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Classifier Constructions and Morphology in Two Sign Languages

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> We see then, in Sign, at every level—lexical, grammatical, syntactic—a linguistic use of space: a use that is amazingly complex, for much of what occurs linearly, sequentially, temporally in speech, becomes simultaneous, concurrent, multileveled in Sign. The surface of Sign may appear simple to the eye, like that of gesture or mime, but one soon finds that this is an illusion, and what looks so simple is extraordinarily complex and consists of innumerable spatial patterns nested, three-dimensionally, in each other.
>
> —Oliver Sacks 1989 (p. 87)

CREOLES AND THE MORPHOLOGY OF SIGN LANGUAGES

For several years, we have been studying sign language morphology from the perspective of an observation that has surfaced with regularity over the short history of sign language linguistics: that sign languages are like creoles, in both their genesis and their structure (Bickerton 1977; Fischer 1978; Feldman, Goldin-Meadow, & Gleitman, 1978; Gee & Goodhart 1985, 1988). The influence of this idea has only grown over time, so that very recently, the development of Nicaraguan sign language morphology, which has been documented in some detail since its inception in a school in Managua in the late 1970s (Kegl, Senghas, & Coppola , 1999; Senghas, 1995), has been taken as a paradigm example of creole genesis, of value not only to sign language researchers, but also to creolists and those interested in language acquisition, language change, and basic linguistic theory. It is not hard to understand why so many researchers have so quickly come to feel a similarity between sign languages and creoles: both types arise under conditions in which the primary linguistic data that serve as the basis for a child's native language come from nonnative speakers. In the case of creoles, the standard definition is that the language that children are exposed to, on the basis of which they must formulate the creole, is a pidgin, no one's native language. In the case of sign languages, only a small fraction of signers (around 8.5%) are raised in households with even a single signing parent or sibling and are thus able to acquire a sign language as their true native language (Gallaudet Research Institute, 2000). Even in this situation, the parent is almost never a native signer, so that, just as with creoles, the child acquires the sign language on the basis of data supplied from a nonnative user. Even in the United States, which has a large community of signers of a single language, American Sign Language, a vanishingly small fraction of native signers are born into households where even one parent is a native user of the language. Thus, almost no signers acquire their language on the basis of native-user input. Most signers in developed countries acquire their sign language at school, usually past the very early childhood years when language acquisition is at its best, and the structure of the signing community guarantees that this will remain true. In recent years, however, there have been programs to promote use of sign language by hearing parents, including parent–infant programs where parents can learn sign language while their children are still young. Despite these recent initatives, for the most part, sign languages, unlike creoles, will always have a large proportion of nonnative users. We will give examples later of how the need to maintain communication across a broad spectrum of levels of competence affects sign languages.

Spoken creoles and sign languages share other features. All known creoles and sign languages are young, having all been created in the last 200 years or so. Because they are young, we do not expect them to have accrued all the quirks that affect older languages, and so they may be closer to language in its unmarked state. And indeed, all creoles and all sign languages have little sequential affixation of any kind, derivational or inflectional (McWhorter 1998). Of course, the fact that a language lacks sequential affixation does not in itself mean that the language is new or a creole. After all, Vietnamese has no affixation at all (Thompson 1965) and the Chinese languages are quite impoverished affixationally, with Mandarin having only about twenty affixes at most.[2] But regardless of why these other languages have little morphology, it is reasonable to ascribe the dearth of sequential affixation in both creoles and sign languages to their youth. Despite these similarities, however, unlike creoles, all sign languages that have been investigated in any detail so far have complex morphology. The morphology of sign languages tends to be nonconcatenative or "simultaneous" rather than sequential. An example is verb agreement, which we describe below. This is trebly peculiar. As young languages, sign languages should have little morphology of any kind, let alone inflectional agreement. In addition, nonconcatenative or simultaneous morphology is much less common in spoken languages than is sequential affixation: although most spoken languages have sequential affixation but no simultaneous morphology, no spoken language we know of has simultaneous morphology but no sequential affixation. We have argued elsewhere (Aronoff, Meir, & Sandler, 2000) that the complex pattern of simultaneous agreement morphology found in sign languages, and so remarkably similar across them, is rooted in the medium of these languages: sign languages show agreement because they can do so directly and iconically. Spoken languages can only show agreement if they have had the chance to develop both noun classes and the necessary morphological markers. And indeed, although it is a hallmark of the Indo-European family with which we are most familiar, agreement morphology is not widespread among the spoken language families of the world.

Besides agreement, two other types of morphological processes are pervasive among sign languages: verbal aspect and the use of classifiers, which is the theme of this volume and hence the subject of our chapter. We follow here the general methodology of our research project, which is to compare directly two sign languages, American Sign Language (ASL), and Israeli Sign Language (ISL). Because it is by far the less studied of the two, most of the descriptive detail of our work is devoted to ISL.

One major theme of our research has been the extent to which the structure of sign languages is grounded in the medium of their transmission. In particular, we find that the visual nature of sign languages makes it relatively easier for them to encode spatial and temporal information than for spoken languages. By comparing two unrelated sign languages, we are able to make more firmly supported claims about which aspects of sign languages are grounded in the medium and which are properties of each individual language.

Another major goal of our research, which is highlighted in this chapter, is to see to what extent we can find differences between relatively older and younger sign languages. ASL is among the oldest sign languages known. It can be traced directly to the founding of the first American School for the Deaf in 1817. The roots of ISL are somewhat less clear, though clearly it is much younger than ASL. The deaf community in Israel started to form in the late 1930s and early 1940s. In the early stages, ISL was probably influenced by immigrants and teachers from Germany; and in the late 1940s and the 10 years that followed, by immigrants from North Africa (Meir & Sandler, in press). On the assumption that languages become more conventional with history, one would predict that ASL should show more conventionalization than ISL. We show that this is indeed true, at least within the restricted area of classifiers. We also show, though, that even ASL, despite its greater conventionalization, retains depictive and iconically grounded signs and grammatical structures of the sort that we find in ISL.

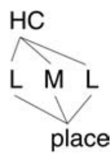
We also compare our findings on ISL and ASL to those of Kegl et al. (1999) on Nicaraguan Sign Language. These authors use the difference between two cohorts of signers, who may be characterized as users of a pidgin and its consequent creole, to argue for a “catastrophic” view of creole genesis. We show that some of the same sorts of differences that they observed hold between ISL and ASL. Because both ISL and ASL are full-fledged sign languages with native users, it follows that the differences between these two, at least, cannot be ascribed to catastrophic metamorphosis, weaking the generality of Kegl et al.’s (1999) claim.

We begin this chapter with an overview of the morphophonology of sign languages, demonstrating what is meant by simultaneous and sequential in these languages. We then turn briefly to typical examples of each—verb agreement versus some sequential affixes—to establish our frame of reference. Focusing on classifiers, we compare the systems in ASL and ISL, suggesting that certain differences between the two languages may be due to the differences in their ages. Another well-known diachronic phenomenon, the “freezing” of classifier constructions as unanalyzed lexical items, is also described in some detail. This approach, which examines synchronic phenomena from a diachronic perspective, informs our position on the creole issue.

SIMULTANEITY AND SEQUENTIALITY IN SIGN LANGUAGE MORPHOPHONOLOGY

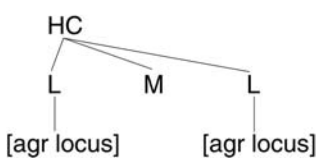
It is generally acknowledged that sign language morphology has a simultaneous quality. Inflectional and derivational functions are often described as layered upon or nested in basic forms of signs (e.g., Bellugi & Fischer, 1972; Klima & Bellugi, 1979). More recently, it has been demonstrated that a purely simultaneous description is flawed, and that there is a certain amount of sequentiality to most signs (e.g., Liddell, 1984; Liddell & Johnson, 1989). These two points of view are integrated in a model that focuses on morphological processes and compares sign language morphology to the "nonconcatenative" morphology found in Semitic languages (Sandler, 1989). The sign canonically assumes a prosodic LML template: a location, a movement, and another location.[3] A single basic hand configuration (HC) and a single major place of articulation normally characterize the whole sign, lending it its simultaneous appearance.

(1) Canonical sign form

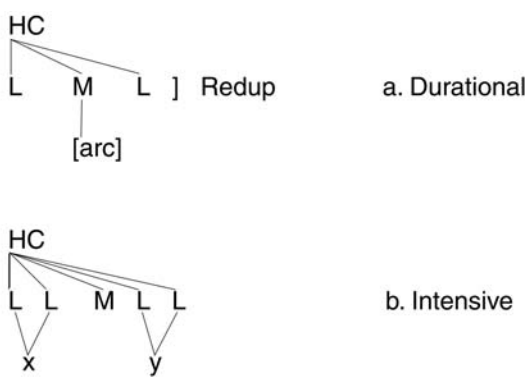


Many of the morphological processes that are most typical of sign languages respect this same LML template, simply altering the specifications of the location segment(s) or of the movement segment (Sandler, 1990, 1993, 1999a). Verb agreement, shown schematically in (2) and described in more detail in the next section, inserts particular agreement specifications into the location segments. Temporal aspect morphology, exemplified in (3), typically adds duration to locations or movements, or changes their features, e.g., changing a straight movement to an arc, and sometimes includes reduplication.[4] Examples from ASL are shown schematically below. In (3b), x and y stand for the feature complexes specified for each location.

(2) Verb agreement



(3) Temporal aspects



This is reminiscent of the derivational morphology of Semitic languages, as analyzed in McCarthy (1979, 1981). McCarthy named this type of morphology nonconcatenative, to stress the difference between it and the much more typical concatenative or sequential affixal morphology. In such languages, root consonants and morphologically distinct vowel sequences are associated to templates consisting of different prosodic patterns. Even those spoken languages that do have prosodic templates, however, also have a good deal of sequential affixation, e.g., for agreement. So at this point in the discussion, sign languages still look quite different from spoken languages, both because all sign languages seem to have this nonconcatenative type of morphology often called simultaneous, and because it is the most widely known kind in these languages.

We stress that this morphology is not simultaneous in the sense of being superimposed across an entire sign in holistic fashion. In each morphological process just represented, discrete sequential positions are selected for the association of morphological material. However, this material is associated with a position provided by the base sign or by the morphological template, and is not added before or after those positions. It is this superimposition of morphological elements on some part of a sign—a phenomenon that is more formally described as nonconcatenative—which we are calling simultaneous here.

SIMULTANEOUS MORPHOLOGY

Of the many morphological processes in sign languages that have been described as simultaneous in nature, we focus here on verb agreement. This process was first investigated in linguistic detail for ASL by Carol Padden (1988). Recently, Meir (1998; to appear) investigated and analyzed the system in ISL. We briefly review some of the properties of verb agreement, and then discuss what is behind the simultaneous morphology of sign language in general.

