Person and Number Agreement in American Sign Language

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Abstract

American Sign Language (ASL) has a group of verbs showing agreement with the subject or/and object argument. There has not been analysis on especially number agreement. This paper analyzes person and number agreement within the HPSG framework. I discuss person and number hierarchy in ASL. The argument of agreement verbs can be omitted as in languages like Italian. The constraints on the type *agreement-verb* have the information on argument optionality.

1   Introduction[1]

During the past fifty years sign languages have been recognized as genuine languages with their own distinctive structure. Signed languages and spoken languages have many similarities, but also differ due to the different modalities: visual-gestural modality vs. auditory-vocal modality.

This paper examines a common natural language phenomenon, verb agreement in American Sign Language (ASL, hereafter) through the recordings of a native signer within the framework of Head-Driven Phrase Structure Grammar (HPSG).[2] Most analyses of signed languages have been based largely on transformational grammar. Cormier et al. (1999) discusses locus agreement in ASL, which is the first work in the HPSG framework. However, their work is limited to locus agreement with singular arguments.

This paper examines person and number verb agreement. One type of verb shows agreement with object or/and subject arguments. Main focus in this paper is to show what constraints agreement verbs have, to explain the subject/object-verb agreement. The arguments of agreement verbs can be omitted. I suggest that the inflectional morpheme on agreement verbs can be either agreement markers or incorporated pronoun arguments, depending on whether the subject/object arguments of verbs are expressed or not.

The other focuses are person and number hierarchy in ASL, which are essential to explain the agreement patterns. All languages can have different grammatical person or number systems. I consider whether ASL, in a visual-

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[1] The examples in this paper are what I gathered from a ASL native signer, unless I specify the source. Great thanks to Franky Ramont for help, who is a Deaf and also an ASL instructor in the Linguistics department, UT Austin.

[2] ASL is a natural language used by most deaf people in the United States and Canada. It is a topic oriented language much like Chinese and has a classifier system comparable to Navajo's. ASL typically exhibits SVO word order, but due to its agreement inflection, many other word orders are possible (Cormier et al. 1999).

gestural modality, has the same universal person hierarchy as in spoken languages in auditory-vocal modality. Person hierarchy says that the first person is ranked above other persons in person hierarchy (1>2>3) (Greenberg 1963, Corbett 2000, etc.). Observing verb agreement, I propose that ASL has the same hierarchy in that first person is more highly ranked than non-first person.

As for number hierarchy, ASL shows a different aspect from the common one in spoken languages. ASL shows plural vs. non-plural distinction and dual number is grouped together with singular. Even though many number incorporated pronouns (e.g. TWO-OF-US) can exist in ASL (about up to 9, depending on signers), I propose that the grammatical number values in hierarchy includes only singular, dual, and plural.

In the next section, I provide a general description of pronouns and verbs in ASL. Section 3 provides a discussion on the agreement feature type hierarchies, while section 4 discusses lexical constraints on the agreement verbs explaining agreement patterns.

2 ASL pronouns and verbs

2.1 Pronouns and person system

Pointing signs serve a number of functions in ASL. Within nominals, it functions as a determiner. Articulation of a pronoun in NOM/ACC case is also accomplished by a pointing sign with the index finger, which points to the location in space associated with the intended referent. For first person reference, the pointing sign is directed toward the signer's chest, while for second person reference it is directed out toward a point in front of the addressee's chest. For third non-participant reference, when the referents are physically present, their locations are generally used. In the case where the referents are not present, usually other arbitrary locations are established, which have to be consistent in the discourse. Thus, each pronoun can identify particular referents.

Pronoun signs do mark number. Plural number in pronouns is mostly marked by a sweeping or circular movement, such as in YOU-ALL/THEY and ALL-OF-US. There is a set of pronouns called number-incorporated pronouns (e.g. TWO-OF-US/YOU/THEM, THREE-OF-US/YOU/THEM, etc.).

