The Structured Use of Space and Movement: Morphological Processes

12 The sentences of a language like English are not simply composites of unanalyzable words strung together in syntactic constructions. Many of the words themselves are built up in various ways to reflect changes in meaning. The study of the internal structure of words is called morphology, which, in traditional grammar, has two branches, inflectional and derivational morphology. Inflectional morphology is the study of the grammatical markers added to words to indicate such grammatical categories as tense, aspect, person, number, gender, and case; the verb *act,* for instance, can be varied as in *he acted, he is acting, he acts.* The words *acted, acting, acts,* according to this tradition, are different forms of the same verb. Derivational morphology is the study of the formation of different words from the same lexical base. The verb *act* is thus the basis for the formation of the nouns *action, actor, actress,* the adjective *active,* and the semantically related verbs *react* and *activate.*

Languages differ widely in the degree to which they employ inflectional and derivational processes, as well as in the meanings expressed by those processes. Nineteenth-century grammarians developed a classification of languages according to the structure of their words, which ranged from so-called isolating languages, like Chinese, to highly inflecting languages, like Latin and Greek. In languages like Chinese the individual lexical items are more or less immutable in form. While English is rich in derivational morphology, it shows relatively little inflectional variation of its words. Latin, on the other hand, is rich in inflections. For example, the verb meaning 'love' in Latin varies in form according to its grammatical subject—whether it is the speaker, the

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This chapter was written in collaboration with Don Newkirk, Carlene Canady Pedersen, and Susan Fischer.

person being addressed, or some other person (or thing); in this sense, it is said to be inflected—that is, internally varied—for the grammatical category of person. The Latin verb is inflected also according to whether its subject is singular or plural. Other inflections appearing on the verb specify the time of the event with respect to the time of utterance (the verb inflects for tense); and aspectual inflections indicate a focus on the durational aspects of the action, event, or state involved in the meaning of the predicate. In fact, for Latin, the choice of which single free-standing word form one gives for *the* verb meaning 'love' is arbitrary: some glossaries and dictionaries list *amo,* the first-person singular, present indicative form of the verb; but this particular form reflects inflection for several different grammatical categories, including person, number, and tense.

We are led to the study of morphological processes in American Sign Language for a straightforward reason: ASL exhibits a very rich set of inflectional variations on its lexical units.[1] Chapter 11 described one set of such processes, aspectual modulations on certain stative predicates. But such processes in fact seem a favored form of semantic differentiation in the language, expressing many fine distinctions of meaning.

The inflectional processes that have evolved in American Sign Language are entirely independent from English (or any form of Signed English) in the meanings expressed. Like Latin, ASL verbs, for instance, are internally varied for many different grammatical categories. Most of the distinctions that are inflectionally marked in ASL are expressed either lexically or phrasally in English. The semantic distinctions expressed by these processes are often quite abstract. In many cases it is difficult to find single words or simple phrases in English that express the distinctions of meaning coded by the inflectional forms of ASL.

Among the inflectional processes in ASL are the following: *indexical* inflections that change person reference for verbs; a *reciprocal* inflection that indicates mutual relation or action; *number* inflections that indicate singular, dual, trial, and multiple with respect to arguments of the verb; inflections for *distributional aspect,* which indicate distributed action with respect to 'each,' 'certain ones,' 'unspecified ones,' as well as distributed action 'all over,' 'all around'; inflections for *temporal aspect,* reflecting distinctions such as 'for a long time,' 'regularly,' 'continually,' 'incessantly,' 'over and over again,' 'characteristically'; inflections for *temporal focus,* reflecting distinctions such as 'starting to,' 'increasingly,' 'gradually,' 'progressively,' 'resulting in'; inflections for *manner,* reflecting distinctions such as 'with ease'; inflections for *degree,* reflecting distinctions such as 'a little bit,' 'approximately,' 'very,'

'excessively.' In addition, ASL has morphological processes that derive nouns from verbs, predicates from nouns, nominalizations from verbs.

ASL differs dramatically from English and other spoken languages in the *mechanisms* by which its lexical units are modified. For the form of its morphological processes, the mode in which the language developed appears to make a crucial difference. In spoken languages the most widespread morphological device for modification of meaning is probably affixation: the addition of sound segments at the beginning of, within, or at the end of the word. To the basic English form *act* [ækt], for instance, can be added *-ed, -ing, -s, re-, de-, -ion, -or, -ress, -ive, -ate, -ity,* and so on. Internal modification also occurs as a morphological device in spoken languages (compare *man* to *men* or *bath* to *bathe*), and in some languages this is a favored device; other devices include reduplication of part or all of a word as well as changes in stress or tone (Sapir 1921; Cassirer 1955; Eulenberg 1971; Wilbur 1973; Fromkin and Rodman 1974; Key 1965). In spoken languages the form of morphological processes is intimately connected with the linear organization of the lexical units.

In ASL there appears to be a strong resistance to sequential segmentation at the lexical level and hence to the morphological device favored by English and a great many other spoken languages: affixation. To our knowledge there are no intrinsic segmental affixes in ASL. Four such affixes are listed among the 2500 signs of the DASL, but these are clearly loan translations from English and their usage in communication between deaf native signers has so evolved that they now have the status of independent lexical items; other morphological devices and syntactic constructions within ASL have largely displaced them in their original functions.[2]

ASL signs are made by the hands moving in space; it is dimensions of space and movement which the language uses for its grammatical processes. Rather than affixlike sequential additions to signs, inflections in ASL involve superimposed spatial and temporal contrasts affecting the movement of signs.

Before examining the meanings and particulars of form that result from the inflectional and derivational processes we shall cover in this chapter, let us take a glimpse at some of the more global characteristics that appear under such processes. Inflectional processes always affect the movement of signs. Figure 12.1 shows the one-handed sign GIVE and a small set of the array of forms it takes under various morphological processes.

In uninflected form the sign GIVE is made with a single outward movement. Under one inflection, a rounded circular contour appears; under another, the hands separate and sweep to the side; under an-

Figure 12.1 GIVE (upper left) and its forms under an array of morphological processes.

other, multiple articulations move along an arc; under another inflection, the two hands alternate in criss-crossing patterns; and still another inflectional process results in a rounded alternating crossing contour of movement of the hands in space.

Inflectional Processes

The patterns that morphological processes assume in this visual-manual language, ASL, are thus radically different from those of spoken language. What is it that is being expressed, being grammatically marked, by such imposed patterning?

The same semantic distinctions marked in ASL are commonly marked in many spoken languages as well (though often not in English). Inflectional processes in ASL mark distinctions within the grammatical categories of *deixis, reciprocity, number, distributional aspect,* and *temporal aspect.*[3]

Deixis: Referential Indexing

The structured use of space in ASL is nowhere more evident than in the means by which verbs reflect their arguments—that is, the way they indicate indexic reference, as in specifying the difference between 'I gave him' and 'he gave me' or 'he gave you' and 'you gave me.' In traditional grammatical theory, when a verb is said to inflect for person, internal changes in the form of the verb reflect characteristics of the discourse situation. What is reflected is not objectively who or what is referred to by the subject of the verb but rather whether in the discourse situation the subject is the speaker, the person or persons addressed, or some subject (or subjects) of the discourse, not restricted to the participants in it. In English, pronouns like *I* (first person) versus *you* (second person) versus *he/she/it* (third person) are discourse dependent, shifting according to who is doing the talking and who is being addressed. Such shifters, as Jakobson (1957) calls them, are integral to a grammatical category called deixis.

The meaning of the term *deixis*—a loan word from Greek that means essentially 'pointing' or 'indicating'—makes it a particularly apt expression for describing the special way many ASL verbs reflect their arguments; for the deictic function is marked in ASL directly by indexing locations in space and by changes in the form of the verb—in the direction of its movement and in orientation—so as to point to such spatial loci.[4]

The indexic system operates with respect to target loci in a horizontal plane of signing space, which functions as the indexic plane. Those ASL verb signs that are mutable with respect to space move toward different target points in the indexic plane in distinguishing reference

to first person, second person, and third persons. Figure 12.2 shows changes in the basic sign ASK for indexic reference to first-, second-, and third-person singular. In its citation form ASK is made with movement directly away from the signer (figure 12.2a). To inflect for indexic reference, as in 'I ask you,' the sign moves toward the second-person target locus (figure 12.2b). For 'I ask him' the sign moves toward a third-person locus (figure 12.2c). For 'you ask me' the sign changes direction and path of movement again, starting with the hand at the second-person locus and moving toward the signer (see figure 12.2d). Figure 12.3 illustrates the same indexic changes on a two-handed sign, INFORM; figure 12.3d shows the form of the sign as it would be used in a sentence such as the following:

(1) NEW ADDRESS, INFORM[x:'you to me'] NOT-YET.
You haven't informed me of your new address yet.

The specific locations of the indexic loci are determined in a variety of ways. The actual positions of the signer and addressee determine the locations of their indexic loci in the indexic plane. Such referential loci can be specified in signing by articulating an indexical sign at a point that constitutes that particular indexic locus. The same can be the case with objects and other individuals that happen to be in sight, though here other conventions also come into play. (Indexical signs have some of the same general functions as free-standing pronouns.)

In discourse that extends beyond the speaker, the addressee, and the here and the now to objects, events, and persons not present, there are a variety of conventions for establishing indexical loci. The signer as narrator can use the indexic plane as a kind of stage on which indexical loci are created by indexic signs alone, or in conjunction with noun signs, or by positioning certain noun signs or classifier signs at particular locations on the indexic plane.

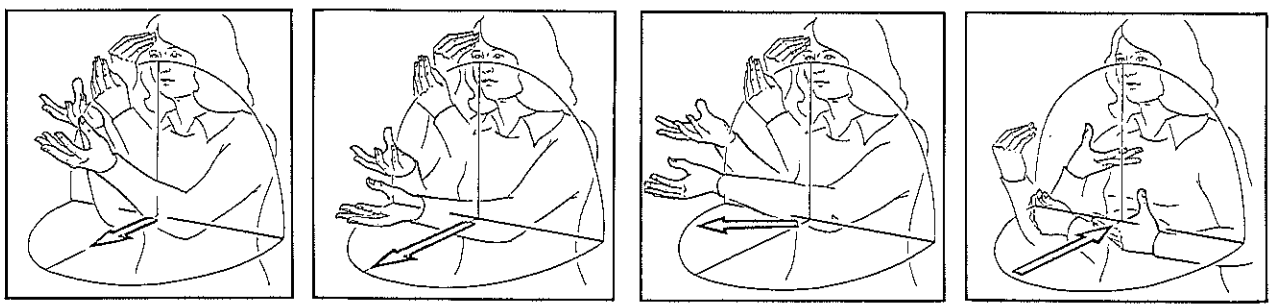
Verb signs can move toward and between such loci and can be articulated at them, thereby expressing anaphoric reference. In addition, verbs can themselves establish indexic loci (and thus express differences in indexic reference). Such referential distinctions must be incorporated into ASL verbs in specific sentential contexts. Thus *JOHN LOOK-AT (ME), with the verb uninflected for referential indexing, is ungrammatical in ASL. The correct form would be JOHN LOOK-AT[x: 'me']. The conventions for establishing and differentiating indexic loci and for expressing shifts in the referents of loci involve not only the manual signals but body shifts and changes in eye gaze. More detailed discussion of indexing can be found in Woodward (1970), Lacy (1974), Fischer (1975), Friedman (1975), Edge and Herrmann (1977), and Friedman (1977).

Here we will not consider further the various conventions used to es-

Figure 12.2 Indexic reference on the sign ASK.

(a) ASK (b) ASK[x:'me to you'] (c) ASK[x:'me to him'] (d) ASK[x:'you to me']

Figure 12.3 Indexic reference on the sign INFORM.