Verb Agreement

The simultaneous type we have investigated is verb agreement, a type of inflectional morphology found in all sign languages studied to date. *Verb agreement* in sign languages takes the following form: the beginning and ending points of the agreeing verb are associated with the points in space established for the arguments of the verb. These points have been called referential loci or R-loci by Lillo-Martin and Klima (1990). Consequently, the direction of the path movement of the verb is determined by the locations in space associated with the verb's arguments. The verb agreement systems of sign languages have three verb classes: plain, spatial and agreement (Padden 1988). Plain verbs have invariant beginning and end points; in particular, the direction of the path movement of these verbs is not determined by the R-loci of their arguments. *Spatial verbs* are those whose beginning and end points are determined by spatial referents, that is, locations. In *agreement verbs*, the beginning and end points are determined by the R-loci of their grammatical arguments. Agreement verbs are further divided into regular and backward verbs, the latter having a "backward" movement path (Padden, 1988), determined by the semantics of the verb (Meir, 1998a, 1998b, 2002). Different sign languages resemble each other in both the morphological instantiation of agreement and the meaning of the members of each class. This is not to say that all sign languages have identical agreement systems. Fischer and Osugi (2000), for example, found that in Nihon Syuwa (the Sign Language of Japan), an "indexical classifier," articulated in neutral space by the nondominant hand, marks the locus of agreement. However, in all of these languages, the tripartite classification of verbs still holds, as does the spatial and simultaneous nature of their instantiation.

This presents us with a typological puzzle. All sign languages we know of have this type of verb agreement and verb classification. Yet no spoken language that we know of has the tripartite classification into plain verbs, spatial verbs, and agreement verbs, and none show the particular sort of agreement found in sign languages. How can we account for this difference between signed and spoken languages?

Solving the puzzle involves the characterization of the morphological mechanisms involved in marking agreement in sign languages. Agreement verbs are composed of two argument-marking morphemes, each encoding a different aspect of the verb-argument relations, according to Meir's analysis. The path movement encodes the spatial thematic relations between the verb and its arguments: the direction of the verb's path is from the thematic source to the thematic goal. The facing of the hands encodes the syntactic relations between them: the hands face the syntactic object. The crucial point for accounting for the typological facts is the path movement morpheme, glossed as PATH, and, more specifically, the manner in which it encodes spatial relations. *PATH* is an iconic representation of its meaning—a unidimensional space with direction.

Sign languages, as languages transmitted in space, can represent this source-goal spatial relation iconically, and they all seem to exploit this possibility. This results in an identical verb classification in different sign languages. In spoken languages, however, it is physically impossible to express PATH directly. The expression of spatial relations in spoken languages is necessarily arbitrary, and therefore different languages may develop different means for encoding them, resulting in great differences among spoken languages. The striking cross-linguistic sign language similarity might suggest that languages—any languages—will use iconicity if they can. Sign languages, unlike spoken creoles, have extensive complex verb inflection. However, this inflection is an iconic representation of universal conceptual structures. What we find then is that sign languages develop complex morphology in case the morphology is an iconic representation of a conceptual category or relation. The universality of these categories and relations, and the fact that they can be represented directly in manual–visual languages, determine the similarity in form and structure among sign languages.

What Lies Behind the Simultaneity of Sign Language Morphology?

We have already said that the visuospatial nature of the medium accounts for certain types of morphology across sign languages, specifically, those morphological processes like verb agreement in which spatial relations can be directly represented by the hands. As we show presently, visual properties and spatial relations involved in the motion and location of objects that can be directly represented also occur abundantly in sign languages, in particular, in their classifier systems.

Another effect of the ability of sign languages to represent objects and events iconically is simultaneity of structure. In the physical act of giving, for example, the agent, theme and recipient are simultaneously visible and involved, and their expression in an agreement verb is similarly simultaneous. The simultaneity of sign languages has been explained on different grounds, namely, that it results from production and perception constraints . We believe that an explanation in terms of production and perception constraints is not an alternative explanation to ours, but rather that the two approaches address somewhat different issues, and that they complement each other. Emmorey (1995, in press) argued that vision, unlike audition, can easily perceive in parallel fashion information that is spatially disparate. In other words, the visual processing system is not overburdened by the simultaneous presentation of distinct units of information. If correct, this may explain in part why the morphological formatives are simultaneously encoded;

they can all be perceived at once. From the production perspective, it has been found that signs take a good deal longer to produce than spoken words, but that the length of a given proposition in English and ASL is about the same (Bellugi & Fischer, 1972). The latter authors suggest that constraints on short-term memory for processing the content of linguistic propositions may well be a factor here.[5] Production and perception constraints, then, can account for simultaneity, in both phonological and morphological structure. They can explain the strong tendency of signs to adhere to the LML template introduced above, the tendency of morphological processes to be simultaneous, and the tendency even of the products of concatenative morphological processes, such as compounding and "negative incorporation" in ASL, to conform to the canonical LML template over time (Sandler, 1993).

However, these constraints cannot predict which morphological categories are more likely to be encoded by simultaneous morphology, nor can they account for the fact that certain specific categories are encoded in a very similar way in all sign languages. Furthermore, they cannot explain the fact that the same categories that occur universally across sign languages are those that iconically reflect visuospatial structures. Our model addresses precisely these latter issues. It predicts that the categories that are likely to be encoded by complex simultaneous morphology are those whose real-world simultaneity of occurrence can be represented iconically. It is the iconicity of these categories, made available by the modality, that accounts for the cross-linguistic similarities among different sign languages, and the differences between sign languages and spoken creoles. These observations suggest that production and perception constraints, as well as the availability of iconinc representation of certain conceptual categories, both specific to the visuospatial modality, together conspire to yield the specific morphological structures that characterize sign languages, and sign languages only.

Despite the clear tendency toward nonconcatenative morphology, however, sign languages also take advantage of the concatenative or sequential option that is universally available to human language. We now turn to linear affixation in sign language.

SEQUENTIAL AFFIXATION IN SIGN LANGUAGES

In addition to the nonconcatenative processes found in sign language morphology, the concatenative or affixal kind, although understudied, also exists. We have investigated one affix in ASL—a negating suffix—and three in ISL—a perception–cognition prefix, a case marked pronoun that is in the process of becoming an enclitic, and a negating suffix that is quite different from the ASL negative suffix. We briefly describe those affixes below. We then turn to a model that attempts to explain the occurrence and properties of both sequential and simultaneous morphology found in sign languages.

The ASL '-ZERO' Suffix

The ASL negative suffix appears to be indigenous to the language, and grammaticalized from an independent word (Aronoff, et al., 2000; Sandler 1996a). Glossed ZERO, and translated 'not (verb) at all' the form is argued to be a suffix rather than an independent word for several reasons.

* Its order with respect to the verb is fixed and the verb-ZERO form cannot be interrupted with other words.

FIG. 3.1. ASL—ZERO suffix: UNDERSTAND–ZERO ('not understand at all').

* For some signers at least, the verb and suffix are fused phonologically and are obligatorily characterized by the same nonmanual articulations and postures.
* Some verb+ZERO forms have taken on special meanings that are not directly retrievable from the components.
* There is much variation across signers in this form's use, productivity, and ability to affix to verbs versus adjectives, from which we conclude that ZERO is still undergoing grammaticization.

The ZERO suffix also appears to have the properties of an affix as opposed to a clitic, according to criteria proposed in Zwicky and Pullum (1983). It is selective about roots, at least for some signers. It is phonologically nonneutral (changing the form of the base) in the following ways: it reduces lexical double movement to single movement (e.g., in READ-ZERO and DOUBT-ZERO), and it may delete the final location of the base (e.g., in SEE-ZERO). Finally, some forms negated with the ZERO suffix have semantically opaque meanings (e.g., TASTE-ZERO, 'not my type' and TOUCH-ZERO, 'not use').

Fig. 3.1 shows the ASL suffixed form, UNDERSTAND-ZERO, meaning 'not understand at all'.

Other affixes exist in ASL that have not been studied much yet. Well-kown ASL affixes are the comparative and superlative suffixes and the agentive suffix. Comparative and superlative suffixes are productive suffixes in ASL, possibly derived from the independent sign, MOST. There is also an agentive suffix that had been thought to have been borrowed by analogy with English -er. T. Supalla (1988) suggested, on the basis of evidence from early movies of ASL signers, that the form was actually grammaticized from a native ASL sign meaning 'person'. Whatever its origin, whether through borrowing or through grammaticization, the synchronic agentive ASL suffix has a different distribution pattern than English -er, creating, for example, LEARN-agentive (English: student, *studier), TYPE-agentive (typist, *typer), and OPERATE-agentive (surgeon, *operater).

ISL Sense Prefixes

In ISL, a set of prefixes has been discovered (Aronoff et al., 2000). These prefixes, which attach to verbs, nouns, and adjectives, appear to have descended from signs indicating sensory percep-

FIG. 3.2. ISL sense prefix: EYE-SHARP ('discern by seeing').

tion or cognition, and can be used to create forms that tend to bear meanings of the general form 'to do something by seeing/hearing/smelling (intuiting)', etc. For example, EYE-SHARP, pictured in Fig. 3.2, means 'to discern by seeing'. So far, about 70 such forms have been recorded.[6] There are good reasons to believe that the "sense" parts of these forms have become prefixes:

* Some prefixes have opaque meanings, e.g., EYE-RABBIT-EARS-DOWN, 'chicken out'.
* They always create verbs, even if the base to which they attach has no independent meaning or part of speech, or has a different part of speech, as in the case of SHARP.
* They obligatorily precede their base.
* Words cannot be inserted between them and the base.

Idiosyncrasies such as opaque meaning and less than full productivity are generally typical characteristics of stem level affixes (Aronoff & Sridhar 1987). Indeterminacy of the lexical category of the base is an additional idiosyncratic property of this ISL affix.

ISL Case-Marked Pronoun Enclitic

Another example of concatenative morphology in ISL that has developed through grammaticization is a particular pronominal sign, which is cognate to the sign PERSON in the language. Its function is to mark the (pronominal) human object of certain verbs, mainly psych verbs (e.g., WORRY, BE-ANGRY-AT), verbs with malefective meaning (e.g., INSULT, INFORM-ON, EXTRACT-INFORMATION-FROM) and verbs that select a "content" object (e.g., TALK /WRITE/ASK/READ [about]). This marker is analyzed as a case-marked pronoun (Meir, 2000), forming a paradigm with the unmarked indexical pronoun. There are distributional as well as prosodic clues indicating that this form is on its way to becoming a clitic.[7] It usually occurs right after the verb, with no other signs (such as negators) intervening in between, although in very specific contexts, such as for indicating contrast, the sign can occur in topic position, preceding its verb. Another indication that the form is cliticizing is the spreading of lexical facial expression characterizing specific verbs over the pronominal sign.

Unlike verb agreement, the case-marked pronominal clitic is apparently found only in one particular sign language, ISL. Some sign languages do not have a comparable form at all (ASL, Auslan, BSL). In other sign languages, such as Swedish Sign Language (Brita Bergman & Inger Ahlgren, personal communication, March 19, 1998) and German Sign Language (Rathmann, 2000), one finds a pronominal form that resembles the ISL PERSON pronoun. However, what little is known at this point indicates that there are important differences in the function, distribution, and co-occurrence restrictions of the form in each of these sign languages.

The ISL Negative Suffix

There are many different signs that have negating functions in ISL, including some that are formationally and semantically similar to the ASL -ZERO form. Unlike -ZERO in ASL, however, those negating signs of ISL function as independent words and not as affixes. They can be ordered in different ways in relation to other words in the sentence, and other words can come between them and the word they modify. Recently, however, a negative form has been discovered that behaves like a true affix. Like the other affixal forms discovered, it originated as an independent word and has been grammaticized. This ISL suffix has the meaning 'without', like the -less suffix in English (homeless). It is apparently grammaticized from an independent word meaning 'none'. Fig. 3.3 shows the suffixed word, ENTHUSIASM-NONE, 'without enthusiasm'.

