshape, \(D = \) palm down, \(B = \) fingertips back, \(\text{src} = \) source, \(3 = \) locus established for 3\(^{rd}\) person (participant other than signer and recipient), \(\text{gol} = \) goal, \(1 = \) signer. (Note that (9) only provides the second and third lines of the standard format of linguistic examples. The first line would be a phonological description, using one of a variety of available notations, preferably accompanied by a videoclip.)

\[
\begin{align*}
\text{(9)} & \quad \text{pm}'\text{GAZE-ori}'D\text{B-src}'3\text{-gol}'1 \\
& \quad \text{‘He/she looks at me.’}
\end{align*}
\]

ASL and Yucatec are both head-marked languages, with polycomponential verbs that indicate the roles of arguments without the use of pronouns that carry grammatical marking of those roles. Because argument roles are indicated on the verb, these are technically “pro-drop” languages. The term, however, is misleading. It is not that there are pronouns that need to be “dropped.” Rather, if a pronoun or overt noun participant is used, it must be added. This is because the default clause in such head-marked languages carries all of the essential syntactic information within the verb. Explicit arguments are needed only when they are in focus—that is, when they are introduced as topics or when they contrast with other possible participants. It therefore would be more appropriate to call these “pro-add” languages.\(^8\)

What happens to our examples if we replace ‘he/she’ by an explicit noun, for example a name? In English and Turkish nothing essential changes. The pronoun is simply replaced: \(\text{John sees me}. \text{John beni görür.}\) (The Turkish proper noun has a “zero suffix,” indicating that it is nominative case.) In Mayan, though, \(\text{John}\) does not serve as the subject of the verb; rather, the external noun must be introduced as a topic, with a suffixed marker in first position, as in (10) (or with the noun after the verb, in a pragmatically marked position that does not require a topic marker; thanks to William Hanks for elucidating this construction).

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8 Sebastián and Slobin (1994) introduced this term in analyzing Spanish child language. Spanish is also “pro-drop,” though for other reasons, as discussed below with regard to agreement morphology (see also footnote 6). But with regard to acquisition, children learning all types of “pro-drop” or “argument-ellipsis” or “null subject” languages face the task of knowing when to explicitly mention an argument. This is the opposite problem to English-learning children, who must be sure to always explicitly encode the arguments that are required by the verb, regardless of their pragmatic status.
Note that the verb in (10) is the same as the verb in (8). If John is interpreted as a topic, the -uy- marker indicating 3rd person singular actor on the verb is not an “agreement” marker. It remains an element on the head that indicates the role of the 3rd person participant.

The pattern in ASL is identical. John is introduced by pointing to him, if he is present, or to a locus that has been established for him, or by giving his name in f Sign language Development

Head-marking, agreement, and pro-drop

There is, in fact, more to marking on the verb than indicating argument roles (that is, expressing clause relations). Markers on the verb can also index inherent categories of arguments, such as number and gender. This is the familiar domain of agreement in classical syntax. In the head-marked languages discussed above, marking on the verb serves, in Nichols’s terms, to mark “the presence or type of dependency” (1986, p. 59). As she points out, this sort of relation is what Sapir (1921, p. 101) called Pure Relational Concepts. In his words, the marking elements “serve to relate the concrete elements of the proposition to each other, thus giving it definite syntactic form.” The movement of the ASL “classifier” indicated by pm’GAZE does just this: it relates the source and goal elements of the proposition, without providing further information about inherent qualities of those elements. What has traditionally been termed “agreement” is the use of markers to “index categories of one member on the other” (Nichols, 1986, p. 59). Sapir used the term Concrete Relational Concepts to refer to this kind of marking. These are the categories that underlie subject-verb agreement—such as person, gender, number—and they do not seem to play a central role in sign language syntax.
Nevertheless, both kinds of verb-marking of relational concepts allow for argument ellipsis (“pro-drop”). That is, in languages like Spanish and Turkish, where person/number marking on the verb indicates inherent qualities of the grammatical subject, it is possible to elide the subject when it is no longer topical in discourse. Languages with this kind of argument ellipsis, however, cannot elide all of the arguments of a predicate, whereas fully head-marked languages do so normally and easily. We must be careful, therefore, not to draw upon “pro-drop” languages like Spanish and Turkish when making comparisons to a quite different motivation for “pro drop” in languages like ASL and SLN. What is important in a sign language is that, except for “plain verbs” (i.e., verbs that cannot move in space), the normal procedure is to establish topics at loci and then embed those loci in movement trajectories of verbs (whether indicating physical or metaphorical movement). Note that even for “plain verbs,” many sign languages make use of auxiliary verbs that do move in space, retaining the dominant head-marked typology of those languages (e.g., Bos, 1994; Hoiting & Slobin, 2001, for SLN; Smith, 1990, for Taiwan Sign Language).