The traditional person system assumes three persons – first, second and third. Meier (1990) observes that there is no evidence for a grammatical

distinction in ASL between second and third person. He observes that the location of the addressee (as opposed to other referents) is not something the grammatical system by itself can determine. That is, it requires access to the specific discourse situation to determine which referent is currently addressed. And, a description of the third person form cannot be specified for location as any location in the signing space can be used for a referent, and this requires a non-finite number of locations.[3]

Instead of a three person system, Meier (1990) argues that the pronominal system of ASL is best described in terms of a first/non-first person distinction. One of his arguments for a distinct first person hinged on certain idiosyncratic properties of first person forms, in particular the pronouns WE and OUR, which do not specify the number or locations of their referents in any direct way and point to only the signer.[4]

2.2   Different types of verbs in ASL

Padden (1988) categorized verbs into the following three classes: plain, spatial, and agreement verbs.[5] Plain verbs (e.g. LIKE) are not marked morphologically for subject or object agreement. Spatial verbs (e.g. PUT) and agreement verbs (e.g. GIVE) both use the signing space referentially. But spatial verbs show agreement with locations associated with the initial and final positions of motion. Agreement verbs use spatial locations to mark subject and/or object agreement. Agreement verbs are further divided into two subtypes: single-agreement verbs, agreeing only with the object (e.g. SEE) and double-agreement verbs, agreeing with both the subject and object (e.g. HELP). These agreement verbs mark for Person and Number, and make use of the association between NPs and distinct locations.

3   Verb agreement – Locus and Number

This section explores person and number agreement features using a double agreement verb, HELP to examine both subject and object agreement.[6] For

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[3] My informant's signing also clearly confirms his observation.

[4] As in ASL, the spoken language Qawesqar, an Alcalufan language from Chile, has independent pronouns that show 1st vs. non-1st person distinction. *ce* is used for 1st person pronoun and *caw* for second and third person (Cysouw 2003: 44).

[5] Agreement verbs are also called inflecting verbs (Padden 1988), indicating verbs (Liddell 2000), and agreeing verbs (Sandler and Lillo-Martin 2006).

[6] The verb HELP can be analyzed more easily than some other verbs due to the two-handed sign, allowing no overlap with other signs.

double agreement verbs, there are two affixes, a subject agreement prefix and an object agreement suffix that constitute the manual expression of the person and number features of the relevant argument. Through an observation of the data, the person and number hierarchies are proposed in this section.

3.1 Locus agreement and person/locus hierarchy

The verb HELP starts at (or is oriented towards) the location in space associated with the subject and ends at (or is oriented towards) the location in space associated with the object. For example, $_1$HELP$_2$ as in Figure 1 indicates that the verb moves from the location associated with the signer to the location associated with the addressee.[7]

Figure 1. $_1$HELP$_2$ 'I help you.'

When the subject is WE, whether the other referent is the addressee (e.g. YOU AND I) or not (e.g. SHE AND I), the initial point of the verb should be in front of the signer's body which shows 1st person agreement. If the verb starts from the addressee or non-addressee's body, the sentence becomes ungrammatical as in (1a) and (2a):[8]

(1) a.   *$_i$PT LEARN SIGN $_{1,2}$TWO-OF-US $_2$HELP$_i$
    b. $_i$PT LEARN SIGN $_{1,2}$TWO-OF-US $_1$HELP$_i$
        'You and I will help her$_i$ to learn sign.'

(2) a.   *$_i$PT LEARN SIGN $_{1,j}$TWO-OF-US $_j$HELP$_i$
    b. $_i$PT LEARN SIGN $_{1,j}$TWO-OF-US $_1$HELP$_i$
        'He$_j$ and I will help her$_i$ to learn sign.'

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[7] The subscripts on both side of the sign HELP mean that this verb is a dual agreement verb, and the *1* subscript refers to one signer (and others), *2* refers to the addressee(s) (and others), and i, j, etc. will refer to non-addressed participants.
[8] PT means a pointing sign. I put the loci of the pronoun TWO-OF-US on the left side of it. SM means subject marking; OM object marking.

However, when the subject is YOU-ALL or THEY, the initial point of the verb tends to be the midpoint between the referents or the locus in neutral signing space, regardless of whether the other referent is an addressee or non-addressed participant as in the example (3), which confirms Meier (1990)'s observation that there is no distinction between 2nd and 3rd person values.

(3)   MARY $_i$PT $_{2,i}$TWO-OF-YOU $_{b/w2,i}$HELP$_1$
        'Mary$_i$ (not present) and you will help me to sign.'

