

FOREIGN VOCABULARY IN SIGN LANGUAGES

A Cross-Linguistic Investigation of Word Formation

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Native and Foreign Vocabulary in American Sign Language: A Lexicon With Multiple Origins

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ABSTRACT

This chapter examines the composition of the ASL lexicon with particular reference to the status of the types of words containing fingerspelled letters. There are four major findings of this research. First, along with morphologically based diagnostic tests, we found that major divisions within the lexicon emerge based on the handshape inventories of different types of words. Second, the native and non-native components are composed of subcomponents; neither the native nor non-native lexicon is a single homogeneous set of signs. Third, the non-native component is divided into strata according to the word-formational operations involved and the proximity to the core. Fourth, items in the non-native component are not necessarily on a predetermined path toward the core. Although ASL has had close contact with English since its beginning, the mechanisms for borrowing English elements into the language are constrained, systematic and expressed within the grammar of ASL.

INTRODUCTION

This chapter examines the composition of the ASL lexicon with particular reference to the status of the types of words containing fingerspelled letters. To date, studies of the ASL lexicon have focused on certain sets of vocabulary, notably verbs of motion and location, agreement and plain verbs (Fischer & Gough, 1978; Klima & Bellugi, 1979; Padden, 1988, T. Supalla, 1985), adjectival predicates (Klima & Bellugi, 1979), and derivational forms (Klima & Bellugi, 1979; T. Supalla & Newport, 1978). Mentioned only in brief are signs said to be borrowed from English such as initialized signs and loan signs derived from fingerspelling. For our purposes here these will be referred to as "non-native" or "foreign" vocabulary.

This marked division between native and foreign vocabulary in ASL is most likely due to two reasons. First, there appears to be ideological anxiety about the presence of foreign elements in a natural sign language. Sign linguists have labored long and hard to demonstrate that sign languages are not codes for spoken languages; the inclusion of foreign vocabulary would seem to detract from the strength of this position. Second, there is more generally a shortage of unitary analyses of diverse lexicons, or lexicons where vocabulary derive from more than one origin.

Itô and Mester (1995a, b) have proposed a model of the Japanese lexicon that is based on principles that are directly relevant to an analysis of the ASL lexicon. In Japanese, the Yamoto forms (or native vocabulary) constitute the native subcomponent; the Sino-Japanese, derived from the Chinese ideographic system, foreign, and mimetic subcomponents are peripheral. Itô and Mester (1995a, 1995b) argued that many of the constraints that hold for the native subcomponent cease to hold or are weakened in systematic ways in the peripheral subcomponents. They also predict that the subcomponents of the lexicon do not behave as nonoverlapping entities within the grammar, but rather that principles of the core are weakened in peripheral subcomponents; peripheral subcomponents do not add or strengthen a constraint; and the subcomponents should be identifiable by differences in segmental inventories and exploitation of constraints. These predictions are empirically supported by forms in ASL.

Our goal here is to explore a range of foreign vocabulary in a signed language and demonstrate that there are ways of accounting for them without undermining the fundamental independence of a natural sign language. At the conclusion of this analysis we briefly review the implica-

tions of a lexicon reanalyzed in this manner for larger issues of sign language description.

There are four major findings that have emerged from this research. First, along with morphologically based diagnostic tests we find that major divisions within the lexicon emerge based on the handshake inventories of different types of words. Second, the native and non-native components are composed of subcomponents; neither the native nor non-native lexicon is a single homogeneous set of signs. Third, the non-native component is divided into strata according to the word-formational operations involved and to phonological proximity to the core component of the native lexicon, based on how well a strata conforms to a set of well-formedness constraints. Fourth, items in the non-native component are not necessarily on a predetermined path of relexicalization from the periphery to the core; on the contrary, we find that some items in the most peripheral subcomponent are quite stable, and these remain deliberately foreign.

The structure of the ASL lexicon we are proposing is given in Fig. 3.1. The native lexicon includes the polymorphic predicates, often called classifier predicates (Part 2) and the "core" lexicon (Part 3); the foreign or non-native vocabulary (Part 1) are words that contain fingerspelled letters. Our analysis shows that each more peripheral stratum of the non-native component obeys fewer and fewer phonological constraints that hold in the core component. Part 3 overlaps with Parts 1 and 2; the analyses presented here make clear how this is so.

The polymorphic/iconic component (Part 2), is made up of: bound roots and a variety of types of affixes that can be put together to form classifier predicates (T. Supalla, 1985)—verbs of motion and location, size and shape specifiers, and other classifier predicates (e.g., 'two-aircraft-dock-in-outer-space,' shown in Fig. 3.2); spatial verbs, as defined in Padden (1988); the pronominal system; and predicates of locative direction, such as UP, DOWN, THIS-WAY/THAT-WAY, are also included in Part 2. This vocabulary can be defined as "iconic," not in the sense that the forms

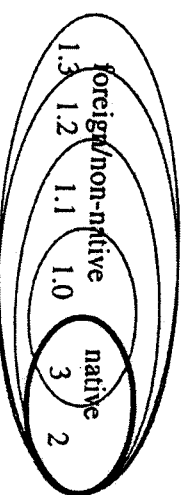


FIG. 3.1. Components of the ASL lexicon.



FIG. 3.2. A form from the polymorphemic/iconic component of the lexicon (part 2): 'two-aircraft-duck-in-outer-space'.

are obviously transparent to the naive viewer or continuously vary with the real world, but are understood in terms of their origin in the gestural domain. T. Supalla (1985) described handshapes of ASL verbs of motion as "incorporat[ing] meaning based on salient visual-tactile characteristics of the referent object (p. 184)." Singleton, Morford, & Goldin-Meadow, (1993) found that naive hearing subjects can mimic and report the meaning of ASL verbs of motion and location with 72% accuracy. Their ability to recognize, even mimic, these forms, it can be argued, derives from a common human ability to manipulate gestures for symbolic purposes. Our reference to the term "iconic" is not intended to imply that these forms are "analogic" (i.e., nondiscrete) or nonlinguistic in any way, but rather to capture the fact that these vocabulary originate from the complex gestural resources of human beings (see Goldin-Meadow & Mylander, 1985; Kendon, 1988; McNeill, 1992).

The core lexicon includes the verb categories of plain and agreement verbs are added to the core component indirectly by both the fingerspelling system, through a complex set of operations of nativization as discussed in the rest of this paper, and directly by the classifier predicate system.

Non-native forms are those that have a handshape or handshapes whose source is the manual alphabet as well as forms borrowed from other sign languages. In this chapter, we address only the former—those that derive from fingerspelling, such as "loan signs" (first analyzed in Batison, 1978). He proposed calling such signs loan signs because they consisted of handshapes drawn from fingerspelled English words. In this chapter, we expand his initial discovery to include a number of other vocabulary of

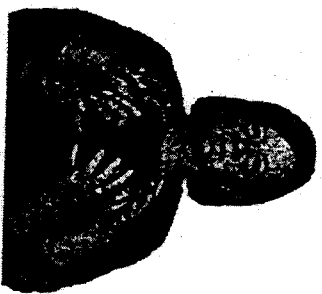


FIG. 3.3. A form from the core component of the native lexicon (Part 3): GROUP.

similar origin. Our analysis includes, in addition to loan signs, name signs (first described by S. Supalla, 1992), initialized signs (e.g., WATER, shown in Fig. 3.4), abbreviation signs, and sign+fingerspelled compounds. None are especially rare among signers; indeed, they appear frequently in everyday signing, but few descriptions of ASL vocabulary refer to them.

LINGUISTIC DIAGNOSTICS FOR COMPONENTS OF THE NATIVE LEXICON

Important to this analysis of the native lexicon are linguistic tests that address: handshape inventories; the morphemic or phonemic status of handshape, movement, orientation and place of articulation (abbreviated



FIG. 3.4. A form from the non-native component of the lexicon (Part 1): WATER, an initialized sign.

