

Acquisition of Syntax in Signed Languages

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There are at least two reasons to be interested in the acquisition of syntax in sign languages. One is in order to see the development of language in the deaf child—the process by which deaf children come to determine how their language operates. A second is to learn about the nature of language, thereby informing linguistic theory. By studying how deaf children acquire the syntactic structure of their language, we can test theories of language and language acquisition. We concentrate on the latter goal in the present chapter.

It is important for linguistic theory to consider data from the acquisition of sign languages. Generally, linguistic theory is developed on the basis of data from spoken languages only—and often, primarily on the basis of English and other Indo-European languages. Languages with distinct structures—particularly, languages employing a distinct modality—are crucial testing grounds for such theories. When linguistic theory is concerned with those properties that hold across all languages, its proposals should hold for sign languages as well as spoken languages. If some proposed universal does not hold for sign languages, the question should be asked whether there is an explanation for this gap as a modality effect. That is, is there some characteristic of the manual-visual modality as opposed to the oral-aural modality that explains why one group of languages, but not the other, displays this property (i.e., modality effect)? If not, the status of the purported universal as a true linguistic universal is threatened (Sandler & Lillo-Martin, 2005).

As an example, let us consider the tendency for signs to be monosyllabic yet multimorphemic (Brentari, 1995). What this means is that

signs can convey a lot of information in a small unit. For example, many verbs with agreement (discussed in some detail below) convey information about the verb root, the subject, and the object, all within a sign with one simple movement path—the typical shape of a monomorphemic sign. Even more dramatically, classifier signs (discussed in several other chapters of this book) may convey multiple types of information about a moving entity, its path, and manner of movement, also within a single syllable. Unlike many familiar spoken languages, sign languages primarily employ nonconcatenative morphology—that is, they add morphemes without adding affixes. There are some spoken languages that employ this kind of nonconcatenative morphology (e.g., Semitic languages), but many do not. Similarly, while some spoken languages have a largely monosyllabic lexicon, others have rampant multisyllabicity. Sign languages, quite generally, as far as we know, do both: Both lexical and derived forms tend to be monosyllabic, due to the common use of nonconcatenative morphology (Brentari, 1998; Liddell, 1984; Sandler, 1989).

This is a true modality effect. The availability of simultaneous encoding is taken advantage of in sign languages. Sign languages make use of mechanisms generally available to language (spoken and signed), but particularly those that are most compatible with the manual-visual modality. Theories of language should take these observations into account.

Although additional variables come into play when considering language acquisition, the point is still vital. There might even be more opportunities for modality effects to appear in language acquisition, due to physiological aspects of the articulatory system. For example, suppose that the articulators for sign language develop at an earlier age than the articulators for spoken language. Then, the first words might occur at an earlier age in sign languages as compared with spoken languages. This, in fact, seems to be the case. Meier and Newport (1990) have argued that the observed development of first signs about 2 months earlier than first words can be attributed, at least in part, to the earlier development of control over the articulators needed to produce recognizable signs. This would be an example of a modality effect that holds for acquisition without holding for the mature grammar—there is no consequence in the mature grammar of this effect. But a theory of the development of first words must take into account the observation that words are acquired differently (i.e., earlier) in sign languages. Thus, linguistic theorists need to be aware of the areas of sign language, and sign language acquisition, which do and do not exhibit modality effects (Lillo Martin, 1999).

In this chapter, we review studies of the acquisition of two areas of sign language morphology and syntax. For each of these areas, we ask whether the theories developed on the basis of spoken languages make

the right predictions for sign language. If there are differences between sign languages and spoken languages, what would the reasons be? In neither of these areas is the work completed, and we suggest areas for further study in both.

THE ACQUISITION OF VERB AGREEMENT

Quite a few studies have examined the acquisition of verb agreement in American Sign Language (ASL) and other sign languages. Most of the questions these studies have addressed are sign-language specific; that is, they concern issues that do not arise in the study of spoken languages. Some, however, relate to proposals that apply to the acquisition of verbal morphology in both signed and spoken languages. Sign language verb agreement in itself has properties that are unusual, from the point of view of spoken language agreement systems. Thus, study of sign language verb agreement systems is important for theories of agreement more generally, and the study of the development of sign language verb agreement should be of broad interest.

Verb Agreement in Sign Languages

Agreement can be described as a system by which a “target” element changes its form based on characteristics of a “controller,” which is the item whose inherent features are matched. So, for example, the form of a verb—the target—may reflect the person, number, and gender characteristics of its subject—the controller. As another example, the form of an adjective (target) may reflect the gender and number of the noun it modifies (controller).

In sign languages, there is a class of verbs that is modified depending on aspects of the subject and object; this is the phenomenon generally considered verb agreement.¹ Verbs show agreement with their subject and object by sharing a spatial locus with them, and this is generally taken to mean that the verb agrees with its arguments in person and number (though not gender).

Before discussing verb agreement in more detail, a few words must be said about the spatial loci. Many referents can be associated with locations in signing space. People who are actually present in a discourse situation, for example, are associated with the locations they actually occupy. People who are not present, but referred to in the conversation, may be “imagined” as occupying various spatial locations, or “associated” with loci. These loci are used by pronouns, which point to them, and by agreeing verbs, which move with respect to them.

¹ Not all verbs can be modified in this way. Verbs that do not indicate subject and object agreement are known as “plain” verbs.

To illustrate, consider the verb "ask." When the signer wants to convey, "Ask John," the sign moves from the location associated with the signer (the signer's own trunk) to the location associated with John, with the palm facing John. To convey, "John asks me," the sign moves from the location associated with John to the location associated with the signer, with the palm facing the signer.

When John is not actually present in the discourse, but the signer wants to refer to him, one of a number of devices may be used to associate him with some location (or imagine him at a location; see Liddell 1990). Then, the agreeing verbs are used in the same way. The use of agreement with nonpresent referents is illustrated in figures 10.1 and 10.2.



Figure 10-1. I-ASK-JOHN.