(a) INFORM (b) INFORM[x:'me to you'] (c) INFORM[x:'me to him'] (d) INFORM[x:'you to me']

tablish particular indexical loci; we have instead focused on how verb signs themselves incorporate indexic reference.

The Reciprocal Inflection

Some languages have special ways of expressing the difference in meaning between 'they pinched them' and 'they pinched each other.' In 'they pinched them' the action expressed by the verb is directed from subject to object; in 'they pinched each other' there is mutual interchange between them. In English the form of the verb does not change; English has reciprocal pronouns, *each other* and *one another,* to express the relation of mutual action within a predicate.

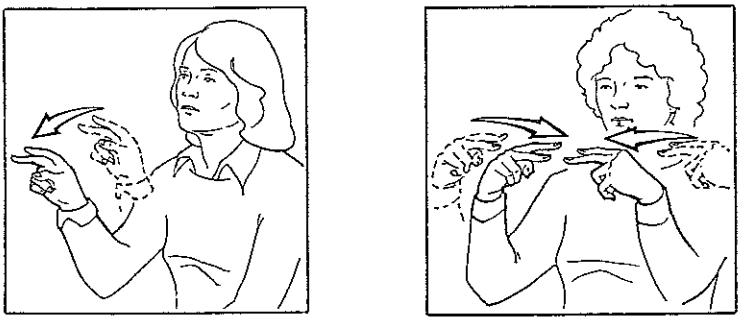
ASL has instead a special *reciprocal inflection,* which operates on verbs to indicate mutual relations or actions. This inflectional process expresses the grammatical notion of mutual action or mutual relation in a direct and visibly appropriate way. The verb sign is doubled: it is made with two hands rather than one, in simultaneous movement, and the hands are directed or oriented toward each other and toward target points in the indexic plane.

The sign LOOK-AT in uninflected form is made with one hand directed away from the signer. When LOOK-AT undergoes the reciprocal inflection to express 'they look at each other,' the sign is doubled, made with two hands oriented and moving toward each other simultaneously without contact (see figure 12.4).

The sign INFORM undergoes the reciprocal inflection in an analogous way; note that although it is initially a two-handed sign (with the second hand executing a copy of the dominant movement), under the reciprocal inflection each hand acts in an independent, dominant way: for the reciprocal INFORM, meaning 'they informed each other,' the hands move simultaneously past each other toward two third-person loci (right and left) of the indexic plane (figure 12.5).[5]

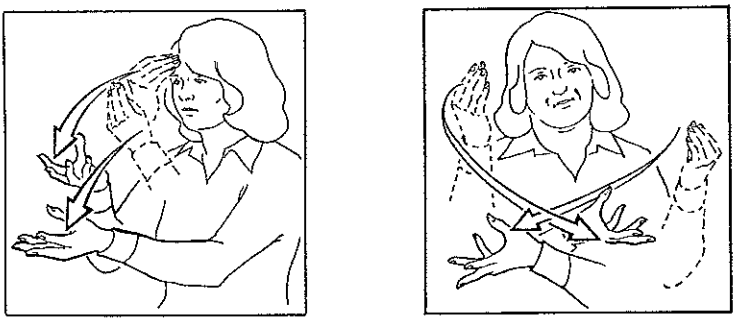
Although the reciprocal is made with the two hands moving toward each other simultaneously, this does not indicate that the actions referred to are necessarily simultaneous, only that the exchange of actions is viewed as a single event. However, in ASL it is obligatory to specify whether a reciprocal action is considered one event or recurring events. If the situation referred to involves repeated exchanges of information, the reciprocal form must be specified for recurrence also. Thus, whereas the sign INFORM[R:'each other'] (figure 12.5) specifies an exchange of information considered as a single event, the sign form specifying regularly occurring exchanges of information, as in 'keeping each other posted,' would also be inflected for aspect (see figure 12.21).

Figure 12.4 The reciprocal inflection on LOOK-AT.



LOOK-AT LOOK-AT[R:'each other']

Figure 12.5 The reciprocal inflection on INFORM.



INFORM INFORM[R:'each other']

Numerosity: Grammatical Number

Verbs in ASL are inflected for several kinds of numerosity distinctions. Such distinctions as whether certain arguments of the verb (its object, or subject) are singular or plural result in internal changes in the form of the verb (inflections for the grammatical category of number). Other internal changes in the form of the verb reflect distinctions in the number of actions referred to as well as distinctions in the nature and extent of the distribution of those actions over arguments (inflections for distributional aspect). In this way the form of the verb expresses quantificational distinctions, including 'action to all,' 'distinct actions to each,' 'actions to certain ones,' 'actions to any.' The grammatical categories of number and distributional aspect are so interrelated in ASL that we have treated them together as expressions of numerosity.

Languages differ considerably in the degree to which the expression of certain distinctions in meaning are obligatorily marked by inflec-

tion, given some particular state of affairs described. In English the distinction between singular and plural number, for example, is obligatorily marked on nouns (*boy, boys*). In ASL, although there are inflections for number on nouns, such expression is not obligatory in all sentence contexts. In some contexts the noun object may appear in uninflected form while the verb carries the burden of specification for number.

The sentence MAN, (ME) ASK, with no number inflection on the noun or verb, means 'I asked the man.' But for the meaning 'I asked the men' only the verb need vary to specify whether the action refers to two or more men, as in MAN, (ME) ASK[N:multiple], in which the sign MAN has no number inflection. In fact, the singular uninflected form of the verb cannot be used in construction with an inherently plural noun sign like CHILDREN (when it occurs before the verb), nor with quantifiers on preposed nouns, nor, for that matter, in construction with adverbial signs expressing temporal distribution (signs meaning 'regularly,' 'often'). Inflectional distinctions are obligatorily marked on ASL verbs in a variety of sentence contexts.

Inflections for number on ASL verbs specify such distinctions of meaning as that an action involves an argument (recipient or agent) whose number is two, three, or many. Although inflections for number may be used in describing situations involving two or more separate actions, the inflectional forms for number themselves do not specify the nature of the distribution of action, just as the English sentence *I informed both of them* does not indicate whether the information was conveyed in separate actions or in a single act, only that two were informed.

The singular form of the verb has movement toward a single target locus of the indexic plane; the dual inflection has movement toward two loci; the multiple inflection has a single movement along an arc on the indexic plane.

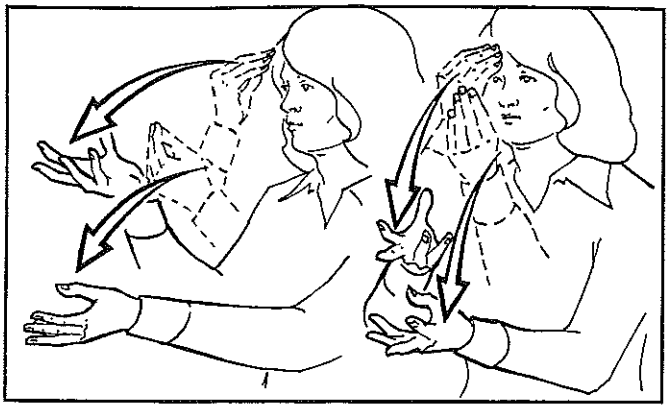
Dual inflection. ASL has a dual inflection that specifies action with respect to a dual argument (two recipients or agents). It occurs in sentences like the following:

(2) MEETING TIME TEN, SUPERVISOR INFORM[N:dual].
The supervisor informed each of the two about the ten o'clock meeting.

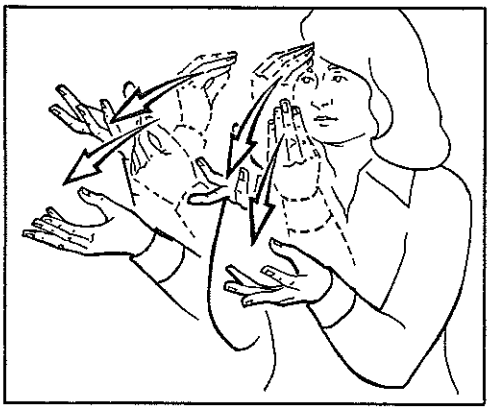
The movement of the verb is articulated twice, once on each side of the indexic plane. The dual inflection is rhythmically distinct from two conjoined predicates (see figure 12.6).

A *trial* form specifying separate actions with respect to a trial argument (three recipients or agents) has been provided by some signers. The movement of the verb is clearly directed toward three distinct third-person loci.

Figure 12.6 INFORM as a sequence of two predicates, and the dual inflection of INFORM.



(a) INFORM as two predicates.



(b) INFORM[N:dual]

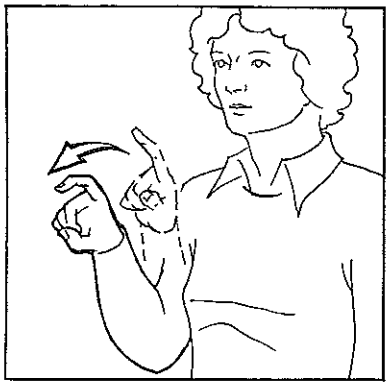
Multiple inflection. The uninflected form of the verb cannot be used in ASL when the object of a verb is multiple in number (unless it is a collective noun in ASL, such as GROUP or CLASS). The verb specifies number of recipients, and inflections indicate some, many, or all members of a group. The multiple inflection is used, for example, in sentences like the following:

(3) HOMEWORK, TEACHER GIVE[N:multiple].
The teacher gave out homework to them.

(4) MAN, (ME) ASK[N:multiple].
I asked the men.

(5) *A-G-N-E-W* QUIT[+], CONGRESSMAN (HE) INFORM[N:multiple].
Agnew informed the congressmen he was resigning.

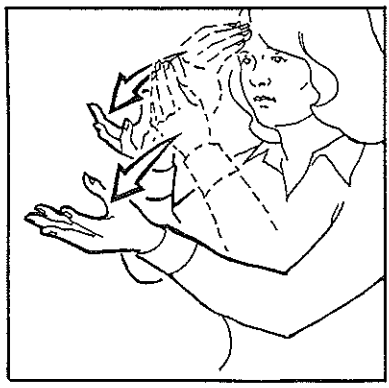
Figure 12.7 The multiple inflection on ASK.



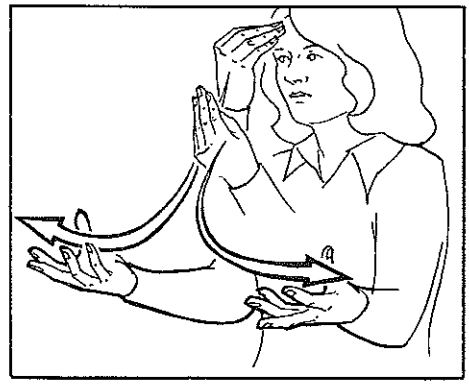
ASK

ASK[N:multiple]

Figure 12.8 The multiple inflection on INFORM.



INFORM



INFORM[N:multiple]

Note that the noun objects of the verbs in these sentences are themselves unspecified for number. The meaning specified by the inflected verb in example (3) is that things were given out to many—the action is viewed as a single episode. This inflected form of the verb does not specify whether the action was distributed to each recipient, nor does it specify the temporal distribution; it is a general unspecified multiple form. The form of this multiple inflection involves a sweep along an arc of the horizontal plane of indexic space perpendicular to the direction of the base movement. The sign ASK is made in uninflected form with the hand moving away from the signer. Under the multiple inflection meaning 'I asked them,' the hand moves along the indexic plane in an arc (see figure 12.7). Figure 12.8 shows INFORM under the multiple inflection.[6]

Numerosity: Distributional Aspect

Several inflections focus not only on grammatical number in selected arguments of the verb, but also on differentiating the actions denoted by the verb, distinguishing (a) whether a specific act presents itself as an indivisible whole or as several separate actions, (b) whether the actions are specified for occurrence at distinct points in time, (c) whether the actions are specified for their order of occurrence, and (d) how the actions are distributed with respect to individuals participating in the action—an action for each one, or actions for certain ones, certain groups, or just anyone. These and other distinctions are made by inflections for the grammatical category of distributional aspect on ASL verbs. It appears that the specification of distributional aspect in ASL is partly a matter of choice and focus; that is, though marking number on verbs is obligatory in some contexts, one may choose not to focus on specific distributional relations between actions and recipients.