POA); prosodic structure; the affixation of inflectional morphology to verbs and nouns; and the affixation of derivational morphology to verbs to form nouns. We can determine where a vocabulary item belongs within the native lexicon using these tests.

Morphology

Regarding inflectional morphology, native verbs (in Parts 2 and 3 of Fig. 3.1) are grouped according to the distribution of inflectional verbal morphology that may co-occur with them (Fischer & Gough, 1978; Padden, 1988). Plain verbs and spatial verbs, including classifier predicates, do not inflect for person and number agreement, although spatial verbs allow locative agreement. Agreement verbs inflect for person and number of the subject and object, with varying subclasses of verbs inflecting for agreement with the object only and others with both the subject and object (Askins & Perlmutter, 1995). Plain and agreement verbs accept a variety of aspectual morphology, as do adjectival predicates. Nouns accept plural affixation in the form of reduplication of the stem.

Regarding derivational morphology, derived nouns with verb counterparts are frequent in native vocabulary (Supalla & Newport, 1978)—for example, PUT-ON-HEARING-AID:HEARING-AID; SIT: CHAIR; GO-BY-TRAIN: TRAIN. In most cases the pairs are distinguished by a smaller, restrained, reduplicating movement on the noun. The rule is productive with many pairs, but some native verbs have no noun counterparts, for example, LOVE or LAUGH (*LAUGHTER).

Classifier predicates and verbs of locative direction (e.g., UP, DOWN) do not inflect for person and number of the subject and object; instead they incorporate locatives that refer to locations of referents. To give a contrasting example, the core agreement verb GIVE inflects for person and number of the subject and object—for example, 1_{sg} GIVE_{2sg} GIVE_{pl}. In contrast, the similar looking classifier verb TO-CARRY-BY-HAND can move between locative points of a donor and a recipient, as well as between locative positions such as to move a book from one point on a table to another point, but it cannot exhibit person or number inflection. It is argued elsewhere that although these two verbs are virtually identical in form, they are members of distinct morpheme classes (Padden, 1988). Classifier predicates do exhibit certain types of distribution classifiers of quantity, such as 'in-a-row' (e.g., 'books-in-a-row', 'vehicles-in-a-row') or 'scads-of' (e.g., 'scads-of-people'), but this is not plural marking, *per se*, but rather marking distribution, because the spatial configuration of the

The ability to exhibit derivational morphology is a characteristic of core forms. There are two types of derived nominals in ASL—reduplicated nominals (T. Supalla & Newport, 1978), and activity nominals (Padden & Perlmutter, 1987). Classifier predicates exhibit neither type of derived nominal, demonstrated in the following examples. Although many lexicalized classifier verbs (those with reduced morphemic complexity) have noun counterparts, for example, TO-FLY-BY-PLANE: AIR-PLANE or TO-DRIVE-VEHICLE: CAR, novel classifier structures do not have noun counterparts. 'To-flow-in-liquid-form' does not have a noun counterpart, *WATERFALL, nor does 'to-be-flat-on-ceiling' have one, *CEILING. Further, "activity" nominalizations such as ACT:ACTING, READ:READING (Padden & Perlmutter, 1987) are not possible on novel classifier structures, for example, 'to-flow-in-liquid-form': *flowing-in-liquid-form. We can distinguish between classifier structures and core forms in cases where the output looks similar by using this as a diagnostic. The handshape of the core form AIRPLANE can function as a productive, bound classifier morpheme that can be put together in the polymorphemic or iconic part of the lexicon in forms, such as 'two-aircraft-dock-in-outer-space' or 'two-planes-fly-side-by-side'; however, this same handshape is a part of the core stem TO-FLY and the derived noun AIRPLANE (see Fig. 3.5), which can be placed in the core lexicon, because of the existence of this verb and its derived reduplicated nominal, these forms are placed in the core.

Some non-native signs allow aspect and person agreement morphology—for example, 1_{sg}#SAY-NO_{3sg}—and some allow aspect morphology—for example, in #SHIT (expletive) [intensive], the first letter is held longer than the other letters exactly like core forms that lengthen the first hold of intensive forms (e.g., GOOD [intensive], BAD [intensive], HURT [intensive]); therefore, the non-native and native components overlap with respect to these morphological criteria. As mentioned earlier, agreement and spatial morphology involves affixing to stems loci that refer to locations of referents. Loan signs accomplish this in either of two ways. In #SAY-NO, the orientation of the palm or fingertips is directed toward the desired object agreement locus, or, in a form such as #BACK, the transitions between the letters can provide the basis for a path movement achieved through phonetic enhancement (Brentari, 1998; Stevens & Keyser, 1989; Stevens, Keyser, & Kawasaki, 1986). In the case of the loan sign #BACK, the transition between the -C- and the -K- involves a flexion of the wrist outward, which is enhanced by the addition of an elbow joint movement outward. The beginning and end of the derived movement provide points of affixation of new spatial loci. All ASL forms, including all



FIG. 3.5. The form AIRPLANE (top right) is derived from the core form TO-FLY (top left). In contrast, the polymorphic form 'two-directly-dock-in-outer-space' (bottom) allows no derivational suffix.

fingerspelled forms, can take locative or spatial morphology, clearly seen in contrastive contexts. Fingerspelled words typically occur at a POA at locus in the ipsilateral shoulder. This place can be moved to a different spatial locus in contrastive contexts—for example, B-O-B (left) EAT MEAT, H-A-R-R-Y (right) NOT? These morphological criteria (Table 3.1), plus the nativeness of a form and divide the native lexicon into subcomponents. Often non-native forms allow more types of morphological affixation than do classifier forms. We return to this point at the end of the chapter.

PHONOLOGY

The phonological diagnostics used in these analyses have to do both with the parameters of handshape, movement, and POA, and with constraints

² There is only one loan sign that takes number agreement (i.e., #SAV-NO), but this may be an accident.

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TABLE 3.1. Morphological properties of native lexicon and loan signs

Component of the Lexicon	Derivational Morphology	Inflectional Morphology				Spatial Morphology
		agreement			locative quantity/descriptive	
		aspect	person	number		
Part 1 (loan signs only)	?	+	+	+	+	-
Part 2 classifier predicates	-	-	-	-	+	+
Part 3 core	+	+	+	+	+	-

on prosodic structure that hold in the core lexicon and that are systematically weakened in the strata of the non-native lexicon. We address the issue of inventories of phonological elements first and constraints second. The feature geometry in Fig. 3.6 shows how the groups of features being discussed relate to one another in the phonological representation dominated by the hand node. Movement features are all dominated by the Prosodic Features node, and the place of articulation node dominates the place of articulation features. The relevant class nodes for each parameter are circled. Orientation is a derived relation between one of eight hand-parts specified at the hand node and at the place of articulation.³

Handshape Inventories. Itô and Mester (1995a, b) predicted that the components of the lexicon should be identifiable by differences in inventories, and we have evidence for the division between native and non-native components if we compare the handshape inventories of each component (Fig. 3.7). There is evidence for dividing up the lexicon according to handshape inventories from two sources. First, there are restrictions on the combinations of handshapes and movements in initialized and abbreviated non-native signs. For example, if a handshape in a core form retains its status as a classifier, a fingerspelled letter may not be substituted for it. Signs violating such combinatoric restrictions are judged to be ungrammatical by native ASL signers, and many such forms occur in manually coded English systems. Evidence for this restriction is also seen in the ASL name sign system. Name signs are generated to refer to members of the Deaf community and arise via a mechanism for developing "classifier name signs" and "arbitrary name signs" (S. Supalla, 1992). Classifier name signs are generated by combining a bound movement root and a classifier handshape in a POA (often depicting a

³ The orientation referred to here is "inherent" orientation, that is, the contrastive orientation specified.