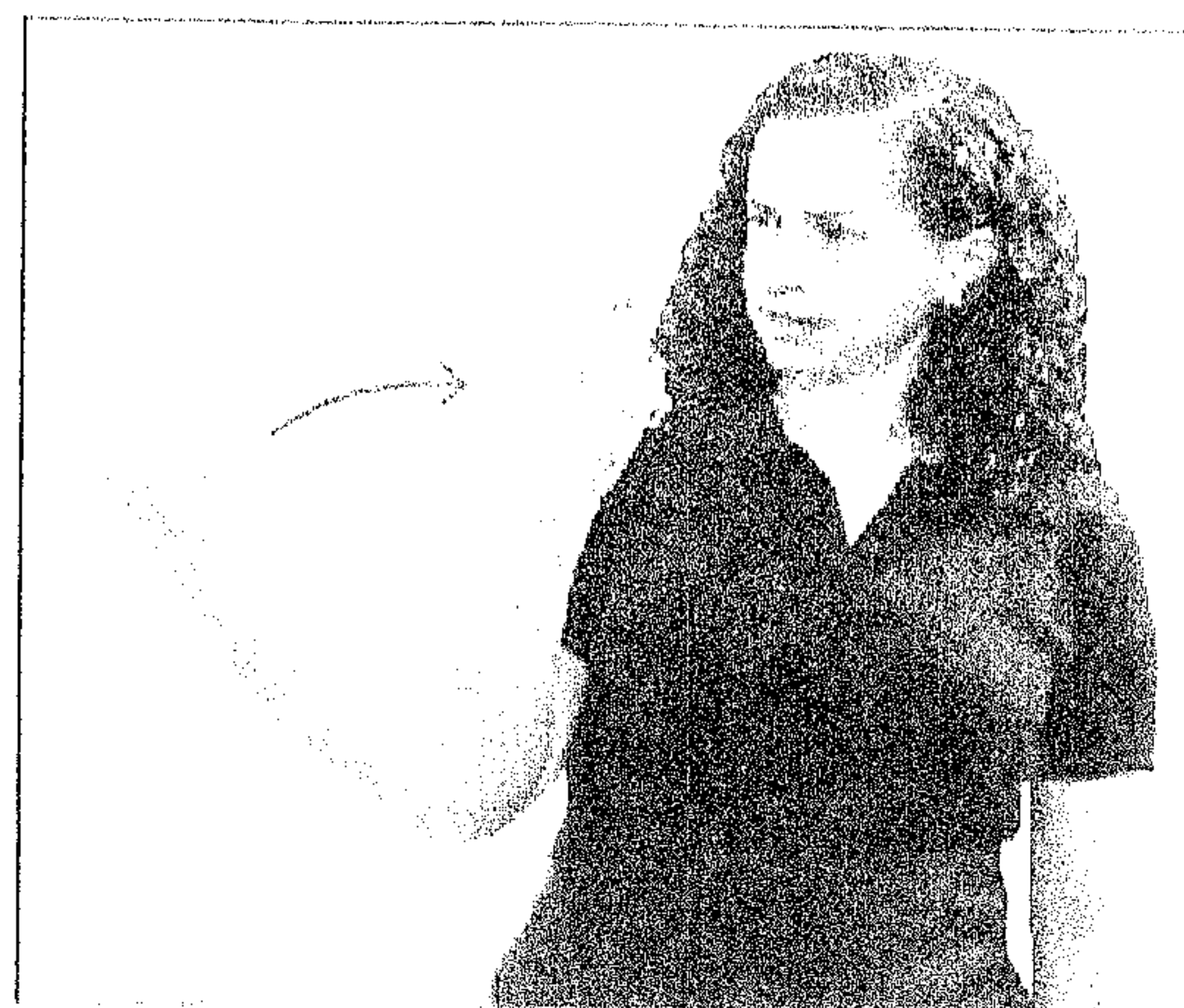


Figure 10-2. JOHN ASK ME.

The description just given is the standard one assumed for many years (e.g., Fischer & Gough, 1978; Klima & Bellugi, 1979; Padden, 1988). In recent years, however, various aspects of this analysis have been questioned (for discussion, see Liddell, 1995, 2000; Lillo-Martin, 2002; Meir, 2002; Rathmann & Mathur, 2002). For the purposes of the present chapter, we assume the description given; at the end of this section, we discuss some areas for future research based on some of the new concerns. We now turn to an examination of the role of iconicity in the development of verb agreement.

Iconicity and Verb Agreement

Brown (1980) thought that the acquisition of sign languages by hearing people would be facilitated because of the iconicity of signs. He suggested that "iconic signs, when the iconicity can be recognized, will be more easily learned and remembered than arbitrary signs" (p. 14). There are reasons to think he did not make the right prediction even for second language learners, but let's consider whether his argument would hold for young deaf children acquiring sign language as a first language. Does the iconicity of some signs make them easier to learn?

This question was addressed explicitly in Meier's (1981, 1982, 1987) study of the acquisition of verb agreement in ASL. While iconicity of verb agreement is not blatant in an example like "ask" given above, other verbs do bear a resemblance to the actions they denote. For example, when a signer produces the sign I-GIVE-YOU (figure 10.3), it is very similar to the action the signer would use to hand something over to the addressee.



Figure 10-3. I-GIVE-YOU.

Meier asked whether this iconicity might make it easier for deaf children to acquire verb agreement than it is for children learning spoken languages to acquire their systems of verbal or other inflectional morphology. Does the spatial analogy between the sign and the event facilitate acquisition of verb agreement?

Before addressing this main question, let us first consider how the acquisition of inflectional morphology in spoken languages takes place. Drawing on the work of Slobin (1982), Meier identified three kinds of spoken languages with respect to inflectional morphology (including verb agreement and nominal case). In one kind, exemplified by Turkish and Hungarian, inflectional morphemes are syllabic, stressed, and acquired quite early—before 2 years of age. In the second kind, which includes English, inflectional morphology is unstressed and unreliable, so comprehension of grammatical roles requires attention to word order. Acquisition is slower in such languages (around 3 years to 3 years 6 months [3;6]). In the third, including Serbo-Croatian, inflection is fusional, which means that multiple meanings may be expressed in a single unstressed affix, with the same form sometimes conveying different kinds of information. According to Slobin, acquisition is even slower in such languages, because the child must attend to both inflection and word order for appropriate comprehension.

Meier studied the acquisition of verb agreement by three deaf children who were exposed to ASL by their deaf parents from birth. One child was studied from the age of 1;6 through 3;6, and the other two were studied for shorter periods: 3;1 through 3;9, and 2;7 through 3;3. The percent use of agreement in obligatory contexts at each session is given in figure 10.4.