Person agreement with object argument shows the same patterns:[9]

(4) a. *$_2$PT   TEST   G-R-A-D-E   CHECK $_i$PT $_i$HELP$_\mathbf{2}$
         $_{1,2}$TWO-OF-US   GRADE
     b. $_2$PT   TEST   G-R-A-D-E   CHECK $_i$PT $_i$HELP$_\mathbf{1}$
         $_{1,2}$TWO-OF-US   GRADE
         'She$_i$ will help you and me to grade the tests.'

(5) a. *LEARN   SIGN $_2$PT $_2$HELP$_\mathbf{i}$ $_{i,1}$TWO-OF-US
     b. LEARN   SIGN $_2$PT $_2$HELP$_\mathbf{1}$ $_{i,1}$TWO-OF-US
         'You will help her$_i$ and me to learn sign.'

(6) $_{i,2}$TWO-OF-YOU   LEARN   SIGN
            $_1$HELP$_\mathbf{b/w2,i}$ *or* **neut** $_{i,2}$TWO-OF-YOU
        'I will help her$_i$ and you to learn sign.'

When the referent of the argument includes the signer, the verb has to show first person agreement – i.e. the ending point of the verb HELP should be in front of the signer's chest. Example (4) is a case where the object is the combination of 1st person and 2nd person. In the example (5), the object is a combination of 1st person and 3rd person. When the object argument does not refer to the signer, the ending point of the verb is in midpoint or in neutral space. Thus, what matters is only whether the locus for person value is near the signer's body or not, confirming 1st vs. non-1st person distinction.

In typological studies, it has been argued that languages show universal person hierarchy – the first person is ranked above second and second person above third person in person hierarchy '1st > 2nd > 3rd' (Greenberg 1963,

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[9] When a sign is written with dashes between each letter like G-R-A-D-E, it means that it is finger-spelled.

Corbett 2000, etc.). For example in Italian, when the subject is conjoined, the verb agreement follows this person hierarchy:

(7) a. 1st + 2nd person resolution: 1st person on verb
     Io   e   tu   **siamo**   onesti/e
     I   and   you   **be.1PL**   honest.PL.M/F
     'You and I are honest.'

     b. 2nd + 3rd person resolution: 2nd person on verb
     Tu   e   tua   sorella   **siete**   onesti/e
     you   and   your   sister   **be.2PL**   honest.PL.M/F
     'You (sg.M/F) and your sister are honest.'

     c. 3rd + 3rd person resolution: 3rd person on verb
     Lei   e   Sua   sorella   **sono**   oneste
     she   and   her   sister   **be.3PL**   honest.PL.F
     'She and her sister are honest.'

When the subject includes 1st person, the verb agrees in 1st person. If the subject includes 2nd person, but not 1st person, verb is in 2nd person. Otherwise, verbs should be in 3rd person.

One of this paper's goals is to compare the person resolution in ASL with the one in spoken languages. In the above examples (1) – (6), the original sentences I asked the informant included specific pronouns, (e.g. *me and you*) as in the English glosses. In ASL, there is no sign corresponding to the English conjunction '*and*'. Thus, the signer consistently used number incorporated pronouns instead of the coordinated phrases. Those number incorporated pronouns do not have a different form. They point the referents. Thus, person value of agreement verb tells us the person hierarchy. The person hierarchy in ASL and spoken languages are the same in that first person is more highly ranked than others. That is why the verbs showed 1st person agreement with any plural argument including 1st person referent. But, there was no clear grammatical distinction between *1st* vs. *non-1st* person.

As I have discussed, pointing signs and agreement verbs are all heavily depended upon location, or *locus*. Cormier et al. (1999) propose a type [LOCUS *locus*] in INDEX, whose values are equivalent to *1*, *2*, *i*, etc. in this paper's notation. I follow their idea. This locus agreement in ASL is equivalent to person agreement in spoken languages. Thus, with the assumption of *1st* vs. *non-1st* person distinction in ASL, the hierarchy of type *locus* is proposed as the following:

(8)

$$locus$$

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              locus
           /        \
        1st         non-1st
                   /  |  \   \
                2nd   i   j   ...
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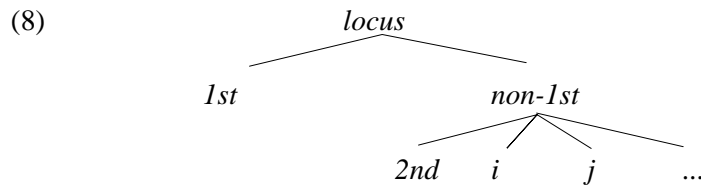
These values of type *locus* are used to refer to locations associated with the signer, addressee, or non-participant. The locus related to the signer is the location in front of the singer's chest. The locus related to the addressee or non-participants (for example, *i*, *j*, etc.) is the location within the signer's own sign space but toward and associated with the addressee or those non-participants.