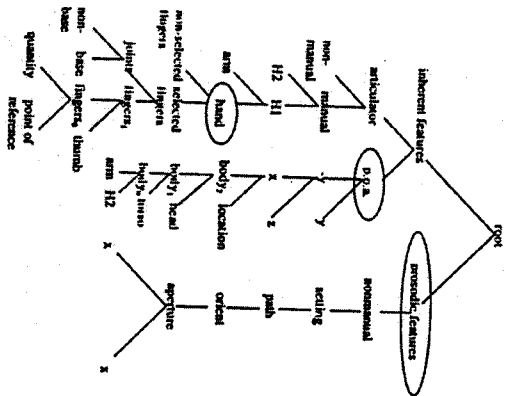


FIG. 3.6. Feature geometry of handshape, place, orientation and movement (Brentari, 1998).

salient aspect of the person's habits or personality); arbitrary name signs are generated by combining the first name initial (and sometimes the initial of the last name as well) of the person's English name, given the restrictions on movement and POA described earlier. Native ASL signers reject as ungrammatical name signs that combine bound movement roots of the classifier name signs with handshapes of arbitrary name signs (e.g., *movement root meaning 'limp' + H- 'Harry') or forms that alter the shape of a fingerspelled letter with a handshape feature with morphemic

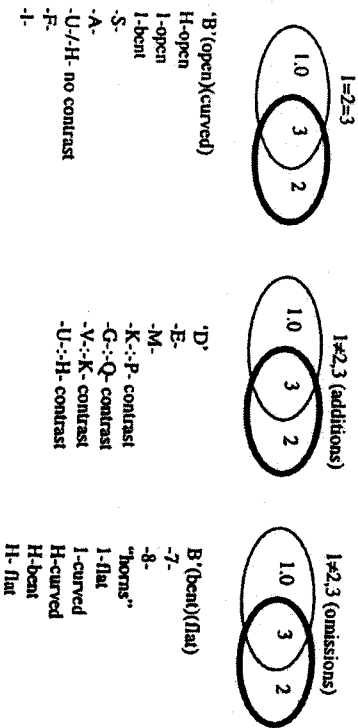


FIG. 3.7. Overlap and non-overlap in the handshape inventories of the native and non-native sub-components (1 = non-native; 2 = iconic (native); 3 = core (native)).

status (e.g., *-H- with bent fingers meaning 'the bent-over-Harry'). In addition to these combinatorial restrictions on forming new words, the handshape inventories used of different components of the lexicon do not overlap in certain areas. ASL handshapes are broken down into three kinds of features: "selected fingers" (Brentari, 1990a, 1998; Mandel, 1981; Sandler, 1989), "joints" (Brentari, 1998; van der Hulst, 1995), and "aperture" (Brentari, 1998; van der Hulst, 1995) and in some cases there are properties of the orientation relation (either of the "hand" node or the "place of articulation" node) that distinguish handshapes (Brentari, 1998; Crasborn & Koopij, 1997). These are defined in (1).

(1) *Handshape features*

- "selected fingers": specification capturing those fingers that are able to move or contact the body during the course of executing a sign. Examples of handshapes that contrast in selected fingers features are -G-:-H- and -M-:-N-.
- "joints": specification that captures the joints of a handshape that may be flexed. The specifications are open (no joints), bent (non-base joints), curved (base and nonbase joints), flat (base joints), and closed (whole hand closed in a fist). Examples of handshapes that contrast in joint features are the three-way contrast -B-:-C-:-E-.
- "orientation relation": the relation between a specific part of the hand (one of eight possible places on the hand) and the POA. Examples of handshapes that contrast in inherent orientation are -G-:-Q- and -K-:-P-.

There is considerable correspondence among the native components, and there is also considerable non-overlap between Parts 2 and 3 versus Part 1, as (Fig. 3.7) shows. In general, the handshapes shared by Parts 1, 2, and 3 (Fig. 3.7 left) are more simple, whereas those that differentiate (Fig. 3.7 middle) and (Fig. 3.7 right) are more complex. The fingerspelled alphabet lacks handshapes appearing in (Fig. 3.7 right): B-bent, B-flat, H-bent, H-curved, H-flat, I-flat, I-curved, and "thorns" (i.e., the handshape with the index and pinkie finger extended). These handshapes appear in the classifier system and in core forms. The fingerspelled alphabet also has some handshapes and handshape contrasts that the two parts of the native lexicon do not have (Fig. 3.7 middle): -D-, -E-, and -M-, occur as fingerspelled forms, but not in the native lexicon. -K- and -V- are contrastive because of the feature [stuck], but these

pairs of handshapes are not contrastive in the classifier predicate system or in the core lexicon. [Stacked] is defined as having the fingers in a global position of a squash racquet grip where the fingers are progressively less closed from the pinkie to the index finger (Brentari, 1998; Grefeget, 1993; Johnson, 1994).

There are also handshapes that are minimally contrastive in the manual alphabet (Fig. 3.7 middle) because of their inherent orientation in space: -K- (palm toward a frontal plane) versus -P- (palm toward a horizontal plane); -U- (palm toward a frontal plane) versus -H- (palm toward a midsagittal plane); -Q- (palm toward a horizontal plane) versus -G- (palm toward a midsagittal plane). In the core and iconic components, these distinctions are neutralized.

Movement and Place Of Articulation (POA) Inventories. Movement and place have different roles according to the component of the lexicon in question. In the iconic part of the native lexicon, movements and place of articulations are generally morphemic—for example, movements: 'S-shaped', 'square-shaped'; POA: OBJECT_a OBJECT_b, where 'a' and 'b' are referential loci in space. In the core, only inflectional and derivational affixal movements and POAs are morphemic; stem movements and POAs are phonemic.⁴

In non-native forms, there are two ways that POA and movement are employed. One way is typically seen in initialized forms. In these forms the handshape is a letter of the manual alphabet, but the POA, movement and orientation is that of the core lexeme on which the initialized form is based. For example, FINANCES, ECONOMY, and BUDGET are all based on the POA movement and orientation of the core form MONEY. The other way is typically seen in abbreviated and loan signs. In abbreviated signs, the POA is typically that of fingerspelled words—that is, near the ipsilateral shoulder or in neutral space; this single POA is expanded in the contralateral shoulder, chin, and ipsilateral forehead. Movement is derived from the transitions between the letters of the manual alphabet used in executing the word. In abbreviated forms, discussed later, the letters used (most often two of them) correspond to letters in specific positions in the English word. Although this is the typical pattern, there are a few loan

English word. Although this is the typical pattern, there are a few loan signs with displaced POAs (e.g., #SOON, #ALL, from Battison, 1978).

With respect to movements, in loan signs, all of the corresponding letters of the English word are in the input, and the transitional movements between them are made by the wrist or fingers. These transitional movements are subject to an evaluation of sonority (Brentari 1994, 1998). The more proximal the joint the higher the sonority (i.e., from shoulder (high sonority) >> knuckle joints (low sonority)); relatively higher sonority movements are kept and subject to phonetic enhancement, by adding a more proximal joint to the movement (e.g., an elbow movement can be added to a wrist movement). Movements thus derived by phonetic enhancement can form directional movements to which loci of inflectional or spatial reference may affix. Consider the loan sign #BACK. When the middle and index fingers are extended in the -K- the wrist extends in same way as it extends in the core verb SEND. The wrist movement in #BACK is enhanced by adding the elbow. This creates a path movement that can start and end in different places; as a result #BACK often articulated with spatial loci at the beginning and end of the sign (e.g., THEY-TWO SEPARATED, NOW #BACK). The movement and POA characteristics of the components of the ASL lexicon are summarized in Table 3.2.

