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**MORPHOLOGICAL INFLECTIONS AND SYNTACTIC
REPRESENTATIONS OF PERSON AND NUMBER IN ASL**

ABSTRACT

This article examines the expression of number features in relation to (but as distinct from) person features in ASL. We consider parallelisms in the spatial instantiation of agreement features in the nominal and verbal domains, which may be seen as natural consequences of the existence, in both domains, of functional projections of person, number, and aspect.

KEYWORDS

Sign language, ASL, syntax, non-manual markings, agreement, number, person, plural, functional projections, aspect.

1. Introduction

In previous work conducted within the context of the American Sign Language Linguistic Research Project (ASLLRP)¹, we have argued that syntactic features are often realized by non-manual expressions (movements on the face and upper body, such as raised or lowered eyebrows, head shakes, tilts, or nods, and so on) that spread over precise syntactic domains. We have paid particular attention to features associated with negation (+neg) and questions (+wh), and we have demonstrated that person agreement features also have non-manual correlates that are governed by the same distributional principles as other syntactic features. Moreover, our examination of the distribution of non-manual expressions of person agreement within the clause and the noun phrase has revealed interesting parallels.

In this article we extend our examination of agreement to number. We describe the use of space to represent information about number and the ways in which locations in space are accessed through agreement morphology. We discuss several parallels between the nominal and verbal domains, not only with respect to number agreement, but also with respect to the expression of certain types of aspectual information. We begin by presenting, in section 2, a brief introduction to the basic syntactic organization of ASL. We then present a summary of our prior findings with respect to person agreement in section 3². Finally, in section 4, we examine the expression of number.

In this article, ASL example sentences are presented by use of conventional glosses (English near-equivalents, written in capital letters)³. However, since there is no one-to-one correspondence between English words and ASL signs, often this representation does not allow a reader to reconstruct the original signed utterance. Moreover, the glosses do not reflect in any detail the phonological and morphological characteristics of the signs themselves, nor can they fully convey the non-manual components that have essential linguistic functions, not all of which are even fully understood yet. For these reasons, we have made available from our Web site (see note 1) digitized video corresponding to the constructions discussed here⁴.

2. Basic syntactic organization of ASL

We have argued elsewhere that ASL exhibits the same kind of hierarchical organization that is found in spoken languages. The basic

word order of ASL is SVO. Deviations from this word order may result from standard syntactic movement processes and from the use of topics, tags, right dislocations, null arguments, etc. We have argued that the ASL clause contains projections for tense, aspect, and subject and object agreement. Thus, the basic syntactic organization of ASL is comparable to that of spoken languages.

However, there are two characteristics of languages in the visual modality that are particularly relevant to this paper. In section 2.1, we discuss linguistic uses of movements of the face and upper body; section 2.2 describes ways in which the 3-dimensional signing space may be used for referential purposes.

2.1. Non-manual marking

Concurrently with manual signing, important information is conveyed non-manually through movements of the head and upper body. These markings are often associated with abstract syntactic features ⁵, such as +neg or +wh, which are housed in the heads of functional projections ⁶. The distribution of non-manual syntactic markings may be captured by the following generalizations :

- A non-manual marking may optionally spread over its c-command domain ⁷ if manual material is available locally. Otherwise, the spread is obligatory, so that the marking may be coarticulated with manual material.
- The intensity of the marking is greatest at the node of origin and decreases as distance from the source increases.

These generalizations may be illustrated with respect to the following examples of ASL negative sentences, which contain a characteristic marking consisting most notably of a side-to-side head shake, as well as furrowed brows and squinted eyes ⁸. The line labeled ‘neg’ indicates the domain over which the non-manual marking occurs (*i.e.*, the manual signs with which it is coarticulated).

- neg
- (1) JOHN [NOT]_{Neg} BUY HOUSE
 ‘John is *not* buying a house.’

- (2) $\text{JOHN [[NOT]}_{\text{Neg}} [\text{BUY HOUSE}]_{\text{VP}}]_{\text{NegP}}$
 ‘John is not buying a house.’
- (3) $\text{JOHN [+neg]}_{\text{Neg}} \text{BUY HOUSE}$
 ‘John is not buying a house.’
- (4) *JOHN NOT BUY HOUSE
- (5) *JOHN [+neg]_{Neg} BUY HOUSE

In these examples, the non-manual marking of negation is obligatorily associated with the +neg feature in the Neg node. If a lexical sign of negation, such as NOT, is present, it also occupies this position. In (1), the non-manual marking co-occurs solely with the manual sign NOT in Neg, while in (2), the non-manual marking has spread over the c-command domain of Neg and is articulated throughout the signing of the verb phrase. In the absence of a lexical sign of negation, the non-manual marking *must* spread over the VP (compare (3) with (5)).⁹ Furthermore, in sentences like (2) and (3), the angle of head turn and the furrowing of the eye brows are greatest at the position associated with the negative feature (the Neg node) and gradually decrease as the rest of the VP is signed.

