

THE INFLECTIONAL MORPHOLOGY OF ASL DIRECTIONAL VERBS

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1. INTRODUCTION

I will propose a model for the acquisition of directional morphology of American Sign Language (ASL) through a paradigm formation mechanism (following Pinker 1984:166-208). I will show that the segmentation of the ASL 2- and 3- place predicates, acquired as a regular inflectional process, requires the child to segment the sign and to attach morphological significance to sublexical phenomena. Paradigm formation would allow the child to generalize directional signs in a regular manner, in keeping with the systematicity of adult usage. It has been suggested that many ASL phenomena, including directionality and mimesign (a system of moving classifier handshapes about the discourse area to indicate relative position and movement of referents, which will be discussed in a later section) is an 'analogue' phenomenon; i.e., a representational mapping of continuous semantic concepts onto continuous sign phenomena (De Matteo 1977). I feel that Newport (1980) presents sufficient justification for analyzing this phenomenon as a system of discrete location, movement, and classifier morphology; that is, a nonanalogue analysis consistent with morphology of oral languages. This would have an impact on acquisition of these features. If they are analyzed as morphological features, the model must account for learning them under the same sorts of mechanisms suggested for oral acquisition.

2. THE STRUCTURE OF ASL

2.1 Notation and cheremics

The signs of ASL can be subjected to sublexical analysis much as the phonology of oral languages. Stokoe (1978) defined the 3 'cheremic' features commonly used to describe ASL: DEZ (designator), the handshape of the active hand; TAB (tabula), the location or point of articulation of the sign; and SIG (signation), the movement element of the sign. SIG has several parameters, including motion (e.g. towards or away from signer), internal movement (of hand or fingers), interaction (with TAB) or, in some

signs, diacritics for certain types of movement (e.g. repeated touching action), and subscripts denoting the orientation of DEZ (e.g., palm up or back vs. palm down or out). Friedman (1977) uses a fourth major feature, orientation, to detail which direction DEZ is facing (notably towards or away from signer or referents). I follow Stokoe's system, as I am unconvinced of the necessity of orientation as a feature rather than a parameter of SIG. Orientation can be a salient feature (e.g. the possessive pronominals, in which the palm of the flat hand is faced towards the referent), but other SIG parameters can be equally salient -- e.g. the internal (finger) movement of 'WAIT' (fingers of '5 hand' wiggle in front of signer) is the equally distinctive. All cheremic features have a limited set of possible values.

At the level of the sentence or phrase the standard notation is to use a capitalized English word to represent a signed morpheme; hyphenation is used for inflected signs, e.g. 'I-SEE-YOU'. All forms in capitals are in this notation.

2.2 What is to be acquired

2.2.1 Pronominals

ASL has 3 sets of pronouns; simple (I YOU, HE/SHE/IT, etc.), possessive, and emphatic/reflexive (usually rendered as MYSELF, YOURSELF, etc. but also available for emphasis (Humphries, et al. 1980:83)). Possessive/nonpossessive is the only case distinction applicable. All are marked for person (1st, 2nd, or 3rd) and number (singular and plural, with a possibly arguable distinction between the simple plural ALL-OF-YOU and an iterative plural 'you and you and you', and possibly a dual 'you two'). The iterative plural is formed by simple reduplication; the pronoun sign is simply repeated. For this analysis I will not consider these separate morphemes, but rather a syntactic (compound NP) phenomenon. In this paper, I will not deal with the dual number, but it is present in the adult language. The simple (nonpossessive) series consists of a pointing index finger DEZ (the 'G hand') directed towards the referent (the TAB feature). There is no SIG movement in the singular series, outside of the first person (where there is a contact SIG, index touches chest). 3rd person with referent not present is indicated with reference to an arbitrary position (generally off to the side); this parallels the use (in quotation) of 2nd person not present (Index straight forward). The plural forms use the same DEZ and TAB with a horizontal movement SIG.

The possessive series differs from the simple pronouns only in DEZ, using the open palm ('B hand') handshape. Emphatic/reflexives use a closed-fist DEZ ('A hand') and an internal movement at the wrist (generally described as a wiggle or shake movement). Table 1 shows these pronominal features.

