Unit 1

Introduction

1 One human language or two?

The study of language over the centuries has yielded a large inventory of concepts and categorizations that are commonly taken for granted. Consonants, vowels, syllables, morphemes, words, phrases, clauses, sentences, and at all levels, rules or constraints are accepted unquestioningly as the nuts and bolts of language. But how fundamental are these properties? In other words, are these and other ubiquitous properties of language genuine universals? That is the question that guides our enterprise.

We are compelled to ask this question by a deceptively simple discovery: natural human languages exist in a physical modality that is different from the one that has been studied for so many centuries – the modality of sign languages used by deaf people all over the world.

That these are natural languages in the same sense as spoken languages seems now to be beyond any doubt (see, among many others, Klima and Bellugi 1979, Wilbur 1979, Poizner, Klima, and Bellugi 1987, Lucas and Valli 1992, Sandler and Lillo-Martin 2001, Emmorey 2002). Sign languages arise spontaneously wherever deaf people have an opportunity to meet regularly. They are acquired by children raised in deaf families without instruction, and along a timetable that is similar to that of hearing children acquiring spoken language (overviews include Newport and Meier 1985, Lillo-Martin 1999a). Sign language appears as effortless and as user-friendly as its spoken counterpart. This impression of naturalness is reinforced by Bellugi and Fischer's (1972) discovery that transmission of a given proposition takes about the same time in both the manual–visual and the oral–aural modalities. They found that the general rate of transmission is the same, about one proposition every 1 to 2 seconds in both language modalities. When the signal is sped up, intelligibility breaks down in speech and in sign at the same point – at about two and a half to three times the normal rate (Fischer, Delhorne, and Reed 1999). As Emmorey (2002, p. 119) points out, this suggests "a modality independent upper limit for the ability to accelerate language processing." In sum, the way sign language is acquired and the ease and speed of its transmission strongly support

the view that a single cognitive system underlies language in both modalities.

And, of course, sign languages are used for everything that spoken languages are – within the family circle, for social interaction, oratory, education, scientific exchange, introspection and dreaming, story-telling, theater, and poetry (Lane and Philip 1984, Padden and Humphries 1988, 2005). In short, whatever it is that humans are doing when they use spoken language, they are doing the same thing, in some significant sense, when they use sign language. Our goal here is to be more explicit about what is meant by "the same thing."

1.1 Separating the code from the mode: the role of linguistic theory

No serious approach to the study of sign language can be entirely atheoretical. One might adopt the hypothesis that sign language must be very much like spoken language, as it is the same human brain that is responsible for them both. An opposing hypothesis is that sign language is likely to be very different structurally from spoken language because of the different modality, despite the identity of species and function. Any of a number of variations on those two themes is imaginable. In order to investigate and categorize the system and its components, some kind of tool must be applied, and investigators will choose the tools that best fit their initial theory – anywhere along a continuum from a general cognitive model to a formal linguistic one.

Our choice is to use established models of linguistic structure and organization, and to push them as far as they will go in accounting for sign language – but, crucially, no farther. If spoken and signed languages are the product of the same cognitive system, we think it reasonable to start with the assumption that languages in the two modalities are likely to have structural and organizational similarities. If that is our hypothesis, then it makes sense to use similar tools – developed on the basis of centuries of cross-linguistic research – to study languages in the only other modality that is natural for humans. We want to know if there are language universals; we have tools for investigating this question; let's use them!

The majority of theoretical frameworks referred to in this book are generative. There are two reasons for this choice. The first is the philosophy behind this school of thought, which raises interesting challenges for sign language investigation. The second has to do with the rigorous investigative tools that have been developed in response to generative theories.

The motivating force behind the generative school of linguistics is the view that the commonalities among languages are more significant and more interesting than their differences. In a television series about this scientific paradigm,[1] its founder Noam Chomsky explains:

[1] *The Human Language, Part I*. A series by Gene Searchinger.

> As human beings, we are naturally interested in the differences among humans; we take the similarities among humans for granted. So, we're interested in the way humans look different from one another and [the way that] their faces are so different, and their sizes are so different, and the way they behave is so different, and so on. But from the point of view of, say, some Martian, we would all look alike. Just as from our point of view all frogs look alike. Now from the point of view of the frog, they look, I'm sure, very much different from one another, because they're interested in the differences among frogs. We just notice the overwhelming respects in which they're similar. If we can make the leap of the imagination that enables us to look at ourselves the way we look at other organisms, we will quickly discover that we're remarkably alike.