Careful study of the distribution and intensity of non-manual syntactic markings provides evidence about phrasal boundaries, as well as the syntactic position of the features with which the markings are associated. We have employed such evidence in support of our analyses of particular ASL constructions, such as affirmative and negative sentences and yes-no, wh, and rhetorical questions. As will be discussed later, agreement features may also be expressed non-manually through head tilt and eye gaze.

2.2. Use of space for reference

One interesting way in which ASL differs from spoken languages is in its use of locations in the 3-dimensional signing space for refe-

rential (and other) purposes. Some signs are articulated on the body. Others are necessarily articulated in a location off the body; such locations may or may not carry referential information. When a sign is produced in 'neutral space' (the space close to and in front of the signer's body), the location in which it is produced does not carry referential information. When signs are articulated in a non-neutral location, that location does have referential significance.

For example, a signer who wants to talk about John will establish a location in space associated with John, and can point back to that location in a number of ways for subsequent reference to that person. The addressee may also access this same location in space to reference John (see Figure 1). In fact, any number of referents may be assigned to distinct locations in space, although only a few locations are generally used at any one time.

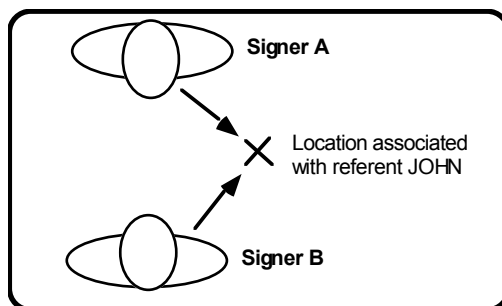


Figure 1. Sharing of referents in space

Our work has revealed an important difference in the way that space is used for definite and indefinite referents¹⁰. Whereas definite referents are associated with points in space, indefinite referents are associated with areas, where the size of the area may vary in relation to the (un)identifiability of the referent (MacLaughlin, 1997)¹¹. As we will see, certain markings of agreement are sensitive to this distinction.

Because locations in space systematically participate in the same linguistic phenomena that involve person agreement features cross-linguistically, we have interpreted such locations in space as constituting manifestations of grammatical person features. ASL distinguishes grammatically between first and non-first person: first person is asso-

ciated with the signer's body, while non-first person referents may be associated with distinct locations in the signing space¹². The next section describes in more detail how locations in space that are used referentially may be accessed both manually and non-manually in order to express person agreement.

3. Person agreement

We first describe the manual and non-manual expressions of person agreement in the clause. Then, in section 3.2, we discuss striking parallelisms in the expression of person agreement within DP.

3.1. Manual and non-manual expressions within the clause

In ASL, so-called 'agreeing' verbs (Padden, 1983, 1988) may express agreement manually by referencing the location in space associated with the relevant argument (while other verbs, referred to as 'plain,' do not display manual agreement). For example, an agreeing verb like BLAME involves movement from the location associated with the subject to the location associated with the object. Thus, subject agreement and object agreement are expressed by a prefix and a suffix. An intransitive verb expresses manual agreement by being signed in or oriented toward the location in space associated with the single argument.

Object agreement may actually take one of two forms, depending on the definiteness of the object argument¹³. With definite objects, the articulation of the object agreement suffix is such that the verb moves to the precise point in space associated with the object. In contrast, indefinite referents are associated not with a point in space, but with an area. For some verbs, this may be reflected in the articulation of the object agreement marking. For example, in the articulation of the verb GIVE, the fingers and thumb, which are usually closed throughout the articulation, may spread as the verb approaches the location associated with an indefinite object. This spreading reflects agreement with an area in space. The illustrations in Figures 2 and 3 show manual agreement marking with GIVE, differing in the handshape of the end position of the sign, depending on whether or not the object is definite¹⁴.



Figure 2. Start and end positions of GIVE with a definite object
(© Bahan, from Bahan 1996.)



Figure 3. End position of GIVE with an indefinite object
(© Bahan, from NBMLK 1998.)

In addition to receiving manual expression, agreement features may also be expressed non-manually via head tilt and eye gaze. These non-manual agreement markings are essentially optional, although they occur quite frequently. In transitive clauses, head tilt marks subject agreement whereas eye gaze expresses agreement with the object. In intransitive clauses, head tilt and/or eye gaze may mark agreement with the sole argument. We have argued that these non-manual agreement markings — which ‘point’ to the same spatial locations that are used for manual subject and object agreement inflection — are expressions of abstract agreement features located in the heads of functional agreement projections. The examples that follow illustrate non-manual markings of agreement in transitive clauses (with both agreeing and plain verbs) and intransitive clauses ¹⁵.