We shall describe briefly seven inflectional forms and the meanings they convey. All specify distributed actions of the verb; that is, not only is some argument of the verb grammatically multiple, but the action of the verb itself is multiple.

Exhaustive: actions distributed to each individual in a group—the actions viewed as a single event.

Allocative determinate: actions distributed to specified individuals at distinct points in time.

Allocative indeterminate: actions distributed to unspecified individuals over time.

Apportionative external: actions distributed around members of a closed group.

Apportionative internal: actions distributed all over, within a single whole.

Seriated external: actions distributed over a series of objects in the same general class.

Seriated internal: actions distributed with respect to internal features (or typical parts) of an object.

Exhaustive. When the sign GIVE undergoes the exhaustive inflection, it specifies a separate act of giving with respect to each recipient and means 'to give something to each one' (see figure 12.9a).

(6) DIPLOMA, PRINCIPAL GIVE[N:exhaustive]; (ME) NONE.
The principal gave out a diploma to each one, except for me.

The form of the exhaustive inflection is multiple iterations—numerous specific articulations of the verb—in a series along an arc in the indexic plane, with successive articulations displaced laterally.[7] The form the sign assumes under this inflection is congruent with its mean-

Figure 12.9 The exhaustive inflection (a) with change in indexic reference (b).

(a) GIVE[N:exhaustive; x:'me to them'] (b) GIVE[N:exhaustive; x:'they to me']

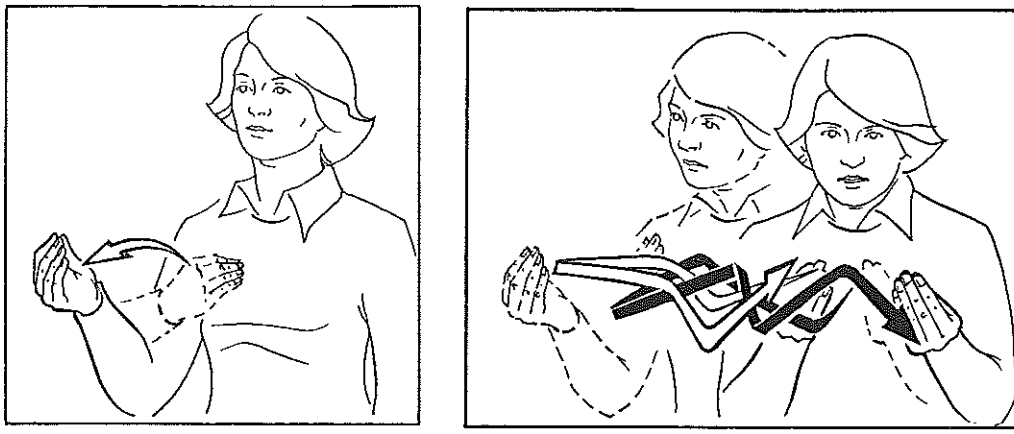
ing: the separate articulations of the verb's movement are distributed in space, the spatial-temporal array reflecting separate actions distributed over individuals; the quantificational force is that of 'each.' Although this inflection specifies individuated distribution of the action denoted by the verb, it does not focus on the temporal separation or succession of the actions. The actions are viewed as a single event or episode.

As with inflections for number, and other inflections for distributional aspect, the exhaustive occurs in combination with referential indexing. The exhaustive distributive force can apply to the recipient of the action, 'I gave to each of them,' or to the agent of the action, 'They each gave to me' (see figure 12.9b).

(7) SMALL-BOX, CHILDREN GIVE[N:exhaustive; x:'they to me']; (ME) SURPRISE.
The children each gave me a gift; I was surprised.

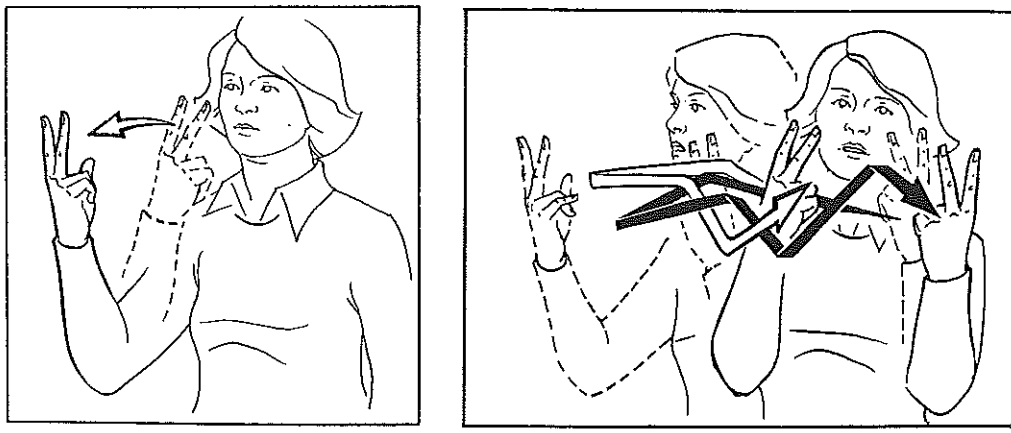
Allocative determinate. Whereas the exhaustive inflection specifies distributed actions that together are viewed as a single event, two allocative inflections specify that the distributed actions are distinct. The allocative determinate inflection specifies separate actions occurring at distinct points in time and distributed selectively with respect to certain definite recipients: 'to ask this one and that one' or 'to give to certain ones in distinct actions.' This inflection indicates definite differentiated plurality of both argument and action, with the actions distributed in time. The quantificational implication is that of 'certain, but not all.'

Figure 12.10 The allocative determinate inflection on GIVE.



GIVE GIVE[N:allocative determinate]

Figure 12.11 The allocative determinate inflection on SEE.



SEE SEE[N:allocative determinate]

This inflection is used in sentences like the following:

(8) RECENTLY[+] FRIEND (THERE) GALLAUDET, (ME) SEE [N:allocative determinate].
During a recent visit to Gallaudet College, I saw various ones of my friends.

(9) COP HIS[+] DUTY ARREST[N:allocative determinate].
A policeman's job includes making certain arrests.

The form of the inflection has the following patterning: it is made by multiple articulations of the sign's movement targeted toward separated points in the indexic plane; the points at which the articulations

are made are not in serial order. This form brings a new dimension into play: the hand is doubled and the two hands target toward the points in alternating patterns of movement.

Figure 12.10 illustrates the two-handed alternating pattern of the allocative determinate inflection on the sign GIVE. Figure 12.11 shows the patterning of the sign SEE under the same inflection; in citation form SEE is made with one hand, beginning with contact on the cheek and then moving away, but under this inflectional pattern the sign is made with two hands alternating.

Allocative indeterminate. A further element of patterning is added to that of the allocative determinate to create a still more complicated inflected form; that element is the contouring of movement. What we call the allocative indeterminate inflection has, like the allocative determinate, the meaning of multiple separate actions specifying different events—but with respect to unspecified recipients. Appropriate sentences with this inflection include:

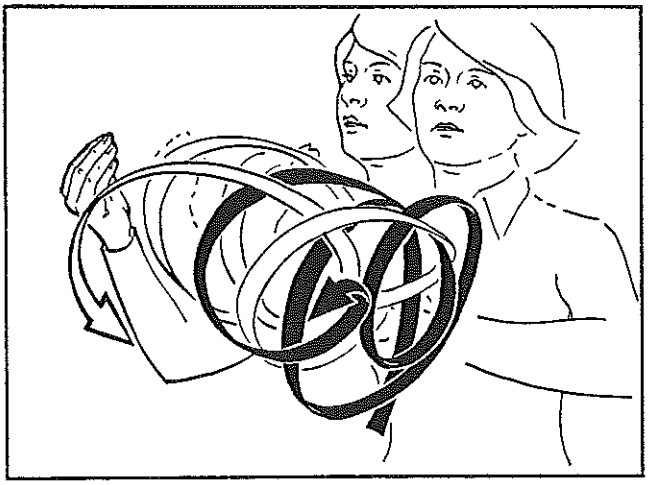
(10) AUNT MUST OLD⌒HOME[+]; DECIDE[+] NOW MONTH THINGS PRESENT[N:allocative indeterminate].
My aunt must go to an old folk's home; she decided to give away her belongings during this month (for instance, to anyone in the family).

(11) CHRISTMAS[+] ALL-WEEK MAN GIVE[N:allocative indeterminate].
At Christmas-time, all week long, the man gave out things (to all comers).

The form of this inflection is similar to that of the allocative determinate, but whereas the determinate inflection has straight-line movement in each of its multiple articulations, the indeterminate inflection has decidedly rounded, spiraling contours, specifying events separated in time. Note that the allocative indeterminate occurs in sentence contexts with time adverbials of extended duration (NOW MONTH, ALL-WEEK). Thus the indeterminate inflection is made in the horizontal plane of the signing space with two hands alternating in repeated movements directed toward multiple nonseriated targets, and it has rounded contours. Figure 12.12 illustrates GIVE under the allocative indeterminate inflection.

Apportionative external. Two inflections express the apportionment of action; they differ according to whether the action of the verb is distributed with respect to a closed group or collective object (the apportionative external) or to components of a singular object (the apportionative internal). The apportionative external is made by iteration of the movement of a sign along a circular path on the horizontal plane; the path of the apportionative internal is identical in shape but made on the vertical plane.[8]

Figure 12.12 The allocative indeterminate inflection on GIVE.



GIVE[N:allocative indeterminate]

When the sign ASK undergoes the inflection for apportionative external it means 'ask the members of a collected group' (figure 12.13a). MEASURE so modulated means 'measure things within a collected group.'

The apportionative external inflection is used in sentences such as (12):

(12) BIRTHDAY NOW[+], FORGET WHO; MUST ASK[N:apportionative external].
Today is someone's birthday, I forget whose. I must ask around the group.

Apportionative internal. This related inflectional form has the meaning of action of the verb distributed within or over a single object, or of action distributed within some location. The apportionative internal inflection consists of a series of iterations of the sign's movement around a circular pattern in a vertical plane parallel to the body; like the apportionative external, the movement of the sign root is iterated along a circular path—but in a different plane. The pattern in the vertical plane specifies distribution of action 'all around' or 'all over a singular object.'

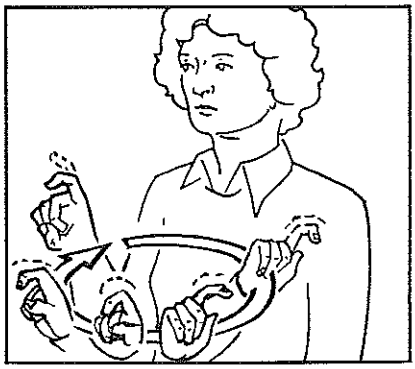
Figure 12.13b,c show MEASURE under the apportionative external and internal inflections. Note the contrasting meanings of the two inflectional forms for the apportionative:

(13) HOUSE, (ME) MEASURE[N:apportionative external].
I took measurements of the houses in the group.