3.2 Number agreement

Singular verbs are the uninflected verb stems. These verbs agree with a singular nominal, number-incorporated pronouns or collective arguments, while plural verbs require a plural argument, as shown in the following examples:[10]

(9) a. $_2$PT   TEST   G-R-A-D-E   CHECK $_i$PT

         $_i$HELP$_{1SG}$ $_{1,2}$TWO-OF-US   GRADE

      'She$_i$ will help you and me to grade the tests.'   (= 4b)

   b. MARY   JOHN $_{i,j}$TWO-OF-THEM   SIGN

         BOB $_k$PT $_k$HELP$_{nuet.SG}$

      'Bob$_k$ will help Mary$_i$ and John$_j$ to sign.'

   c. ASL   STUDENT $_{j.PL}$PT   SIGN $_2$HELP$_{j,SG}$

      'You$_{(sg)}$ will help them$_{[ASL\ students]j}$ to sign.'

   Klima & Bellugi (1979) and Padden (1988) argue that the verb can show dual or exhaustive agreement with the object argument. In my data, a native ASL Signer uses "singular" verbs as a default with any number-incorporated

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[10] Showing singular agreement in the predicate with the collective plural is not unusual in spoken languages like the following Maltese example:
Ex. Dak   id-dubbien il-kbir   dahal   mit-tieqa
    that.SG.Masc the-flies.**PL**   the-large.SG.Masc entered.**SG**.Masc from.the-window
        'Those large flies came in through the window' (Corbett 2000; p.131)

pronouns (e.g. TWO-OF-YOU, THREE-OF-YOU, etc.) unless she really wants to emphasize the individual argument.[11] Padden (1988) describes the dual or exhaustive number form of the verbs as follows: The verb stem is executed two (for dual) or more (for exhaustive) times with the inflected end points displaced. Thus, I propose that the grammatical numbers that verbs can have is either singular or plural although the nominals can have dual number. Also, I assume that the forms, which Klima and Bellugi (1979) or Padden (1988) analyzed as dual or exhaustive, are results from two or more instances of singular agreement, one for each conjoined noun phrase. Also we should keep in mind that the verbs do not agree in number with the subject argument.

As Padden (1988) noted, the verb cannot show subject number agreement in plural.[12] Signed languages show object agreement more than subject agreement, which is contrary to the typological generalization of spoken languages. The initial point of the verb HELP cannot show the sweeping movement to show plural number agreement:

(10) a. *$_i$PT   LEARN   SIGN   WE $_{1,\mathbf{PL}}$HELP$_{i,SG}$

     b. $_i$PT   LEARN   SIGN   WE $_{1,\mathbf{SG}}$HELP$_{i,SG}$

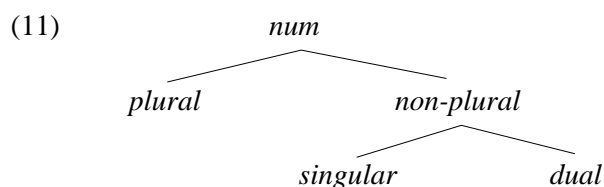   'We will help her$_i$ to learn sign.'

So far, we have seen how number agreement works. Now, we need to consider what the grammatical number values are in ASL. All languages can express any number of referents. But, that does not mean that grammatical numbers are infinite. For example, in English sentence *Two of us left*, the subject argument refers to 2 people. However, we do not say that English has *dual* number. ASL has many number incorporated pronouns (up to 9ish). Can any number like *trial*, *quad*, and so on be grammatical number values due to the existence of number incorporated pronouns like THREE-OF-US?