- head tilt_i
eye gaze_j
- (6) ANN_i [+agr_i]Agr_S [+agr_j]Agr_O iBLAME_j MARY_j
 ‘Ann blames Mary.’

- (7) JOHN_i [$+\text{agr}_i$] Agr_S [$+\text{agr}_j$] Agr_O LOVE MARY_j
‘John loves Mary.’
- (8) a. JOHN_i [$+\text{agr}_i$] Agr ARRIVE
b. JOHN_i [$+\text{agr}_i$] Agr ARRIVE
c. JOHN_i [$+\text{agr}_i$] Agr ARRIVE
‘John is arriving.’

Note that in (6)-(8), spread of the non-manual agreement markings is obligatory. This follows from the generalizations about the distribution of non-manual syntactic markings presented earlier, given the lack of manual material in the Agr heads ¹⁶.

Space does not permit a full discussion of these non-manual agreement markings (see Bahan, 1996 and NKMBL, 2000 for further details). However, there are several important results :

- Non-manual agreement markings are found with both plain and agreeing verbs, providing evidence against a proposal by Lillo-Martin (1986, 1991) that syntactic agreement is necessarily lacking in clauses that contain non-agreeing verbs.
- Non-manual agreement markings may license null arguments (see BKLMN, 2000). Recognition of this fact provides evidence for a uniform licensing mechanism for null arguments [*contra* Lillo-Martin (1986, e.g.)].
- These non-manual markings exhibit the same distributional characteristics as other non-manual markings, providing evidence that agreement features are on a par with other syntactic features (*contra* recent proposals in Chomsky, 1995).
- The distribution of these non-manual markings provides evidence against recent proposals that there are no agreement projections (Baker, 1996; Chomsky, 1995).

3.2. Parallelisms between the noun phrase and the clause

There are interesting parallels in the manifestation of agreement marking within the clause and the noun phrase. In the recent syntactic literature, noun phrases have been analyzed as being similar in structure to verb phrases (e.g., Abney, 1987) : both NP and VP are contained in extended projections involving functional categories, including agreement. Similar manual and non-manual expressions of agreement are found in both domains (see MacLaughlin, 1997; NBMLK, 1998; NKMBL, 2000). Possessive DPs pattern with transitive clauses, while non-possessive DPs pattern with intransitive clauses.

Lexical signs that function as determiners (the definite determiner, the indefinite determiner, and the possessive marker) and pronominals (many of which are identical in form with determiners) may express agreement manually by pointing to or orienting toward a location in space. Similarly, certain 'agreeing' nouns and adjectives express agreement manually by being signed at or oriented toward this same location in space associated with the referent. This is also the same location that would be accessed by an agreeing verb to express agreement with the DP.

The distribution of non-manual expressions of agreement within DP is summarized as follows :

- In non-possessive DPs, head tilt and/or eye gaze may be associated with D, spreading optionally over its c-command domain when manual material is present in D (with the spread being obligatory otherwise).
- In possessive DPs, head tilt may be associated with the possessive marker that occurs in D (head tilt spreads optionally over the c-command domain of D), while eye gaze may be associated with the agreement features of the possessee (eye gaze spreads obligatorily over the NP within DP).

Thus, as in the clause, head tilt and eye gaze optionally express agreement non-manually, again by pointing to the relevant locations in space. The major difference is that within the clause, there is never manual material in the Agr heads, and thus spread of non-manual agreement markings is always obligatory, while within DP, the higher Agr head may contain manual material (a determiner or possessive sign), in which case spread of the associated non-manual marking is optional.

There is another similarity in the expression of agreement features in the clause and in DP. This concerns the distinction seen earlier in the manifestation of verbal inflection (manual agreement marking) depending on the definiteness of the object. The manual forms of the definite and indefinite determiners display a comparable distinction: they reference a point and an area, respectively. The definite determiner, IX_i, involves the index finger pointing to a particular location. In contrast, the indefinite determiner, glossed SOMETHING/ONE (because it can be translated by the English 'something' or 'someone' when used pronominally), involves the same handshape as is used for the definite determiner, but the palm is oriented inward, with the finger pointing upward, and there is a slight tremoring motion in the upper forearm, allowing the index finger to move through a region of space (the size of this space may vary inversely with the 'identifiability' of the referent).