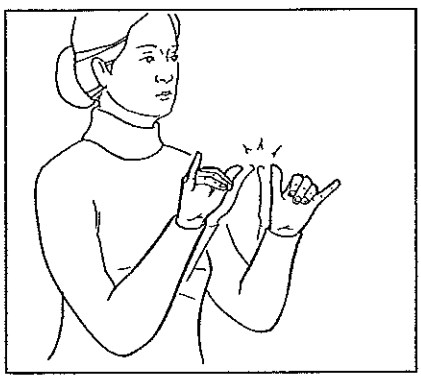
(14) HOUSE, (ME) MEASURE[N:apportionative internal].
I took measurements all over the house.

Figure 12.13 The apportionative external inflection (a) and (b); the apportionative internal inflection (c).

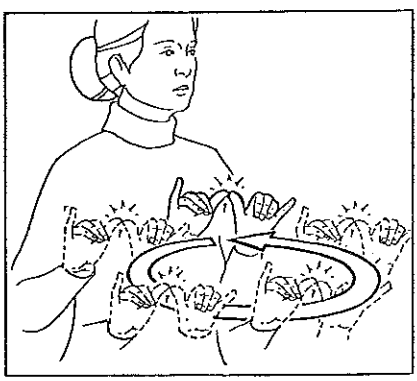
(a) ASK



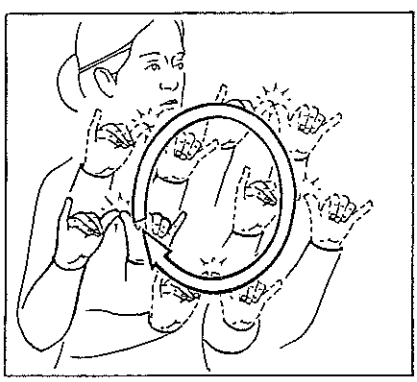
ASK[N:apportionative external]



(b) MEASURE



MEASURE[N:apportionative external]



(c) MEASURE[N:apportionative internal]

Seriated external. A third pair of inflections makes use of iterations of a sign's movement—but along straight lines; such patterns occur frequently with nouns as well as verbs. These seriated inflectional forms are made with sideways iteration (seriated external) and with downward iteration (seriated internal). The seriated external inflection on verbs specifies distribution of action with respect to objects of the same general class. The inflection applies also to nouns, in which case the meaning of the form is often very transparent: 'a row of cars,' 'a line of girls.' With verbs, however, the inflection can become more abstract in meaning:

(15) CAR PRICE, (SELF) WANT COMPARE[N:seriated external].
He wants to compare the prices of several kinds of cars.

(16) NOUN, VERB MODULATION$_{inv}$, (ME) COMPARE[N:seriated external].
I made an overall comparison of (different kinds of)modulations on nouns and verbs.

Seriated internal. The seriated internal inflection is made with downward displacement and iteration and has a more specialized meaning —not distribution of action with respect to classes of objects but, rather, distribution of action with respect to (some list of) typical components, characteristics, or internal features of objects. Note the contrast in meaning between sentences (16) and (17).

(17) NOUN, VERB MODULATION$_{inv}$, (ME) COMPARE[N:seriated internal].
I compared noun and verb modulations (with respect to some internal features of each).

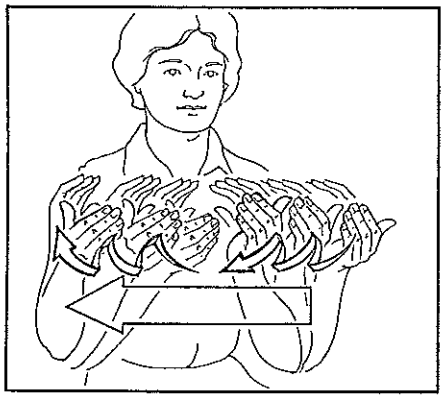
As further examples, the sentence *A-S-L*, ENGLISH, (ME) COMPARE with downward displacement of the verb means to compare (a series of) features of each language, that is, to make a comparative analysis; the sign FIGURE with downward displacement means to figure out the details of something.

Figure 12.14 shows the basic verb sign COMPARE and the form of that sign under the seriated external and the seriated internal inflections.

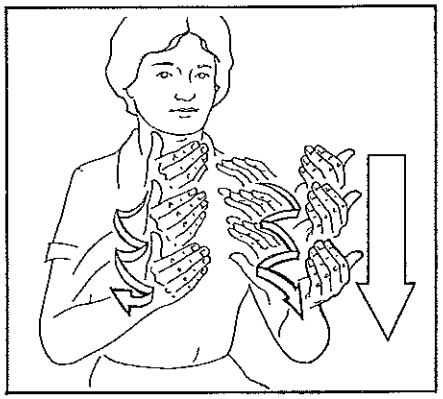
Thus inflections expressing numerosity (number and distributional aspect) have movement targeted with respect to points, lines, arcs, and circles; some have single sweeping movements (the multiple inflection) and some have iterated movements (exhaustive, apportionative). Some use one hand (exhaustive) and some use the two hands in alternating movements (as in the random-looking pattern underlying the allocative inflections). Some pairs of contrasting inflectional forms are distinguished by the planes that are their loci (apportionative external and internal), other pairs by the direction in which successive iterations are displaced (seriated external and internal). The meanings

Figure 12.14 The seriated external inflection (a) and the seriated internal inflection (b).

COMPARE



(a) COMPARE[N:seriated external]



(b) COMPARE[N:seriated internal]

coded all have to do with number of the argument (dual, trial, multiple) and with distribution of the actions (one action to each, to certain ones at specified times, to any one at distinct times, all over, all around, and so forth). The forms progress in complexity from the simple uninflected form to the two hands in alternating movement toward random targets, with a rounded contour of movement. One dimension of spatial patterning builds on another to create increasingly complex patterns of form.

The Grammatical Category of Temporal Aspect and Focus

Verb signs in ASL also inflect for temporal aspect and manner: these grammatical categories were the focus of chapter 11. We interpret as-

pect broadly, including not only inflections specifying recurrence and duration but inflections that differentiate temporal aspect, temporal focus, and distinctions of degree. There is a wide array of inflectional forms marking distinctions of temporal recurrence and duration (meaning 'for a long time,' 'regularly,' 'frequently,' 'incessantly,' 'from time to time,' 'characteristically'); distinctions of temporal focus (meaning 'starting to,' 'increasingly,' 'gradually,' 'progressively,' 'resulting in'); distinctions of manner (meaning 'with ease,' 'readily,' 'with mental preoccupation'); and distinctions of degree (meaning 'a little bit,' 'sort of,' 'very,' 'excessively').

The meanings indicated by inflections for temporal aspect and focus are different from those for number and distributional aspect in that they specify only the temporal distribution, contour, and saturation of the predicate, without respect to number, of either agent or recipient of the action. As we will see, inflectional forms may interact in specific ways to provide still further distinctions of meaning. Here we consider only the simplest inflectional forms and describe only some of the forms we have identified.

The differences in meaning indicated by inflections for different grammatical categories are mirrored by general differences in form. The most salient formal characteristic of inflections for number and distributional aspect is *spatial* patterning, with displacement along lines, arcs, and circles in vertical and horizontal planes. By contrast, inflections for temporal aspect rely heavily on *temporal* patterning, making crucial use of dynamic qualities such as rate, tension, evenness, length, and manner in the movement of signs. Various types of multiple articulations characterize some inflections in both groups.

Let us illustrate with some of the forms that LOOK-AT assumes under a variety of inflections for temporal aspect and focus. The changes in meaning and form roughly parallel some of the modulations on adjectival predicates described in chapter 11. Just as we found pairs of inflectional forms on the sign SICK, one member of which reflected a stative sense ('be sick'), the other a nonstative sense ('get sick'), we have collected pairs of inflectional forms on verbs; in this case, the distinction hinges on whether the verb has a durative or punctual sense. LOOK-AT has a punctual form made with a short directional-path movement (figure 12.15a) and a durative form made without directional-path movement (not shown).

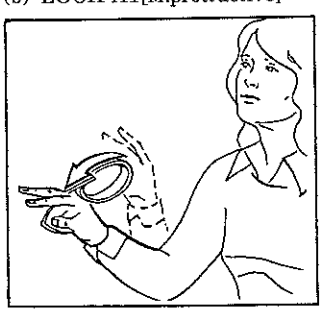
One inflected form of the durative verb is made with a long tense hold and without motion; the nuance in meaning is the same as that of the *protractive* modulation of adjectival predicates and translates roughly as 'to stare at (uninterruptedly)' (figure 12.15b). A parallel form of the punctual verb is made with short tense iterated movement;

Figure 12.15 Some inflections for temporal aspect on LOOK-AT.

(a) LOOK-AT

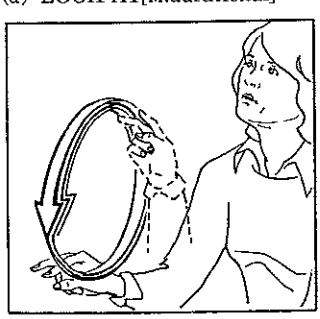
(b) LOOK-AT[M:protractive]

(c) LOOK-AT[M:incessant]



(d) LOOK-AT[M:durational]

(e) LOOK-AT[M:habitual]



(f) LOOK-AT[M:continuative]

(g) LOOK-AT[M:iterative]

the nuance of meaning is that of *incessant* acts, roughly, 'to look at incessantly' (figure 12.15c).

A second inflected form of the durative verb has smooth, circular reduplicated movement; it focuses on the verb's *durational* characteristics, and the meaning is roughly 'to gaze at' (figure 12.15d). A parallel form of the punctual verb has rapid, nontense repetitions, the meaning is that of *habitual* action: 'to watch regularly' (figure 12.15e).

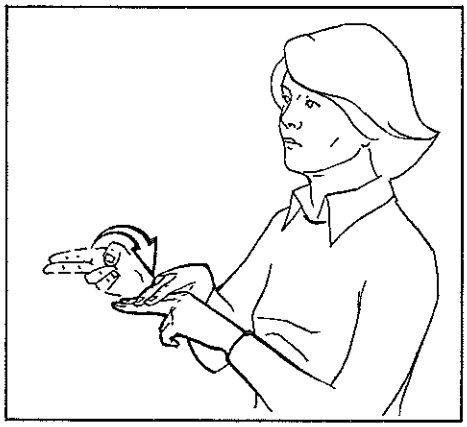
A third inflected form of the durative verb is like the *continuative* modulation on adjectival predicates, with slow, elongated, continuous reduplications that are elliptical in shape; the meaning is 'to look at for a long time' (figure 12.15f). A parallel form of the verb in its punctual sense is like the *iterative* modulation on adjectival predicates; the reduplicated movement is tense and end-marked (hold manner), with a slow elliptical return. The meaning is 'to look at again and again' (figure 12.15g). Other discussions of aspectual distinctions can be found in Fischer (1973) and Supalla and Newport (in press).

Parallelisms in meaning and form suggest that the six inflected forms represent three temporal aspects: one with protractive or incessant meaning, depending on whether the inflection operates on the durative or the punctual form; one with durational or habitual meaning; and one with continuative or iterative meaning.

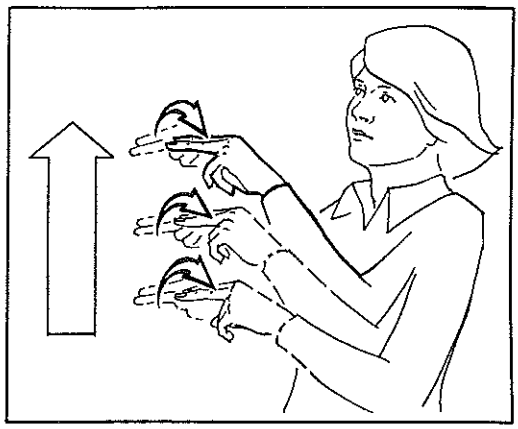
Other aspectual distinctions marked on ASL verbs include the following: an inflection for *facilitative aspect,* meaning 'with ease,' has a single movement, which is both elongated and fast. Under this inflection READ means 'to skim through' and WRITE means 'to write with ease.' An inflection for *inceptive aspect,* makes reference to the beginning of a change in state. Under this inflection LIKE, for example, means 'start to like.' An inflection for *augmentative aspect* has iterations at three or more points along a straight line moving in a direction determined by the movement of the uninflected sign; in the group of signs described here the direction is upward. Under this inflection UNDERSTAND means 'understand more and more' and INCREASE means 'increase more and more' (see figure 12.16).