In the same program, Lila Gleitman makes clear that this leap of imagination pertains specifically to the study of language:

> In fact the existing differences among human languages has ... been called by Chomsky trivial ... trivial, compared with the differences between the human languages taken together and any other system of communication by other kinds of animals, by intelligent machines and the like – these are all vastly different from the set of human languages which by comparison are very, very much like each other.

Now, if Chomsky's Martian, noticing the remarkable similarities across human populations speaking different languages, were then to observe another group of earthlings signing to each other in sign language, would the Martian be struck by the same sensation of overwhelming similarity? The answer is no longer so obvious. In order to see things through the Martian's eyes, to try to determine the extent to which language in the two modalities that are natural to the species are alike, we adopt the research paradigm that is designed expressly to find universal properties of human language. Over the course of half a century of extremely intense scientific investigation, generative theory has developed and refined tools through which it has analyzed a large number of spoken languages. We are interested in learning what the same tools reveal in the study of sign language.

To the extent that sign languages are found to conform to the constructs and predictions of linguistic theory, we will have demonstrated that the models on which the predictions are based indeed reflect universal properties, that is, that any human language must conform to them. Where sign languages as a group fall outside such predictions, then the models will be revealed to be less than universal.

Insofar as differences in modality are implicated as the cause of such differences, this strategy will allow us to tease apart the linguistic code from the mode of its transmission. And where the mode does not seem to be to blame for differences in code, the finger must be pointed back at the

theory, and revision must be considered in order to make the right predictions, universally. In both cases, sign language research is an instrument for refining both linguistic theory and broader theories of language as a cognitive system. There is also a third possibility, that linguistic theory makes the right predictions about sign languages but still misses generalizations. This more difficult issue is addressed below. Let us illustrate our approach, beginning with the word.

1.1.1 The word and its structure

Formulating a definition of the concept "word" is far from a simple task. Efforts to do so have resulted in theories that distinguish different aspects of "wordhood," such as the morphosyntactic or grammatical word, the lexeme (Matthews 1974), and the phonological word (see e.g., Hall and Kleinhenz 1999). All may overlap, but each can be shown to be distinct. The analyst of sign language words is confronted with similar issues, and similar distinctions emerge from investigating them.

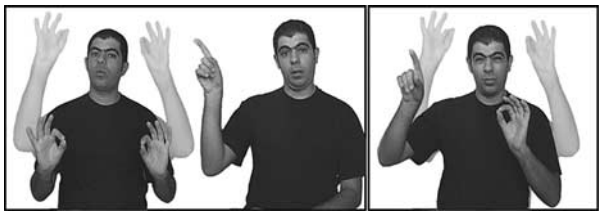
Roughly speaking, it is useful to think of the sign as analogous to the word. Consider the American Sign Language (ASL) sign, ASK.[2] When this sign is inflected for agreement, e.g., first-person subject and non-first-person object (as shown in Figure 1.1a), or non-first-person object and first-person subject (Figure 1.1b), the sign has different forms, both of them different from the citation form of ASK. The signs in Figure 1.1 are two different morphosyntactic words as they have somewhat different forms (in each form, the hand moves along a different path in space) and different grammatical properties (First-person subject/third-person object, and third-person subject/first-person object, respectively). Yet the two signs are in some sense the same word, and can be characterized as belonging to the same lexeme, just as English *see* and *sees* both belong to the lexeme SEE. In addition to demonstrating that sign language words may systematically take different forms, this example reflects an additional phenomenon commonly found in spoken languages: the grammatical property of agreement is encoded by morphological changes in the form of the verb.

In sign language, as in spoken language, a distinction must also be made between the morphosyntactic word and the prosodic or phonological word. A word with a clitic, such as *Jill's* in *Jill's choosey*, constitutes a single stress group and therefore a single word phonologically, though it represents two morphosyntactic words, *Jill* and *is*. In Israeli Sign Language (ISL), a similar distinction occurs, also as a result of

[2] In the absence of a practical transcription system, we follow the convention in sign language linguistics and gloss signs with English words in upper-case letters. The numeral '1' stands for first person, and the letters 'a' and 'b' mark agreement with loci established in space to refer to the subject and object of the verb (cf. Chapter 3). See p. xx above for more detailed notation information.

a. 1-ASK-a b. b-ASK-1

Figure 1.1 Two inflected forms of the ASL lexeme ASK



a. SHOP b. IX 'there' c. SHOP-IX 'there'

Figure 1.2 Cliticization in ISL

cliticization, described in detail in Chapter 15. In this case, indexical locative forms cliticize to hosts. Indexing (glossed IX) is a device that plays a role in many aspects of the grammatical organization of sign languages, as we will see especially in Chapters 3, 20, and 21. It is manifested as pointing toward spatial locations or loci.