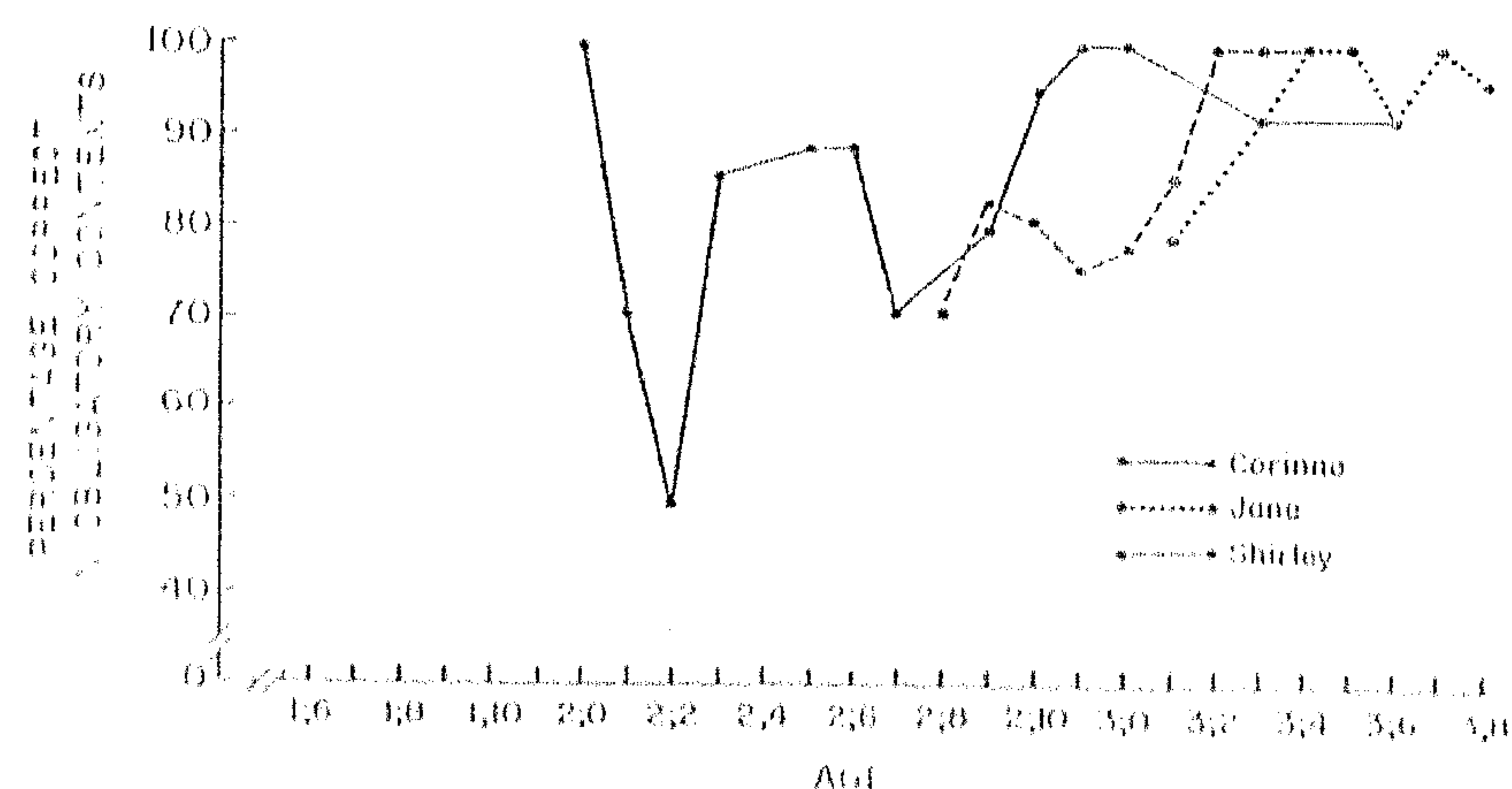


Figure 10.4. Production of verb agreement in obligatory contexts. Reproduced with permission from Meier (1982).

Meier set as his criterion for acquisition the correct use of agreement in at least 90% of obligatory contexts in each of three successive samples (following Cazden, 1968). Using this strict criterion, he found that the three children acquired ASL verb agreement at the ages of 3;0, 3;4, and 3;6. This is clearly not "early," particularly in comparison with the acquisition of Turkish. Rather, it is more in line with the acquisition of verbal morphology in English.

Meier's study showed that deaf children acquiring ASL treat it just like any other language. Children see words as things that must be analyzed, decomposed, broken down into their component parts. They resist what might be seen as a temptation to treat words holistically. Rather, the nature of ASL verb agreement as a morphological system means that it is acquired much like other similar morphological systems. In particular, since the agreement inflections are not stressed syllables, they are acquired around the age that inflection is acquired in languages like English. The iconicity of some signs seems to play no role in their acquisition—a conclusion reached on independent grounds by Supalla (1982).

The role of iconicity in the development of verb agreement has been addressed again more recently by Casey (2003). Casey observed "directionality" in the signs and gestures of six deaf children, ages 0;8 to 2;11, exposed to ASL by their deaf parents.² These children were observed longitudinally in 41 free-play and structured sessions. In her detailed study, she compared the age of first use of directional and nondirectional literal versus metaphorical verbs. All of the children produced literal verbs prior to their production of metaphorical verbs. While two of the children produced directional and nondirectional metaphorical verbs for the first time at the same session (ages 1;11 and 2;3), two others were delayed in their production of directional metaphorical verbs. Casey suggested that the delay in these two children, at least, likely indicated that they were attending to iconicity. If they were treating directionality as purely morphemic, there would be no explanation for their later use of directionality with metaphorical verbs.

Meier's (1982) study concerned the acquisition of verb agreement with present referents. He did not include in his analysis children's use of verb agreement with nonpresent referents. Is there a difference in the use of verb agreement between these two contexts? If so, to what would such a difference be attributed? We now turn to several studies that address this question.

²Casey uses the term "directionality" rather than agreement in order to be neutral concerning whether the child's uses should be considered agreement or not. This also allows her to make direct comparisons with directionality in gesture, a major component of her study.

Verb Agreement With Present and Nonpresent Referents

Very young children generally talk about the here and now. However, there are various reasons for them to talk about nonpresent referents. For example, they may ask about a missing parent, friend, or toy. They may also engage in storytelling, telling about a past event or one that exists only in the imagination.

How do young children use verb agreement when discussing nonpresent referents? According to several studies, children use verb agreement with present referents before doing so with nonpresent referents.

Loew (1984) studied children's use of aspects of grammar and discourse involving space, including verb agreement (part of what she called "indexing") and role play. She focused on the association of referents with locations in space, and later reference to these locations through pronouns, verb agreement, and role play, in children's storytelling. She studied one child from the age of 3;1 to 4;9, with some additional information from two other children at 2;11 and 4;3.

Loew found that children produce verb agreement with nonpresent referents much later than the age at which Meier observed verb agreement with present referents. During the first stage she investigated (3;1–3;4), the child she observed frequently produced verb agreement with present referents but generally used the "citation" (uninflected) form with nonpresent referents. Agreement is used with some consistency during the second period (3;6–3;11), but the location for a referent does not remain consistent across sentences within a narrative. Multiple referents may also be "stacked" in the same location. By the age of 4;6–4;9, Loew reports frequent and often consistent use of agreement with nonpresent referents. However, a quantitative analysis is not provided, so it is not clear at what point this child would pass a stringent criterion such as 90% correct use in three consecutive sessions.

Further support for Loew's observations come from experimental studies of children's development of verb agreement and spatial mechanisms. Bellugi, Lillo-Martin, O'Grady, and vanHoek (1990) asked children to tell a story associated with wordless picture books (the "balloon" and "paint" stories).³ They found that 2–3-year-old children may produce the signs of the story on the book, using the pictures as "present referents" for agreeing verbs. However, the children did not set up and use abstract loci and verb agreement with nonpresent referents until around four, making errors of the same types that Loew reported until around five.

³For more information on the results of these story elicitation, see Bellugi, vanHoek, Lillo-Martin, and O'Grady (1993), Lillo-Martin (1994), and vanHoek, O'Grady, Bellugi, and Norman (1987, 1989, 1990).

Lillo-Martin, Bellugi, Struxness, and O'Grady (1985) conducted experimental studies of 5- to 10-year-old children's comprehension of verb agreement with nonpresent referents. They found that children's performance on picture-choice and act-out tests of agreement for nonpresent referents did not reach ceiling until 6 years of age.