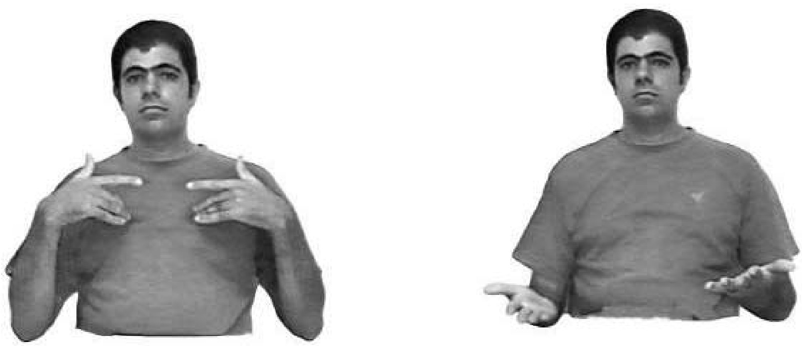


FIG. 3.3. ISL negative suffix: ENTHUSIASM-NONE ('without enthusiasm').

THE UNIVERSAL AND THE PARTICULAR IN SIGN LANGUAGE MORPHOLOGY

Because sign languages are new languages like creoles, sign language researchers have been puzzled by the fact that, unlike creoles, they exhibit complex morphology (see, e.g., Gee & Goodhart, 1988). In our investigation of sequential and simultaneous morphology in ASL and ISL (Aronoff et. al., 2000), we saw some generalizations about the two types that led toward an explanation. These generalizations are summarized in Table 3.1.

The explanation that emerges through considering these clusterings of properties is quite simple. The properties associated with the sequential morphology are what might be expected in a young language. The affixes have arisen through the normal historical course of

TABLE 3.1

Two types of sign language morphology[8]

Simultaneous	*Sequential*
Related to spatial cognition	More arbitrary
Productive; no lexical exceptions	Less productive to unproductive
No individual variation	Individual variation
Semantically coherent	Less semantically coherent
Universal across sign languages	Tied to specific sign languages
Morphologically underspecified	Grammaticized from free words

grammaticization by which affixes develop in any language modality. Because grammaticization of affixes takes time, the limited nature of affixal morphology in sign languages may be more the result of the youth of these languages than the result of their modality.[9] The simultaneous morphology and its characteristics, on the other hand, may be expected in sign languages despite the fact that they are creoles. This is because sign languages are uniquely suited to reflecting spatial cognitive categories and relations in a direct manner, as our earlier discussion of verb agreement showed. Thus, the key to understanding the difference between spoken creoles and sign languages is the facility with which the latter may represent iconically certain conceptual functions. Because of the unique compatibility of form with meaning available to sign languages, they retain their simultaneous morphology even as they add sequential morphology, which eventually becomes established and conventionalized. The arbitrariness of linguistic signs is considered by most linguists to be a defining property of natural languages. Our line of reasoning, developed more fully in Aronoff et al. (2000), suggests that iconicity is a desirable property in language, but that it is not found much in spoken languages because they are not suited to extensive use of direct mapping between form and meaning. Languages that are produced by two intricately manipulable articulators and perceived visually are suited to such direct mapping. Sign language signs are iconic because they can be. Spoken language signs would be iconic if they could; because they cannot be, they are arbitrary.[10]

CLASSIFIERS

One of the most frequently noted properties of sign languages is their apparently universal use of a system that depicts the movement and location of objects in space. In an early description of this system, T. Supalla (1982, 1986) called the nominal elements classifiers, linking them to noun classifiers found in certain spoken languages, notably native American languages.[11] Recently, there has been some debate over how similar such forms are to their counterparts in spoken languages (see, e.g., Schembri, chap. 1, this volume). We consider the label 'classifiers' to be acceptable for the sign language forms in question, according to the generally accepted definition of such forms: morphemes that classify nouns according to semantic criteria (see Senft, 2000a, 2000b).

Of the myriad types of noun classification found in spoken languages, sign language classifiers are best compared to what Grinevald (2000) called verbal classifiers—classifiers that take the form of verbal affixes.[12] In addition to formal categorization, Grinevald offers a semantic typology of classifiers, of which two types are clearly similar to those found in sign languages: 'essence categories', and 'physical categories'. Two examples will suffice, one from Cayuga, and one from Digueño. In each example, the classifiers are printed in boldface type. The Cayaga example *treht*- (VEHICLE) falls into the 'essence' category of verbal classifier. It is comparable to sign language 'semantic' or 'entity' classifiers, on semantic grounds, and also on morphological grounds, in that it is a bound morpheme, like the ASL VEHICLE classifier. Here we use the term 'entity classifiers' for these forms, already current in the sign language literature (Engberg-Pedersen, 1993; Schembri, chap. 1, this volume).

(1) Cayuga (Mithun 1986; pp. 386-388)
Skitu ake'-**treht**-ae'
Skidoo I-CL (vehicle)-have
"I have a skidoo.'

The prefixes in the Digueño example, are classifiers that refer to some physical property of a nominal; a LONG OBJECT, a SMALL ROUND OBJECT, or a BUNCH OF OBJECTS, in these examples. In Grinevald's semantic categorization, these are of the type that represent 'physical categories'. As bound forms classifying nominals according to physical properties, such classifiers are comparable to Size and Shape Specifiers of sign languages (T. Supalla, 1982), such as SMALL-ROUND-OBJECT, CYLINDRICAL OBJECT, FLAT OBJECT, etc.[13]

(2) Digueño (Langdon, 1970, p. 78; cited in Grinevald, 2000)

a'mi…	'to hand (a long object)'
tumi…	'to hand (a small round object)'
a xi …	'to drag (a long object)'
c' xi …	'to drag (a bunch of objects)'

These examples are not identical to the classifiers of sign languages, neither in form nor in distribution. But using the same label for these morphemes in spoken and signed language—justified on definitional grouns—has the advantage of encouraging comparison among the various classifier systems, which is likely to result in a better understanding of sign language classifiers and their behavior. In any case, for us, the fact that sign language classifiers do not behave identically to those of Cayuga or Digueño does not justify removing the label, 'classifier' from the sign language forms, any more than it would be justified to say that the Cayuga forms are not classifiers because they are not the same as the Digueño classifiers, or to call neither of them classifiers because both are different from the numeral classifiers of Kilivila (Senft, 2000b).

It may be useful to mention also two types of classification that are not comparable to those of sign languages. Sign language classifiers are not similar to the classificatory verbs of Navajo and other languages with which they have sometimes been compared.[14] In fact, Grinevald (2000) argues that such verbs do not involve classifiers in spoken language either, as the 'classification' is achieved by suppletive verb stems and not by any nominal element. Nor are sign language classifiers comparable to the numeral classifiers that figure prominently in Allan's (1977) survey, which are more blatantly classificatory in nature than are verbal classifiers.

It seems that verbal classifiers (unlike numeral classifiers) often play a stylistic role in shaping a discourse—referent tracking, backgrounding, modifying, etc.— and that their classificatory function may be secondary. So, it is not only the semantics and affixal character of verbal classifiers that allow for a comparison with those of sign languages, but some of the expressive functions they perform as well. Due to space considerations, we will not elaborate here, but we refer readers to Sandler & Lillo-Martin (in preparation) for a more detailed discussion of classifiers in spoken and signed languages.

Relevant to our discussion is Supalla's distinction between those classifier constructions which involve use of hands and those which involve use of the body or body parts. In the former, there are several categories of forms, including (a) size-and-shape specifiers (SASS) which depict shapes, outlines, and relative sizes of objects[15]; semantic classifiers or (b) "entity classifiers" (Engberg-Pedersen, 1993; Schembri, chap. 1, this volume), which are less depictive and represent a broad class of noun objects; and (c) handling classifiers, which represent the human hand manipulating an object. In all these forms, the hands are depictive of features of objects, either their physical features or more abstract semantic features. In contrast to classifier constructions involving the hands, Supalla refers to what he calls *body classifiers*, in which the signer's head and body take on animacy, and become representative of the body of the animate referent, including head, limbs and torso. In the Nicaragua study (Senghas, 1995; Kegl et al., 1999), such expressions are called *whole body signs*. Engberg-Pedersen (1993) also described how the head and body are used in this system, but she referred to the body classifier as a "referent projection," where the referent or entity is projected to the body. Without taking a position as to whether the body acts as a classifier in these forms, or whether or not the resulting structures are discrete signs as the term whole body sign implies, we adopt Engberg-Pedersen's (1993) neutral term and call them referent projections.

Classifier Constructions in ASL and ISL

Our study relies primarily on two sources of data. One is a videotape of a collection of short narratives especially rich in classifier constructions, created for training interpreters (Interpreting Consolidated, 1998). This tape was translated into written Hebrew and then into ISL by our consultants. The other is the elicitation of a range of classifier constructions in the two languages, in isolation and in specially created contexts, conducted in our lab by Carol Padden working with ISL consultants. In both cases, we were comparing the same types of data in the two languages. All data were recorded on videotape.

In the context of our research program, we are interested in the nature of classifier constructions in the two sign languages we are studying at a descriptive level, and in how these structures can help us develop an explanatory model of sign language morphology. We pay special attention to different devices that may be used within the classifier system for essentially the same function: the use of the hands versus the use of the body, and the use of entity classifiers versus the use of SASS classifiers. After discussing these devices in ASL and ISL, we turn to their implications for our model.

The Hands Versus the Body. ASL commonly uses hand classifiers to depict animate entities in motion. For example, in the sentence, *The man took his dog for a walk*, a signer could use either an upright index finger, indicating 'upright human walking' or an inverted V hand with fingers wiggling to depict walking. Simultaneously the other hand could be characterized by a bent V 'crouch' shape to represent 'animal walking'. Or, to depict two birds sitting on a tree branch, ASL signers would use both hands in V-crouch adjacent to one another.

In more performative ASL, or ASL used in storytelling, signers tend to use more referent projections (i.e., body classifiers or whole body signs). For example, a signer might use reference projection to show the demeanor and gait of a man walking and holding a leash, then quickly change the body demeanor to show a dog with front legs walking. It is understood from the quick sequence that the object at the other end of the man's leash is an animal, but the body does not move from side to side, nor are the signer's legs involved. Instead, the body remains fixed as the hands are used to depict the walking gait of the legs. After the event is expressed on the hands, the following sequence is expressed by the body:

(Man) TORSO-SWAYS. RIGHT-ARM-HANDLING-LEASH (Dog) TORSO-LEANS-FORWARD. ARMS-EXTENDED-OUTWARD-WITH-FISTS-ALTERNATING MOVEMENT.

In everyday language, signers can switch between hand classifiers and referent projections. When this occurs, referent projections are normally used briefly; long sequences of referent projections are seen as more appropriate for storytelling or poetic forms than for conversational ASL.

In ISL, we find more frequent and more extended use of referent projections in everyday conversation. Hand classifiers, particularly of the kind where each of the hands represents a different entity, are less common, though not absent. For a dog and a cat sitting together on the floor, ASL signers would commonly use the two hands in adjacent V-crouch form, but in ISL, we saw instead an example of a signer using his own upper body to show the body of the dog with the paws under the chin, then changing his body position and configuration to show the cat lying on one side with the front legs extended out. The comparison is shown in Fig. 3.4. in another example. An ISL signer used two different types of body projections to indicate a dog walking and a cat walking. ASL signers can also use such body forms but would tend to do so either while performing a story or in rapid sequence with hand animate entity classifiers.