CASE	DEZ	PERSON	TAB	NUMBER	SIG
simple	G	1	signer's chest	sg.	touch/
possessive	B	2	directly front		stationary
emphatic/ reflexive	A	3...	to side	pl.	horizontal sweep

Table 1. Case, person, and number in ASL pronominals.

2.2.2 Inflected Verbs

ASL has certain verbs (the directional 2- and 3- place predicates) which must be inflected for number and person of subject, object, and/or indirect object. An example of a 2-place directional predicate is SEE. In the citation form (which is actually I-SEE-YOU) the first 2 fingers of the dominant hand (V hand) move away from the signer's eyes. The TAB position indicates subject reference (as with the pronouns, the actual TAB -- in this case the eye region -- becomes somewhat arbitrary; the sign then originates from about eye level in the appropriate person area). SIG encodes movement towards the object. Person is marked in the same areas used by the pronoun system. Number in the object incorporates the horizontal sweep SIG.

Number in the subject is less clearly marked. It may be marked by horizontal movement of the beginning of the sign (where physically possible; which it is with this example, SEE), but in cases where this is awkward, plural subject may also be expressed by partial reduplication; both hands may be used (with the same handshape). When applied to signs requiring both hands, inflection for subject's number is not possible in this sense (i.e., an overt pronoun or reduplication of the entire sign is required, processes which I am not considering in this paper). 2-place predicates which do not regularly inflect for person/number in this fashion may be classified by chericmic characteristics; they are predicates like HIT (DEZ A, a closed fist, strikes TAB index of other hand), which have a SIG and/or TAB which may not be moved to a referential position.

There is another class in which subject/object marking takes place, but in which the order given above is reversed. Predicates of this type include CHOOSE and SUMMON. In CHOOSE, the open spread hand (5 hand, one of the neutral handshapes of ASL) facing the person or object to be chosen is drawn back towards the chooser while the index and thumb come together. These must be placed in a separate class, presumably on the basis of semantic characteristics (e.g., the role of subject and object).

3-place predicates show marking for subject and indirect object, in a manner analogous to the subject-object marking of 2-place predicates; the sign originates at the subject's TAB and moves toward the indirect object. In these verbs the indirect object is the goal, a role which apparently causes the oblique to be treated in the same manner as the object goal. The object of such a predicate may be a lexical item which follows the inflected verb, or it may be an incorporated classifier. ASL classifiers include classifiers for size and shape characteristics (e.g., the C handshape, the actual handshape used in handling a cup becomes a classifier for 'cup-like vessels'). There is a limited set of these classifiers. If an appropriate classifier exists for the object of a 3-place predicate, the classifier handshape may supplant DEZ in that predicate. As with predicates discussed earlier, there is the additional restriction that the supplanted DEZ feature must be one of the neutral handshapes.

3 ACQUISITION

3.1 Pronominals and POINT

The ASL pronouns establish areas for person marking which are used throughout the language. The pointing gesture appears quite early in the acquisition data for deaf children of deaf (hence native fluency in ASL) parents (Hoffmeister 1975, 1975 first treated POINT as salient acquisition feature). POINT is prominent in the first combinatorial sequences; 2-POINT and POINT + sign sequences were the earliest observed. Early use of POINT required a concrete reference present in the room, and the abstract use developed later. Verbs are first acquired in the citation form; inflection for person first appears with overt (and redundant) POINTs. The early paradigm for POINT is shown in Table 2.

POINT towards self:	person = 1
POINT straight out towards addressee:	person = 2
POINT towards other object/person:	person = 3

Table 2. Early one-dimension paradigm for POINT.

This allows the formation of a one-dimension (person) paradigm, identical with the adult simple pronominal paradigm for that dimension. This is, in fact, the early usage of POINT in Hoffmeister's (1975) Stage 1 (This was arbitrarily defined as the first 1000 utterances, and ended at 29 months.). POINT in the early part of this stage appears with invariant handshape (thus, possessive POINTS without the adult possessive B hand). Horizontal-sweep pluralization is also absent at this point, plurals being indicated with a separate MUCH/MANY sign and/or by repeated points. Both these forms are present in the adult language as productive pluralizations for nouns, and are also used for plural nouns in the child language. This would suggest that the child has extracted the reduplicative plural from the noun system and attached it to POINT. The sweep plural begins to emerge near the end of Stage 1, as does the possessive handshape.