The expression of eye gaze, in both the clause and DP, is sensitive to the definiteness of the argument with which it is marking agreement. There is a distinction between a definite form of eye gaze (to a single point) and an indefinite form of eye gaze, which involves the eyes directed at an area of space (they may wander slightly within the area, which may be facilitated by a slight head shake, or they may take on an unfocused stare). As shown in Bahan (1996), MacLaughlin (1997), and NKMLB (2000), the distinction in the form of eye gaze used with definite and indefinite referents is systematic and occurs both in the clause and in DP.

In summary, the realization of manual and non-manual agreement marking is essentially the same in the clause and in DP. Non-possessive DPs pattern with intransitive clauses, while possessive DPs pattern with transitive clauses. Such parallels between transitive clauses and possessive determiner phrases, on the one hand, and intransitive clauses and possessorless DPs, on the other, have been found in many languages, with respect to both case and agreement morphology¹⁷. The one apparent difference between the expression of agreement markings in the clause and in DP — the optionality of spread of non-manual agreement markings associated with D in DP (if it is filled with manual material) — follows from independent generalizations about the conditions under which spread of non-manual syntactic markings is or is not obligatory.

4. Number

Thus far we have restricted our attention to singular referents, in order to identify the role of person agreement as distinct from number agreement. This section presents an overview of the spatial representation of number agreement features and their interaction with aspect and person agreement features, based on both prior literature and our own preliminary results. As with person agreement, we find interesting parallels in the instantiations of number features within the clausal and nominal domains.

4.1. Spatial representation of number

ASL distinguishes grammatically among singular, dual, and plural, although, as pointed out by Padden (1990), dual is essentially a subcase of plural¹⁸. For purposes of this article, we focus on the fundamental singular vs plural distinction.

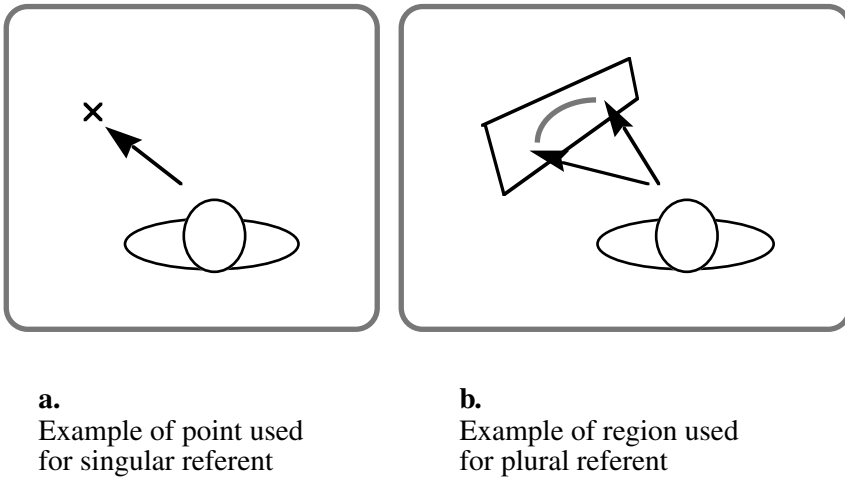


Figure 4. Schematic illustration of use of space for singular and plural referents

As with person agreement features, number features are also instantiated spatially. When agreement is expressed either with a singular entity or with a set of entities viewed as a singular collective (what Padden, 1983 : 18 refers to as a 'collective plural'), the agreement features are identified with a single location in space. In contrast, plural marking makes reference to a region in space that normally stretches linearly along the horizontal plane (see Figure 4). This area may be accessed in several ways, generally involving a sweeping motion along an arc through the region. With both singular and plural referents, the specific locations that are used may have referential significance, or these may be in neutral space.

4.2. Subject and object number agreement within the clause

We now consider number agreement inflection as it is manifested overtly on verbs and adjectives. As already mentioned, only some classes of verbs and adjectives overtly display agreement. The discussion that follows pertains specifically to such 'agreeing' verbs and adjectives, and even for those, we present only the basic generalizations. For more detailed description of articulatory properties and morphological subclasses of verbs, see, e.g., Padden (1983, 1988), Brentari (1998).

Those transitive verbs that display number agreement with the subject or object do so by modification of their start or end point to reference the spatial location associated with the argument with which agreement is being expressed. Some intransitive verbs and adjectives may also display number agreement by being articulated in or oriented toward an appropriate spatial location (either a point, for singular reference, or an area, for plural reference).

The expression of plural agreement interacts with the aspectual properties of the clause. Many aspectual distinctions that involve various types of iterativity are expressed by verb forms that involve reduplication.¹⁹ See Klima and Bellugi (1979) for details of some of the semantic and articulatory distinctions. We focus here on one particular type of aspect marking that interacts significantly with expression of number : an aspect that has been called 'distributive'²⁰. This conveys the information that the action was performed with respect to each member of the set of entities constituting the subject or object argument.