In describing the use of agreement verb forms in Danish Sign Language, Engberg-Pedersen (1993) observed that older signers use fewer agreement forms marking first person patient or indirect object agreement. Instead they "use their head and body as referent projections in constructions with polymorphemic verbs" (p. 294), where the body becomes the recipient of an action, rather using the hands to direct the verb toward the R locus of the patient argument. Her observation suggests that over generations of Danish signers, there are changes in use of the body in agreement. When comparing ISL and ASL, we also see different emphases in use of the body, not to mark agreement, but in the use of classifier constructions. It is not our argu-

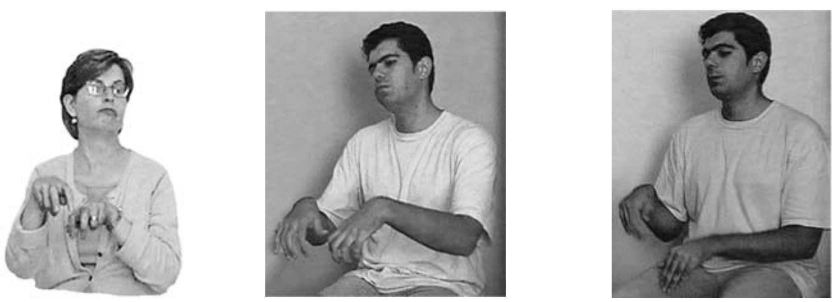


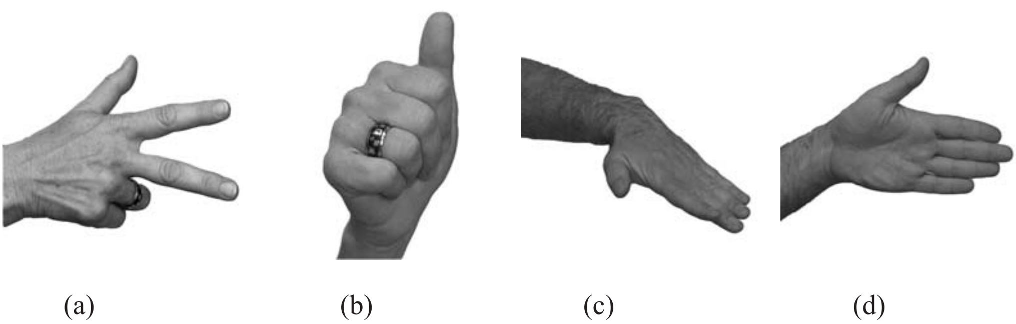
FIG. 3.4. ASL hand classifiers versus ISL referent projections: (a) FOUR-LEGGED ANIMAL (ASL) (b) DOG (ISL) (c) CAT (ISL).

ment that referent projections disappear in ASL; indeed they remain robust especially among popular storytellers. Referent projections are layered among conventionalized hand classifier forms. But in ordinary conversations in ASL, they are deemphasized in favor of SASS or entity classifiers.

Entity Versus SASS Classifers. In ASL, we also see more entity classifiers than SASS or handling classifiers compared to ISL. SASS and handling classifiers both represent a physical feature of a referent, be it its size and shape, or the shape of the hand in handling objects of different shapes or dimensions. Entity classifiers, or "semantic" classifiers in Supalla's terminology, categorize by membership in a semantic class that is more abstract than those of size-and-shape classifiers. The semantic classes are not necessarily determined by explicitly visual features; hence, the handshape representing the class is less iconic. ASL has two entity classifiers with particularly broad membership: the well-known VEHICLE classifier, and the A-upright, or OBJECT classifier pictured in Fig. 3.5. The ASL VEHICLE classifier can be used for cars, trucks, bicycles, trains, boats, submarines, and sometimes motorized wheelchairs. What the referents have in common is their semantic status as transportation vehicles; hence their classification as entity classifiers. In ISL, the classifier used for CAR can also be used for TRUCK (flat B-hand) but the upright B-hand is used for bicycles and trains. Neither can be used for BOAT; instead the two hands are used together to show the movement and general direction of the vessel. A submarine uses yet another handshape classifier. The shape and orientation of the referent determine the choice of classifier in ISL, as is typical of SASS classifiers.

The other ASL entity classifier with broad class membership is the A-UPRIGHT or OBJECT classifier, which can be used for an object as large as a building or as small as a vase on a shelf. For knickknacks of varying sizes and shapes arranged on a shelf, the OBJECT classifier can be used to show each, although their physical features may be very different, from a small sculpture to a vase or a china dish. In ISL, there is a "row" classifier, showing that objects are lined up on a surface, but to show each object would require the use of different size-and-shape specifiers. ASL also can show featural properties of each, by using a SASS to represent each different object on a shelf, but again, such forms are used when the detail is desirable. Otherwise the OBJECT classifier is used broadly for those objects.

Although we have found entity classifiers like LEGGED-ANIMAL in ISL, we have so far found none that are as abstract in meaning and form as the two ASL entity classifiers just described.



(a) (b) (c) (d)

FIG. 3.5. ASL entity classifiers (a) VEHICLE; (b) OBJECT (A-UPRIGHT), ISL SASSes (c) FLAT-OBJECT (CAR); (d) FLAT-OBJECT (BIKE).

Classifier Constructions and Sign Language Morphology

Our model of sign language morphology provides a context for understanding classifier constructions in the two sign languages. These structures, which involve complex simultaneous morphology and are related to the encoding of the motion and location of objects in space, are found in ASL and ISL, and apparently in all sign languages, as the model predicts. Yet there are notable differences between the two languages under study here, mainly in the ways the objects themselves are represented. We suggest that the differences, like the similarities, can be captured in our model. Both languages encode an event of motion by a complex, simultaneous morphological structure: the co-occurrence of the path movement with a particular handshape representing an object. This puts both languages in the *motion+figure* category in Talmy's (1983) typology. Additionally, both languages follow similar restrictions concerning those aspects of a motion event that may be encoded in classifier constructions. (See Talmy, chap. 8, this volume, for a detailed presentation of these restrictions.) These similarities are related to the manner in which the languages conceptualize an event of motion. As such, they are related to spatiotemporal cognition, and conform to our hypothesis that sign languages generally will have complex simultaneous morphology if it is a direct representation of spatiotemporal categories and relations.[16]

But classifier constructions also represent the object that is in motion or being located. And it is in this respect that we find differences between the two languages. One difference is between representation of the object on the hands, making the resulting form appear similar to conventionalized lexical signs, and mapping of the body of the referent onto the body of the signer, which is more motivated, or iconic. The other difference is whether the handshape represents a visual feature or a less iconic semantic feature of the object. We suggest that both of these differences may be attributed to the relative age of the two languages. In our earlier work, summarized in sections 4 and 5, we suggest that the relative scarcity of more arbitrary morphology appears to be a function of the relative youth of sign languages in general. On a continuum from motivated/iconic to arbitrary/abstract, our comparison of classifier constructions in ASL and ISL indicates that ASL is farther toward the arbitrary/abstract end than is ISL. Our model explains this difference in terms of language age.

The classifier systems of both sign languages are still relatively iconic, as our model predicts, because they reflect visuospatial properties of things in the world. And even as they move toward the more arbitrary, they still reflect their iconic origins. This makes classifier systems inherently different from the far more arbitrary affixes described in section 4 above, a difference that is also explained by our theory.

In the case of referent projections, we argue that older sign languages have conventionalized forms that are broader in category and more free of the constraints of the body—its physical fixedness and its starkly human and animate features. Historical work on the ASL lexicon has shown a tendency for signs to evolve from more iconic to more arbitrary in form (Frishberg, 1975). Our argument here, though related, is different from Frishberg's in two ways. First, we are dealing with the issue of arbitrariness in classifier constructions and not lexical items. Second, we are not arguing that sign languages develop toward more arbitrary or conventionalized forms in lieu of the more motivated or iconic ones. Instead we find that the body remains active even in older sign languages, appearing in sequence along with conventionalized forms, and returning full force in performance, where the detail and richness of the body can be exploited for dramatic effect. Crucially, our argument is that the difference between older and younger sign languages is not the presence or absence of referent projections versus classifier constructions, but differences in emphasis and in layering together of the two types of forms.

The ASL entity classifiers, which we described above as less iconic and more general in meaning than ISL classifiers representing similar concepts, may have followed the grammaticization path described in Zeshan (chap. 6, this volume). They may have undergone "desemanticization," from meanings that are more transparent to those that are more arbitrary and abstract. As grammaticization is a diachronic process, this is compatible with our suggestion that the age of a sign language is a factor in the development of classifier systems.

We are aware that we are comparing two different sign languages and not two stages of the same sign language. But it is significant in our view that all sign languages we know of use classifier constructions involving the same types of classifiers. The striking resemblance of this system across sign languages makes it reasonable to entertain our hypothesis that the particular kinds of differences we have found between a newer and an older sign language represent the diachronic development of classifier systems within a single sign language as well.

THE LEXICALIZATION OF CLASSIFIERS

The differences between classifier constructions in ASL, an older sign language with a large community of speakers, and ISL, a newer language with a smaller community, suggest that the system may become somewhat more arbitrary over time. A quite different diachronic process involving classifiers has been noted by researchers of several different sign languages. This is the entry of classifier constructions into the so-called frozen lexicon as simplex monomorphemic words (e.g., Engberg-Pedersen, 1993 [Danish SL]; Klima & Bellugi, 1979 [ASL]; McDonald, 1983 [ASL]; Schembri, 2000 [Australian SL]; Shepard-Kegl, 1985 [ASL]; Zeshan, chap. 6, this volume [Indo-Pakistani SL]).

Consider, for example, the ASL sign, FALL, shown in Fig. 3.6. It apparently originated as a classifier construction in which the hand represents the legs classifier of two-legged animals. Although the classifier construction handshape can only represent the class of nouns it classifies, namely, two-legged animals, the frozen sign has become more general in its semantic interpretation, taking also apples, boxes, even rocks as possible themes. The handshape, location, and movement components no longer have distinct meanings in the lexicalized sign. Formationally, the frozen form and the classifier construction are distinct as well. The movement and the originating location of the extant classifier construction may vary according to the event being described. The hands may begin at virtually any spot in the signing space and then move in one of a variety of patterns from straight to arc to spiral, for example. The frozen sign is

FIG. 3.6. ASL 'frozen' sign, FALL.

much more restricted in form. It is limited to a single rotating movement from a relatively high position in neutral space in front of the torso, to a relatively low one (Supalla, 1986).

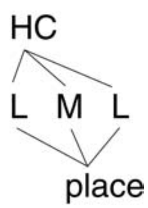
Although classifier constructions are sometimes referred to as verbs (e.g., T. Supalla, 1982) and by implication as words, we argue that they have no inherent prosodic structure of their own—they are not necessarily words. Rather, classifier constructions can span prosodic domains of various sizes, including entire intonational phrases and up to phonological utterances, in the terminology of Nespor and Vogel (1986). But when classifier constructions enter the lexicon, they assume the form of self-contained words, obeying strict constraints that generally characterize prosodic words (Sandler, 1999a, 1999b). In particular, as prosodic words, they conform to the tendency toward monosyllabicity and to Battison's (1978) dominance and symmetry conditions. We elaborate the formal process of lexicalization of classifier constructions in the next section.