In summarizing the results of studies such as Meier's and Loew's, Newport and Meier (1985) argued that the verb agreement system is acquired around 3 years of age, and the later observation of verb agreement with nonpresent referents is due to the difficulties of establishing and maintaining abstract loci. This proposal contrasts with one that attributes the acquisition of agreement with nonpresent referents to a system separate from the one used with present referents.

Lillo-Martin et al. (1985) tested one part of this hypothesis by examining children's ability to understand the association of a referent with a location in space. The experimenter begins by associating two or three referents with points in space. Then the experimenter asks where a particular referent is located, or what is in a particular location.

The results showed that very young children do indeed have difficulty with abstractly associating referents with locations in space. After associating a doll with one location, for example, when the experimenter asked a 2-year-old, "Where's the doll?" the child ran to her bedroom to find her own favorite toy.

However, this problem was only found for the youngest children, the 2-year-olds. Three-year-olds were able to answer the questions indicating an understanding of abstract association. They did show effects of limited memory, as their results were higher when they only had to remember where two items were located. But the concept was already in place.

Thus, it is unlikely that failure to understand the relationship between nonpresent referents and abstract locations in space fully explains the failure of 3- and 4-year-old children to consistently produce and understand verb agreement with nonpresent referents. But does this mean that the child acquires verb agreement with nonpresent referents as a completely separate system?

Lillo-Martin (1991, 1999) argues against this extreme, noting that the experiment by Lillo-Martin et al. (1985) only required children to recognize the relationship between a potential referent and a location in signing space, not to set it up themselves or remember it across a discourse. She presented children's failure to use verb agreement with nonpresent referents as a performance problem rather than an indication of a lack of grammatical competence.

The use of directionality with present versus absent referents in the acquisition of ASL was also studied by Casey (2003). In her study, children spontaneously produced directionality with nonpresent referents at much younger ages than those reported by the earlier studies.

Although three children exhibited a delay of 1 month to 1 year between the production of directionality with present versus nonpresent referents, four children did produce directionality with nonpresent referents by the age of 2;7. The youngest productions of directionality with absent referents used real locations of unseen referents, and the latest ones used abstract spatial loci. This observation fits with the notion that the complexity of establishing and remembering locations for nonpresent referents is behind the later acquisition.

This conclusion is bolstered by the study of Hänel (2004), who studied the acquisition of verb agreement with present and nonpresent referents in two deaf children, ages 2;2–3;4, learning German Sign Language (*Deutsche Gebärdensprache*, DGS). She studied monthly recordings of the children's spontaneous productions, and coded verbs for the presence or absence of agreement (as well as additional aspects of syntactic development).

Hänel found an early stage (until 2;3 for one child and 2;7 for the other) during which the children did not productively use verb agreement with either present or nonpresent referents. The children used the "citation" form of agreeing verbs during this period, just like what has been reported for ASL. During phase II, however, both children productively used verb agreement with present referents and with nonpresent referents. That is, Hänel did not find the same kind of delay in the use of agreement with nonpresent referents reported by other researchers working on ASL.

During phase II, then, verb agreement is productive with both present and nonpresent referents. This does not mean, however, that there are no cases of verb agreement errors during this time. In fact, Hänel illustrates an interesting commission error made by both children, in which the verb is signed twice—once moving toward the location associated with the subject, and then toward the location associated with the object. How many errors of commission or omission are made during phase II is not reported.

Overall, Hänel concludes that the mechanisms underlying verb agreement with both present and nonpresent referents are acquired simultaneously. The apparent difference in their use is attributed to performance, not competence.

We have seen a variety of results regarding the earliest appearance of verb agreement with present and nonpresent referents. In part, the variability of these results reflect the different foci of the studies, as well as different criteria used. Meier observed overall usage of agreement, but did not consider it acquired until it was used in 90% of obligatory contexts across three successive sessions—a very strict requirement. Hänel considers verb agreement to be productive if the form appears with more than one agreement verb, and is shown in several subsequent recordings. This is not as strict as the criterion used by Meier,

but more strict than simple first usage. In Hänel's early stage, then, agreement with present referents might have been used, although not productively. Other researchers report overall descriptions without figures (Loew), or present figures without a strict criterion of acquisition (Casey). Comparing across studies can thus only be tentative. However, there is general consensus that although agreement with nonpresent referents may be somewhat delayed with respect to that with present referents, this difference is attributable to the abstract performance demands of the latter (particularly, memory for spatial locations).

Omissions of Verb Agreement

All of the studies summarized thus far have in common the observation that children acquiring sign languages omit verb agreement in a sizable number of the obligatory contexts at an early age. This might be comparable to the observation in the spoken language literature that 2-year-old children frequently use a nonfinite (or uninflected) form where a finite form is called for. In English, this results in the use of bare forms such as "Mommy work," where an inflected form ("Mommy works/ worked/ is working") is called for. In languages with a morphological marker on the verb for the infinitive form, children's productions use this infinitive, such as the German *du das haben* (you that have-inf), and so this period has come to be known as an "optional infinitive stage"⁴ (Poeppel & Wexler, 1993; Rizzi, 1993/94; Wexler, 1994, 1998).

Studies of the acquisition of spoken languages have determined that the languages that most convincingly display such a stage are those that do not productively allow syntactic subjects to be omitted (i.e., nonnull subject languages such as English and German). Children acquiring languages with rich verbal morphology, which do allow subjects to be omitted (e.g., Italian), do not produce optional infinitive forms at anywhere near the same rate.

Are children acquiring sign languages going through an optional infinitive stage? Since sign languages are like Italian in allowing subjects to be omitted (in fact, objects may be omitted as well; see Lillo-Martin, 1986), it might be expected that children would not go through such a stage. Yet the studies cited above seem to indicate that they do.

To investigate this further, Lillo-Martin, Quadros, and Mathur (1998) took another look at young children's use of verb agreement in the

⁴In English, the infinitive form of the verb is simply bare: "run" ("to run" vs. "I run," "he runs"). In German, however, the infinitive (*laufen* "to run"), and the inflected forms (or *hielt*, "he runs") employ distinct morphological affixes.

development of ASL, and Brazilian Sign Language (*Língua de Sinais Brasileira*, LSB). They wanted to see if the pattern of agreement omission and null argument use was unlike that found for spoken languages. They examined nine sessions from two children ages 1;9–2;3 learning ASL, and 10 sessions from one child age 1;8–2;10 learning LSB. Each verb was categorized as to verb type (agreeing or not) and the agreement morphology used. They also categorized the subject and object as overt or omitted, in order to check these children's use of null arguments.

Lillo-Martin et al. (1998) found a surprising result. Unlike the previous studies, they found virtually *no* instances of verb agreement omission, even in the 2-year-old age range. That is, the children they studied consistently used verb agreement where it was required.

What can explain the different results found by Lillo-Martin et al. (1998) as compared with the other studies? Of course, it is possible that Lillo-Martin et al. might have miscoded children's use of agreement in some way. However, there is support for their conclusion from one other recent study. Berk (2003) examined the acquisition of verb agreement by children whose exposure to sign language began only after the age of 6 years. She found that these children had many errors of omission and commission in their verb agreement. As a comparison, Berk also coded verb agreement in one native signer, at the ages of 2;0, 2;6, and 2;9. Like Lillo-Martin et al., Berk found that agreeing verbs were used with virtually no errors during this time.