Prosodic Structure. Itô and Mester (1995a, b) predicted that the subcomponents of the lexicon should be identifiable by differences in the exploitation of phonological constraints. Here we focus on constraints that refer to the ASL syllable and the prosodic word, given in Table 3.3. The number of syllables in a word is equal to the number of sequential, phonological movements it has. All ASL words must have at least one movement, hence words are at least one syllable long (Brentari, 1990a, 1990b, 1990c, 1998, Perlmutter, 1992). Handshape changes in signs have

TABLE 3.2. ASL movement and POA inventories (N=ative; -N=non-native)

	POAs	Movements
(N) classifier preds	morphemic	morphemic
(N) core	phonemic, morphemic phonologically derived	phonemic, morphemic phonologically derived from
(-N) initialized	from core forms	core forms
(-N) arb. name signs	specified within a small phonological set	specified within a small phonological set
(-N) loan signs	neutral space or derived from core forms	derived from transitional movements

⁴Thematic transfer expressed as [direction] features on core verbs may be a case of encoding transitivity relations, and as such, may also be a case of morphemic use of movement in core verbs (e.g., RESPECT, SUBSCRIBE, etc.; see Brentari, 1988).

provided some of the strongest arguments for syllable structure in ASL, and as it turns out, are also relevant in the discussion of vocabulary originating or extracted from fingerspelling. When Battison (1978) proposed his constraint on handshape changes in ASL signs, he acknowledged only word-level phenomena: "signs are limited to no more than two such different handshapes" (p. 49). Additionally, "... the handshape changes [involve] relative openness and closedness of the handshapes" (p. 52). Moreover, Mandel (1981) and Sandler (1988) refined Battison's observation to express the generalization that most handshape changes involve changes only within the same set of selected fingers. Signs appear not to involve a change from one to another completely unrelated handshape, such as from -8- (middle finger selected) to -1- (index finger selected). Perlmutter (1993) proposed a similar but more general formulation in which there was no reference to which fingers are involved, instead the constraints refer simply to the number of changes permitted at syllable- and word-level. There are no more than two handshape "tokens," or particular instances, forming an allophonic contour in a syllable, and no more than two handshape "types," or distinct handshape contrasts, in a lexeme. Aperture features are involved in allophonic handshape contours, sometimes called hand-internal movements, and they specify whether the joints of a given contrastive handshape are open or closed.

In this analysis, we adopted a version of Brentari's (1998) word-based SELECTED FINGERS constraint and a version of Perlmutter's (1993) 2-TYPE CONSTRAINT. Hand-internal movements, referred to in the PERIPHERALITY CONSTRAINT are changes in aperture setting; that is, given the selected fingers and specified joints of a handshape, allophonic handshape changes involved a change from open to closed or vice versa (Brentari, 1990, 1998).

Within the core lexicon, the sign SEND (Fig. 3.8) is monosyllabic and has two tokens and one type: the -5- (closed) followed by an allophonic -5- (open). The sign GOVERNMENT (Fig. 3.8) is disyllabic, and has three tokens but only one type (i.e., 1-open > 1-bent > 1-open). Both mono- and disyllabic forms have one set of selected fingers and this is evidence that the SF constraint applies at the level of the word. The effect of the two-type constraint is seen in the two-morphemic forms SEND+ 'agent' (Fig. 3.8), which has three handshape tokens at the level of the word, but only two types.

With respect to movement constraints in ASL on words, Coulter (1982) and Perlmutter (1992) have argued that the native lexicon is

TABLE 3.3. *Phonotactic constraints on ASL words*

SELECTED FINGERS Constraints (SF, from Brentari, 1998)	
a.	One selected fingers group per prosodic word.
b.	Hand-internal movements involve only selected fingers.
TWO-TYPE Constraint (2-TS, from Perlmutter, 1992).	
There may be no more than two handshapes per lexeme.	
PERIPHERALITY Constraint (MAX-AP, Maximize aperture change; from Brentari 1990b, 1998).	
Handshape changes that occupy syllable peaks maximize aperture change.	
TWO-MOVEMENT Constraint (2-MVT, from Brentari, 1998)	
There are at most two movements (i.e., syllables) per prosodic word.	
ALIGNMENT Constraints	
a.	ALIGN(L): initial handshape of stem with left edge of stem.
b.	ALIGN(R): final handshape of word with right edge of word.
FATHFULNESS Constraint	
MAX-TS All handshapes in the input must appear in the output.	

largely (but not exclusively) monosyllabic. There are monosyllabic, monomorphemic signs such as LIKE, UNDERSTAND, GERMANY, and monosyllabic, polymorphemic signs, for example, agreement verbs such as ^{1st}GIVE_{2sg}.⁵ Smaller in number are polysyllabic, monomorphemic signs that include DESTROY, MAKE-NOTE-OF, and APPOINTMENT. Polysyllabic, polymorphemic signs include some classifier structures, stem+aspectual marking on adjectives, and stem + certain inflections on agreement verbs, for example, dual marking. Importantly, at the level of the prosodic word, there appears to be no more than two syllables allowed, captured by the TWO-MOVEMENT CONSTRAINT, given in Table 3.3.⁵

Foreign words fall into distinct groups according to how they behave with respect to these constraints. Some obey all of them; such forms are in Part 1.0 of the ASL lexicon (1). Some obey none of them; such forms are in Part 1.3. There is some overlap between Part 1.0 and the core (Part 3).

Typology of Non-Native Vocabulary

We define non-native vocabulary in ASL as including, in addition to loan signs first described by Battison (1978), sets of vocabulary ranging from initialized signs and abbreviation signs to sign + fingerspelled compounds and name signs. All share an origin in the American fingerspelling system. The fingerspelled alphabet is a set of names for the

⁵Signs with bidirectional movements apparently violate this constraint; further research on this is necessary.

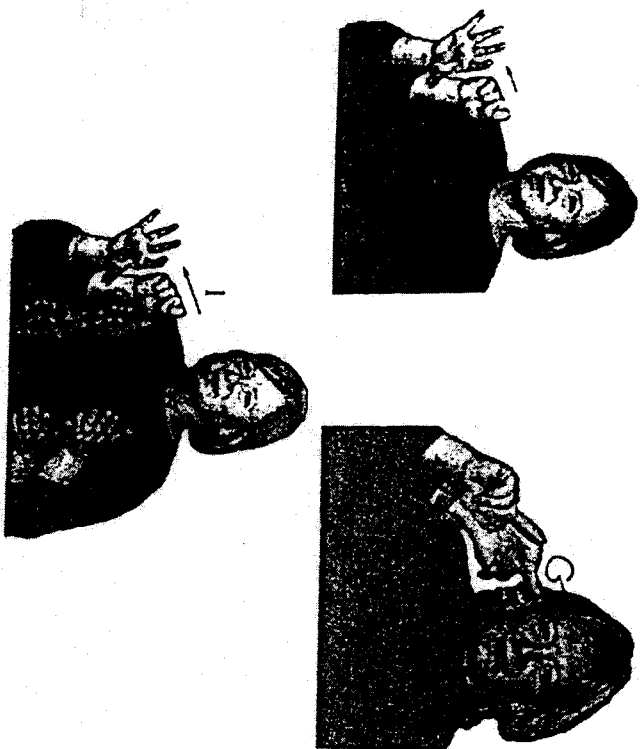


FIG. 3.8. The SEND (top left) has two handshape tokens, but one handshape type; GOVERNMENT (top right) three handshape tokens, but only one handshape type; the word containing SEND + urgent (bottom) has three handshape tokens, but two handshape types.