The Prosodic Transition from Classifier Constructions to Prosodic Words

A *word* may be defined in terms of its morphosyntactic structure; e.g., its part of speech, meaning, morphological constituency, etc. But the phonological form of a word is also important to its definition and behavior in any given language. One aspect of phonological form is prosodic. For example, in spoken language, answers to the following questions determine the prosodic form of words: What is the shape of its consonant–vowel patterns? How many syllables may it have? How is stress assigned? In order to prepare the ground for our documentation of the journey of a classifier construction into the lexicon, it is necessary to sketch two types of prosodic constituents in sign language: the *prosodic word* and the *intonational phrase*.

Prosodic Words. The words of sign languages generally have a relatively uniform canonical phonological structure, shown schematically in section 2 and repeated here.

(4)



This representation encodes the widely observed generalization that signs tend to be monosyllabic (e.g., Coulter, 1982; Sandler, 1989), specifying only two locations and a single movement from one to the other.[17] The single, multiply-associated representation of hand configuration reflects the selected finger constraint, which requires there to be only be one group of selected fingers in a sign (Mandel, 1981). Two-handed signs have two severe restrictions on the nondominant hand, expressed by Battison (1978) in his Symmetry Condition and Dominance Condition:

(1) The Symmetry Condition states that (a) if both hands of a sign move independently during its articulation, then (b) both hands must be specified for the same handshape, the same movement (whether performed simultaneously or in alternation), and the specifications for orientation must be either symmetrical or identical.

(2) The Dominance Condition states that (a) if the hands of a two-handed sign do not share the same specification for handshape (i.e., they are different), then (b) one hand must be passive while the ac-

tive hand articulates the movement and (c) the specification of the passive handshape is restricted to be one of a small set: A,S,B,G,C,O.[18] (pp. 34–35)

The Dominance Condition and Symmetry Condition are inviolable in words of the lexicon. The selected finger constraint and the monosyllabicity constraint are only systematically violated in words that have more than one syllable, in which each syllable is a morpheme.[19] However, classifier constructions freely violate all of these constraints—monosyllabicity, selected finger, symmetry, and dominance—regardless of internal morphological structure. Assuming that these are constraints on prosodic words (see Brentari, 1998; Sandler 1999a, 1999b,), we conclude that classifier constructions do not have the phonological form of prosodic words.[20]

Battison's conditions on the two hands are violated in classifier constructions in ASL and ISL, as well as in Danish Sign Language (Engberg-Pedersen, 1993), Swedish Sign Language (Wallin, 1994), and possibly other sign languages. Let us take an example from ISL. If the nondominant hand represents a ground classifier, such as an 'airplane' in in an expression meaning, 'A person approached an airplane (on the runway)', it may assume a marked handshape—here the Y shape—violating the Dominance Condition,[21] as shown in Fig. 3.7.

The Symmetry Condition is also violated. In a story we recorded about a recalcitrant dog that had to be dragged by its leash behind its master, the two hands each moved but were characterized by different shapes, shown in Fig. 3.8. In this example, the movement was different for each hand as well. The 'person' hand moved in a straight path, while the 'dog' hand wiggled back and forth at the wrist as it followed the direction of the 'person' hand.

Clearly, this freedom of configuration and movement results from the fact that each hand functions as a figure in this expression. *Figure* is a vague term that corresponds to the salient element in a scene (Talmy, 1983), and can translate to any of a number of semantic and syntactic roles. Semantically each figure could be an agent or a patient. The two figures could conceivably play the same semantic role (e.g., patient) or different ones. This indicates that the semantic and syntactic structure of classifier constructions may be very elaborate indeed.[22] As prosody is intimately connected to both syntax and semantics, we believe that analysis of the prosodic struc-

FIG. 3.7. Static nondominant hand with marked shape: 'A person approached an airplane' (ISL).

FIG. 3.8. Two hands moving, with different handshapes: 'A person walks dragging dog' (ASL).

ture of classifier complexes must play a role in any future syntactic and semantic investigations.[23] We must leave detailed syntactic and semantic analyses to future research, however, and restrict ourselves here to the form and in particular to the prosodic constituency.

Intonational Phrases. From the discussion so far, one might conclude that classifier constructions are just ill-behaved words. But it seems rash to call them words at all, because they may span much larger prosodic domains than words. We show here that a classifier construction may spread across much larger constituents than the prosodic word, even spanning a sequence of intonational phrases. First, we provide a brief and, we hope, intuitively accessible sketch of the intonational phrase in an ordinary sentence of a sign language. We then show that a classifier construction whose parts mean 'VEHICLE RIDE' may span more than one of these.

In a study of prosody in ISL, it was found that the prosodic constituents Phonological Phrase and Intonational Phrase are marked by clear phonetic correlates (Nespor & Sandler, 1999; Sandler, 1999b). These constituents are arranged in the following prosodic hierarchy, adapted from Selkirk (1984) and Nespor and Vogel (1986):

(5) syllable>foot>prosodic word>phonological phrase>intonational phrase>phonological utterance

We have already seen that classifier constructions do not observe constraints on prosodic words: Unlike typical prosodic words, classifier constructions are often disyllabic or multisyllabic, and the constraints on two-handed signs do not hold. We have also seen that each hand may play an independent syntactic and semantic role, which in principle opens the door to extremely complex classifier structures. As prosodic constituency is related to (though not necessarily isomorphic with) syntactic constituency, it is expected that classifier constructions may also comprise higher prosodic constituents than the prosodic word; and indeed they do.

Certain syntactic constituents form intonational phrases in many languages. For example, parenthetical constituents, nonrestrictive relative clauses, topicalizations and other types of expraposed elements all typically constitute intonational phrases. Examples of topicalized constituents that form their own intonational phrases in English and in ISL are shown in (6), taken from Nespor and Sandler (1999). In English, the topicalized constituent is *that movie*, and in ISL, it is CAKE.[24]

(6) English: [That movie]$_I$ [I would never see]$_I$
ISL: [CAKE]I [I EAT-UP DEPLETE]I 'I ate the cake up completely'.

In both language modalities, intonational phrasing may vary depending on speed, register, and other factors. The intonational phrase is the domain of intonational tunes in spoken language (e.g., Hayes & Lahiri, 1991), and is often followed by a breath (Nespor & Vogel, 1986). In ISL, intonational phrases are always marked by a change in head position and a change in all aspects of facial expression (Nespor & Sandler, 1999). The authors argue that this prosodic patterning of facial expression explicitly supports the commonly drawn analogy between facial expression in sign language and intonation in spoken language.[25] In ASL, Wilbur (1999) found that signs have longer duration at the ends of intonational phrases, and the two research projects have found that eyeblinks are common between intonational phrases in both ASL and ISL—as breaths are common in that position in spoken languages.

FIG. 3.9 Two intonational phrases: 'Car turns right || car turns left' (ASL).

Attending to the prosodic structure of classifier constructions, we find that even simple complexes can span more than one intonational phrase. For example, the construction VEHICLE RIDE[26] can continue without rearticulation across several intonational phrases, to convey a meaning such as: 'The car went straight; (the car) turned left; (the car) went over a hill; and (the car) parked at the bottom'. The following example is from such a sequence in ASL. Here we extract 'car turn right; car turn left', which we interpret as two propositions and that comprise two intonational phrases. In the videotape, there is a long hold between the two phrases, and, as can be seen in the extracted pictures in Fig. 3.9, there is a clear change in head (and body) position. These features clearly mark intonational phrase breaks.

ACHIEVING PROSODIC WORDHOOD

As we said in the previous section, when these prosodically indeterminate complexes enter the frozen lexicon, they observe all constraints on prosodic words. In the course of our investigation, we were priveleged to observe the evolution of an ISL classifier construction into a wordlike form in a single discourse segment. In a description of the structure of human bones and ligaments at a joint, the signer began with a series of classifier constructions. A rough translation follows in Fig. 3.10, with classifier constructions glossed with hyphens, and major prosodic breaks marked with double lines: || . The portion in boldface type, describing the ligaments (the extent and spatial relation of the two thin stringy objects), is pictured below.

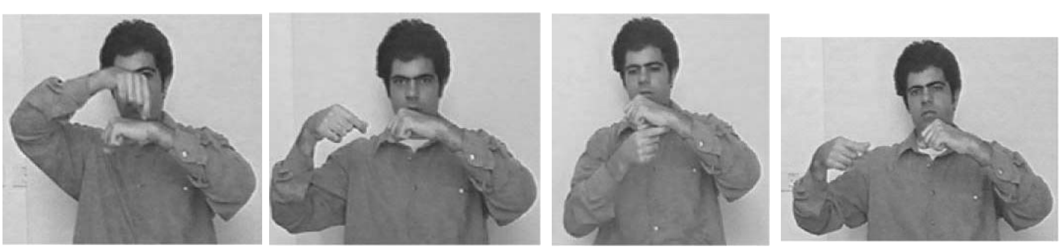


FIG. 3.10. Excerpt from classifier constructions describing a ligament (ISL): Arm || Meet, two-roundish-objects-adjacent-rock-together ||
Thin-stringy-object-extend-from-top-of-roundish-object-in-arc-shape ||
Thin-stringy-object-extend-from-under-roundish-object-in-arc-shape-to-meet (other thin stringy object).

FIG. 3.11. Novel frozen word, LIGAMENT (ISL).

The sequential form of the material in boldface type is roughly: LML || LML, with an intonation break between the two LML sequences. Specifically, between the two sequences, interpreted as the two sentences printed in boldface type above, there was a long hold and eye contact with the addressee as well as a head nod, clearly marking an intonational phrase break. The whole expression spanned 1,440 ms. It is noteworthy that the classifier for the roundish object is held in front of the signer's face. As signers typically look at the face of their interlocutors and not at the hands (Siple, 1978), placing the hand in front of the face rather than in neutral signing space draws special attention to the form and action they depict, and makes the string anomalous compared to lexical signs.

Within moments, the name of this anatomical structure was reduced to a monosyllabic form that might simply be glossed, 'LIGAMENT'. Though not yet in full conformity in every detail, this sign already fits the canonical prosodic LML structure of a sign language word. It was uttered extremely rapidly, with no intonational or rhythmic break of any kind. The newly formed word, shown in Fig. 3.11, spans only 280 ms. It is signed in neutral space and does not block the face of the signer. Here we note that the facial expression of the signer—squinted eyes—is that used to represent shared information in ISL (Nespor & Sandler, 1999; Sandler, 1999b). In creating a lexical sign for the concept 'ligament', the signer uses this facial expression to call the addressee's attention to the earlier signed classifier construction from which it so quickly evolved.

Because classifier constructions exist side by side with the frozen lexicon in sign languages, words that are diachronically related to classifier constructions can be reinterpreted into their components synchronically. This occurs regularly in ordinary conversation, and is elevated to a stylistic device for humorous effect and in poetry. A typical example from ordinary usage in ISL is the sign WRITE, shown in Fig. 3.12, which presumably originated as a classifier construction consisting of a SASS for flat object (the thing written on), a handling classifier for handling a small thin object, and a reduplicated movement across the palm. We know that the form is listed in the mental lexicon as the word WRITE, both because it is reliably glossed that way in isolation, and because it undergoes temporal aspect inflection for Durational and Continuative, like any verb.