In Figure 1.2a, the citation form of the ISL sign SHOP is pictured. The deictic index IX 'there' is illustrated in Figure 1.2b. In the coalesced form, Figure 1.2, the dominant hand signs half of SHOP and makes a smooth transition into the deictic within a single path movement. Over the same time span, the non-dominant hand simply signs SHOP. As a result, what was originally two signs, each with its own movement, has become a cliticized form with a single movement. As we will see in Chapter 14, a single movement is considered by many researchers to define a syllable, and has been argued to be the optimal prosodic form of a word (Sandler 1999b, 1999c). At the same time, this process, together with the verb agreement process illustrated in Figure 1.1, reveals a property that is far more characteristic of sign languages than of spoken languages: simultaneity of structure. The different inflections of ASK are formed by simultaneously superimposing different directions of movement; the coalesced host and clitic take up a single syllable, whose bounds are simultaneously denoted by the other hand.

In these few simple examples, we have demonstrated some properties of sign language words that are far from trivial by appealing to general and theoretically interrelated linguistic principles. The concept "lexeme"

unifies different forms of the same word; signs may be marked for inflection; prosodic structure plays a role in determining the form of words when they combine in sentences. None of these properties could have been assumed to exist in sign language a priori, nor are they likely to have been predicted by a general theory of cognition. All were revealed by using the tools of analysis provided by linguistic theory. Theories are statements of generalizations about language; if sign language instantiates these generalizations, we are more inclined to believe they are truly universal. The second unit of this book examines in detail these and many other morphological forms and processes that exist in sign languages, such as derivation, compounding, and allomorphy.

1.1.2 Sublexical units

Words of sign language are made up of still smaller elements – a finite set of discrete meaningless elements that recombine to create a potentially large lexicon. William Stokoe's (1960) discovery that a sign language has a phonemic level of structure was revolutionary. Not only was Stokoe's contribution socially revolutionary, showing plainly and publicly for the first time that deaf people command real languages like everybody else, it was also scientifically revolutionary, flinging sign language suddenly and dramatically into the arena of linguistic activity. From then on it would no longer be possible to claim, as even linguists of the stature of Leonard Bloomfield had done, that sign languages were primitive and transparent gesture systems (Bloomfield 1933, p. 39). If sign languages have such duality of patterning – that is, meaningless as well as meaningful components – then they could potentially manifest the same computational and communicative power as spoken languages. From the publication of Stokoe's (1960) *Sign Language Structure* on, the scientific community has had two kinds of natural human language to contend with.

Stokoe's investigation was both accessible and convincing because it exploited linguistic theory. Working within the structuralist phonemic tradition, he methodically demonstrated minimal pairs in ASL by substituting units within each of the three major formational categories that he posited: hand configuration, location, and movement. For example, the pair, TOUCH and SICK, shown in Figure 1.3, are minimally distinguished by different places of articulation. The handshape of the dominant, articulating hand is the same for both signs; the straight path movement to contact is also the same. The pair differs only in place specifications: [non-dominant hand] for TOUCH and [head] for SICK.

Structuralist theories of spoken language phonology – for this is the level of analysis at which Stokoe conducted his investigation – proved inadequate in accounting for the sound system of spoken languages, and this was the case for sign language phonological investigation as well.

a. TOUCH b. SICK

Figure 1.3 Minimal pair in ASL, distinguished by place of articulation

Later researchers exploited generative theory, and interpreted the primitive units of the three sign language parameters as binary distinctive features (Sandler 1989, Corina 1993), showing as well that they are hierarchically organized. Let us look a bit closer at this example of the way that specific insights from spoken language phonological research were extended to sign language.

In spoken languages, models of the internal structure of phonological features have been proposed in which, for example, the place of articulation features are separated from laryngeal features such as voicing, and all of these from the feature [nasal] (Clements 1985, Sagey 1986, and many others). Clearly, each of these feature groups is separated by the physiology of the system: the place features are articulated in the oral cavity; features such as voicing, in the larynx, and nasality, by raising the velum.