English alphabet, consisting primarily of handshapes, a few of which are also specified for orientation (e.g., -G, -Q, -U, -H, -K, -P-) or for movement (-J- has an orientation change, and -Z- has a tracing movement). The conventional description of fingerspelling in ASL is that it constitutes borrowed vocabulary from English and is used to represent names, places, and vocabulary for which no signs are available. The fact that fingerspelling has existed since the earliest filmed records of ASL (Hoitchiss, 1913; Veditz, 1913) and much earlier in Spain (Bonet, 1620) seems not to have discouraged the popular sentiment that fingerspelling is English and its presence in ASL is marginal.⁶ But as Lucas and Valli (1992) pointed out, the relation between fingerspelling and English is a distant one. The system is at least two levels of representation removed

⁶The American fingerspelling system can be traced to an invention by a hearing priest in the seventeenth century, Juan Pablo Bonet (Bonet, 1620), who developed it in the course of his tutoring a young deaf boy. The system was subsequently appropriated by the Abbe Sicard, a French educator of deaf children (Lucas, 1984).

from English: it is a representation of another representation. More precisely, it is two inventions removed: first, the written invention, followed by the manual, face-to-face invention. Further, its presence in ASL is ubiquitous; fingerspelled words appear as frequently as 7%–10% in the overall vocabulary in everyday signing (Padden, 1991). It has a durable and established niche in ASL. We claim that the long-standing presence of sequences of fingerspelling has made it possible for fingerspelled sequences to become routinized and for words thus derived to become structurally integrated in sign languages.

More globally, the ASL fingerspelling system is one of many similar inventions in sign languages of the world, designed to cross modalities and allow representation of spoken material in visual form, and processes of nativization have been reported for these systems as well. The ASL fingerspelling system is a one-handed alphabetic system also found in European sign languages such as French Sign Language and Swedish Sign Language. The British Deaf community uses a two-handed alphabetic system (Sutton-Spence & Woll, 1993; see also Brennan, this volume, chap. 2), as do Australians and New Zealanders. Deaf Italians use alphabetic fingerspelling for foreign names, but articulate by mouth spoken Italian vocabulary, as do signers of SLN (Schemmer, 1990), DSGS (Boyes Braem, this volume, chap. 1), Norwegian Sign Language (Vogt-Svensson, 1984), Swedish Sign Language (Bergman & Wallin, 1998), and German Sign Language (DGS) (Ebbinghaus & Hessman, 1996). In Japanese Sign Language (JSL), there is a manual representation of the syllabic hiragana system. In addition, JSL and other Asian sign languages, including Taiwan Sign Language (Ann, 1995) and Hong Kong Sign Language, have manual character signs, for example, NORTH, and signs that represent Chinese characters (Fok & Bellugi 1986; Fok, Bellugi, van Hoek, & Klima, 1988). Danish Sign Language uses a "mouth-hand system" involving mouth movements coordinated with disambiguating hand configurations (Birch-Rasmussen, 1982).

Because of its origin as an invention for representing English words in alphabetic form, it is as yet unclear how to characterize the form of fingerspelled words in ASL. Obviously, fingerspelling involves a sequence of handshapes that correspond to its sequence in written form. But Akamatsu (1982) and Wilcox (1992) found this description inadequate. From her work analyzing very young signers' fingerspelling attempts, Akamatsu proposed that fingerspelled words have salient "movement envelopes," or characteristic movement shapes at the segmental and word level. Indeed, very young signers can fingerspell and recognize forms they cannot yet read in written form. Wilcox found from kinematic analyses of fingerspelled movements of skilled adult signers that they consistently repeat

the same sets of movements across many repetitions of the same word. Less skilled fingerspellers show more variability, demonstrating that skilled, fluent fingerspelling involves knowledge of movement as well as of handshape sequences. We return to the question of the phonological form of fingerspelling in a later section.

Initialized Signs

Among the most frequent and well-entrenched foreign vocabulary items in ASL are initialized signs; for example, WATER, BLUE, PINK, PURPLE, YELLOW, GREEN, FAMILY, and PERSON. The popular definition of initialized signs is that the handshape of a native sign is replaced with one corresponding to the first letter of an English translation (Frisberg & Gough, 1973). However, some initialized signs have no native counterparts, for example, WATER and signs corresponding to color, trait, and status. Instead what appears to be a defining characteristic is that they are members of semantic fields, occupied by several signs varying along a semantic dimension, given in (2).

- (2) *Initialized Sign forms (*no native sign)*
- | | |
|-------------|---|
| GROUP | FAMILY, ASSOCIATION, GROUP, TEAM, SOCIAL, DEPARTMENT |
| PERSON | PERSON, INDIVIDUAL, CLIENT, HUMAN, SUBJECT |
| SCIENCE | BIOLOGY, CHEMISTRY, EXPERIMENT |
| COMPUTATION | STATISTICS, ALGEBRA, CALCULUS, GEOMETRY, TRIGONOMETRY |
| THOUGHT | THEORY, REASON, LOGIC, MEDITATE |
| *Color | BLUE, PURPLE, YELLOW, GREEN, BROWN |
| *Trait | PERSONALITY, CHARACTER, NOBLE, LOYAL |
| *Status | BACHELOR, SINGLE, TWIN, SENIOR-CITIZEN |

Initialization is one of the most productive of word-building processes in ASL, used widely for technical or professional purposes. Many initialized signs often appear in pairs with native signs representing the common and familiar, and initialized signs, the scientific and distant, for example, the native FEELING-DOWN and initialized CLINICAL-DEPRESSION; native SUSPICIOUS and initialized PARANOIA; native SOUND and

initialized PHONOLOGY; and native GOVERNMENT and initialized POLITICAL/POLITICS. Initialized signs almost always correspond to the first letter of an English translation of the sign. An exception is the sign SEX/GENDER in which the handshape is the last letter of the word, -X. Interestingly, there has been further word-building from this particular sign; in the related form, TRANSEXUAL, the contacting root movement has been replaced with a root movement meaning 'to reverse, change.'

As widespread as this particular process of word building has been in ASL, many Deaf people say they are suspicious of initialized signs. Part of the anxiety stems from the fact that sign language reformers of the 1970s (Gustason, Petzling, & Zawolkow, 1975) proposed substituting large numbers of native vocabulary with initialized signs, an action that predictably met with much resistance in the Deaf community. Yet initialized signs are widespread, even if specific initialized forms from the Gustason and associates' project are disallowed. It should be noted that the rapid growth of new initialized signs used in everyday contexts in the community almost perfectly coincides with the rise of the Deaf professional middle class during this period (Padden, 1990). With the movement of Deaf people away from traditional and low-paying solitary trades into technical and scientific fields of work, new vocabulary for their new work lives was needed. In these contexts, initialized signs are productive means of forming semantic and lexical oppositions between known, intimate, in-group vocabulary with scientific vocabulary (Ramsey & Padden, 1998).

Abbreviation Signs

Except for BULLSHIT, none of Battison's (1978) examples include words that exceed five letters, leaving open the question of how to analyze so-called "abbreviation" signs. Such signs involve reduction of the string of fingerspelled letters to at most two handshapes, as do loan signs. Like loan signs, some take agreement inflection, for example FEEDBACK, which can inflect for person and number of the subject and object; however, unlike loan signs that tend to retain the first and last letters of the origin fingerspelled word, abbreviation signs tend to retain the first and a medial letter. One group of abbreviation signs have a single handshape change and one movement such as a path or brushing movement (3); another involve two contacts (4).