Yet the two parts represented by the two handshapes can be interpreted into their separate classifier components. This possibility is described in Brentari (1995) for ASL and for IPSLin Zeshan (chap. 6, this volume). We elicited a sequence with the meaning, 'I wrote a letter to the editor, and on considering it, saw I hadn't written it as I'd intended'. In this sequence, the unanalyzed sign WRITE, pictured in Fig. 3.12, was signed first, and subsequently the nondominant hand was interpreted as a classifier for the paper on which the writing took place, as shown in Fig. 3.13.

FIG. 3.12. WRITE (ISL).

FIG. 3.13. Reinterpretation of nondominant hand as a classifier for a flat object: 'consider letter' (ISL).

Summary: The Synchronic-Diachronic Perspective

Sign languages, like spoken languages, are dynamic, ever-changing natural communication systems. Focusing on classifier constructions in particular, we have tried to describe in detail the phonological path from multiproposition constructions to "frozen" lexical items and back again. Due to the communicative advantage of iconicity to which sign languages are uniquely suited, we expect classifier constructions to endure over time, side by side with lexicalized forms. However, this investigation also suggests that the nature of classifier constructions as such may change diachronically. Comparison of such structures in two sign languages—one 250 years old with 200,000 signers, and the other under 60 years old with 8,000 signers—suggests that classifier constructions may become more restricted to the hands and more arbitrary over time. With this diachronic perspective in mind, we return to the issue of creolization.

A UG LIGHTNING BOLT OR MORE GRADUAL SYSTEMIZATION?

Senghas (1995) and Kegl et al. (1999) reported on the development of Nicaraguan Sign Language, which they have had the privilege to observe from the ground up in a school in Managua. According to Kegl et al., the Nicaraguan school signers divide up quite neatly into two linguistic groups, which correlate with their age and year of entry into the school. The older group are described as signers of a peer-group pidgin or jargon that Kegl et al. (1999) call *Lenguaje de Señas Nicaraguense* (LSN), whereas the younger group are signers of "the full-blown signed language" (p. 181), called *Idioma de Señas Nicaraguense* (ISN), idioma being the Spanish word for 'formal, national languages'.

Kegl et al. (1999) observed that the two systems can be distinguished, even by a nonsigner, "on the basis of the size of the signing space, amount of symmetry in the use of the hands, [and] degree of involvement of the whole body in signs …" (p. 182). On a more refined level, they measured the performance on several dimensions of two groups of signers, those born before 1970, whom they characterize as LSN signers, and those born after 1970, whom they characterize as ISN signers. Each signer produced narratives after watching two short nonverbal cartoons. The researchers then counted the occurrence in each group of five types of forms typical of sign languages: verb inflection, size and shape specifiers, handling classifiers, entity classifiers, and signs using the whole body.

Overall, Kegl et al. (1999) found that the younger group produced significantly more verb inflection than did the older group.[27] The younger group also produced more size and shape specifiers than the older group, though this finding is difficult to interpret, both because only the tracing type of SASS was counted in this category, and because mimetic tracing depictions for size and shape were lumped together with SASS constructions. The younger group used significantly more "object" classifiers, but the groups did not differ in their use of handling classifiers. In their object classifier category, the researchers include both SASS classifiers of the nontracing type—e.g., FLAT-OBJECT, etc,—and what we call entity classifiers. Finally, the older group produced more whole-body signs than the younger group. The authors ascribe the differences to the catastrophic change[28] that occurs when a pidgin is replaced by a language, as a result of the "direct contribution of innate language capacities" (p. 212).

Coincidentally, we have studied some of the same structures that the Kegl et al. (1999) study reported on, in particular, verb agreement and classifier constructions. Our findings indicate that the Kegl et al.(1999) explanation, involving the catastrophic intervention of the language faculty, cannot be maintained for the development of these structures in ISL. With respect to verb agreement, Kegl et al. (1999)found that the ISN signers distinguished the same three classes of verbs—plain, agreement, and spatial—that we described above. This particular clustering of generalizations about the verbal categories and main agreement characteristics found in sign languages indicates that something other than an innate language capacity is at work. In particular, these agreement properties appear to be universal across sign languages; they are based on visuospatial cognition; and, although they form an essentially grammatical system, they are unlike verb agreement found in spoken languages in significant ways (Meir, 1998a; Aronoff et al. 2000). If sign languages all have essentially the same agreement system, and it is one that no spoken languages have, then it is not reasonable to attribute its appearance in ISN to an innate and universal language capacity. If such a capacity were responsible, we would expect ISN (and all sign language) verb agreement to have a core of properties that is also present in spoken language, but this is not the case. Rather, ISN verb agreement has the same properties that are found in other sign languages, which, as we have argued, are attributable to universals of visuospatial cognition rather than to universals of language.

Turning to the main focus of this chapter, classifier constructions, our results again lead us to draw a different conclusion from that of Kegl et al. (1999). In particular, the differences that Kegl et al. found between their two groups in the use of whole body signs (referent projections) are apparently similar to those that we found between ISL and ASL. But ISL, unlike the language of the older Nicaraguan signers, is no less regular than ASL. Also, ISL is not a pidgin, and has been around for over 60 years (Meir & Sandler, in press). So the parallels between both pairs—LSN versus ISN and ISL versus ASL—cannot reliably be ascribed to a sudden explosion of innate language capacities.

The comparison of entity classifiers in the two studies is less straightforward than the comparison of reference projections, but still sheds light on the issue. First, it is less straightforward because the Nicaragua study's category of *object classifiers* includes both signs that we call *en-*

tity classifiers, and signs we categorize as (nontracing) SASS constructions (such LONG-THIN-OBJECT, etc.).[29] Second, we focused more on the relative abstractness of entity classifiers in comparing the two languages, finding more abstract entity classifiers in ASL than in ISL, whereas the Nicaragua study only counted the number of occurrences of object classifiers as they define them, finding significantly more instances per total number of signs among younger than among older signers.

What is crucial to the argument in our view is not the relative age of the languages in question, but rather the fact that all signers in both studies—and in fact in all sign languages investigated so far—have SASS, handling, and entity classifiers. This is in sharp contrast to spoken languages, which often have no classifiers, or have classifier systems that may differ radically from language to language (Grinevald, 2000; Senft, 2000b). Once again, the existence of these particular types of classifiers in all sign languages points more to the role of general visuospatial categorization than to an innate language capacity. The fact that sign languages tend to have certain types of structures is not lost on Kegl et al. (1999), who attribute them to "modality-dependent markedness differences" (p. 223). However, we find it difficult to reconcile that the structures representing linguistic innateness are precisely the same structures that are characterized by modality dependent markedness differences.

We conclude, then, that the explicit differences between the Nicaraguan languages do not provide any evidence for an innate linguistic capacity in the sense of a core of linguistic structures. The differences can be more parsimoniously ascribed to the fact that the older children were past the critical period at the time of acquisition, a fact to which Kegl et al. (1999) also attributed a central role. The relevance of the critical period in sign language acquisition is underscored by Singleton (1989) and Newport (1999), who studied the native signing of a young child whose parents were both late acquirers of ASL. Newport noted that the child's signing was much more consistent than that of either parent, and ascribed that difference in consistency to the fact that the child acquired the language during the critical period, which the parents did not. The important finding that younger Nicaraguan signers make more general use of object classifiers than do older signers, although it does not argue for universal language structures, is relevant here. Together with the other differences between the two cohorts, the finding provides striking evidence for the relentless generalization and regularization of linguistic structure that is the privileged province of children. But it does not provide evidence for universal language structures, and not necessarily even for exclusively linguistic structure.

This line of reasoning does not argue explicitly against the notion of an innately specified core of linguistic properties, against Universal Grammar—only against the use of the Nicaraguan situation to support it. External evidence for Universal Grammar will always be tremendously difficult to find, because other possible causes for the relevant phenomena must be ruled out first.

CONCLUSIONS

Our comparison of classifier constructions in ASL and ISL suggests that all sign languages have the same types of structures that have been discussed in the literature on ASL classifiers: SASS classifiers; entity classifiers, handling classifiers, and referent projections. Just as with agreement, these types arise naturally from the visual nature of sign languages.

But there is an interesting difference between the classifier system and agreement. In the case of agreement, the three verb classes and all their properties are found full blown in both ASL and

ISL. In the use of classifiers, we found instead that ISL signers tend more toward the iconic end than do ASL signers. Reference projections are more common in ISL than in ASL, and entity classifiers tend to be more highly grammaticized in ASL than in ISL. In both languages, classifier constructions are also a source of lexicalization, in which the inherent iconicity of each component is diminished and the resulting word thus becomes more arbitrary. In a sense, the classifier system is a middle ground between agreement and sequential affixational morphology, grounded in iconicity like agreement, but susceptible to progressive grammaticization like affixation. The differences between the two classifier systems is in full accord with the model that we presented in our earlier work on ISL and ASL, which emphasizes the competing forces of communicability, modality specific iconicity, and individual language-specific grammaticization in the growth of each language.

We hope that the reader will conclude as we have that it is possible to understand much of the morphological structure of sign languages in terms of the interplay among three factors: (1) the capacity for combining linguistically significant partials into unified complex structures; (2) language modality; and (3) language age. All sign languages share certain striking similarities in their morphological structure (and differences from spoken languages) that are grounded in the spatial modality of sign. This modality permits sign languages to easily represent spatial structure, relations, and events isomorphically and iconically.

In our earlier work (Aronoff et. al., 2000), we showed the effect of modality on agreement, and in our current work we have extended the scope of our observation about spatial isomorphism and iconicity to what have come to be called *classifiers*. With age, though, sign languages change. Researchers have known for a long time that individual signs can become less iconic and more arbitrary, making sign languages more like spoken languages in that regard (Frischberg, 1975). As summarized in the section beginning on page 57 (*Sequential Affixation in Sign Languages*), we showed how sign languages develop idiosyncratic arbitrary affixational morphology through time, which, like arbitrary lexical signs, makes them more like spoken languages. Turning to classifier constructions, we have found that the effect of age is subtly different. Yes, we find lexicalization of individual signs out of classifier constructions, which is sometimes dramatically swift as with the ISL word, LIGAMENT. But what is newly discovered is how the entire system of classifier constructions can show more arbitrary and grammaticized forms, as in ASL versus ISL. Still, the users of any sign language never lose touch with the system's iconic roots, and are consequently able to return to these roots for conversational eloquence or performative effect.

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ENDNOTES

[1]Authors' names are listed in alphabetical order.

[2] Packard (2000), in the most recent survey of Mandarin morphology, lists five inflectional suffixes and one prefix, along with seven derivational prefixes and eight suffixes.

[3] We assume here the HT model proposed in Sandler (1989). Other models that involve sequentiality but that differ from this one and from one another in important ways are those of Liddell (1984) and its successor, Liddell and Johnson (1989), both of which influenced the HT model; Perlmutter (1992); van der Hulst (1993); and Brentari (1998).

[4] Reduplication is not viewed as sequential, because it does not affix new material but merely repeats the inflected base.

[5] Very interesting evidence supporting the naturalness of simultaneous encoding of particular kinds of linguistic information in sign languages was presented by S. Supalla (1991). Supalla studied the language of deaf children exposed only to Manually Coded English, an artificial manual language that represents the derivational and inflectional morphemes of English in a linear sequence. Supalla found that the children spontaneously produce simultaneous modifications of verbs to mark verb arguments, although they have had no exposure to real sign languages.