When the child first becomes aware of number as a dimension in POINT, he or she adds that dimension to the paradigm and tentatively fills the cells from the abstract noun paradigm, producing the word-specific paradigm shown in Table 3.

		number	
		sg.	pl.
	1	POINT towards self	? POINT towards self repeatedly ?
Person	2	POINT towards addressee	? POINT towards addressee repeatedly ?
	3	POINT towards other person/object	? POINT towards other person/ object repeatedly?

Table 3. Two-dimension paradigm for POINT.

Under Pinker's model, the new plural forms are preemptable; when the child observes the sweep plural, he will replace the reduplicative one with the observed, and non-preemptable, form. In actual practice it is necessary to require a certain strength of input before making a permanent replacement. This must be considered in the acquisition of any language, to avoid irrevocable insertion of parental slips of the tongue into the paradigm. It is particularly important in this instance, because reduplication of pronominals will occur in the adult language as described earlier. When both forms have been observed, they cannot share the cell (violation of the Unique Entry Principle). Paradigm splitting is required; the sweep plural forms, once acquired, replace the reduplicative plurals and the latter must be reanalyzed (as compound NPs under my analysis). A dimension for number is added

to the abstract pronoun paradigm. The possessive pronouns begin to emerge at the end of this stage, and the correct incorporation of number supports the existence of the corrected abstract paradigm.

The possessive (B hand, an open palm handshape, using the same TAB and SIG as POINT pronominals) presents some problems. It displays a correct word-specific paradigm, but alternates with the POINT pronominals for some time, with the (presumably unmarked) POINTs used with possessive intent). This would appear to be another violation of the UEP, if we consider both POINT and the possessive to have the feature (possessive). The most reasonable explanation would be that the child has at this time two separate systems for encoding possessor-possessed relationships: the N-N possessor-possessed syntax and the possessive inflection. This is somewhat awkward, since the explanation only pushes the problem to a different area. It seems that acquisition of possessive inflection causes problems with the expression of possession, and it takes some time for the system to be reanalyzed.

3.2 Inflected 2- and 3- place predicates

Both directional and nondirectional verbs are first acquired as fixed units in the citation form and marked for subject/object/goal relationships by the use of overt nominals. The child begins to exhibit directionality in verbs with the use of POINT pronominals. The earliest directional verbs preserve the S-V, V-O, or S-V-O word ordering, which is redundant. ASL shows some assimilation of sign to following sign, particularly in verbs (e.g. in adult usage, the sequence for 'I give you a book' would be I-GIVE-YOU BOOK; in actual practice the sign for 'book' would begin while the towards-goal movement of the verb is still in effect). This may be a further aid to early acquisition of verb inflection, since assimilation to object/goal POINT would produce movement towards object/goal. It should, however, be noted that pronouns used redundantly with directional verbs (which Hoffmeister observed some time after the mastery of inflection) do not assimilate to any form which could be considered verb inflection (otherwise they would not have been observed), and that this later usage appears identical in terms of how far the pronoun is assimilated to the verb. I model the acquisition of verbal paradigms by assuming sensitivity to the features person and number, and to subject/object or subject/goal relationships. The child would presumably note person and number features for subject and object of a directional verb such as SEE and hypothesize the features SUBJ's person and OBJ(GOAL)'s person. From the feature equations of these forms a word specific paradigm could be generated, and the

abstract paradigms extracted as shown in Table 4.

SUBJ's person :

1	SIG away from self
2	SIG away from addressee
3	SIG away from 3rd person (other)

OBJ's person:

1	SIG towards self
2	SIG towards addressee
3	SIG towards 3rd person (other)

Table 4. Abstract Paradigm for 2-place predicates.

This functions as one paradigm with SUBJ's person and OBJ's person as dimensions; I have shown each dimension separately only for considerations of readability. The word specific paradigm is omitted for the same reason.

Number may be treated in a similar fashion, although it may be generalized a little later than person as it is more often omitted from the input for chereamic reasons. Number should appear first in a few lexical entries, until enough data is present to form a sufficantly complete word specific paradigm. However, there is enough data to permit fairly rapid acquisition from a few examples and a generalization. The child's analysis of plural = repeat sign, still present during the acquisition of person, is a better motivation for the early lack of number inflection. The child does have access to evidence for number marking in the input, but may not recognize it as such. The child does use the reduplicative plural with directional verbs, indicating that the feature number is salient to these verbs in the child's grammar, but replacement of the plural paradigm has not yet occurred. Consistent use of the sweep plural in verbal inflections appears about the same time as the use of sweep plural in pronominals.