A verb marked with distributive aspect necessarily involves a plural argument, and thus includes a sweeping motion in its articulation,

marking plural agreement with the relevant argument. The distributive inflection takes the form of reduplication of the verb stem (normally two reduplications). The net effect of reduplication combined with the sweep that marks plurality ²¹ is that each repetition of the verb has a start point or end point (for subject or object agreement) that is progressively further along the arc of the sweep [see Figure 4 (b) ²²].

Thus, the verb stem is normally articulated a total of three times. This is the unmarked case for plural, regardless of the number of elements in the set (although more than three iterations of the verb may occur), as long as the set consists of three or more members. For sets of two, however, the total number of iterations used to express distributive aspect would be limited to two. This is true systematically for the discussion that follows concerning plural marking on predicates; we describe the marking used for three or more entities, with the number of iterations being limited to two in the case of the dual.

Distributive inflection can occur with either plural subject or plural object agreement ²³, as illustrated by (9) and (10), respectively ²⁴.

- (9) ALL BOY_{pl_i} iplGIVE[dist]_{sg_j} TEACHER_j APPLE
 ‘All the boys each give the teacher an apple.’

- (10) TEACHER_i ;sgGIVE[dist]_{pl_j} BOY_{pl_j} BOOK
 ‘The teacher gives the boys each a book.’

In both sentences, there is reduplication of the verb stem, and spatial agreement with both subject and object. That is, each successive articulation of the reduplicated verb occurs with a singular start point [in (9)] or end point [in (10)] and an arc-like movement affecting the end points [in (9)] or start points [in (10)] occurring within the region associated with the plural argument. Note that in both cases, the implication is that multiple acts of giving are involved.

In contrast, if a sentence like (10) had a singular object (e.g., BOY), the reduplication on the verb would still indicate multiple acts of giving, but in this case, each iteration would have the same end point, namely that point in space associated with the singular referent, as illustrated in (11). Such inflection marks a different type of aspect, which might be labeled ‘iterative.’

- (11) TEACHER_i ;sg GIVE[iterative]_{sgj} BOY_{sgj} BOOK
 'The teacher gives the boy a book repeatedly
 (over and over again).'

In the absence of aspectual marking indicating multiple occurrences of the action, the distinction between singular and plural is overtly marked on verbs only for object agreement, not for subject agreement. In examples (12) and (13), there is no distinction in the articulation of the verb. However, in (14) and (15), the articulation is significantly different. While the verb's articulation ends at a single point for (14), in (15), the end of the verb's articulation involves a sweeping motion through the region associated with the plural object ²⁵.

- (12) IX_{sgj} GIRL_{sgj} ;i GIVE_{sgj} JOHN_j BOX_{pl}
 'The girl is giving John boxes.'

- (13) IX_{plj} GIRL_{plj} ;i GIVE_{sgj} JOHN_j BOX_{pl}
 'The girls are giving John boxes.'

- (14) JOHN_i ;i GIVE_{sgj} GIRL_{sgj} BOX_{pl}
 'John is giving the girl boxes.'

- (15) JOHN_i ;i GIVE_{plj} GIRL_{plj} BOX_{pl}
 'John is giving the girls boxes.'

Subject agreement with adjectives patterns with object agreement for transitive verbs. Thus, for example, to express the idea that 'they are blue,' the adjective may be articulated in a sweeping manner through the region in space associated with the plural entity that is being modified. Alternatively, to convey the idea that 'they are each blue,' an adjective may be reduplicated (analogous to a verb) such that each successive iteration occurs progressively displaced along an arc.

In sum, the specific instantiation of morphological marking for number agreement, although there is some interdependency with aspect marking, generally accesses the kinds of locations in space illustrated in Figure 4 to express distinctions in number ²⁶.

4.3. Number agreement within DP

Various elements within DP access the same basic spatial domains discussed in section 4.1 to express distinctions between singular and plural. Here we consider how such distinctions are expressed for determiners and nouns.

In previous work, we have identified several classes of signs that function as determiners or pronouns ²⁷. These signs are all expressed by pointing (in slightly different ways) to the location in space associated with the referent :

- The definite determiner and pronoun (IX) normally point with the index finger.
- The possessive marker (POSS) points with an open palm.
- The reflexive/emphatic marker (SELF) points with a closed fist, thumb extended upward.

In all these cases, the singular form involves a single point in space, while the plural form involves an articulation that sweeps through the region of space associated with the plural referent. There is also an alternative instantiation of plural marking when a distributional reading is intended, involving a reduplicated pointing gesture (analogous to the reduplication previously described for verbs) along a sweeping arc. We return to consider the significance of this finding in section 4.4.2.