Another possibility is that Lillo-Martin et al. (1998) had a different standard for coding forms as agreeing. In particular, they observed the use of eye gaze during verb production, noting Bahan's (Bahan, 1996, Neidle, Kegl, MacLaughlin, Bahan, & Lee, 2000) argument that eye gaze is a nonmanual marker of agreement. If the child's manual form displayed some minimal movement in the agreeing direction, a more conservative coding might not count this as agreement. However, as long as eye gaze also marked the object, Lillo-Martin et al. counted such forms as displaying agreement. (There were not cases, however, where eye gaze would have been the only possible marker of agreement.)

Finally, there could be a difference in terms of which verbs are considered agreeing. In recent years, it has become clearer how to assign verbs to the category of agreeing or plain (Janis, 1995; Meir, 2002). In particular, only verbs that have [human] controllers can be marked for person agreement. Verbs with [location] controllers can be marked for spatial agreement. For some plain verbs, location can optionally be marked. Thus, these verbs might have been considered agreeing verbs in earlier studies, but would not be considered agreeing now. If the verb agreement omissions previously reported were primarily from verbs of this type, this would account for the much lower attribution of omissions in the recent studies. Interestingly, Meier (1982) reports that

in the earliest sessions of one of the children he investigated, she frequently used agreement with the verb TELL-NO, using it in two different agreeing forms at 2;2. Agreement was missing from verbs including POUR and DROP, which would not be considered agreeing verbs under many current classifications. Removing such verbs would bring the proportion of required agreement omissions down, although not to zero, since verbs including GIVE, TAKE, and GET are also reported by Meier as missing agreement. Also, Casey (2003) found many instances of obligatory agreement missing, although her classification of agreeing verbs is quite similar to that of Lillo-Martin et al. (1998).

The difference in results from these studies remains to be fully explained. All examined native signing children of about the same ages, yet some find many more errors of agreement omission than others. Studies of the acquisition of verbal morphology with children learning spoken languages have in general found relative consistency across speakers within languages, with wider cross-language differences. Are there wider differences across children learning a sign language? Or is there another reason for these different results?

Topics for Future Study

The conflicting findings regarding missing obligatory agreement call for more extensive research. Verb classification does vary from study to study and could account for an important portion of the differential results observed. However, it is clear that more work must be done to understand the different patterns of results just reviewed. Are the differences all due to different criteria used in coding? Do some children omit obligatory agreement while others progress without errors? Are there certain verbs or verb types that are more susceptible to agreement errors than others? These and related questions concerning the "optionality" of agreement in sign languages are of interest for understanding both how sign languages are acquired and more general questions about the acquisition of verbal morphology.

Studies of the acquisition of verbal morphology in spoken languages also suggest additional paths of inquiry. Researchers have attempted to account for children's problems with verbal morphology in different ways. Some researchers have suggested that children's early grammars allow tense to be omitted, while others claim that the uninflected forms used by children reflect nonadult understanding of temporal aspect rather than tense (Hoekstra & Hyams, 1998; Wexler, 1994). Both tense and aspect relate to the time of an event, but tense conveys its relation to the utterance time, while aspect conveys its duration (among other things). Previous research on sign language verbal morphology has not examined aspect, which could be a confound in the apparent different results on agreement. Examination of the development of verbal aspect in sign languages would contribute to this discussion.

As in many areas, further examination of the acquisition of verb agreement across sign languages would be especially appealing. Since sign languages seem to universally employ very similar agreement systems, they might be expected to display similar paths of development. However, sign languages do vary in their use of an auxiliary-like element with plain verbs; auxiliaries are found, for example, in Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT), LSB, and DGS but not ASL. This auxiliary seems to take the place of agreement in signs that fail to mark it for phonological reasons. It is well known that in spoken languages, the acquisition of verbal morphology is related to the acquisition of auxiliaries. Lillo-Martin et al. (1998) did not observe the use of an auxiliary in the child acquiring LSB they studied. How does the acquisition of agreement relate to the acquisition of the auxiliary system in sign languages?

Finally, there are many aspects of the relationship between agreement and sentence structure that call for additional study. Lillo-Martin (1991), Quadros (1995), and Hänel (2004) have all examined the acquisition of null arguments and verb agreement. These studies can be compared with each other and also should be re-examined under the more recent classifications of agreeing verbs. The relationship between agreement and word order is another area of great interest. In the next section, we examine several studies of the acquisition of word order.

THE ACQUISITION OF WORD ORDER

Around the age of 2 years, most children begin producing their first word combinations, or early "sentences." The word order of these first sentences or, more specifically, the order in which subject, object, and verb (S, O, V) appear has long been an area of interest to language acquisition researchers. In his highly influential book, Brown (1973) reported that children learning English exhibit mastery of the canonical (typical) order of their target language (SVO) from their earliest multiword combinations. Other researchers studying languages with greater word order variability than English (e.g., Park, 1970, for Korean; Slobin, 1966, for Russian) reported a similar pattern among children acquiring these languages. Some researchers proposed that this overreliance on a single word order (typically the canonical order of the language) was an early strategy for distinguishing subjects from objects until more advanced grammatical devices (e.g., case morphology) developed.

More recently, researchers working within the popular Principles and Parameters theory (Chomsky, 1981) – according to which children must discover the right "settings" for a variety of features (parameters) of their language – concluded that the parameters controlling canonical word order must be especially easy for children to set (e.g., Chabien &

Muysken, 1986; Wexler, 1998). Specifically, they proposed that the specifier-head parameter (responsible for the order of subjects with respect to the rest of the sentence) and the head-complement parameter (responsible for the order of the verb and object with respect to each other) are among the earliest parameters to be set. If this is true of all children, it would explain why even those acquiring languages with high word order variability initially adopt a fixed order strategy.

The investigation of word order acquisition in ASL is of great interest because ASL exhibits variable word order, thus providing a good test for the hypothesis that the word order parameters are set early, and the claim that children exhibit overreliance on the canonical order of their target language. It is all the more compelling because studies on the topic have come to contradictory conclusions. In early reviews of sign language acquisition (e.g., Newport & Meier, 1985), Hoffmeister (1978) is credited with discovering an overdependence on canonical SVO word order by his deaf subjects, confirming the patterns described above for English, Korean, and Russian. The apparent rigidity with which deaf children maintained canonical order, even once they had acquired morphological means for marking grammatical relations, led Newport and Meier to categorize word order as the only aspect of ASL grammar to be "acquired early and without error (if acquiring and consistently using the canonical order of a language with great order flexibility can be considered a nonerror)" (1985, p. 912).