**Consequences for acquisition**

The use of motion as a feature of head-marked languages does not pose a problem to young learners of sign languages—at least on the basis of the limited evidence currently available. The most detailed study that I’m aware of is Casey’s recent dissertation (2003a; also see Casey, 2003b), where extensive evidence is presented for the elementary use of motion of the hand from one locus to another to indicate relations between participants. Marking argument relations on the verb is thus a basic element of sign languages—indeed of the gestural modality generally, including homesign, children’s adaptations of sign systems, and co-speech gestures of hearing people.

Children acquiring spoken head-marked languages are also adept at manipulating verbal affixes to indicate source and goal, agent and patient, giver and recipient, and so forth. For example, (11) is an utterance of an Eskimo child of 3;2 speaking Inuktitut, a head-marked language (Allen, in press; also see Allen, 1998). The child is referring to a puppy in the porch, which she saw her friend bring in and can hear but not see. Her utterance is a single verb indicating that a first-person singular subject (the child) wants a third-person singular object (the dog) to come in. Because the dog’s presence is known, it is a presupposed topic and does not have to be lexicalized. There is therefore no agreement here, but simply an indication of Nichols’s “type of dependency” or Sapir’s “Pure Relational Concept”—that is, the child’s desired action on the dog. This is indicated by the verb particle -jara, which encodes a relation between a 1st singular participant and a 3rd singular transitive participant (roughly, agent and patient).

(11) *itiq -guma -jara*

> enter -want -1SG.3SG.TRANSITIVE

‘I want to take him/her/it in.’
Sign languages in a network of typological dimensions

Table 3 represents an attempt to demonstrate the complexity of finding typological comparison languages for the investigation of acquisition, and psycholinguistics generally. The table compares ASL with six spoken languages—the five studied by Berman and Slobin (1994), plus Yucatec Mayan, an example of the sort of head-marked language discussed above. The rows provide ten typological dimensions along which the languages can be compared and contrasted, with my best estimate of the position of each of the seven languages on those dimensions. The cell entries represent the dominant option used in a language (there are almost always minority constructions that differ).

To summarize the dimensions:

- **marking type**: the head-/dependent-marking typology discussed above.

- **case inflectional**: the presence or absence of casemarking on the dependent arguments in a clause.

- **grammatical morphology**: grammatical morphemes that are arranged in sequence (prefixes, suffixes, infixes) versus those that occur simultaneously with root forms. Much has been made of the simultaneous morphology of sign languages (manual plus nonmanual features, co-placement of handshapes, etc.). Among spoken languages, Semitic languages such as Hebrew and Arabic have another kind of simultaneity. Briefly, a lexical item is represented by an unpronounceable consonant frame which becomes pronounceable with the intercalation of vowel patterns that express grammatical morphemes. For example, the Hebrew root s-g-r ‘close’ can be realized in many forms with various intercalated vowels (+ prefix and/or suffix); e.g., the present tense masculine singular is sagr and the past tense masculine 3rd person is sagar, where the vowel frames (-o-e- and -a-a-) are the tense markers.