The nuances of meaning that are expressed inflectionally in ASL represent a considerable range of semantic distinctions. Expression of such nuances is sometimes a matter of choice and focus; but in the case of many of the grammatical categories expressed by inflectional processes (referential indexing, number, temporal and distributional aspect), the sign form that we have designated as uninflected is not a semantically neutral form that would simply be less explicit in describing some conceived state of affairs; the uninflected form and the inflected forms are semantically contrastive. That this is really the case is indicated by the fact that some purely linguistic contexts require the presence of an inflected form or one of a class of semantically

Figure 12.16 The augmentative inflection on INCREASE.



INCREASE



INCREASE[M:augmentative]

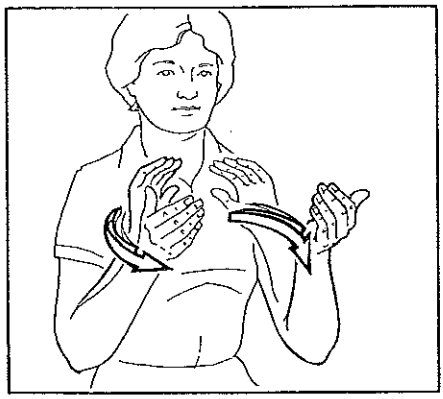
related inflected forms but preclude the presence of the uninflected form. For example, the uninflected form of the predicate cannot occur in construction with adverbials meaning 'regularly,' 'occasionally,' or 'continually'; thus the sentence *GIRL, JOHN LOOK-AT REGULARLY, with the verb uninflected, is ungrammatical in ASL. In such a linguistic context one of a class of semantically related inflected aspectual forms must occur.

Derivational Processes

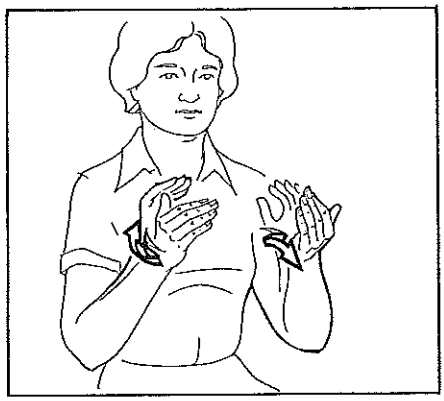
In addition to inflectional processes, ASL has a wide variety of devices that expand the lexicon by regular systematic changes in lexical roots and result in the formation of related lexical items. Traditionally these are called derivational processes, although, as in spoken languages, the distinctions between inflectional and derivational processes in ASL are not easy to draw.[9]

As with inflectional processes, derivational processes in ASL invariably involve changes in the movement of the sign. One derivational process forms deverbal nouns. Supalla and Newport (in press) have found a consistent formal relationship between semantically related verbs and nouns in 100 pairs of signs where the verb denotes an action and the noun a concrete object involved in the action. Both continuous and hold manner occur in the verb signs (a continuous sweep as opposed to a noticeable stop at the end of the movement); the related noun forms show a consistently restricted pattern: they are the same as the verb forms except that they have duplicated movement and a restrained manner (that is, the muscles are tightened in performing the movement). As a result of the restrained manner the nouns are

Figure 12.17 The verb sign COMPARE and its formationally related noun.



(a) The verb COMPARE



(b) COMPARE[D:'comparison']

typically made with smaller movements than their related verbs. The verb SWEEP and the noun BROOM are among the pairs so distinguished. Although Supalla and Newport deal only with a set of noun signs denoting concrete objects, the phenomenon is clearly more general. The same distinction in form holds between the verb COMPARE and a semantically related abstract noun meaning 'comparison' (see figure 12.17). Similarly, COMPETE has a related form meaning 'competition'; EXPLODE, a related form meaning 'explosion.' To a nonsigner the distinction between the related verb and noun forms may not be readily apparent unless the two forms are made consecutively (or presented side by side in drawings). The same pattern has been used productively by native signers within our laboratory to create new abstract nouns from existing verbs: the sign QUOTE-FROM was used as a basis for the invention of a sign meaning 'a derivation.'

Certain nouns can form predicates by an ascriptive derivational process which also effects a regular change in movement: in the derived form the movement of the sign is made once and is fast and tense, with a restrained onset. The meaning change is from a noun to a predicate meaning 'to act like _____,' 'to appear like _____.' Thus the sign CHINA can form a predicate meaning 'to seem Chinese'; GIRL can form a predicate meaning 'effeminate'; BABY, a predicate 'to act like a baby' ('babyish'); and CHURCH, a predicate meaning 'churchy' or 'pious' (figure 12.18b). The sign CHURCH also undergoes a derivational process that resembles the resultative inflection described in chapter 11. Its derived form means 'become narrow-minded' or 'become single-minded'; it is idiosyncratic in that it need no longer refer to religion or churches in any way (figure 12.18c).

A derivational process producing something semantically rather like the English gerundive derives activity nouns from certain verbs;

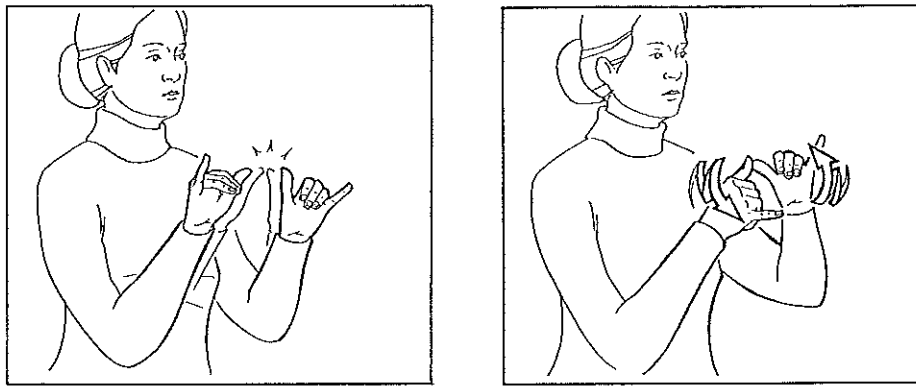
Figure 12.18 Derivational processes on the sign CHURCH.

(a) CHURCH (b) CHURCH [D: 'pious'] (c) CHURCH [D: 'become narrow minded']

this process adds the meaning 'the general activity of' to the verb, changing WRITE to 'the activity of writing,' (as in 'authoring books') MEASURE to 'the activity of measuring' (as in 'engineering a building') (see figure 12.19), IMPROVE to 'the activity of improving' (as in 'improving a house'). These activity nouns often serve as the names of professions.

Some derivational processes that have the same effect on form as the inflectional processes (which operate uniformly on broad semantic-syntactic categories) operate sporadically on other lexical items with more idiosyncratic effects on meaning. In chapter 11 we described an aspectual inflection (predispositional aspect) by which adjectival predi-

Figure 12.19 A derivational process under which MEASURE (a) means 'the activity of measuring' (b).



(a) MEASURE (b) MEASURE[D:nominalization]

cates denoting transitory states are changed to designate dispositions or basic characteristics: SICK is changed in meaning to 'sickly' or 'prone to sickness,' EXCITED to 'high-strung.' A process that has the same effect on form (elongated, smooth, reduplicated movement, circular in pattern) applies sporadically elsewhere, with less predictable meanings: from INSULT it produces a form meaning 'self-righteous'; from NOISY, 'boisterous'; from PRETTY, 'vain'; from RICH, 'ostentatious'; from COMMAND, 'bossy'; from DRESS, 'clothes-conscious.'

Finally there are formal devices that characteristically seem to be brought into play when a sign adopts a figurative or extended meaning. We observed the process being used productively in the context of our laboratory when signs were coined to express metalinguistic terms. Sometimes coinages involved compounding, initializing, or other devices, but often such terms were expressed through the use of a derived sign form based semantically on a standard lexical item and identical to it except for minimal differences in certain dimensions of movement—differences that seemed not to be characteristic of minimal formal differences in the core vocabulary that we had considered up to that point. Typically the derived form differed from the standard form in movement quality: the movement had increased tension or laxness, elongation or abbreviation, or acceleration. The change was in one dimension only. The sign PICTURE served as the basis for an idiomatic derivative meaning 'iconicity' that differed in form from PICTURE only in that its movement showed acceleration and tension.

We found, however, that as a matter of fact such minimal movement differences were not confined to derivatives invented on the spot. There are pairs of well-established signs that appear to be derivationally related (and are judged so by native signers), in which one sign of the pair is a good candidate for metaphorical or figurative extension of the other and differs from it in the same sort of minimal difference in quality of movement (tense, lax, or accelerated): a form meaning 'horny' differing from HUNGRY, a form meaning 'have a hunch' differing from FEEL. Even in the case of metaphorical extensions that may have been based originally on extensions found in English (the English word *blue* with its extended meaning 'sad'; *chicken* in its meaning 'cowardly'), the sign forms with the figurative meanings differ in quality or size of movement from the signs BLUE (the color) and CHICKEN (the fowl).

Finally, minimal differences in movement appear to characterize the process whereby certain signs have acquired an extended usage as sentence adverbials and conjunctions (like the extended use of *well* in English in *well, he did it* compared with *he did it well*). The sign WRONG has apparently undergone such extension. WRONG has a movement

directly toward the chin, with contact; a form WRONG[ID], which appears to be an idiomatic derivative of WRONG, functioning as a sentence adverbial with the meaning 'suddenly' or 'unexpectedly,' has a lax abbreviated twist of the wrist during contact at the chin. Other signs with extended use as sentence adverbials and differing from their probable sources by similar minimal differences in movement are BAD[ID], with the meaning 'unfortunately,' TROUBLE[ID], with the meaning 'nevertheless,' and DIGRESS[ID], with the meaning 'instead.'[10]

What can we conclude from these preliminary observations about idiomatic derivatives in ASL? Certainly not that a sign cannot be used metaphorically without some change in form. Nonetheless, though words of many spoken languages can be used figuratively without any change in phonological shape, it seems that in ASL figurative extensions of meaning are preferentially accompanied by minimal changes in movement. There appears to be a strong and pervasive tendency in this language for shifts in meaning to operate in concert with shifts in movement.

Some of these differences may well be attributable to semantic values of movement that have not yet been classified. Certainly, some derivatives resemble regularly inflected forms and represent regular semantic additions to the meanings of the basic signs. For example, the movement in the form of HUNGRY meaning 'horny' resembles the regular inflection showing incessant aspect or mental preoccupation; the form of FEEL meaning 'have a hunch' has a movement like many signs with a 'dubitive' nuance, expressing doubt or uncertainty; the accelerated, stressed movement that changes the meaning of PICTURE to 'iconicity' is similar to that observed in the regular resultative inflection. Furthermore, some of the simple dynamic changes involved in such derivatives appear in regular inflectional processes as well: the lax quality of WRONG[ID] as a sentential adverbial is found in the approximative inflection described in chapter 11 (though that inflection involves iteration of movement as well).