The portrayal of early ASL word order as reliably canonical stands in stark contrast to the findings of more recent studies conducted by Schick and Gale (1996; Schick, 2002), Chen (2001), and Chen Pichler (2001), as well as Coerts and Mills (1994; Coerts, 2000) for NGT. All of these studies emphasize the frequently noncanonical order of early sign combinations, presenting a potential challenge to the notion of universally early setting of the word order parameters. In the following sections, we take a careful look at the relevant literature and conclude that the data reported so far are not necessarily contradictory. In fact, they are consistent with one conclusion: Deaf children acquiring ASL not only set the word order parameters early but also learn early on to modify the resulting canonical order in grammatical ways.

Word Order in ASL

Investigation of the acquisition of word order in ASL began at a time when sign language linguists were debating the properties of word order variability found in adult signing. While some claimed that ASL had no basic word order scheme (e.g., Friedman, 1977), Fischer (1975) and Liddell (1977) had argued convincingly that the basic word order for the language was SVO, and that departures from this order occurred as a result of various grammatical mechanisms such as object topicalization or "modulation" of the verb.

Topicalization refers to syntactic structures in which the grammatical topic (presupposed information) appears in sentence initial position (Fischer, 1974; Liddell, 1980). Objects are very frequently topicalized in ASL (although other constituents can also be topicalized), resulting in structures with the order O[topic], SV. In sign languages, topics are generally accompanied by a particular non-manual marker; the typical ASL topicalization nonmanual includes raised eyebrows and lengthening of the duration of the topicalized sign(s).

"Modulation" is described by Hoffmeister (1978), citing Kegl (1976), as the process by which verbs are made to indicate subject and object through spatial means, referred to as verbal agreement in modern terminology.⁵ Kegl noted flexibility in word order with "modulated" verbs, or verbs modified to move from the subject to the object, reinforcing earlier observations of word order variation associated with certain syntactic properties of the language. Additional contexts resulting in word order flexibility have since been identified and are discussed in greater detail below.

Is Early Word Order Strict?

Interestingly, the conclusion for which Hoffmeister (1978) is remembered and cited is not completely accurate. Although Hoffmeister did conclude that deaf children show strong preference for canonical word order in their early production, he also acknowledged variation and "error" in word order, particularly when verbal inflection is involved. His stated goal was not to document whether or not young deaf children display the same fixed word order strategy observed for hearing children, but rather how they transition from such a stage to one in which they can use adultlike verbal inflection and corresponding word order variation. Unfortunately, because Hoffmeister (1978) said so little about the many noncanonically ordered utterances produced by his subjects *prior* to their mastery of verbal inflection, he is remembered as claiming that noncanonical orders do not occur in the early sign combinations of deaf children.

Hoffmeister followed three deaf children acquiring ASL from deaf signing parents. Two deaf sisters, Alice and Anne, were filmed beginning at 24 months of age and continuing until 4;6 for Anne and 3;0 for Alice. A third child, Thomas, was filmed from 4;3 months of age to 5;7. All three children were filmed at home as they interacted naturally with their parents. The data were arbitrarily divided into four stages of development based loosely on age, and comparisons were made

Table 10-1: Percentages of Utterances Following Canonical Order in the Hoffmeister (1978) Data

Child, Stage	Total Subject-Verb Utterances	% Subject-Verb Order	Total Verb-Object Utterances	% Verb-Object Order
Anne, stage I	72	67%	26	58%
Alice, stage I	36	83%	15	60%
Anne, stage II	53	83%	34	62%
Alice, stage II	79	90%	57	88%
Thomas, stage II	189	87%	134	81%
Alice, stage III	181	86%	100	88%
Thomas, stage III	90	92%	75	87%
Alice, stage IV	541	92%	259	86%
Thomas, stage IV	251	87%	171	80%

between children at comparable levels of production (as determined by mean length of utterance, MLU).

Although Hoffmeister did not include a list of the actual utterances used for his analysis, he did specify that his analysis included only sentences containing an overt verb, and focused only on S, V, O, and locations (L; including either a phrase or a point [notated by Hoffmeister as PT]). For each child at each stage, Hoffmeister reported the frequency of eighteen possible ordering combinations. To answer the broader question of how often the children produced canonical ordering (in terms of preverbal subjects and postverbal objects), we have reorganized Hoffmeister's data by collapsing the counts.⁶ Table 10.1 summarizes percentage counts for each child at each stage.

At stage I, Anne and Alice followed canonical patterns (preverbal subjects and postverbal objects) for most of their recorded utterances. However, noncanonical sequences were also frequent. Of her utterances containing a verb and object, Anne produced preverbal objects 42% of the time (11 of 26 utterances), and Alice 40% of the time (6 of 15 utterances). Postverbal subjects, also exhibiting noncanonical order, appeared in 33% of Anne's utterances containing a subject and a verb (24 of 72 utterances) and 17% of the time (6 of 36 utterances) in Alice's. Interestingly, nearly all of the girls' postverbal subjects in this stage occurred in two-sign VS strings, as illustrated by examples CRY PT (this/doll) and

⁵ "Modulation" may also have included certain types of spatial or locative inflection. However, in this chapter we will substitute the current term "verbal agreement" for "modulation" and assume that it refers to subject and object features marked on the verb.

⁶ To arrive at the total percentage of preverbal subjects used by each child at each stage, we counted all utterances in which the subject appears before the verb and then divided by the total of all utterances containing both a subject and verb in any order, with or without additional constituents. Figures for the percentage of postverbal objects were similarly calculated.

ALL DOWN PT (this/clown). It is worth noting that both example sentences are acceptable in adult ASL, suggesting that the girls' VS utterances are *grammatical* instances of noncanonical order.

Hoffmeister also noted that Anne in stage I occasionally produced utterances such as example (10.1), in which a verb that allows inflection appears in citation form, without any change in space to indicate subject or object. Grammatical relations are made clear by the addition of indexes (points) to subject and object.

(10.1) PT(this picture) HIT PT(me/Alice)

"He/she (the person in the picture) hit me."⁷

At this stage, noted Hoffmeister, the children appeared to be oblivious to the word order altering potential of inflecting verbs and used them in canonical order, just like any ordinary verb.

At stage II, use of canonical preverbal subjects and postverbal objects increased and Hoffmeister reported that the sisters "have developed distinct preferences for basic sentence orders, either S-V or S-V-O." Although Alice and Anne now correctly inflected some verbs for subject and object, they continued to use overt arguments in canonical order with such utterances. Hoffmeister interpreted this redundancy as a learning strategy designed to ensure clear communication of grammatical relations while the children worked out the function and formation of verbal inflection. In addition to redundantly marking subject and object with inflected verbs, Hoffmeister's children also produced non adult-like OV sequences with verbs that do not allow inflection. Both types of errors persisted into stages III and IV, during which the percentage of canonically ordered subjects and objects remained similar to that found in stage II. Thus the overall characterization of word order during stages II-IV is strong preference for canonical order, even in conjunction with verb inflection that would normally permit the use of noncanonical order or null arguments.

The main conclusion of Hoffmeister (1978) was that deaf children acquire noncanonical orders gradually, discovering that verbal inflection is associated with word order variation after progressing through a stage where grammatical relations are redundantly specified. By the end of the study, all three children continued to favor canonical order, despite being able to use verbal inflection correctly. This is the conclusion for which Hoffmeister is widely cited in later work. In contrast, the early use by Anne and Alice of grammatical noncanonical orders independent of verbal inflection (viz., VS order) has escaped notice, but is also an important finding.