- **word-order variability**: the degree to which the order of words in a clause can be varied for pragmatic purposes, without additional grammatical morphology.

- **pro-drop**: the option of eliding one or more arguments in a clause. (ASL and Yucatec allow eliding of several arguments; Spanish and Turkish only of subjects; Hebrew only of 1st and 2nd person subjects in past and future.)

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9 Perhaps the simultaneity of sign language morphology has been overstated. Although handshapes are placed together simultaneously in two-handed signs, and property marker handshapes move as simultaneous parts of directional verbs, the movement from source to goal (however defined) is of necessity sequential. That is, there is no way to simultaneously encode source and goal. Also note that the simultaneity of nonmanual and manual expressions is comparable in many ways to the simultaneity of suprasegmental features of spoken languages (intonation, stress, rhythm, etc.), which are all too often ignored in transcription and linguistic analysis.
- **topic-/subject-prominent**: relative importance of topic or subject in overall grammatical organization
  - **topic-prominent**: topic is overtly marked and is critical in syntactic organization
  - **subject-prominent**: subject controls verb agreement, coreference, and a number of other constructions, forming the grammatical pivot for structuring the clause

- **classifiers**: obligatory marking of semantic categories of nouns ("property markers" in sign languages).

- **motion lexicalization**: the expression of path of motion in a directional verb—*verb-framed*, or directional satellite (affix, adjunct)—*satellite-framed*.

- **grammaticized tense**: formal marking of tense on the verb.

- **grammaticized aspect**: formal marking of aspect on the verb (e.g., durative, completive, habitual, etc.)
Table 3.
Some grammatical features of ASL compared with six spoken languages:
Typological summary

<table>
<thead>
<tr>
<th></th>
<th>ASL</th>
<th>English</th>
<th>German</th>
<th>Spanish</th>
<th>Hebrew</th>
<th>Turkish</th>
<th>Yucatec</th>
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</table>

Note that no two languages line up identically on all ten dimensions. In addition, the dimensions interact in various ways. For example, word-order variability is more likely in case-inflectional languages (because casemarking makes it possible to keep track of argument roles regardless of word order). Pro-drop is likely to be the norm in head-marked languages, but may be an option—as null subject—in dependent-marked languages. The message is that there is no simple way to pick comparison spoken languages in making predictions about the acquisition or use of particular construction types in a sign language. Prediction is only feasible if one attends to interaction among dimensions, along with data on frequency of use and discourse functions of the forms under consideration. And this can only be done in a psycholinguistic framework that includes attention to processing mechanisms along with strategies of learning, memory, and communication.

Summary and conclusions

In order to make crosslinguistic comparisons—between spoken and signed languages, or between the acquisition of different languages—it is necessary to work in a linguistic framework that is not biased towards languages of a particular type. Beginning with several case studies of the acquisition of spoken languages, I have tried to demonstrate the progress that has been made by moving away from predictions based on patterns of the structure and acquisition of particular languages, generally English or, more broadly,
Indo-European languages. The examination of several case studies from the child language literature demonstrates the importance of typological analysis, as well as attention to factors of frequency and discourse function of grammatical forms and constructions.

Crosslinguistic analysis on the linguistic level also requires standards of morphosyntactic and lexical analysis that are not biased toward one language or type of language. I have argued that sign languages differ systematically from the spoken languages of the surrounding communities, across Eurasia and America. In particular, sign languages are head-marked, whereas the surrounding languages are dependent-marked. Close attention to these typological dimensions calls for a reorientation in which traditional notions such as “subject,” “agreement,” and “pro-drop” are replaced by analyses more appropriate to the typology of signed languages.

In sum, then, this brief overview of several critical typological and psycholinguistic issues is a call for continued careful research across a variety of disciplines and language types. This volume is best seen as an attempt to fill in the blanks and seek the connections between language type, modality, acquisition, and communication.

References