The System Underlying Inflectional Structure

American Sign Language is clearly a heavily inflected language, and inflection appears to be its favored form of grammatical patterning. It differs dramatically from English in the degree to which it makes use of inflectional devices. Not only are there indexical inflections which change person reference for verbs and a reciprocal inflection that indicates mutual relation or action, ASL predicates undergo a variety of inflections for number and distributional aspect as well as for temporal aspect and focus (including manner and degree). The nu-

ances of meaning that are expressed inflectionally in ASL represent a considerable range of semantic distinctions. The semantic effects of such morphological processes are familiar and are marked in other ways in various spoken languages of the world. But for the forms of these morphological inflections, the mode in which the language develops may make a crucial difference.

Each inflectional process affects the overall appearance of classes of signs in a characteristic way, adding values (and perhaps dimensions) that appear not to occur at the lexical level. The inflectional processes are distinguished from one another exclusively by differences in the global movement changes they impose on classes of uninflected signs. One inflectional process imposes a rapid lax single elongated movement; another inflectional process imposes a smooth circular lax continuous movement; still another imposes a tense iterated movement. Each inflectional process has its own specific properties of movement dimensions by which it operates.

Taken as a group, the modulated forms we have identified are globally different in appearance from one another. We want to ask whether or not these inflectional forms themselves share some systematic underlying features—is there an underlying system to inflectional processes in ASL?

Formational Components of Morphological Processes

Perhaps the most intriguing aspect of the morphological processes of ASL is the dimensions of patterning that are called into service in a language of moving hands. The form of the morphological processes reflects complex use of the possibilities of contouring movement in space.

In their final surface form, the inflections examined in this chapter and chapter 11 differ from one another along eleven spatial and temporal dimensions. These dimensions were reflected in our descriptions of their visual or articulatory qualities. For each dimension there appear to be only two or three specific values. For example, for the dimension of rate we note that some inflections impose a fast rate on the normal rate of citation form signs and some impose a slow rate.

Three dimensions involve primarily the manipulation of forms in space: planar locus, geometric arrays, and direction of movement; these three dimensions figure significantly in the construction of inflections for indexing, reciprocity, grammatical number, and distributional aspect. Six dimensions specify essentially temporal qualities of movement: onset/offset manner, rate, tension, evenness, size, and contouring; these six dimensions figure significantly in the construction of inflections for temporal aspect and temporal focus. Two dimensions interact with the others in the formation of inflection in several cate-

gories: cyclicity and doubling of the hands. We describe the dimensions and the values that we have posited for them.

Planar locus. Certain of the inflections operate with respect to specific orthogonal planes in neutral space (the space in front of the signer's torso): the horizontal plane and the vertical (frontal) plane. For example, the apportionative internal inflection is made on the vertical plane; the contrasting apportionative external, as well as the exhaustive and the multiple inflections are made on the horizontal plane.

Geometric pattern. Inflections differ from one another in the geometric patterns of their movements: points, arcs, circles, and lines. For example, indexing and the reciprocal make use of movement toward points; the multiple and the exhaustive make use of an arc; the apportionative inflections use circles; and the seriated inflections use lines.

Direction. Sideways movement, downward movement, and upward movement constitute distinct components of inflectional patterns. The seriated external has sideways movement in the vertical plane; the seriated internal has downward movement in the same plane.

Manner. Inflections differ in the nature of the offset that is imposed on the movement: hold (end-marked), continuous, or restrained (checked or with a noticeable recoil). The intensive inflection has hold manner; the facilitative, continuous manner; the susceptative, restrained manner.

Rate. Relative fastness and slowness of individual articulations. The continuative has slow movement; the habitual, fast movement.

Tension. Different degrees of muscle tension are used in inflections. The incessant and protractive are tense; the facilitative and approximative are lax.

Evenness. Under some inflections movement is constant in rate (for example, the frequentative); under others rate is uneven (for example, the resultative).

Size. Under some inflections the movement of the individual cycle is spatially elongated (for example, the predispositional); in others the movement of the individual articulation is abbreviated (for example, the susceptative).

Contouring. The forms of inflections that have multiple articulation differ with respect to whether the articulations are, for example, straight, circular, or elliptical. In the durational the movement is circular; in the continuative, elliptical; in the habitual, straight.

Cyclicity. This dimension of inflectional form specifies the relative number of articulations of movement that surface: A single articulation (single cycle) characterizes some inflections; others have varying numbers of multiple articulations. For example, the facilitative and the resultative involve a single cycle of movement. The continuative and

frequentative have multiple articulations (reduplication); the exhaustive and incessant have relatively smaller, faster, and more numerous articulations (reiteration).

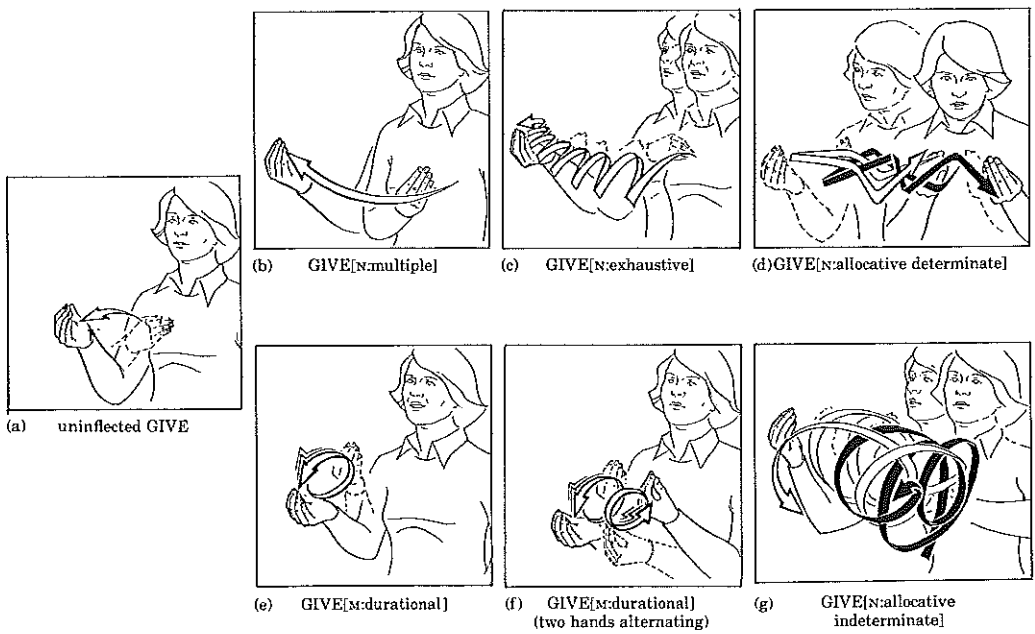
Doubling of hands. Some inflections involve doubling of the hands, doubling the sign form in either simultaneous movement or alternating movement. The reciprocal makes use of the two hands moving simultaneously; the allocative inflections use the two hands in alternating movements.

Inflections as Combinations of Dimensional Values

Consider the multitude of ways in which a single lexical sign can be built up in inflectional patterning to create complex single-unit forms into which a great deal of information has been simultaneously compacted. Figure 12.20 presents the uninflected sign GIVE and six different inflectional forms which show some relationships in form and meaning.

The uninflected form of GIVE, shown in (a), has a single movement away from the signer. Under the multiple inflection (b), meaning 'give to them,' the root form is embedded along an arc of the indexic plane.

Figure 12.20 The parallel buildup of form and meaning in inflectional processes.



Under the exhaustive distributive (c), meaning 'give to each,' the root form is embedded in multiple iterations along the same arc, replacing the single movement with ordered iterated movements. Under the allocative determinate (d), meaning 'give to certain ones at distinct times,' the hands are doubled in alternating movements and the ordered iterations are replaced with nonseriated movements. These are all inflections for distributional aspect.

The remaining drawings in figure 12.20 show the same sign GIVE built up in another way. Under the inflection for durational aspect (e), meaning 'give all the time,' the root form is embedded in circling contours of repeated movement. The form in (f) is like that of (e) but is made with two hands alternating, meaning 'give different things all the time.' Finally, under the allocative indeterminate inflection (g), meaning 'give different things to unspecified recipients at different times,' the two hands alternate with enlarged circling contours of repeated movement toward nonseriated targets. The form in (g) differs from that in (f) in that elongation and nonseriated targets are added. It differs from that in (d) in that elongation and rounded contouring are added.

The complex parallel buildup of meaning and form in these inflectional patterns indicates the extent to which such processes constitute a coherent system.

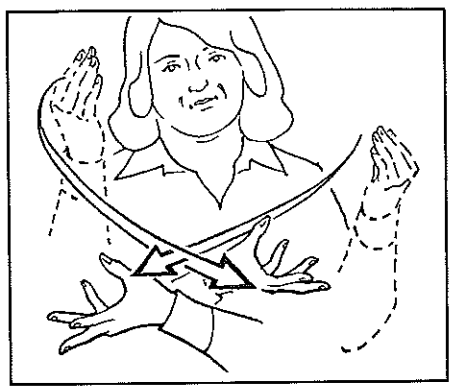
When signs simultaneously undergo two or more inflectional processes, even more complex patterns are created. As we have seen, a form inflected for the reciprocal and indexed for third-person reference may at the same time be inflected for habitual aspect; on the sign INFORM the resulting form means 'they regularly keep each other informed' and displays patterning characteristic of both inflections simultaneously (see figure 12.21).[11]

The simultaneous use of superimposed spatial and temporal patterning (rather than some kind of sequential affixation) in inflectional processes reflects, at this morphological level, the same principle of simultaneous organization that ASL sign units exhibit at the basic level.[12]

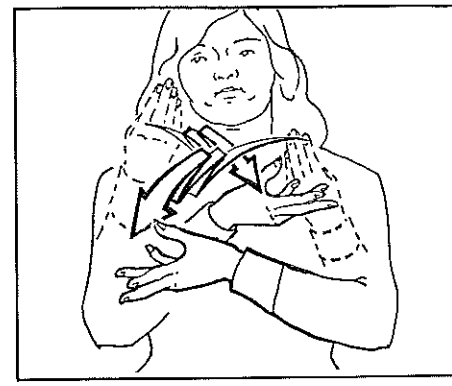
Systematic Features of Inflections

The eleven dimensions we have examined, and the different values along those dimensions, represent consistent differences in the surface forms of signs—their appearance—when the inflected forms are compared one with another (with respect to their visual characteristics or, in the case of tenseness, for example, with respect to marked kinesthetic articulatory properties). The specification of one value on each of these dimensions will readily serve to distinguish any of the inflec-

Figure 12.21 Combinations of inflectional processes.



INFORM[R:'each other']



INFORM[R:'each other'; M:habitual]

tional forms we have described from all others; but do the dimensions form a structural system, a network of minimal oppositions?

Many of the dimensions that differentiate one inflectional pattern from another are clearly independent. There are inflections in which the difference in form is entirely within one dimension. Examples of such unidimensional contrasts include the following:

(a) Some inflectional patterns differ only in planar locus (horizontal versus vertical) (see figure 12.22).

(b) In some inflectional forms the only independent distinguishing dimension is the geometric pattern (arc, circle, line) as illustrated in figure 12.23 (the number of multiple iterations may be determined by the size of the pattern).

(c) Some inflectional forms are distinguished only by direction of movement (upward, downward, sideways), as are those illustrated in figure 12.24.

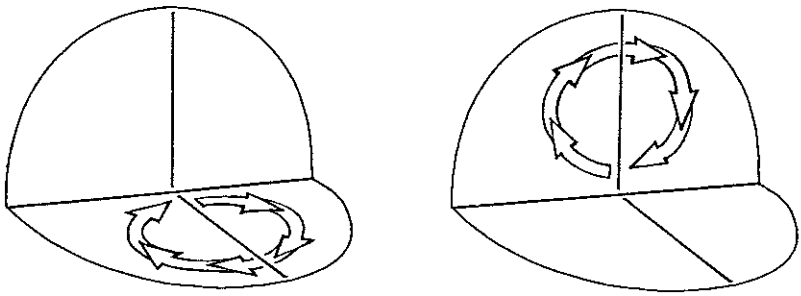
(d) The independent dimension that distinguishes some inflectional forms is the manner of movement (continuous, hold, restrained) as illustrated in figure 12.25, where the difference in contouring is predictable.