As previously mentioned, only some nouns may express person agreement overtly. Plurality on nouns also may or may not be expressible morphologically. When plurality is marked overtly, this marking normally takes the form of reduplication. This occurs with some nouns that do not (spatially) express person agreement (e.g., BROTHER), as well as with some nouns that do (e.g., BOX). Note, however, that plural marking on nouns differs from plural marking on adjectives and verbs, in that nouns generally involve a single reduplicated portion (see, e.g., Baker and Cokely, 1980 : 377), while plural adjectives and verbs in the distributive aspect normally involve (at least) two reduplications.

A noun with reduplicative plural marking may not always surface in this form. In ASL, there are certain contexts in which signs whose underlying form involves one syllable ²⁸ followed by a reduplication of that syllable (including singular nouns like GIRL_{sg} or plural nouns like BROTHER_{pl}) may be reduced to a single articulation. Various factors

affect the realization of such forms²⁹. Important areas for future research include investigation of the syntactic and morphological conditions that determine exactly when a plural reduplicated form actually surfaces as such.

4.4. Parallels between the nominal and verbal domains

We next consider parallels in DP and in the clause related to the expression of number distinctions and aspect.

4.4.1. Use of space for number distinctions

As should now be apparent, essentially the same types of spatial locations are employed to distinguish singular and plural entities (where such distinctions are overt). This is manifested in the spatial realization of manual number agreement morphology found in DP and in the clause.

When these locations are situated on the body or in neutral space, they convey information about number without any further person information. However, in non-neutral space, the locations employed convey simultaneously information about number and person. This is consistent with a hierarchical representation in which number features are lower in the tree than person features.

The non-manual correlates of number agreement (in combination with person agreement, in some cases) remain to be investigated fully. However, preliminary research suggests that non-manual expressions may point to the location in space associated with the referent's person and number features. For example, in the case of a sweeping manual articulation instantiating non-first person features plus plurality, the eyes may also sweep across the same area; likewise, the distributive manual agreement inflection may be accompanied by eye gaze to the points accessed manually.

4.4.2. Aspect projections

Thus far, our work on functional categories in extended verbal and nominal projections has focused primarily on agreement. We now consider parallels in these two domains that are associated with information that is aspectual in nature. Crosslinguistically, various parallels

have been noted with respect to quantification over nominal entities and over events.

First, much recent work (e.g., Brinton, 1991; Frawley, 1992; Jackendoff, 1991; see also Lasersohn, 1990, 1995) has suggested a parallelism between iterative events and plurality of countable entities. For example, Frawley (1992 : 310) describes iterative aspect, involving multiple 'subevents,' as 'plural.' This kind of parallelism is, in fact, morphologically visible in ASL, in that both types of 'plurality' are expressed through reduplicative morphology ³⁰.

Second, there is a close relationship between distributional aspect of events and 'each'-like quantification within nominal projections. For example, Sánchez (1996) has proposed that there is an aspect projection within the extended nominal projection (above DP), like the aspect projection within the clause, and that interaction between the two aspectual domains is responsible for distributive interpretation of events. In fact, there are languages (e.g., Nunggubuyu (see Heath, 1981)) where overt aspectual morphology occurs both on nouns and verbs ³¹.

We have argued elsewhere (ABKN, 1995 and NKMBL, 2000) that ASL does have aspect projections, at least for perfect aspect (which may be lexically instantiated by the sign FINISH). Following Cinque (1999), we postulate multiple aspect projections associated with different aspectual categories. Thus, in addition to the perfect aspect phrase, we posit additional functional heads containing aspectual features, many of which are realized by some type of reduplicative inflection in ASL. We have yet to investigate the possible interactions among aspectual features that are realized through morphological inflection and those that are expressed by lexical items such as FINISH.

Interesting evidence for the approach taken by Sánchez, involving postulation of aspect projections in both DP and the clause, comes from the occurrence of the same type of aspectual morphology within the extended nominal and verbal projections in ASL ³². Although our investigation of the representation of number and distributivity in ASL is still in a preliminary stage, it is highly suggestive that the distributive aspectual morphology characteristic of verbs is also found with determiners and pronominals. This could very well be a natural consequence of the existence of aspect projections in both the nominal and clausal domains.