Verbs such as CHOOSE, exhibiting action away from object towards subject are obviously not consistent with the paradigms given. Any attempt to update the abstract paradigm from these data will result in a violation of the Unique Entry Principle which can not be reconciled by manipulating the paradigm. These verbs would then be treated as a separate class, arbitrarily labeled Class II,

with its own abstract paradigm, shown in Table 5.

SUBJ's person:

1	SIG towards self
2	SIG towards addressee
3	SIG towards 3rd person (other)

OBJ's person :

1	SIG away from self
2	SIG away from addressee
3	SIG away from 3rd person (other)

Table 5. Abstract Paradigm for Class II 2-place predicates.

Verbs would be classified on the basis of observed forms, assuming a knowledge of subject-object relationships available to the child. The child can also classify verbs on the basis of their citation forms, if known. The citation form is used when citing the word, as opposed to using it (e.g. the signed sentence "ASL learners tend to sign 'blind' when they mean to sign 'see'."). The process would be:

Does citation form's sig move away from signer?

yes: add CLASS II to the lexical entry
mark class feature with ?

no: add CLASS I to the lexical entry
mark class feature with ?

This process reflects classification of verbs as directional (Class I or II) without requiring that the verb be directional in the adult language, hence the preemptability marking. Overgeneralization of verb inflection (i.e., treating nondirectional verbs as directional) is observed in the acquisition data. I have not seen evidence of the details of this overgeneralization, but it is described as regular within the context of the inflectional system (Fischer 1973). Accurate acquisition of the directional verb paradigms requires paradigm splitting; since overgeneralization is a symptom of paradigm formation, I would predict overgeneralization of both paradigms. The reasonably consistent classification of true directionals argues for class assignment procedures at this time.

The 3-place predicates follow much the same pattern, with the indirect object goal behaving as a Class I object dimension (see Table 6), next page.

Subject's person:

1	SIG away from self
2	SIG away from addressee
3	SIG away from 3rd person (other)

Indirect Object (GOAL) 's person:

1	SIG towards self
2	SIG towards addressee
3	SIG towards 3rd person (other)

Table 6. Abstract Paradigm for 3-place predicates.

The motivation for treating the Indirect Object in the same manner as the Object is not entirely clear to me. I suspect that this has to do with these arguments' shared role as goal of action, information to which the child presumably has access.

The ASL classifiers -- used to classify the object of a 3-place predicate and to establish reference points -- comprise a complicated system. Their acquisition parallels that of oral language classifiers, in that the system is acquired late, with many early errors and omissions. Many of these early errors involve 'wrong' handshapes that are not at all similar to the correct classifier handshape -- Kantor (1977) reports a child using the 'g-hand' classifier for the sun, which would properly be one of the closed hand classifiers. Difficulty with the system cannot be explained in terms of articulation difficulty, as there is no correlation between mastery of a classifier handshape as DEZ of a sign and as a classifier. Classifiable predicates (including the 3-place predicates under discussion) appear without classifiers at the time that inflection for person and number takes place and for some time thereafter (Kantor 1977).

4. CONCLUSIONS

ASL has a regular and productive system of verbal inflection, which is learnable through Pinker's model of paradigm acquisition. Children acquiring ASL as a first language produce the same pattern of initial word specific inflection and later overgeneralization as the system becomes productive. The generalization of pronominals to abstract reference follows the same pattern, save that the child must recognize and respect class distinctions in the verb which are not pertinent to the pronominal. Establishing points of reference

(one function of POINT), directionality of verbs, and a handshape classifier system are, in my view, the main requirements for mimesign. This system of moving classifiers about the signing area is not discussed in detail in this paper, but it is one of the adult features of ASL that appears to be the province of the second generation native speaker; it is seldom truly mastered by the adult learner (Newport 1980). This acquisition model explains the acquisition of two main prerequisites (reference and directional inflection) in terms compatible with the acquisition of an oral language. This model supports Newport's claim that manual/visual language processing is not fundamentally different from oral language processing at the level of morphological/syntactic processing.

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