(e) In some inflectional forms dynamic qualities of the movement (rate, tension, evenness, size) appear to be distinguishing dimensions, as illustrated in figure 12.26.

(f) Some inflectional forms are distinguished only by the nature of their cyclicity (single cycle, reduplicated), as are those illustrated in figure 12.27.

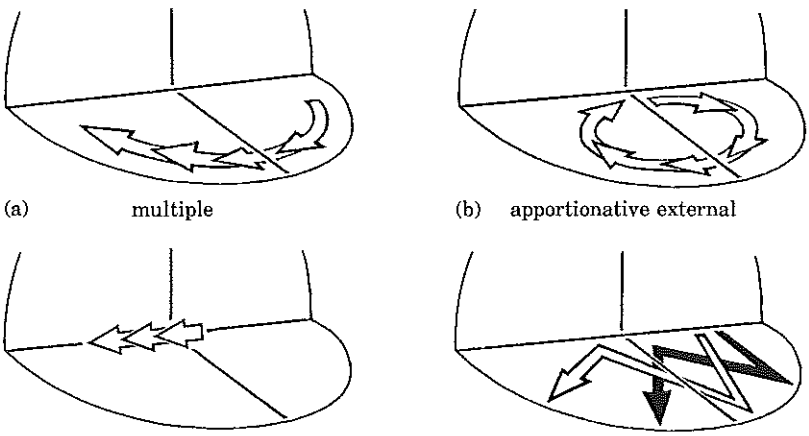
(g) Some inflectional forms are distinguished only by doubling of the

Figure 12.22 Inflectional forms distinguished only by planar locus.



(a) apportionative external (b) apportionative internal

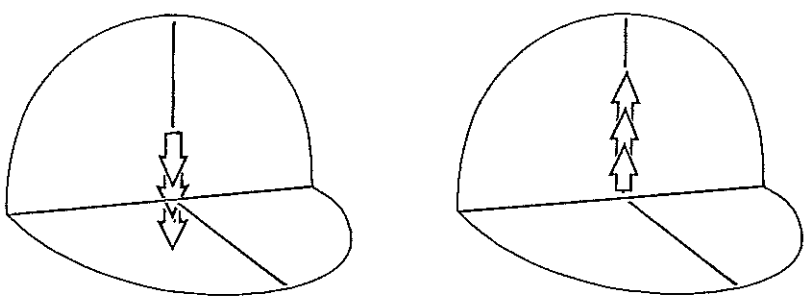
Figure 12.23 Inflectional forms distinguished only by geometric array.



(a) multiple (b) apportionative external

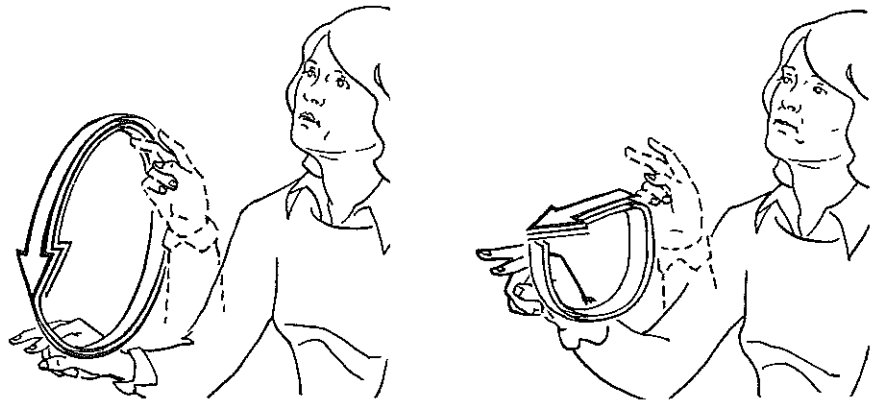
(c) seriated external (d) allocative determinate

Figure 12.24 Inflectional forms distinguished only by direction.



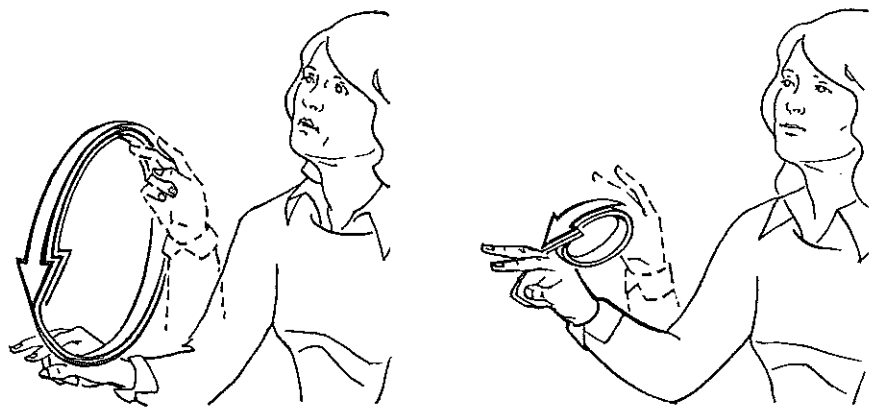
(a) seriated internal (b) augmentative

Figure 12.25 Inflectional forms distinguished only by manner.



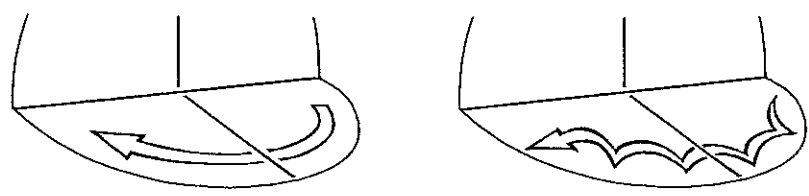
(a) continuative (b) iterative

Figure 12.26 Inflectional forms distinguished only by quality of movement.



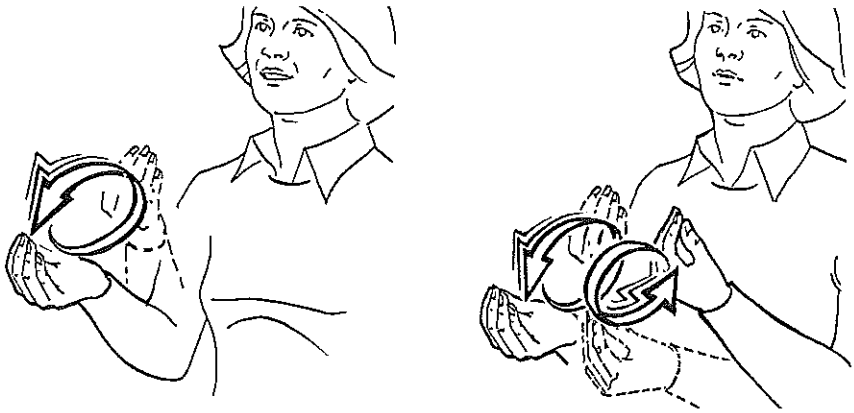
(a) continuative (b) durational

Figure 12.27 Inflectional forms distinguished only by cyclicity.



(a) multiple (b) exhaustive

Figure 12.28 Inflectional forms distinguished only by doubling of the hands.



(a) durational

(b) durational (two hands alternating)

hands (one hand, two hands in simultaneous or alternating movement), as are those illustrated in figure 12.28.[13]

The existence of such minimal pairs of inflectional forms suggests that far from being globally different, inflections in ASL share formational features in terms of which they can be described and distinguished. Morphological processes in ASL exhibit internal systematicity in their dimensions of patterning. There is, however, some evidence suggesting that many of the differences along dimensions do not represent independent values and even that entire dimensions are not independent phonemic-level dimensions in the underlying structure of inflectional forms. That is, many phonetic-level differences—the detailed differences between inflections—appear to be predictable. Similar phenomena occur in spoken language structure: for instance, although vowels in English display consistent and predictable differences in duration in different consonantal contexts, vowel duration is not an independent dimension in the structure of English words.

In ASL certain differences in the number of repetitions appearing in different inflectional patterns may be correlated with (and predictable from) features of size, tension, and rate. Thus one independent value, that of reduplication, can account for the variations in multiple articulations. Similarly, some specific differences in the contouring of reduplicated movement (straight as opposed to circular or elliptical) are correlated with the manner of movement. With respect to this subset of morphological processes, contouring may not be an independent phonemic-level dimension in the structure of inflectional forms.

The proliferation of components of form brought into play in morphological processes and in the language in general is consistent with our

view of the tendency in the language toward conflation, toward packaging a great deal of information into a single-unit form. If many nuances of meaning are to be distinctly marked by sign-internal changes in form, then a considerable number of distinct components of form must be called into service.

Formal Relations of Inflectional to Lexical Structure

So far in this chapter we have considered only the components of form that differentiate inflectional patterns. A fundamental issue in the analysis of the organization of ASL is the relationship of the dimensions of patterning used in morphological processes to the dimensions of patterning that appear at the basic lexical level. Are the dimensions of space and movement that characterize inflectional structure distinct from those that characterize lexical structure?

The forms that result from the inflectional processes we have identified are globally different in dimensional values from those that are characterized as uninflected lexical sign forms; on the whole, uninflected signs are embedded in the movement dimensions imposed by various morphological processes. One explanation for their dramatic difference in appearance could be that the very components of form that characterize the inflectional forms are not the same as those that characterize the forms constituting the basic lexical level. Accordingly, there might be a distinct separation of patterning at these two levels of structure. Such a separation would make what we have called inflectional processes in ASL fundamentally different from the functionally equivalent processes in English, where segments that are added or changed in morphological processes are of the same kind as those that constitute the basic lexical items themselves. The plural inflection [z] in the word *hens,* for instance, is the same sound as the final segment of the word *lens* (where it does not carry the plural meaning); the past tense inflection [t] of *backed* is the same as the final segment of *act.*

Another explanation for the observed differences in form between lexical structure and inflectional structure could be that while the components of form are the same at both levels, the permissible combinations of those components differ at the two levels. Such differences are common in spoken languages. For example, in English, the final consonant cluster of the morphologically complex form *sixths* (that is, [ksθs]) never occurs in a simple monomorphemic lexical item.

At the end of the previous chapter we said "It appears [note *appears*] that the formational properties of these [aspectual] modulations may be different in kind from [those] of lexical items." What this suggested was that there is a definite separation of patterning, that the surface form of a sign can reflect the effects of several coexisting interrelated

systems: (1) a lexical system, describing relevant form distinctions in signs as lexical roots—abstracted from any discourse situation, (2) an indexic system, describing relevant form distinctions connected with the discourse situation and providing specific devices for establishing anaphoric reference relations, and (3) a modulatory system, describing how root signs are modified in expressing grammatical categories.

It appeared that each of these systems utilized certain selected properties of space, form, and movement unique to, or at least specially characteristic of, that system: the indexic system being characterized by the partitioning of the horizontal plane into arcs and points, the inflectional modulatory system being characterized by variations in the size and tempo of movement in space, coupled often with cyclic reduplication. The new material considered in this chapter, though it does not completely change the picture, does reveal a great deal of commonality in the components of form used in these systems and suggests that some of the uniqueness in morphological patterning is due not to the components of form themselves but to particular combinations of them that occur uniquely at either the base level or at the inflectional level. This is clear when one considers the following findings:

(a) The horizontal and vertical (frontal) planes serve as distinguishing loci of uninflected signs; certain inflections are also distinguished by being located in these planes. Inflected forms, then, may have at the same time one planar specification for the basic sign movement and a different planar specification for the inflection.