- (3) *Abbreviation signs articulated as one sequential movement*
FEEDBACK, VIDEO TAPE, WORKSHOP, WITHDRAW, VICT,
PRESIDENT

(4) *Abbreviation signs articulated as two sequential movements*
SOCIAL WORK, SENIOR CITIZENS, BOARD OF TRUSTEES,
BACKGROUND, VIETNAMESE, PROJECT

The second, medial handshape of an abbreviation sign may coincide with the first letter in the second word of a phrase or a compounded unit, for example, USHER'S-SYNDROME and WORKSHOP, or the second stem, for example, PROJECT, and WITHDRAW. A few abbreviation signs involve a first and final letter, for example, CURRICULUM. Abbreviation signs, like initialized signs, occupy semantic fields linking clusters of initialized signs, for example, SENIOR CITIZEN joins TWINS, SINGLE; VIETNAMESE joins JAPAN, and CHINA, KOREA; SOCIAL WORK joins THERAPY, REHABILITATION. For these reasons, Brentari (1990b) analyzed abbreviation signs as a subtype of initialized signs, but a number of other abbreviation signs have no such groupings, for example, FEEDBACK, WITHDRAW, and USHER'S-SYNDROME.

Aside from the correct assignment of these foreign vocabulary, the distribution of the two handshapes in abbreviated signs and in initialized signs are accounted for using the alignment constraints ALIGN(L) and ALIGN(R) (given in Table 3.3 and repeated here in (5); Brentari, 1998).

(5) *Alignment Constraints*

- a. ALIGN(L): initial handshape of stem with left edge of stem.
- b. ALIGN(R): final handshape of word with right edge of word.

ALIGNMENT constraints match the beginnings and ends of morphological categories (e.g., stems) with the beginnings and ends of prosodic categories (e.g., syllables, prosodic words). When the English word(s) on which the abbreviated sign is based consists of one stem (e.g., CURRICULUM), ALIGN(L) will insure that the leftmost letter is used, and ALIGN(R) will insure that the rightmost letter is used, rather than the second leftmost letter (e.g., *CURRICULUM). When the English word(s) on which the abbreviated sign is based consists of more than one stem or more than one word, both leftmost letters of the stems are chosen (e.g., FEEDBACK, WITHDRAW, USHER'S-SYNDROME). This behavior can be accounted for by ranking ALIGN(L) above ALIGN(R) in the grammar's constraint hierarchy.⁷

⁷In Quebec Sign Language (LSQ), the output form derived from the English word 'curriculum' would be predicted to be CURRICULUM, rather than CURRICULUM, revealing different constraint ranking of ALIGN(L) and ALIGN(R) (see Miller, this volume, chap. 5).

Name Signs

S. Supalla (1992) noticed that "arbitrary" name signs in ASL constitute an extremely small system of possible forms, constituting a sublexicon. The handshapes are drawn from a limited inventory of fingerspelled handshapes in addition to a limited set of permissible movement, location, and orientation elements. In contrast to the "descriptive" name sign system in which names are drawn from the classifier inventory, arbitrary name signs have no classifier elements; instead the signs are formed from combinations of a limited set of arbitrary elements.

Name signs, like initialized signs, employ the fingerspelled handshape corresponding to the first letter of an English name, usually a first name or a last name, and sometimes both. But unlike initialized signs, name signs permit only a few movement elements. One of the authors' name signs, CAROL, is the -C- handshape combined with the shaking movement located in neutral space. Because the inventories are so limited, it is not uncommon for individuals in the national Deaf community to have the same name sign, although typically same name signs are avoided in a local or professional community. Because fingerspelled English names are used widely in the American Deaf community, the problem of name sign similarity is a small one.

Loan Signs

Whereas initialized signs and name signs draw only from the fingerspelled handshape inventory in combination with movement and location elements of the native lexicon, loan signs are entirely derived from fingerspelled words. Nativized loan signs involve extensive restructuring with significant reductions in the movement contour of the origin fingerspelled word. The number of handshapes in the fingerspelled word is typically reduced to two in the loan sign. Battison (1978) listed restructured loan signs whose origin forms ranged from at least two letters up to five letters. Examples are those of two-letter origin, #SAY-NO; three-letter, #JOB; four-letter, #EASY; and five-letter, #WOULD. In his analysis, restructured forms typically retained first and last letters with medial letters deleted or reduced as in #JOB, which has a handshape change -J- to -B-, deleting the medial -O-, and #WOULD, with a handshape change -W- to -D-, deleting all other medial letters (Fig. 3.9).

Loan signs fall into a range of word classes, including nouns (#JOB), verbs (#SAY-NO), adjectives (#EASY), conjunctions (#BUT), expletives

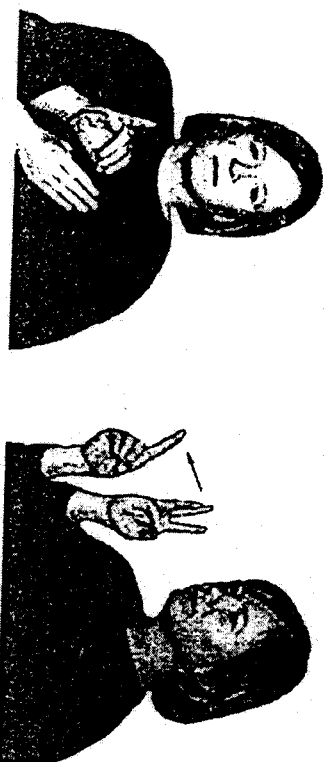


FIG. 3.9. The loan signs #JOB (left) and #WOULD (right). Both retain the initial and final letters of the English word and delete the medial letters.

(#FUCK) and wh-words (#WHAT). Except for very few forms, for example, #BREAD, loan signs' origins as fingerspelled words are still recoverable, despite reduction and resyllabification. Hirsh-Pasek (1981) finds that young signers can report the fingerspelled words from which the loan signs in her sample were derived, which may suggest that loan signs retain not only some of the handshapes but also movements inherent to the full fingerspelled form, which the children can still recognize and, at times, even try to mimic these movements. For example, T. Holcomb (personal communication) observed his young preliterate daughter assigning different movement contours to R-I-C-E and I-C-E; with R-I-C-E, his daughter used a characteristic circling movement, but with I-C-E, she used an opening and closing movement. Further, the original movements are more salient in emphasized forms.

Locally Lexicalized Loans

When long fingerspelled forms occur in discourse (i.e., more than seven letters), the movements between letters assume regular movement patterns within the discourse after three productions. For example, in a set of video presentations on linguistics, the form M-O-R-P-H-O-L-O-G-Y appears as #MPHGY after the third production (Bienvenu & Colonomos, 1987; Brentari, 1994; examples from Valli & Lucas, 1992 (6)).

(6) Locally lexicalized fingerspelled forms

# letters	1st/2nd production	3rd production	# syllables
6	S-Y-N-T-A-X	S-Y- \emptyset -T-X	2
8	C-U-P-B-O-A-R-D	C-P-[wig]-D	2

8	L-O-C-A-T-I-O-N	[L-I]-O- \emptyset -C-N	2
8	M-O-R-P-H-E-M-E	M-P-H-E	2
9	P-H-O-N-O-L-O-G-Y	P-[H-G]-Y	2
10	M-O-R-P-H-O-L-O-G-Y	M-P-[H-G]-Y	2
10	L-I-N-G-U-I-S-T-I-C	L-I-N-G-I-C	2
5	C-H-I-L-D	[C-H]-I-L-D	1

Despite some idiosyncratic variability in such forms, we see that other factors beyond position in the word can influence which letters are deleted or retained. Movements resulting from two-letter sequences are predictably retained because of how salient they are. Letters are potentially deleted if they do not involve a change in orientation from one letter to the next, or, if they occur word medially. A sequence is likely to be retained if it results in an orientation change (e.g., $_G$, $_H$, $_P$, $_X$), or if the sequence results in a legitimate handshape contour.

Compounds With Fingerspelled Forms

It is well known that ASL has productive compounding of native forms (Klima & Bellugi, 1979) in which signs combine to form a compound, for example, RED+SQUARE 'brick' and SLEEP+SUNRISE, 'oversleep.' These compounds undergo reduction and simplification of movement from reduplicated to nonreduplicated forms, for example, in BABY+SIT, the reduplicated BABY is reduced to a single movement in the compound.