[6] ASL, Swedish SL (Brita Bergman, p.c.), British SL (Brennan, 1990), and Japanese SL (Soya Mori, p.c.) apparently also have complex forms in which the first member is related to the senses. Preliminary inquiries indicate that there are differences across languages in terms of productivity, part of speech, and meaning, differences that are important in the context of our model. (See footnote 7.) More research is needed to determine whether or not the forms in these languages are also prefixes and how they pattern in their respective languages.

[7] Ordinary indexical pronouns in ISL also cliticize onto hosts in two different ways, depending on the prosodic strength of their position in a phrase (Sandler, 1999a, 1999b).

[8] We wish to exphasize that the dichotomy presented in this table should be understood as representing general tendencies, and not absolute binary oppositions.

[9] The fact that several sign languages apparently recruit signs involving the senses to create complex words with sequential structure is not incompatible with the generalization that sequential morphological processes are sign language specific and not sign-language universal. Increasing vocabulary by grammaticizing sense terms as affixes also occurs in spoken languages (Sweetser, 1990). The correct prediction, then, is that the particular ways in which sense terms are grammaticized should be different across sign languages. As indicated in note 6, we have reason to believe that this prediction is borne out.

[10] Fischer (1979) makes a similar point at the lexical level, arguing that spoken languages do not have as many iconic words as sign languages because sounds are less apt to represent things in the real world in a direct manner.

[11] Early researchers to use this term are Frishberg (1975) and Kegel & Wilbur (1976), and McDonald (1982).

[12] Senft (2000b) refers to this type as classificatory noun incorporation, a view that is compatible with the influential theory developed in Mithun (1984, 1986). See also Meir (1999) for a treatment of some types of classifiers in ISL as noun incorporation.

[13] We refer here to the SASS classifiers that involve a static handshape which combines with movement and location morphemes, and exclude from our discussion the dynamic Size and Shape Specifiers (Klima & Bellugi, 1979), whose behavior is different.

[14] McDonald (1982) demonstrates that Navaho encodes grammatically some of the same classificatory concepts that are encoded in ASL. Our point is that the morphological means for doing so is not comparable.

[15]In the Klima and Bellugi (1979) description of SASSes, only those that involve tracing the outline of the referent type (e.g., RECTANGULAR-OBJECT) were included. Following T. Supalla (1982), we include as SASSes also those handshape classifiers that indicate size and shape, such as LONG-THIN-OBJECT, FLAT OBJECT, etc. These have no tracing or other inherent movement, but rather

combine with movement and location formatives for form classifier constructions. The tracing type may constitute a SASS subset; they have movement of their own and are more likely to enter into compound constructions than are the non-tracing handshape size-and-shape specifiers.

[16] The analysis of classifier constructions in Meir (2001) lends further support to our hypothesis about the relation between spatiotemporal categories and complex simultaneous morphology in sign languages. In that analysis, Meir argues that the thematic roles and conceptual categories of classifier constructions are directly linked to and iconically represent positions on the spatial thematic tier of lexical conceptual structure (Jackendoff, 1987, 1990).

[17] This movement may be complex, consisting of both a path movement and a handshape or orientation change, but in order to count as a single syllable, the two types of movement must occur simultaneously.

[18] As Brentari (1998) pointed out, there are signs in which h2 has the same handshape as h1, but h2 does not move. Under identity ,h2 may have a marked shape in such signs. We suggest, therefore, that the Dominance Condition be revised as follows: (2') Revised Dominance Condition. In signs in which h2 is passive (i.e., does not move), h2 may not be specified for a marked handshape, except redundantly, by copying the shape of h1.

[19] There are vanishingly few examples of monomorphemic words of more than one syllable apart from reduplications (see Brentari, 1998).

[20] *Prosodic words* (also called phonological words) refer to what might intuitively be considered the smallest unit that can be uttered by itself or, alternatively, the domain within which word level stress is assigned. This constituent might include more than a morphosyntactic word. See, e.g., Selkirk (1984), Nespor and Vogel (1986), and for sign language, Brentari (1998), and Sandler (1999a, 1999b).

[21] See Sandler (1995, 1996b) and van der Kooij (2001) for treatments of markedness in handshapes.

[22] Apparently, Battison' Symmetry Condition does hold on classifiers in Indo-Pakistani Sign Language (IPSL, Zeshan, chap. 6, this volume). If modern IPSL is descended from the language used in the first school for the deaf established in Bombay in 1886 (U. Zeshan, personal communication), then one might speculate that this is an example of the diachronic imposition of grammatical constraints on the relatively iconic classifier system in this language. The Symmetry Condition, while phonetically grounded (see van Gijn, Kita, & van der Hulst, 2000), is not physiologically required, as we see in the ASL example, Fig. 3.8. This means that it is grammatical in some sense. In addition, this constraint is not expected on purely semantic grounds, as we have explained. Thus, it might be the case that grammatical constraints active in the lexicon are imposed on classifier constructions, and that language age is a factor. We note, however, that it is certain that ASL dates back just as far, and yet the Symmetry Condition does not hold on its classifiers. So, even if the constraint in IPSL is a diachronically evolved restriction, this restriction on classifier constructions should not be considered inevitable.

[23] On the relation between prosody, syntax, and semantics in spoken language, see, e.g., Selkirk (1984), Gussenhoven (1984), Nespor and Vogel (1986), and Ladd (1994).

[24] Rosenstein (2001) argued that topics in ISL are not moved, i.e., not topicalized, but originate in topic position. This does not affect our discussion, however, as there is evidence from topic prominent spoken languages that base generated topics also form independent intonational phrases (e.g., Aissen, 1992).

[25] The more neutral term, *superarticulation*, is adopted in Sandler, 1999b, instead of the voice-specific term, *intonation*.

[26] A more accurate gloss might be 'FLAT-OBJECT-MOVE-ALONG-PATH'.

[27] Kegl et al. (1999) included motion and location verbs among the set of inflecting verbs, whereas we considered only the transfer (true agreement) verbs (Aronoff et al., 2000). For us, motion and location verbs fall into the classifier category. Kegl et al. found clear differences between the two predicate types among older group of signers, who used more motion and location than they did verb agreement.

[28] Some linguists believe that creole language emerges abruptly in children who have only pidgin input (see, e.g., Bickerton, 1984; Thomason & Kauffman,1988). Other linguists are committed to the idea that creolization is a more gradual process that also allows an important role for adults and interaction between their native language and the superstrate language (e.g., Carden & Stewart, 1988; Lumsden, 1999). Abrupt leaps in the course of diachronic change within an existing language, in creolization, or in ordinary lan-

guage acquisition, have been characterized as *catastrophic language change* (e.g., Lightfoot, 1979, 1999). Sankoff (1979) used the term 'catastrophic', but with a crucial difference. She uses it not for the process of creolization itself, but for its cause, claiming that pidgins and creoles arise as a result of a catastrophic break in linguistic tradition.

[29] We are following T. Supalla (1982) here. Our entity classifiers correspond to his semantic classifiers, and our SASSes are the same as his.

REFERENCES

Aissen, J. (1992). Topic and focus in Mayan. *Language, 68*(1), 43–77.

Allan, K. (1997). Classifiers. *Language, 53*, 285–311.

Aronoff, M., Meir, I., & Sandler, W. (2000). Universal and particular aspects of sign language morphology. *University of Maryland Working Papers in Linguistics*, vol. 10, 1–33.

Aronoff, M., & Sridhar, S. N. (1987). Morphological levels in English and Kannada. In E. Gussman (Ed.), *Rules and the lexicon* (pp. 10–22). Lublin: Caatholic University Press.

Battison, R. (1978). *Lexical borrowing in American Sign Language.* Silver Spring, MD: Linstok Press.

Bellugi, U., & Fischer, S. (1972). A comparison of signed and spoken language. *Cognition, 1*, 173–200.

Bickerton, D. (1977). Pidginization and creolization: Language acquisition and language universals. In A. Valdman (Ed.), *Pidgin and creole linguistics* (pp. 49–69). Bloomington: Indiana University Press.

Bickerton, D. (1994). The language bioprogram hypothesis. *Behavior and Brain Sciences, 7*, 173–221.

Brennan, M. (1990). *Word formation in British Sign Language*. Stockholm: The University of Stockholm.

Brentari, D. (1995). Sign language phonology: ASL. In J. Goldsmith (Ed.), *A handbook of phonological theory* (pp. 615–639) Oxford: Blackwell.

Brentari, D. (1998). *A prosodic model of sign language phonology.* Cambridge, MA: MIT Press.

Carden, G., & Stewart, W. A. (1988). Binding theory, bioprogram, and creolization: Evidence from Haitian Creole. *Journal of Pidgin and Creole Languages, 3*, 1–67.

Coulter, G. (1982, December). *On the nature of ASL as a monosyllabic language.* Paper presented at the annual meeting of the Linguistic Society of America, San Diego, CA.

DeGraff, M. (Ed.). (1999). *Language creation and language change: Creolization, diachrony, and development*. Cambridge, MA: MIT Press.

Emmorey, K. (1995). Processing the dynamic visual–spatial morphology of signed languages. In L. B. Feldman (Ed.), *Morphological aspects of language processing: Crosslinguistic perspectives* (pp. 29–54). Hillsdale, NJ: Lawrence Erlbaum Associates.

Emmorey, K. (2002). *Language, cognition, and the brain: Insights from sign language research*. Mahwah, NJ: Lawrence Erlbaum Associates.

Engberg-Pedersen, E. (1993). *Space in Danish Sign Language: The semantics and morphosyntax of the use of space in a visual language*. Hamburg: SIGNUM-Verlag.

Feldman, H., Goldin-Meadow, S., & Gleitman, L. (1978). Beyond Herodotus: The creation of language by linguistically deprived deaf children. In A. Lock (Ed.), *Action, gesture, and symbol: The emergence of language* (pp. 351–414). New York: Academic Press.

Fischer, S. (1978). Sign languages and creoles. In P. Siple (Ed.), *Understanding language through sign language research* (pp. 309–331). New York: Academic Press.

Fischer, S. (1979). *Many a slip 'twixt the hand and the lip: The application of linguistic theory to non-oral language*s. Paper presented at the conference, Applications of Linguistic Theory in the Human Sciences, Michigan State University.

Fischer, S., & Osugi, Y. (2000, July). *Thumbs up vs. giving the finger: Indexical classifiers in NS and ASL*. Paper presented at the 7th International Conference on Theoretical Issues in Sign Language Research, Amsterdam.

Frischberg, N. (1975). Arbitrariness and iconicity: Historical change in American Sign Language. *Language 51*, 696–719.

Gallaudet Research Institute. (2001, January). *Regional and national summary report of data from the 1999–2000 annual survey of deaf and hard of hearing children & youth*. Washington DC: Author.

Gee, J., & Goodhart, W. (1985). Nativization, linguistic theory, and deaf language acquisition. *Sign Language Studies, 49,* 291–342.

Gee, J., & Goodhart, W. (1988). American Sign Language and the human biological capacity for language. In M. Strong (Ed.), *Language learning and deafness* (pp. 49–79). Cambridge, UK: Cambridge University Press.

Grinevald, C. (2000). A morphosyntactic typology of classifiers. In G. Senft (Ed.). *Systems of nominal classification* (pp. 50–92). Cambridge, UK: Cambridge University Press.