(b) Although the use of one versus two hands rarely distinguishes basic lexical signs in ASL, this specification is clearly a relevant part of the structural description of any sign. In inflectional processes the use of two hands in simultaneous or alternating movement marks a variety of distinct inflections.

(c) Straight-line and circular movements serve as distinct simple components at the basic lexical level; in the inflectional system, however, complex movement patterns (not found in uninflected signs) may be constructed wherein iterations of entire basic movements are embedded within linear and circular patterns.

(d) Manner and quality of movement, although a proper part of the structural description of basic lexical signs, appear to bear a lighter functional load in distinguishing signs at this level than they do in building inflections. At the inflectional level there appear to be more numerous values of quality of movement than at the lexical level. It is as yet unclear to what extent such features as reduplication figure in the predictability of such quality values.

The elaborate shapes exhibited by different inflectional processes are created by complex combinations of these movement dimensions.

At the lexical level there are far more restrictions on the ways these values can combine to create lexical forms.

Rules That Relate Lexical and Inflectional Forms

We have so far been preoccupied with identifying and describing the different inflectional processes that operate on ASL signs and with discovering the dimensions from which these inflectional forms are constructed. Having found that some of these same dimensions also characterize distinctions at the lexical level, it is appropriate to consider, however tentatively, the way in which inflectional processes operate on lexical forms.

We have not yet attempted an overall description or formalization of rules which connect lexical items and inflectional forms, but there is evidence for certain types of rules which relate uninflected to inflected forms.

(1) Rules that *change* dimensional values of lexical forms.

Certain inflectional processes operate on lexical items by changing the values of formational dimensions. For instance, the sign GIVE has a single end-marked movement. Under the durational inflection, meaning 'give all the time,' it has a repeated continuous movement. The values single and end-marked have been replaced by repeated and continuous (see figure 12.20).

(2) Rules that *add* dimensional values characteristic only of inflected forms.

Certain inflectional processes seem to operate on lexical items by adding dimensional values that appear typically only in inflected forms. For example, the sign CHURCH can undergo a modulatory process that changes its meaning to 'become fully narrow-minded' by adding values of acceleration and tension to the movement of the root sign, values that are not characteristic of uninflected forms (see figure 12.18).

(3) Rules that *nest* the movement of uninflected signs in a movement inherent to the inflection.

Certain morphological processes embed the movement of a sign within a movement inherent to the inflection itself. For instance, the movement of the root sign COMPARE can be nested in the downward iteration pattern of the seriated internal inflection or in the sideways iteration pattern of the seriated external inflection. (This movement-embedding rule is illustrated in figure 12.14.) Such nesting is restricted to inflectional forms and does not occur in uninflected lexical items.

Toward an Underlying Form of Signs

In this chapter we have described morphological processes as if they operated directly on the surface forms of uninflected lexical signs as they appear in citation form. In fact, this is not the case.

From examining the effect of morphological processes on classes of lexical signs, we are led toward a deeper hypothesis about the relation between the surface lexical form of signs and their form under inflections: namely, that the relationship is not direct, but that the processes operate on a more abstract underlying form. This has already been argued in Supalla and Newport (in press). They have shown how sign forms that are ambiguous at the surface level (for example, repeated unidirectional movements and bidirectional movements, which can also be repeated) are disambiguated with respect to their forms under a particular inflectional process. Friedman (1977) comments on this ambiguity: "because of this tendency [for sign movements to be repeated] it is sometimes difficult to determine whether the movement of a particular sign is, for instance, up-and-down or simply down—repeated several times" (p. 32). Supalla and Newport show how the slow reduplication process (which we call modulation for continuative aspect) operates on a single cycle of signs: a sign with repeated up-and-down movement appears under modulation as a single alternating up-and-down cycle; in contrast, a sign with repeated downward movement is only manifested as a single downward movement under modulation. This presents an argument for considering that the modulatory processes do not operate on the surface form of lexical items but rather on a more abstract underlying form.

The notion of an underlying form on which inflections operate bears on the status of clusters of movement components and on surface repetition: for instance, two-touch movements, as in IMPROVE, described in the DASL as three components (contact near the wrist, followed by movement toward the elbow, and ending with a second contact near the elbow), in fact behave as a single, unrepeated integral movement under inflectional processes. Simultaneous clusters, such as that in BAWL-OUT, where the hand configurations open during directional path movement, similarly act as integral units under inflection. However, signs with iterated movement (such as SICK), with oscillating movement (BLUE), with wiggling movement (DIRTY), do not exhibit these surface embellishments under certain inflectional processes. Instead what appears in each cycle is a single base movement.

For some signs the movement shape itself is qualitatively different under certain inflections. YELLOW and PLAY are both made with re-

peated twisting of the wrist. When inflected for continuative aspect YELLOW shows the predicted single turn of the wrist embedded within each cycle; PLAY is made with a tense forward movement in each cycle and has no twisting movement at all under the inflection. The weight of evidence suggests that inflectional processes operate not on the surface form of the lexical unit but on a more abstract underlying form: a naked stem.

Hierarchies of Form and Meaning under Inflection

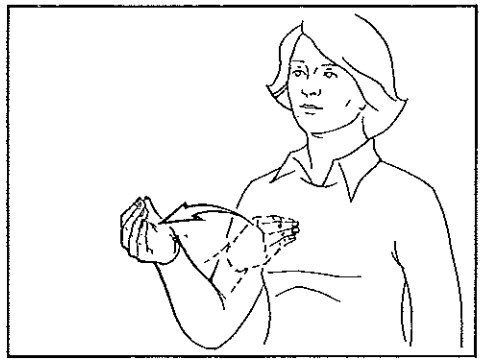
The inflections described in this chapter—by no means the total set of inflectional processes that operate on ASL signs—can, as we have shown, apply in combinations to root signs. For example, the reciprocal and habitual inflections may apply simultaneously to a verb root. In such cases the two inflections can be said to make simultaneous additions to the meaning of the root sign; there is no differential ordering of form and meaning.

Under some combinations of inflections, however, in terms of form the output of one morphological process serves as the input for another, as when the exhaustive and iterative inflections both apply to one root. A sign such as GIVE can be inflected for exhaustive distribution ('give to each') expressed as iterations along an arc; it can also be inflected for iterative aspect ('give again and again') expressed as repeated tense targeted movement with slow elliptical return. Both inflections can apply, but in differing orders, creating more complex forms and meanings. In figure 12.29 the sign GIVE is shown in uninflected form (a), after undergoing the exhaustive inflection (b), after undergoing the inflection for iterative aspect (c), and after having undergone inflection for exhaustive which then serves as the input to the inflection for iterative aspect (d). The final output of this ordering of the two processes means 'to give to each, that act of distributing occurring again and again,' or 'to repeatedly distribute.' The final form shows the pattern of the exhaustive embedded in that of the iterative.

But there is an alternative ordering: the pattern of the iterative of GIVE ('give again and again') can be spatially embedded in the pattern of the exhaustive ('give to each'). In the resulting complex form the iterative form of the root sign is made at each of the separate points in turn used by the exhaustive inflection. Under this ordering of rules the complex combined form means 'give again and again to each in turn,' or 'for each in turn there is repeated giving.'

Thus an inflection that results in reduplication does not have as its structural effect just the change in a value of the lexical stem form; the resulting series of reduplicated units can itself be reduplicated as a result of other inflectional processes, one inflectional process serving as

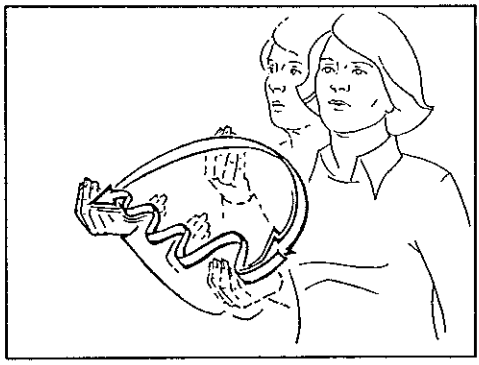
Figure 12.29 Hierarchy of inflected forms.



(a) uninflected GIVE

(b) Give[N:exhaustive]
('give to each')

(c) GIVE[M:iterative]
('give again and again')



(d) GIVE[[N:exhaustive]M:iterative]
('give to each, that act of giving occurring again and again')

the input for another. (Supalla and Newport have also illustrated such hierarchies of form and meaning.) Some of these complexly patterned forms show that there are alternative orderings for combinations of inflectional processes and that signs that have undergone several inflections not only show hierarchical structure in terms of form (the output of one inflectional process spatially nested within another); they have different hierarchies of semantic structure as well.

Summary

We have explored the special nature of certain parts of the grammar of American Sign Language, focusing on the structured use of space and movement that the language exhibits in its morphological processes. In ASL, signs are inflected for a variety of grammatical categories, for example, for aspect: temporal aspect, distributional aspect, recurrence, degree, manner, temporal focus. In this respect, ASL differs from English in its grammatical patterning but not from other inflecting languages which mark similar distinctions of meaning. The existence of such elaborate formal inflectional devices clearly establishes ASL as one of the inflecting languages of the world, like Latin, Russian, and Navajo. We may then raise the question of whether other sign languages may be found which display other typologies, or whether the modality in which the language develops constrains its natural patterning in one direction rather than another.

Thus ASL is similar to some spoken languages in the extent to which it relies on inflectional devices. Nevertheless, it differs radically from all spoken languages in the form these morphological devices assume. In conformity with the unique spatial character of sign, its morphological devices make structured use of space and movement, nesting a naked sign in spatial patterns or within contours of movement. The modality in which the language develops appears to make a crucial difference in the form of its inflectional patterning: ASL signs undergo simultaneous multidimensional changes, resulting in complex spatial-temporal forms.

The inflectional forms, which appear at first so globally different from one another, exhibit internal systematicity in their dimensions of patterning. They are distinguished in terms of specific spatial dimensions (planes in space, directions of movement, arrays such as lines, circles, arcs) and in terms of temporal dimensions (cyclicity and quality of movement). Different combinations of values of these dimensions create a great variety of inflectional patterns. The formal description of apparently different levels of structure in ASL (the lexical and morphological levels) require the positing of abstract underlying representations for lexical items, as well as dimensions of patterning for both

levels that share an underlying formational system. In the context of a broader understanding of inflectional processes and their effects on the lexical items of ASL, it now appears that the same dimensions employed in inflectional morphology may also be used to differentiate lexical items. Thus lexical structure and inflectional structure—which appear on the surface so qualitatively different in form—may in the final analysis turn out to be composed of values along the same dimensions.

Roger Brown (1965) states the issue with respect to features in spoken language clearly: "A feature that is used at all for phonemic distinctions in a language tends to be used for more than one pair. Phonological systems are designed almost as if someone had reasoned that if native speakers are going to have to discriminate a certain feature at all, they may as well discriminate it right along" (p. 266).

One can entertain two opposing hypotheses about the relationship between lexical structure and morphological structure in ASL: (a) that the dimensions that characterize morphological structure are distinct from those that define lexical structure or (b) that the same dimensions define both morphological and lexical levels of structure, which differ in the particular permissible combinations of values of those dimensions. Such questions are by no means answered, nor are the relevant issues resolved; this will require far more research than has yet been done. For the future, we are left with an interesting possibility: despite their apparent differences the two levels of structure within ASL suggest a unified internal organization, which, in its systematicity, may bear a striking resemblance to equivalent levels of structure posited for spoken languages.

We do not mean to argue that spoken language and sign language are essentially the same. Certainly we would be the last to argue that speech does not constitute part of the biological foundations of language. But if speech is specially selected, if sound constitutes such a natural signal for language, then it is all the more striking how the human mind, when deprived of the faculty that makes sound accessible, seizes on, perfects, and systematizes an alternate form to enable the deeper linguistic faculties to give explicit expression to ideas.

An art-sign duet (photographer, Frank A. Paul).