BABY+SIT joins other compounds of native forms that are "loan translations," or literal translations of English compounds. Examples are DEAD+LINE 'deadline,' TIME+LINE 'timeline,' and HOME+WORK 'homework.' Such compounds are plentiful in everyday ASL, including some that seem semantically odd in ASL, for example, BABY+SIT, which means to 'babysit' and not the phrase 'the baby is sitting.' Despite their loan status, these compounds in all respects behave like compounds of native signs: They constitute a unit and show reduction and simplification of movement.

Because ASL has compounds that permit the loan of meaning as well as of form, the case of compounds that consist of a sign and a fingerspelled word are additional interesting forms (7). As with signed compounds, the forms have lexical integrity; they function as single units and cannot be broken apart without altering the meaning of the combined units. The first list contains compounds where signs constitute the first unit, and the second list, the second unit:

(7) *Forms Containing Signs and Fingerspelling*

a. Sign + fingerspelled forms

DEAD+E-N-D	'dead-end street'
SUN+B-U-R-N	'sunburn'
PAY+R-O-L-L	'payroll'
SOFT+W-A-R-E	'software'
EYE+T-O-O-T-H	'eyetooth'
CHEAP+S-K-A-T-E	'cheapskate'
HARD+W-A-R-E	'hardware' (computer)
SOAP+B-O-X	'soapbox' (for lecturing)
b. Fingerspelled + sign forms	
P-R-O-O-F+READ	'proofread'
F-O-O-T+WORK	'footwork'
L-E-G+WORK	'legwork'
B-E-L-L+BOY	'bellboy'
S-T-O-C-K+MARKET	'stock market'
c. Fingerspelled English compounds	
B-A-L-L-P-O-I-N-T	'ball-point pen'
L-A-P-T-O-P	'laptop' (computer)
S-K-Y-L-I-N-E	'skyline'
P-I-C-K-U-P	'pickup' (truck)
P-I-C-K-P-O-C-K-E-T	'pickpocket'
W-O-R-K-O-U-T	'exercise/workout'

At first glance, there appear to be no distributional grounds for whether signs appear as first or as second units, or whether English compounds are represented fully or partly in fingerspelling. The patterning does not become obvious until clusters of loan translations are compared as in (8).

(8) *Clusters of Loans*

a. i. PICK+U-P	'trash pick-up' or 'pick-up bar'
ii. P-I-C-K-U-P	'pick-up' (truck)
iii. P-I-C-K-P-O-C-K-E-T	'pickpocket'
b. i. PAINT+B-A-L-L	'paintball' (for war games)
ii. BLACK+B-A-L-L	'to blackball' (someone)
c. i. TIME+LINE	'timeline'
ii. DEAD+LINE	'deadline'
iii. TELEPHONE+LINE	'phone line'
iv. S-K-Y-L-I-N-E	'skyline'

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d. i. PAPER+WORK	'paperwork'
ii. HOME+WORK	'homework'
iii. F-O-O-T+WORK	'footwork'
iv. L-E-G+WORK	'legwork'

PICK means 'to choose' in (8a.i), but not in (8a.ii-iii). BALL usually means a playing ball held by hand, but in 'blackball' and 'paintball' (8b) the balls are not playing balls nor are they of a size to be held in both hands; a 'paintball' is actually a pellet. Thus BALL is disallowed for meanings varying from the semantic category of the sign BALL. LINE refers to a boundary or a conduit in (8c.i-iii), but not an outline, as in 'skyline', because the sign translation LINE is disallowed for the latter meaning and the form is fingerspelled to preserve semantic integrity of LINE.

It also appears that pointing classifiers, especially for including those for body parts, are disallowed in compounds. In F-O-O-T+WORK and L-E-G+WORK the body part is fingerspelled (8d.iii-iv).⁸ More generally, it appears that there are restrictions on classifier constructions appearing in flowing-downwards; W-I-N-D-S-H-I-E-L-D but not *WIND+flat-sur-face-curved.⁹ One possible reason why such compounds are blocked is that the predicate classifier forms lack derived noun counterparts; instead the fingerspelled word is used for the second half of the noun compound. More generally, there are pairs of signs and fully fingerspelled words that stand in either semantic or word class opposition (9).

(9) *Pairs of fingerspelled words and signs in semantic or word class opposition*

a. FREE 'liberated' versus F-R-E-E 'free of charge'
b. PICK U-P 'to pick up' versus P-I-C-K-U-P 'pick-up' (truck)
c. WORK O-U-T 'to work out' versus W-O-R-K-O-U-T 'exercise workout'
d. LOVE 'to love' versus L-O-V-E 'love' (noun)

⁸The restriction may be that signs articulated below the chest are generally avoided. But pointing is also avoided in other signs; in 'eyetooth' informants report that it is "funny" to point to both the eye. An exception to this are some size and shape specifiers, which appear in RED+square ('trick') and 'square'+ZAP ('microwave').

In these cases, fingerspelled words not only convey meaning borrowed from English but coexist with ASL signs in semantic and grammatical distribution. In this sense, fingerspelled words in compounds act as diagnostics of semantic categorization and of word class in ASL vocabulary.

A UNIFIED LEXICON

Using the descriptive generalizations and the proposed phonological constraints given thus far, we can divide the non-native ASL lexicon into systematically distinct groups (Table 3.4). The analysis in this section is expressed using Optimality Theory (Prince & Smolensky, 1993), in which candidate output forms are evaluated with respect to a set of ranked constraints.

Loan signs have representative forms in each of the non-native strata; therefore, they are used as a basis for our analysis. By understanding how the constraints operate in the forms closest to the core, we will be able to apply them consistently to other non-native strata. The constraint tableau for #BREAD is given in (11), using the set of constraints in Table 3.3. At this point, one more constraint needs to be presented, which is a FAITHFULNESS constraint. FAITHFULNESS constraints do their best to guarantee that the shape of the output matches the input to the greatest extent possible. They militate against deletions from the input form—MAX constraints—or against epenthesis in the output form—DEP constraints. The only FAITHFULNESS constraint we use is called MAX-HS, which requires that all handshapes of the input must also be present in the output; it is given in Table 3.3, and repeated here in (10). FAITH is used instead of the label MAX-HS in the following tableaux.

(10) FAITHFULNESS constraint

MAX-HS: All handshapes in the input must appear in the output.

The tableaux in (11-14) show how the strata of the non-native vocabulary behave with respect to the proposed constraints. A set of possible outputs is listed, but only the one indicated by the * is the optimal one, which best satisfies the ranked well-formedness constraints. The only constraint that must be crucially ranked in the core form #BREAD is FAITH. All of the

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TABLE 3.4. *The non-native lexicon in ASL*

Subcomponent	Description
1.0 * 3.0	Signs that violate none of the rules mentioned in (7)-(10) and (14) and have handshapes that occur in all three components: (e.g., #BREAD, #SAV, NO)
1.0	Name signs, initialized signs, two-letter loans that have a handshape that has a synchronic connection with its English counterpart, but that violate none of the constraints mentioned in this paper (e.g., TEAM, WAR, WATER, EMERGENCY). ¹⁰
1.1	Some arbitrary name signs, abbreviated signs, initialized signs, two-letter loans. These are forms that violate SF (e.g., VIDEO TAPE, WITHDRAW, WORKSHOP, FEEDBACK).
1.2	Partially assimilated loan signs, three-letter loans. These forms violate SF, MAX-AP, and 2-HS (e.g., #EASY, #SURE).
1.3	Commonly fingerspelled words, sign+fingerspelled compounds. These forms violate SF, 2-HS, MAX-AP, and 2-MVT (e.g., F-R-E-E, S-T-O-C-K, MARKET).

other constraints are unviolated in the output form, -8-[open][closed]¹¹, the other candidates in (11) are less harmonic in the following ways.