McBurney (2002) argues that the grammatical number in ASL is singular, dual, and plural and it does not include *trial*, *quadral*, etc. Her arguments are supported by the following facts: First, dual number incorporated pronoun (TWO-OF-US/YOU/THEM) have an idiosyncratic form (K-handshape), which differs from the form of numeral 2 (V-handshape). However, other number incorporated pronouns have the same handshape as the numeral ones. Second, numeral incorporation is very productive in ASL. Signs having to do with

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[11] Padden (1988) also mentions that number agreement may be unmarked for singular or collective plural. Here, unmarked form is singular. Thus, this is analogous to my result.

[12] There are exceptional cases where a few signs show plural agreement with subject as an idiolect (e.g. one signer shows plural form for 'we analyze'.).

time (e.g. DAY, WEEK), age, etc. incorporate numeral handshapes to indicate a specific number of units. Thirdly, the dual form (TWO-OF-US/YOU/THEM) appears to be obligatory in most contexts but it does not appear that the forms in trial, quadral, etc. are obligatory. Some signers use pointing signs with sweeping movement instead of THREE/FOUR-OF-US, etc. Adopting her idea on grammatical number, I propose the following hierarchy for the type *number*:

(11)
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                         num
                  _____/  _____
              plural              non-plural
                                 ___/  \___
                            singular       dual
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We have seen that verbs agree in singular as a default. Singular verbs used with plural argument have number *non-plural*. This hierarchy differs from the one in English and many other spoken languages – singular is more highly ranked than other numbers. For example, even though English does not have dual grammatical number in English, when the subject is 'two of you', the verb is in plural, not singular. This illustrates that in English more than one referent is considered as plural, not singular. In Hebrew, the verbs in plural agree with dual nouns (*hayomayim*[the.day.**dual**] *ʕavru*[passed.**pl**] *maher*[quickly], Corbett 2000: 95). Thus, I want to point out that number hierarchy in ASL which groups *singular* and *dual* together shows the difference from spoken languages.

So far, I suggested that the grammatical number values in ASL are *singular*, *dual*, and *plural*. Verb agreement tells us that ASL has a *plural/non-plural* number distinction and that the *plural* number is marked. Verbs do agree either in *plural* or *non-plural* number although the arguments, including number-incorporated pronouns, can denote any specific number of referents. Verbs in *plural* number agree with only *plural* agreement triggers. Otherwise, the default form of the verbs in *singular* is used.

4   Lexical entries of agreement verbs and related issues

Before proposing the lexical constraints on agreement verbs, let's consider the optionality of arguments. Languages vary in the way that they may or may not permit the null arguments of verbs. Languages like Italian, which has rich verbal morphology identifying the person and number of the argument, allow

the argument to be left unexpressed (e.g. *Parlo inglese* '(I) speak English' in Italian). Topic oriented Languages like Korean and Chinese with no verbal agreement morphology allow any argument to be missing in the right discourse contexts.

ASL has been recognized by many researchers as a discourse-oriented, topic-prominent language like Chinese, as opposed to a sentence-oriented, subject-prominent language like English (Fischer 1975). Thus, as in Chinese, null arguments are allowed in ASL like the following:

(12) A: Did John send Mary the paper?
(In which John has been established at a location and Mary at b.)

B: YES, $_a$SEND$_b$ Ø$_i$
'Yes, (he-) sent it$_i$ to (-her).   (Lillo-Martin 1986: 421)

On the other hand, ASL has a type of verbs showing agreement. Thus, null arguments are found with agreement verbs as well. The argument of the agreement verbs can be omitted as in Italian, which will be discussed below. The constraints on the verb will explain the optionality of the arguments. Like Lillo-Martin (1986)'s arguments, the null arguments of plain verb and agreement verb seem to behave differently. Her evidence comes from different constructions. I will discuss on these matters and move on to the analysis of the verbs.

Let's consider the topic constructions in English first. As Sandler and Lillo-Martin (2006) notice, when we want NP *the cat* to be the topic in the sentence '*The dog chased the cat*,' we can say '*The cat, the dog chased*' by topicalization or we can say '*As for the cat, the dog chased it*.' In the latter sentence, NP *the cat* is not an argument of the verb *chased*. Its argument is the resumptive pronoun *it*, which co-refers to NP *the cat*. In ASL, there is no sign corresponding to the English *as for*. Therefore, it is hard to distinguish if the topic in a sentence is a topicalized argument of the verb or an independent topic in left-dislocation structure.