Gussenhoven, C. (1984). *On the grammar and semantics of sentence accents.* Dordrecht, The Netherlands: Foris.

Hayes, B., & Lahiri, A. (1991). Bengali intonational phonology. *Natural Language and Linguistic Theory 9*, 47–96.

Interpreting Consolidated. (1998). With Angela Petrone Stratiy, *Pursuit of ASL: Interesting facts using classifiers* [videotape]. (Available from Interpreting Consolidated, Box 203, Main P. O., Edmonton, Alberta, T5J 2J1, Canada).

Jackendoff, R. (1987). The status of thematic relations in linguistic theory. *Linguistic Inquiry, 18*, 369–411.

Jackendoff, R. (1990). *Semantic structures*. Cambridge, MA: MIT Press.

Kegl, J., & Wilbur, R. (1976). Where does structure stop and style begin? Syntax, morphology, and phonology vs. Stylistic variation in American Sign Language. *Chicago Linguistic Society, 12*, 376–396.

Kegl, J., Senghas, A., & Coppola, M. (1999). Creation through contact: sign language emergence and sign language change in Nicaragua. In M. de Graff (Ed.), *Language creation and language change: Creolization, diachrony, and development* (pp. 179–237). Cambridge, MA: MIT Press.

Klima, E., & Bellugi, U. (1979). *The signs of language*. Cambridge, MA: Harvard University Press.

Ladd, D. R. (1994). *Intonational phonology.* Cambridge, UK: Cambridge University Press.

Langdon, M. (1970). *A grammar of Digueño. The Mesa Grande Dialect*. Berkeley and Los Angeles: University of California Press.

Liddel, S. (1984). THINK and BELIEVE: Sequentiality in American Sign Language. *Language 60*, 372–392.

Liddell, S., & Johnson, R. (1989). American Sign Language: The phonological base. *Sign Language Studies, 64*, 197–277.

Lightfoot, D. (1979). *Principles of diachronic syntax.* Cambridge, UK: Cambridge University Press.

Lightfoot, D. (1999). Creoles and cues. In M. de Graff, (Ed.), *Language creation and language change: Creolization, diachrony, and development* (pp. 431–452). Cambridge, MA: MIT Press.

Lillo-Martin, D., & Klima, E. (1990). Pointing out differences: ASL pronouns in syntactic theory. In S. Fischer & P. Siple (Eds.), *Theoretical issues in sign language research* (Vol. 1, pp. 191–210). Chicago, The University of Chicago Press.

Lumsden, J. S. (1999). Language acquisition and creolization. In M. de Graff (Ed.), *Language creation and language change: Creolization, diachrony, and development* (pp. 129–157). Cambridge, MA: MIT Press.

Mandel, M. (1981). *Phonotactics and morphophonology in American Sign Language*. Unpublished doctoral dissertation, University of California, Berkeley.

McCarthy, J. (1979). *Formal problems in semitic phonology and morphology.* Unpublished doctoral dissertation, MIT.

McCarthy, J.(1981). A prosodic theory of nonconcatenative morphology. *Linguistic Inquiry, 12*, 373–418.

McDonald, B. (1982). Aspects of the American Sign Language predicate system. Unpublished doctoral dissertation. Buffalo, NY: University of Buffalo.

McDonald, B. (1983). Levels of analysis in sign language research. In J. Kyle & B. Woll (Eds.), *Language in sign. An international perspective on sign language* (pp. 32–40). London: Croom Helm.

McWhorter, J. (1998). Identifying the creole prototype: Vindicating a typological class. *Language, 74*, 788–818.

Meir, I. (1998a). *Thematic structure and verb agreement in Israeli Sign Language.* Unpublished doctoral dissertation, Hebrew University of Jerusalem.

Meir, I. (1998b). Syntactic-semantic interaction of Israeli Sign Language verbs: The case of backwards verbs. *Sign Language and Linguistics, 1*(1), 3–37.

Meir, I. (2000). *The emergence of a case marker in Israeli Sign Language*. Unpublished manuscript, The University of Haifa.

Meir, I. (2001) Verb classifiers as noun incorporation in Israeli Sign Language. Y*earbook of Morphology 1999*, 295–315.

Meir, I. (2002). A cross-modality perspective on verb agreement. *Natural Language and Linguistic Theory 20*, 413–450.

Meir, I., & Sandler, W. (in press). *Language in space: A window on Israeli Sign Language.* (Hebrew) University of Haifa Press.

Mithun, M. (1984). The evolution of noun incorporation. *Language, 60*(4), 847–894.

Mithun, M. (1986). The convergence of noun classification systems. In C. G. Craig (Ed.), *Noun classes and categorization* (pp. 379–397). Amsterdam: John Benjamins.

Nespor, M., & Vogel, I. (1986). *Prosodic phonology.* Dordrecht, The Netherlands: Foris.

Nespor, M., & Sandler, W. (1999). Prosody in Israeli Sign Language. *Language and Speech, 42*(2 & 3), 143–176.

Newport, E. (1999). Reduced input in the acquisition of signed languages: contributions to the study of creolization. In M. DeGraff (Ed.), *Language creation and language change: Creolization, diachrony, and development* (pp. 161–178). Cambridge, MA: MIT Press.

Packard, J. L. (2000). *The morphology of Chinese: A linguistic and cognitive approach*. New York:Cambridge University Press.

Padden, C. (1988). *Interaction of morphology and syntax in American Sign Language*. New York: Garland Publishers.

Perlmutter, D. (1992). Sonority and syllable structure in American Sign Language. *Linguistic Inquiry, 23*, 407–442.

Rathmann, C. (2000, July). *Does the presence of a person agreement marker predict word order in SLs*? Paper presented at the 7th International Conference on Theoretical Issues in Sign Language Research, Amsterdam.

Rosenstein, O. (2001). *ISL as a topic prominent language.* Unpublished master's thesis, University of Haifa.

Sachs, O. (1989). *Seeing voices: A journey into the world of the deaf.* Berkeley and Los Angeles: University of California Press.

Sandler, W. (1989). *Phonological representation of the sign: Linearity and nonlinearity in American Sign Language.* Dordrecht, The Netherlands: Foris.

Sandler, W. (1990). Temporal aspects and American Sign Language morphology. In S. Fischer & P. Siple (Eds.), *Theoretical issues in sign language research* (Vol. I, pp. 7–35). Chicago: University of Chicago Press.

Sandler, W. (1993). A sonority cycle in ASL. *Phonology, 10*(2), 243–280.

Sandler, W. (1995). Markedness in the handshapes of sign language: A componential analysis. In H. van der Hulst & J. van de Weyer (Eds.), *Leiden in last: HIL phonology papers I* (pp. 369–399). The Hague: Holland Academie Graphics. 369–399.

Sandler, W. (1996a, September). *A negative suffix in ASL.* Paper presented at conference on Theoretical Issues in Sign Language Research, Montreal.

Sandler, W. (1996b). Representing handshapes. *International Journal of Sign Linguistics, 1*, 115–158.

Sandler, W. (1999a). Cliticization and prosodic words in a sign language. In T. Hall & U. Kleinhenz (Eds.), *Studies on the phonological word* (pp. 223–254). Amsterdam: Benjamins.

Sandler, W. (1999b). The medium is the message: Prosodic interpretation of linguistic content in sign language. *Sign Language and Linguistics, 2*(2), 187–216.

Sankoff, G. (1979). The genesis of a language. In K. Hill (Ed.), *The genesis of language* (pp. 23–24). Ann Arbor, Michigan: Karoma.

Schembri, A. (2003). Rethinking 'classifiers' in signed languages. In K. Emmorey (Ed.), *Perspectives on Classifier Constructions in Sign Languages* (pp. 3–34). Mahwah, NJ: Lawrence Erlbaum Associates.

Selkirk, E. (1984). *Phonology and syntax.* Cambridge, MA: MIT Press.

Senft, G. (2000a). *Systems of nominal classification*. Cambridge, UK: Cambridge University Press.

Senft, G. (2000b). What do we really know about nominal classification systems? In G. Senft (Ed.), *Systems of nominal classification* (pp. 11–49). Cambridge, UK: Cambridge University Press.

Senghas, A. (1995). *Children's contribution to the birth of Nicaraguan Sign Language.* Unpublished doctoral dissertation, MIT.

Shepard-Kegl, J. (1985). *Locative relations in American Sign Language: Word formation, syntax, and discourse.* Unpublished doctoral dissertation, MIT.

Singleton, J. (1989). *Restructuring of language from impoverished input: Evidence for linguistic compensation.* Unpublished doctoral dissertation, University of Illinois.

Siple, P. (1978). Visual constraints for sign language communication. *Sign Language Studies ,19*, 95–110.

Supalla, T. (1982). *Structure and acquisition of verbs of motion and location in ASL.* Unpublished doctoral dissertation, University of California, San Diego.

Supalla, T. (1986). The classifier system in American Sign Language. In C. Craig (Ed.), *Noun classes and categorization: Typological studies in language, Vol. 7* (pp. 181–214). Amsterdam: Benjamins.

Supalla, T. (1990). Manually coded English: The modality question in signed language development. In P. Siple & S. Fischer (Eds.), *Theoretical issues in sign language research, Vol. 2: Acquisition*. Chicago: University of Chicago Press.

Supalla, T. (1998, November). *Reconstructing early ASL grammar through historical films.* A talk presented at the Sixth International Conference on Theoretical Issues in Sign Language Linguistics, Gallaudet University, Washington DC.

Sweetser, E. (1990). *From etymology to pragmatics*. Cambridge, UK: Cambridge University Press.

Talmy, L. (1983). How languge structures space. In H. Pick & L. Acredolo (Eds.), *Spatial orientation: Theory, research and application* (pp. 1983–282). New York, Plenum.

Thomason, S. G., & Kaufman, T. (1988). *Language contact, creolization, and genetic linguistics*. Berkeley and Los Angeles: University of California Press.

Thompson, L. C. (1965). *A Vietnamese grammar.* Seattle: University of Washington Press.

van der Hulst, H. (1993). Units in the analysis of signs. *Phonology, 10*(2), 209–242.

van der Hulst, H., Gijn, I., & Kita, S. (2000). How phonological is the symmetry condition in sign language? Unpublished manuscript, University of Amsterdam, Max Planck Institute for Psycholinguistics, and Leiden University.

van der Kooij, E. (2001). *The phonology of Nederland Gebarentaal.* Unpublished doctoral dissertation, Leiden University.

van Gijn, I., Kita, S., & van der Hulst, H. (2000). How phonological is the symmetry condition in sign language? Unpublished manuscript, University of Amsterdam, Max Planck Institute for Psycholinguistics, and Leiden University .

Wallin, L. (1994). *Polymorphemic predicates in Swedish Sign Language*. Unpublished doctoral dissertation, University of Stockholm.

Wilbur, R. (1999). Stress in ASL: Empirical evidence and linguistic issues. *Language and Speech 42*, 229–250.

Zeshan, U. (2002). 'Classificatory' Constructions in Indo-Pakistani Sign Language: Grammaticalization and Lexicalization Processes. In K. Emmorey (Ed.), *Perspectives on Classifier Constructions in Sign Languages* (pp. 111–139). Mahwah, NJ: Lawrence Erlbaum Associates.

Zwicky, A. M., & Pullum, G. K. (1983). Cliticization versus inflection: English *n't*. *Language 59*, 502–513.

Commentary