The fully fingerspelled form of #BREAD (the first candidate) has two MAX-AP violations because -B- and -R- are both [open] and -E- and -A- are both [closed]. This form contains five, not two, handshapes, thereby incurring three violations of 2-HS. There are three violations of SFA because although -B- and -E- contain the same selected fingers, -R-, -A-, and -D- cause three changes in selected finger groups. SFb is violated only once, and ALIGN(L) and ALIGN(R) are unviolated, as is FAITH. Candidates 2 and 3 with unparsed first and last letters incur one less 2-HS and SFA violation, but they violate and ALIGN(L) and ALIGN(R) respectively. Deleting two of the middle handshapes (candidate 4) eliminates the violations of MAX-AP and 2-MOV, but the violations of SF and 2-HS remain.

¹⁰These signs will have handshapes not found in the core inventory.

¹¹Two explanatory remarks about the optimal candidate 7 are in order. One is that the movement real- ized in the output form is rapidly repeated. The second is that -8- is a conventionalized, shorthand way of notating a handshape with the middle finger selected and nonselected fingers open. The handshape change from [open] to [closed] with this set of selected fingers indicates an output form which changes from having all of the fingers extended (i.e., -B-) to one where the middle finger is flattened, and the index finger and the ring and pinkie finger are extended independently. The extended index finger approximates the -D-.

(11) *Constraint tableau for #BREAD (8[open(o)]>[closed(c)]
(naive form; Parts 1.0 & 3.0)*

/BREAD/	2- MOV	ALIGN- LEFT	ALIGN- RIGHT	2- HS	MAX- AP	SF.a	SF.b	FAITH
BREAD	**			**	**	***	*	
BREA<D>	*		*	**	**	**	*	*
READ	*	*		**	**	**	*	*
B<RE>AD			*	*	*	*	*	**
B-A			*			*	*	***
B-D						*	*	***
8[o]>[c]								*

The forms with two handshapes (candidates 5 and 6) are quite well formed. B-D incurs only one violation of SF.a. The actual output fares even better, having no violations of the proposed constraints except for FAITH, with a whopping five violations. Notice, too, that the only form with no violations of FAITH is the fully fingerspelled form.

In loan signs with two handshapes (such as #JOB (12)) FAITH is no longer lowest ranked. The output has a violation of SF.a and SF.b, which places the form in stratum 1.1. It is equivalent in structure and number of violations incurred with the #BREAD form of BREAD—candidate 6—that is, J-B has not rid itself of the fingerspelled letters. The output contains one violation of FAITH. The tableau for #EASY (13), a non-native form in stratum 1.2, shows FAITH moving up further in the constraint hierarchy. Violations of 2-HS and SF are what define this stratum. In stratum 1.3, FAITH is ranked above all constraints except ALIGN(L) and ALIGN(R) for example, STOCK in S-T-O-C-K MARKET (14). In this stratum any violation of FAITH will be fatal.

Moving away from the core, each successive stratum ranks FAITH higher in the constraint tableau. In Table 3.5, we can trace the degree of faithfulness to the input of loan signs with respect to the constraints of the core lexicon. It is important to reiterate that forms can be stable members of these strata.

(12) *Constraint tableau for #JOB (J-B; non-native, part 1.1; loan sign)*

/JOB/	2- MOV	ALIGN- LEFT	ALIGN- RIGHT	2-HS AP	MAX- AP	FAITH	SF.a	SF.b
JOB				*			*	*
**J-B						*	*	*

(13) *Constraint tableau for EASY (#E-S-Y; non-native, part 1.2; loan sign)*

/EASY/	2- MOV	ALIGN- LEFT	ALIGN- RIGHT	FAITH	2-HS AP	MAX- AP	SF.a	SF.b
EASY	*				**	**	*	*
E-Y				**			*	*
**E-S-Y			*	*	*	*	*	*

(14) *Constraint tableau for STOCK in S-T-O-C-K MARKET (non-native, Part 1.3; sign+ fingerspelled word)*

/STOCK/	ALIGN- LEFT	ALIGN- RIGHT	FAITH	2- MOV	2-HS AP	MAX- AP	SF.a	SF.b
**STOCK				**	**	**	*	*
S-K			***			**	*	*

Initialized and abbreviated signs combine movements of core forms with at most two fingerspelled letters. In (15) we see the tableau for an initialized form with two handshapes—WORKSHOP. The candidate set helps us see a crucial ranking between ALIGN(L) and ALIGN(R). Because of the 2-HS constraint, all of these forms allow for two empty handshape slots in the input, in addition to the path movement from the core form. What we see here is that a two-handshape form incurring one violation of ALIGN(R) is preferred over a form incurring one violation of ALIGN(L). The preferred form chooses the two leftmost handshapes of the two English stems.

TABLE 3.5. The ranking of FAITHFULNESS in native and non-native components of the ASL lexicon

Native (1.0)	Non-native (1.1)	Non-native (1.2)	Non-native (1.3)
2-MOV ALIGN(L)	2-MOV ALIGN(L)	2-MOV ALIGN(L)	ALIGN(L)
2-HS MAX-AP	2-HS MAX-AP	ALIGN(R) FAITH	ALIGN(R)
ALIGN(R)	ALIGN(R)	2-HS 2-MOV	2-HS
SF(a)	FAITH	MAX-AP	MAX-AP
SF(b)	SF(a)	SF(a)	SF(a)
FAITH	SF(b)	SF(b)	SF(b)

(15) 'workshop' + GROUP (path; non-native, Part 1.1; abbreviated sign)

'workshop' + GROUP	ALIGN-L	ALIGN-R	2-HS	MAX-AP	SF a
W-S+GROUP		*			*
W-P+GROUP	*				*

DISCUSSION AND CONCLUSION

Forms such as sign+fingerspelled compounds and commonly fingerspelled words constitute the most foreign of all ASL vocabulary. They do not inflect for person or for number, nor do they accept plural affixation. PAINT+B-A-L-L in the plural adds the phrase, 'small round object'+[Redup], but does not itself undergo reduplication. These forms also violate all phonological constraints discussed thus far, except for the FAITHFULNESS constraint MAX-AP. It would appear that without further evidence of resyllabification, or restructuring, that these forms are the least nativized, and reside just inside the boundaries of the lexicon.

The morphological aspects of word formation in the "iconic" versus the non-native vocabulary are worth discussing as a final point. Brentari (1990b) argued that fingerspelled forms are polysyllabic, monomorphemic forms. Handshapes in these forms are not morphemic; instead they are linked with words with English sources. Because of their monomorphemic status, it could be hypothesized that forms derived from fingerspelling are relatively simple morphologically and are therefore free to accept agreement and aspect morphology than are classifier predicates, which are morphologically much more complex. In contrast, in the iconic component of the ASL lexicon, handshapes (as well as POA and movement) are morphemic. Furthermore, because of this morphological

difference between handshapes in non-native forms and in classifier predicates, Parts 2 and 1 of the lexicon stay mainly distinct from one another, and attempts to combine them in name signs or in lexical items are considered ungrammatical by native signers. However, if and when a classifier form enters the core lexicon, which can be tested by the ability to derive nominals or affix inflectional morphology to the form, it becomes a potential candidate for hybridization in initialized signs, abbreviated signs, and compounds. This morphological distinction between Parts 1 and 2 of the lexicon is seen in the separation of the classifier and arbitrary name signs. Finally, when a form, such as FREE, is used differently than its adjectival word class with primary meaning of 'liberated,' it may adopt a fingerspelled variant to express an alternative use—that is, as an affix meaning 'without'—in forms such as SUGAR-F-R-E-E.

What this analysis shows is that, although ASL has had intimate contact with English since its beginning, the mechanisms for borrowing English elements into the language—both morphological and phonological—are constrained, systematic, and expressed within the grammar of ASL.

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