The following examples (13) – (14) are the situations where the argument of the plain verb cannot be omitted, but the argument of the agreement verb can:[13]

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[13] In the examples here, notations for non-manual markers are omitted and the gloss is modified to be consistent in this paper.

(13) $_i$PT   COOKIE, $_1$PT   HOPE   SISTER   SUCCEED
        $_j$PERSUADE$_k$ MOTHER   EAT   *($_i$PT)
        'That cookie$_i$, I hope my sister$_j$ manages to persuade my mother$_k$
        to eat it$_i$.'   (Lillo-Martin 1986)

The above sentence is ungrammatical when the argument of the plain verb EAT is omitted since ASL does not permit such long-distance movement. However, the following sentence in the same construction allows the omission of the argument since the verb is agreement verb TAKE-UP:

(14)   EXERCISE   CLASS, $_1$PT   HOPE   SISTER
        SUCCEED $_j$PERSUADE$_k$ MOTHER $_i$TAKE-UP.
        'The exercise class$_i$, I hope my sister$_j$ manages to persuade my
        mother$_k$ to take (-it$_i$).'   (Padden 1988)

This lets us know that NP *exercise class* is not a topicalized argument. The verb TAKE-UP has a null argument in the above sentence.

    Lillo-Martin (1986) also shows the similar cases with wh-island construction as in (15) below:

(15) a. MOTHER, $_1$PT   DON'T-KNOW   WHAT   *($_i$PT)   LIKE
          'Mother$_i$, I don't know what$_j$ (she$_i$) likes t$_i$.'

     b. MOTHER, $_1$PT   DON'T-KNOW   WHAT   ($_i$PT) $_i$SEND$_1$
          'Mother$_i$, I don't know what$_j$ (she$_i$) sent me t$_i$.'

The argument of the agreement verb can be optional whereas the plain verb has to have an argument. Thus, sentence (15b) is not involved in topicalization construction.

    Following examples show coordinated structure where the argument of plain verbs cannot be omitted but the one of agreement verb can:

(16) a. *FLOWER, $_i$GIVE$_1$ MONEY, $_j$GIVE$_1$
          'Flowers, he$_i$ gave me money but $_j$she gave me.' (Padden 1988: 93)

     b. *$_i$PT   MOVIE, $_j$STEVE   LIKE   t$_i$ (BUT) $_k$JULIE DISLIKE t$_i$
          'That movie$_i$, Steve$_j$ likes t$_i$ but Julie$_k$ dislikes t$_i$.'
     c. $_i$PT   MOVIE, $_j$STEVE   LIKE   t$_i$ (BUT) $_k$JULIE   HATE$_i$ t$_i$
          'That movie$_i$, Steve$_j$ likes t$_i$ but Julie$_k$ hate t$_i$.'
                                (Sandler and Lillo-Martin 2006)

ASL, as in other languages, allows the same element to be extracted from all the conjuncts as in (16b), but does not allow extracting one element from one of the conjuncts as in (16a). Although the meaning of verbs DISLIKE and HATE is similar, one is a plain verb and the other is an agreement verb. The sentence (16c) with an agreement verb HATE allows the argument to be omitted and, thus, the topic NP *that movie* is not an argument of the verb *hate*.

Summarizing, the arguments of agreement verbs can be omitted in any situation without any discourse context and those null arguments behave like a pronominal argument. Null arguments with plain verbs, on the other hand, do not generally show the characteristics of pronouns and can be omitted in the proper discourse context.

I propose that inflecting morphemes of agreement verbs seem to behave the same as the agreement markers on Chichewa verbs. Bresnan and Mchombo (1987) show that the subject argument is optional in Chichewa. They propose the dual behavior of the subject marker on the verb: The subject agreement marker on the verb behaves as an agreement marker in the presence of an overt subject argument; otherwise, it is an incorporated pronoun, which is an argument of the verb itself. That is, they explain the former as grammatical agreement, while the latter as anaphoric agreement. Miller and Sag (1997) also treats the French clitic as an argument of the verb. The null arguments with agreement verbs in ASL can be explained just like those in Chichewa.