5. Conclusions

Building on our previous analysis of person agreement in ASL, we have, in this article, examined the syntactic and morphological realizations of number. The evidence to date suggests the following conclusions for ASL :

- Person and number agreement features are contained in distinct projections, with number being lower in the tree than person.
- Both person and number features are instantiated spatially. Definite singular referents are associated with a point in space, while plural referents are associated with a region in space that normally extends along a horizontal arc. These locations may be accessed through both morphological inflections and non-manual markings.
- There is parallel expression in the clausal and nominal domains of agreement features generally (both person and number features).
- Information about iterative events and plurality of countable entities may be expressed through reduplicative morphology, which combines in predictable ways with spatial agreement morphology. Specifically, distributive (aspectual) inflection is manifested both within the clause (on verbs) and within DP (on determiners and pronominals), suggesting the existence of aspect projections in both domains.

NOTES

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1. Abstracts of our prior publications are available at <http://www.bu.edu/asllrp>. Some of these publications are also accessible in electronic format from that site, as is digitized video corresponding to many of the example sentences we discuss, signed by native signers. The major findings of our prior work are summarized in Neidle, Kegl, MacLaughlin, Bahan, and Lee [NKMBL] (2000). Work done in the context of the ASLLRP will be identified by the authors' initials.

2. Because of space limitations, this article includes a very limited discussion of these issues. For further detail, see NKMBL (2000) and references contained therein.

3. For discussion of some of the methodological complexities involved in signed language data collection, transcription, and analysis, see NKMBL (2000 : chapter 2).

4. To overcome some of the obstacles just mentioned, we have been developing SignStream™, a computational tool designed to facilitate the transcription, retrieval, and analysis of data from a visual language in which many linguistically significant events are occurring in parallel over differing domains.

This program is being distributed on a non-profit basis. Further information is available at <http://www.bu.edu/asllrp/SignStream> and in NM (1998) and MNG (1999).

5. See NKMBL (2000) for discussion of other types of non-manual markings and their uses in ASL.

6. Within current generative frameworks, a distinction is made between 'lexical projections' such as NP and VP, headed by lexical elements such as nouns and verbs, and 'functional projections,' headed by such grammatical categories as Tense, Agreement, or Negation, which contain abstract syntactic features. Both types of categories project phrases that conform to the standard phrase structure rules of X'-theory.

7. Several slightly different definitions of c-command (or m-command) have been proposed. Here we adopt the simple definition of c-command that α c-commands β iff every node that dominates α also dominates β and α does not dominate β (as formulated in Chomsky, 1986); thus the head X of an XP c-commands its complement.

8. See, e.g., Baker and Padden, 1978; Baker-Shenk, 1983; Liddell, 1980; Veinberg and Wilbur, 1990.

9. See NKMLB, 2000 : 169-170, note 40 for discussion of claims by Petronio (1993) and Petronio and Lillo-Martin (1995, 1997) that these sentences are not grammatical, and that negation must occur over the entire clause. It is interesting to note that sentences equivalent to those claimed by Petronio and Lillo-Martin to be ungrammatical are reported as grammatical by Crain and Lillo-Martin (1999 : 282, examples (3) a and b), who use this construction to illustrate the properties of non-manual grammatical markers in ASL.

10. For the moment, we restrict discussion to singular referents. In section 4, we discuss how space is used to represent plural referents.

11. See Lambrecht (1994) for discussion of the notion of identifiability. A referent may be more or less identifiable, as the speaker may possess more or less knowledge about the referent.

12. Various claims have been made about grammatical person distinctions in ASL. Friedman (1975) suggested that there are grammatical distinctions among first, second, and third person reference. Lillo-Martin and Klima

(1990) (who examine only singular pronoun forms) claim (p. 198) : 'There are no contrasts for person in ASL.' Meier (1990) (who examines the full system, including plural and possessive forms) makes a strong case for a grammatical distinction between first person and non-first person. (Lillo-Martin, 1995, rejects Lillo-Martin and Klima, 1990, in favor of Meier's view.) We have argued that there is a primary distinction between first and non-first persons (consistent with Meier), and that non-first person can be further subclassified into many distinct person values.

13. In distinguishing definite and indefinite forms of object agreement, ASL is like other languages that mark the information status of the object argument with regard to definiteness and specificity (see NKMBL, 2000 : 35).

14. Subject agreement may also take one of two forms, although the distinction is not based on definiteness. There is both a marked and unmarked form of person agreement, described in Bahan (1996), that is found both for manual and non-manual expressions of subject agreement. See also BKLMN (2000).

15. The labels 'ht_i' and 'eg_j' indicate head tilt and eye gaze toward locations 'i' and 'j'.

16. We have argued that the Verb does not raise overtly to the Agr heads in ASL (NKMBL, 2000).

17. Similar parallels have been noted with respect to agreement morphology in Yup'ik (Abney, 1987 : chapter 2) and Aleut (Bergsland and Dirks, 1981). Bittner and Hale (1996 : 60) also report that many languages that use ergative case do so for the subject of a transitive VP and for the possessor in a possessive NP.