⁷We have modified Hoffmeister's notation somewhat to be consistent with current notational standards. Also, Hoffmeister does not include a translation, so we have provided one that we assume fits the gloss.

A more recent study reported in Schick and Gale (1996) and Schick (2002), investigating the way(s) in which deaf children specify grammatical relations in their early sign combinations, came to the conclusion that early word order is anything but strict. Schick (2002), the more comprehensive of the two reports, considered three possible ways in which deaf children might mark grammatical relations: (1) via canonical word order, as concluded by Hoffmeister, (2) via positional patterns specific to individual verbs, and (3) via context or pragmatics.

Whereas the Hoffmeister study followed a small set of children over the course of many months, the Schick study included data for 12 children carefully controlled for age and parental deafness, but filmed at a single point in their language development. Each child was filmed within two weeks of his second birthday, interacting naturally with a parent. A total of five hours of data was recorded for each child, spread over two to three days. All multi-word utterances including a verb were coded for agent—the one doing an action—and theme—the entity that moves in an action (to avoid any grammatical bias inherent in identifying subjects and objects).

Like Hoffmeister, Schick (2002) reported little use of ASL verbal morphology by her subjects at this stage. She noted that this is consistent with the general consensus that "children do not have mastery of the complex morphological system that accompanies alterations from SVO order" (p. 147) in ASL. However, whereas Hoffmeister emphasized a strong canonical word order strategy for marking grammatical relations, Schick found no evidence for this strategy in her data. Of the multisign utterances including an overt theme argument, anywhere from 43% to 68% (mean, 56%) displayed canonical verb—theme order. Thus, with respect to verbs and themes (objects), children only appeared to choose canonical order roughly half the time, far less often than found by Hoffmeister (1978).

Overt agent arguments were considerably less frequent in Schick's data than overt themes, occurring on average in only 7% of the children's multisign utterances. With the exception of two children who used canonical agent-verb order in 100% of their multisign utterances containing an agent, no child used this order more than 78% of the time (mean, 66%). Furthermore, the two children who used agent-verb order 100% of the time only actually produced one and four utterances with an agent, respectively. Thus, once again, Schick's findings departed dramatically from those of Hoffmeister (1978).

Having ruled out canonical order as a strategy for specifying grammatical relations, Schick next explored the possibility that children follow positional preferences based on individual verbs. This concept was inspired by the Verb Island Hypothesis advanced by Tomasello (1992), by which children assign grammatical properties to verbs on an individual basis, rather than generalizing across the entire class of

verbs in the target language. Thus, Schick investigated the possibility that children might have consistently used verb–theme order with one verb (e.g., EAT COOKIE, EAT SANDWICH), but theme–verb order with another (e.g., BALL WANT, DOLL WANT). Particular patterns would also presumably vary across different children, giving the initial impression of randomness.

The three children with the highest mean length of utterance in words (MLU) were selected for detailed examination of their multisign utterances. The results indicated that no child showed strict positional patterns for specific verbs, although in several cases positional *tendencies* were observed. For example, subject 1 showed almost exclusive use of theme–verb order for the verbs LOOK-FOR and PUT-IN, and verb–theme order for the verbs EAT, SEE, and DRINK. However, the same subject produced some verbs such as WANT and LIKE in both canonical and non-canonical orders, with roughly equal frequency. Table 10.2, extracted from Schick (2002), lists all verbs used a minimum of four times in multisign utterances by child 1, as well as the number of times each verb appeared in verb–theme and theme–verb order, respectively.

Due to the general paucity of verb + agent combinations, these were not included in the analysis. Schick noted that the limited data available did not appear to indicate any positional patterns. Subject 1 produced a fair number of agents (42 in all), but used both preverbal and postverbal order for the same verb, as illustrated by the examples with WANT and EAT in table 10.3.

Schick (2002) concluded that although her subjects did not demonstrate any overall word order pattern used for disambiguating grammatical relations, there was some evidence that word order patterns existed on a verb-to-verb basis. However, positional patterns alone clearly do not account for all the word order variation in the data. Schick proposed two additional factors that could plausibly contribute to word order variability. First, she noted the frequency of topicalized objects in typical ASL. This might have led children to

Table 10-3: Positional Variability with Sample Verbs From Schick (2002)

Examples with AGENT + WANT	AGENT + EAT
WANT ME	
ME WANT POINT-object	
ME WANT GRAPES	
EAT ME	
DADDY EAT	

associate topic noun phrases (NPs) (i.e., presupposed information) with preverbal position. However, topicalization in children's production may have been obscured by the absence of the adult nonmanual marker, reported to emerge around 3;0 (Reilly, McIntire, & Bellugi, 1990). A related possibility is that deaf children view word order variation as encoding pragmatic distinctions (e.g., old vs. new information). Studies of Turkish, a language with highly variable word order, indicate that children manipulate order in pragmatically appropriate ways from around age 2;0 (Aksu-Koc & Slobin, 1985).

Schick's study demonstrates that deaf children use a variety of word orders, "[reflecting] the diversity of word orders that they see in their input" (Schick 2002, p. 157). Thus they are aware that certain noncanonical orders are permitted in their language and produce preverbal objects associated with topicalization and verbal agreement, for example, despite lacking control of the nonmanual marker and inflectional system required to correctly mark these departures from canonical order.

Is Early Word Order Grammatical?

Both Hoffmeister (1978) and Schick (2002) repeatedly mentioned that certain aspects of ASL grammar associated with word order change, such as topicalization and verb agreement, reportedly emerge late in deaf children. While these particular aspects of ASL grammar may be beyond the capacity of 2-year-old children, there may be other order-modifying processes that are already acquired by this age. Chen (2001) and Chen Pichler (2001) investigated early multisign productions with respect to two syntactic devices observed to trigger noncanonical order in adult ASL: subject pronoun copy and nonagreement verbal morphology⁸ (handling, spatial, and aspectual inflections).

⁸It has been argued elsewhere (recently, as well as at the time that the Hoffmeister study was conducted) that agreement morphology also licenses noncanonical word order, but Chen Pichler does not discuss this.

Table 10-2: Positional Patterns With Individual Verbs From Schick (2002)

Verb	Verb–Theme	Theme–Verb
WANT	5	9
EAT	9	1
SEE	5	1
DRINK	4	0
LIKE	2	2
PUT-IN	1	5
LOOK-FOR	0	4

Subject pronoun copy (Padden, 1988) produces a sentence final index coreferenced with the subject, as shown in example 10.2. As Padden notes, the preverbal subject itself may be implied rather than explicit, as indicated by the parentheses. The pronominal index is glossed IX, with the object being pointed to following, in parentheses.

- (10.2) (BABY) SLEEP IX(baby)
 “(The baby) is sleeping (he is).”

Crucially, the subject copy must be a pronoun; full NPs in this position are ungrammatical. Postverbal subjects of this kind are extremely common in adult signing and have been described by Padden (1988) as having a pragmatic function of adding emphasis or confirmation.