The model that represents these features according to their articulatory class is explanatory because the same groups pattern together in rules of language. For example, in many languages, nasal consonants assimilate the place of articulation of a neighboring segment, whatever it is, without losing their nasal quality: *can* becomes [kæm] before *be* and [kæŋ] before *go*. Hierarchical models separate the nasal feature from other features on an articulatory basis, and group all oral place features together on the same basis. In this way, if the rule requires assimilation of the place feature class, all and only the features of this class will assimilate. In the case of [ŋ] resulting from the assimilation of the place features of [g] to the [n] segment, the rule will automatically assimilate both the [high] and [back] features responsible for velar consonants, while leaving the [nasal] specification unaffected.

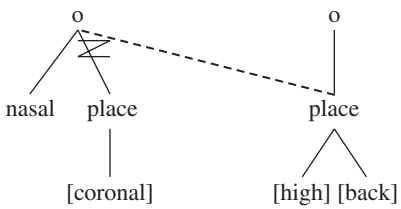
Example (1) shows assimilation of place of articulation from [g] to the preceding [n]. The example, greatly oversimplified for clarity of exposition, shows assimilation by spreading the place class of the [g] segment to the [n] segment, and by disassociating the [n]'s original place specification. The "geometry" of the model captures the generalization that place features often behave as a class: any and all place features spread onto the nasal segment. The hierarchy is intended to be universal in predicting

a. SLEEP b. SUNRISE

Figure 1.4 Components of a compound

which features are expected to behave as a class in any language. In principle, any terminal feature can spread alone, but spreading at any higher node must take along all subordinate features.

(1) Assimilation of place of articulation to a nasal consonant in a hierarchical model



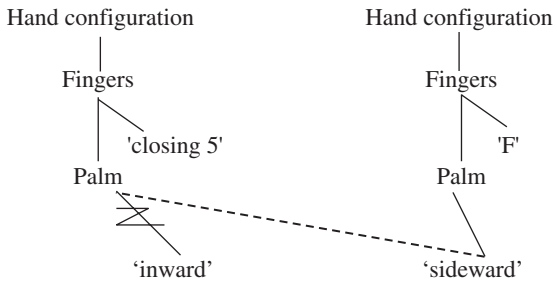
Hierarchical organization of features has been argued to exist in the Hand Configuration class of features in American Sign Language (Sandler 1987a, 1987b, Corina and Sagey 1989). As in the spoken language model, the features are assigned to classes according to articulatory criteria: the shape of the hand is determined by the fingers, and its orientation by the palm (Sandler 1987a, 1987b, 1989). On the basis of assimilation in compounds, it is further proposed that the handshape class dominates the orientation class. The relevant behavior is the following: orientation features may assimilate alone, but if handshape assimilates, orientation must necessarily assimilate as well. Figure 1.4 shows the individual words of the compound OVERSLEEP, which are SLEEP and SUNRISE. In SLEEP, the handshape is  and the orientation is toward the signer. In SUNRISE, the handshape is  and the orientation is toward the contralateral side of the body.

Partial assimilation – i.e., assimilation of palm orientation from the sign SUNRISE onto the first part of the compound, originally SLEEP – is shown in Figure 1.5. The hand for SLEEP has assimilated the contralateral orientation from SUNRISE; the model's palm is now pointing to her left rather than toward her face.

Figure 1.5 OVERSLEEP with orientation assimilation

These and other articulatory facts and the assimilatory behavior motivate the hand configuration hierarchy shown in (2). This process, partial assimilation of orientation only, and other details of the hand configuration category are explored and illustrated in Chapter 10.

(2) Hierarchical organization of hand configuration feature classes (Sandler 1989)



In addition to partial assimilation shown here, total assimilation of both handshape and orientation also occurs in compounds; that this is possible is predicted by the hierarchical model. The example shows how the tools developed for investigating universally viable models of spoken language uncover structural properties of sign language as well. In turn, hierarchical structure gains more credence as a phonological universal. In both spoken and signed languages, the particular hierarchy is determined by the physiology. The features and articulators, and their interorganization, are, of course, different in the two modalities.

1.1.3 The sentence

If sentences are composed of words, and words are signs as we have just described them, what are sign language sentences other than strings of signs? One of the foundational claims of generative syntax is that sentences are not simply strings of words, but are hierarchically structured in a rule-governed way. Is there reason to think that signed sentences are also hierarchically structured?