18. For discussion of the dual, see Padden (1983, 1988, 1990), Klima and Bellugi (1979). There do exist some specific dual forms ; however, they have a restricted usage and will not be discussed here.

19. Reduplication of various kinds has been described by many ASL researchers (e.g., Baker and Cokely, 1980 ; Fischer, 1973 ; Anderson, 1982 ; Padden, 1983, 1988 ; Supalla and Newport, 1978 ; Wilbur, 1979).

20. More specifically, we are discussing what Klima and Bellugi and Padden term 'exhaustive' distributional aspect.

21. There are interesting phonological (reduction) effects that result from combining the sweep with reduplication, which we do not discuss here. For example, the overall amplitude of the signing may decrease progressively with the sweep.

22. This is essentially Padden's (1983) observation, recast slightly ; see also discussion in Klima and Bellugi (1979).

23. Brentari and Benedicto (in press) suggest that exhaustive distributive marking is not possible with subjects (unless they are derived from deep objects). Example (9) would seem to demonstrate that their generalization is

incorrect. However, there do seem to be some restrictions on the use of number agreement with subjects (even with aspectually inflected verbs) that require further investigation.

24. We use 'sg' and 'pl' as subscripts with nouns and adjectives in the glosses to indicate the intended reading of the noun or adjective in question. As will be discussed later, these distinctions are not always overtly marked morphologically. We use subscripted indices (e.g., 'i,' 'j') to mark agreement relations. This is not intended to imply that the noun coindexed with a verb is realized in a referentially significant spatial location. For example, in (9), BOY is articulated on the body and is identical in form for the singular and the plural.

25. In fact, the verb GIVE also allows for another way to express plural object agreement : by modification of the final handshape. Just as indefinite noun phrases may be associated with a region of space, rather than a point, the same is true for plural referents in general. In both of these cases, the same handshape modification for the verb GIVE may occur (as shown in Figure 3).

26. There are, for some verbs, other ways in which plural agreement may be expressed morphologically. We do not discuss those here, but see, for example, Fischer and Gough (1978 : 41).

27. The existence of determiners in ASL has been somewhat controversial. See MacLaughlin (1997) and NKMBL (2000) for discussion.

28. For discussion of syllable structure in ASL, see, e.g., Brentari (1993, 1998); Liddell and Johnson (1986); Perlmutter (1992).

29. Such reduplicated forms seem to be particularly prone to phonological reduction in the absence of stress and when this does not result in a loss of information--e.g., if some other overt marking of plurality is present. (For example, it has been observed, e.g., Baker and Cokely, 1980 : 377, that overt plural reduplicative inflection on nouns is less likely in the presence of a numeral. See also MacLaughlin, 1997, on the relation between phrase-final stress and the distribution of reduplicated and non-reduplicated forms.)

30. It is not uncommon crosslinguistically for languages to employ reduplicative morphology for plurality and/or distributivity of nouns and/or events. For example, Kwoi uses high vowel reduplication to express, among other things, distributive plural of nouns and iterative aspect of verbs (Gerhardt, 1988). As another example, Kiyomi (1995) describes a process of reduplication in Malayo-Polynesian languages that expresses plurality in nouns and repetition/continuation in verbs.

Rijkoff (1992), in his typological survey of the structure of noun phrases, lists the following languages as using reduplication to express plural number : Berbice, Dutch Creole, Cuna, Boumaa Fijian, Mangarayi, Monumbo, Nungubuyu, Pipil, Sumerian, and Tsou. He concludes (p. 127) :

It appears that reduplication is predominantly or perhaps even only a feature of nouns coded for set aspect, which in its turn would suggest that reduplication is perhaps not plural marking but collective aspect marking.

31. A different approach is taken by Schmitt (1996), who proposes an analysis in which there are no aspect projections in either domain. Schmitt argues instead that checking of aspectual kinds of information is done primarily within Agr_{OP}.

32. Further evidence for not conflating agreement and aspect in ASL comes from psycholinguistic research that suggests differential processing (specifically, strength of priming effects) of agreement and aspect morphology (Emmorey, 1991).

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RÉSUMÉ

Cet article examine dans la langue des signes américaine (ASL) l'expression des traits de nombre en relation avec les traits de personne (les deux étant néanmoins séparables). Dans les domaines nominal et verbal, nous considérons quelques parallélismes dans la manifestation spatiale des traits d'accord qui peuvent être conçus comme des conséquences naturelles de l'existence, dans les deux domaines, de projections fonctionnelles de personne, de nombre, et d'aspect.

MOTS-CLÉS

Langue des signes, syntaxe, comportements non manuels, accord, personne, nombre, pluriel, projections fonctionnelles, aspect.