Nontopicalized, preverbal objects are normally considered ungrammatical in ASL, but grammatical preverbal objects occur when the verb is inflected with aspectual, spatial or handling morphology, as illustrated in examples 10.3–10.5, respectively.

- (10.3) PAPER TYPE_{asp}⁹
 “(She was) typing (and typing) her paper.”

- (10.4) MONEY PUT-ON-TABLE
 “Just put the money on the table.”

- (10.5) ... SHOES TAKE-OFF-shoes
 “(In Japan, before entering a house, people) take off their shoes.”

In light of their similar effects on word order, Chen Pichler grouped aspectual, spatial, and handling morphology together as a class in ASL, collectively referred to as *reordering morphology*. Following a derivation for preverbal objects of aspectual verbs proposed by Braze (2004), she proposed that the syntactic tree for ASL includes a functional projection for encoding features such as aspect, location, and instrument. Chen Pichler labeled this projection “manner phrase” and proposed (in line with theories of spoken language morphology) that all verbs with reordering morphology must move to this projection to “check” their aspectual, spatial, and/or handling features. Chen Pichler further proposed that manner phrase branches out to the right, such that checked reordering verbs appear to the right of their object. This is consistent with the OV order observed in sentences with reordering verbs.

Chen Pichler (2001) followed four deaf children of deaf, signing parents, acquiring ASL as their native language between the ages of roughly 20–30 months. The children, referred to by their pseudonyms Ned, Sal, Jil, and Aby, were videotaped on a weekly/biweekly basis at

⁹The subscript *asp* indicates that the verb is produced with durative or continuative aspect.

normal play. All utterances that included a verb plus a subject and/or object were counted for analysis, excluding any utterances judged to be imitation of a prior adult utterance.

Chen Pichler’s analysis revealed that the children used canonical word order inconsistently, similarly to the children in the Schick (2002) report. They used predominantly canonical orders one session and then non-canonical orders the next, giving the overall impression of random word order choice. Table 10.4 summarizes the children’s use of canonical preverbal subjects and canonical postverbal objects during the period of study.

At first glance, the children’s inconsistent reliance on canonical order would appear to indicate failure to set the basic word order parameters by 20–30 months of age. Such a finding would be in stark contrast to those reported for spoken language acquisition, where the word order parameters are reportedly set extremely early (Clahsen & Muysken, 1986; Wexler, 1998). However, Chen Pichler (2001) reasoned that the apparent randomness of the data need not indicate failure to set the word order parameters, but might indicate instead that the children were using grammatical noncanonical orders *in addition* to canonical order. To test for this possibility, she inspected all instances of postverbal subjects and preverbal objects for evidence of subject pronoun copy and reordering morphology, respectively. Chen Pichler adopted the following criteria for identifying reordering operations: for subject-pronoun copy, the presence of a sentence-final subject in pronoun (index) form (i.e., a point); for aspectual OV, repetition of the verb in large movements with extended duration; for spatial OV, articulation of the verb toward or at a specific location, with corresponding eye gaze; and for handling OV, use of a handling classifier in articulation of the verb.

In their SV combinations, all four children favored pronoun subjects over full NPs in postverbal position, consistent with subject-pronoun copy. Samples of postverbal subjects counted as subject-pronoun copy are given in example 10.6.

- (10.6a) I SEARCH_{asp} I (Aby, 29.5 months)
 “I’m looking and looking (for my shoes).”

Table 10-4: Use of Canonical Word Orders From Chen Pichler (2001)

Child	Total Utterances with Overt Subject	Percentage Preverbal Subject	Total Utterances with Overt Object	Percentage Postverbal Object
Ned	68	72%	25	52%
Sal	50	54%	44	32%
Jil	33	73%	50	50%
Aby	98	57%	76	50%

poor understanding of word order phenomena in adult ASL. Non-topicalized preverbal objects, in particular, seem to occur frequently in ASL and may be the result of object shift, movement of the verb to the sentence final position, or both. Verbs presumably move syntactically for morphological reasons, as briefly described above, but there is no consensus on the types of morphology that trigger movement, or on the functional projection(s) targeted by such movement (the proposal for manner phrase by Chen Pichler being only a working proposal with few details of the derivation worked out).

Once we have a better idea of the patterns of word order variation that occur in normal adult ASL, we can address the question of whether these patterns are altered in child-directed signing and, if so, what effects these changes have on children's word order choices. It is likely that many aspects of ASL development are susceptible to input patterns. To date, very few studies have focused on word order in child-directed ASL and corresponding effects on children's word order choice (but see van den Bogaerde & Mills, 1994, for NGT).

Another area that requires further research is the development of topicalization. Object topicalization is a noted source of preverbal objects in adult ASL, yet the status of this construction in children's early production has not yet been seriously investigated (but for preliminary discussion, see Chen Pichler, 2001; Reilly, McIntire, & Bellugi, 1991). The emergence of topics, in turn, is linked to children's development of pragmatic distinctions such as old versus new information and the knowledge that only old information can function as topics.

Finally, there is always a need for more research conducted using disparate methodologies and focusing on different sign languages. All the word order studies cited in this summary rely on spontaneous production data. This is due to the fact that children begin producing multisign combinations at 2;0 or younger, an age at which few children have the attention span required for experimental tasks. As the focus of early word order research broadens to include older children, experimental techniques such as elicited production and acceptability judgments become appropriate. Experimental methodologies will allow researchers to conduct studies on specific word order phenomena that may occur with low frequency in spontaneous signing. More studies focusing on sign languages other than ASL are also sorely needed, particularly non-SVO sign languages. Only via cross-linguistic comparison can we determine whether patterns observed for ASL are representative of sign languages more broadly, or simply language-specific artifacts.

SUMMARY AND CONCLUSIONS

We have examined in some detail the acquisition of two aspects of sign language morphosyntax: verb agreement and word order. We

have concentrated on these two areas because there has been sufficient research on them that interesting theoretical questions have been raised and addressed. We find tying studies of the acquisition of sign languages to theoretical issues in language development and linguistics to be of utmost interest and importance. Only by the examination of data from all language types can truly explanatory theories be developed.

Our overview has only scratched the surface of "acquisition of syntax." Studies of other areas of syntax have been conducted or are in progress. As an illustration, consider Morgan (chapter 13 this volume) on morphosyntax in British Sign Language, Reilly (chapter 11 this volume) on nonmanuals (an important part of the syntax of sign languages), Schick (chapter 5 this volume) on classifiers (prevalent across sign languages), and Shaffer (chapter 12 this volume) on modality (an issue not yet well studied). We are involved in additional studies of the acquisition of syntax as well, including studies of wh-questions (Lillo-Martin, 2000, Lillo-Martin and Quadros 2004a) and focus (Lillo-Martin & Quadros, 2004b).

We look forward to the outcomes of these and additional studies on the acquisition of syntax in sign languages.

ACKNOWLEDGMENTS

The preparation of this chapter was supported in part by National Institutes of Health grant NIDCD 00183 to D.L.-M. We thank our sign models, Brenda Schertz and Doreen Simons-Marques.

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