In section 2.2, three different types of verbs were described, one of which has two different subtypes. Therefore, the type *verb* has three subtypes. The verbal type hierarchy is simple as follows:

(17)
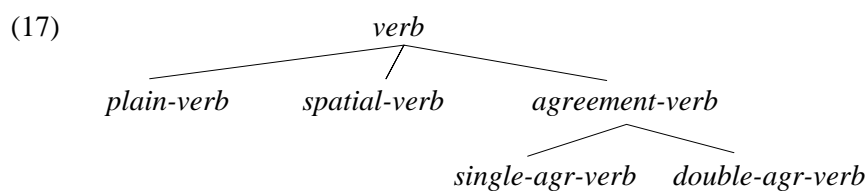
Again, the type *plain-verb* is without agreement; while the type *spatial-verb* is verbs showing the movement of entities in space. The type *agreement-verb* is verbs showing the grammatical argument and has two subtypes, *single-agr-verb*, showing object agreement, and *double-agr-verb*, showing subject and object agreement.

The type *agreement-verb-lexeme* has constraints on object agreement and the type *single-agr-verb* inherits the constraints of its supertype without

posing any extra constraints. The type *double-agr-verb* has constraints on subject person agreement. Partial constraints on the types *agreement-verb-lxm* and *double-agr-verb-lxm* are proposed below:[14]

(18) a. *agreement-verb*:

$$\begin{bmatrix} \text{PHON} & F(..,[4],[3],x) \\ \\ \text{SYNSEM} & [5] \begin{bmatrix} ... \\ \text{ARG-ST} <[1]\text{NP}, & [2]\text{NP}\begin{bmatrix} \text{INDEX}\begin{bmatrix} \text{LOCUS} & x \\ \text{NUM} & [3] \end{bmatrix} \end{bmatrix}, ...> \\ \text{VAL} \begin{bmatrix} \text{COMPS} & \langle ([2]) \rangle \end{bmatrix} \end{bmatrix} \\ \\ \text{STEM} & \begin{bmatrix} \text{PHON} & [4] \\ \text{SYNSEM} & [5] \end{bmatrix} \end{bmatrix}$$

b. *double-agr-verb:*

$$\begin{bmatrix} \text{PHON} & F(y, [4],..) \\ \\ \text{SYNSEM} & [5] \begin{bmatrix} ... \\ \text{ARG-ST} <[1]\text{NP}\begin{bmatrix} \text{INDEX}\begin{bmatrix} \text{LOCUS} & y \end{bmatrix} \end{bmatrix} ...> \\ \text{SUBJ} & \langle ([1]) \rangle \end{bmatrix} \\ \\ \text{STEM} & \begin{bmatrix} \text{PHON} & [4] \\ \text{SYNSEM} & [5] \end{bmatrix} \end{bmatrix}$$

All verbs included in the type *agreement-verb* have locus and number information on object in ARG-ST (argument structure). The type *double-agr-verb* has constraints on locus agreement, not on number agreement, with the subject. All of the arguments of the agreement verbs are optional, which is constrained as optional value of the argument in valence features, SUBJ and COMPS. When they are omitted, the verb itself has an incorporated pronoun, otherwise the verbs agree with the overt argument. The subject argument of the type *single-agr-verb* is impossible to be omitted without context since this verbal type does not have information on the subject argument.

As proposed in the above constraints, ASL verb agreement is INDEX agreement. As for the number agreement, we have seen that singular verbs agree with plural arguments when those arguments are conceived as a "single" group collectively. In that case, the collective plural nominals are in

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[14] In signed languages, phonological components include handshape including (palm) orientation, movement, and location. Thus, phonological value of inflected verbs includes locus and number agreement information.

ASL is articulated not only through manual signs but also through co-occurring non-manual expressions, which play an important role in the grammar (e.g. wh- or yes/no question, negation, etc.). But, this paper will not cover those features.

plural morphologically but singular semantically. Thus those nominals have *pl* in [CONCORD|NUM] and *sg* in [INDEX|NUM], so that verbs, showing INDEX agreement, agree in number *non-plural* with collective plural nominals.

5 Conclusion

Recent researches of signed languages tell us they should be considered as natural languages with their own grammar although they are still in an early stage. This paper analyzes person and number verb agreement in ASL through the recordings of a native signer (a Deaf) within the framework of HPSG.

ASL has three types of verbs – plain, spatial, and agreement verbs. Agreement verbs are divided into two subtypes – one showing object agreement in person and number and the other showing this information plus subject agreement in person. This differs from the typological generalization governing spoken languages in which subject agreement is favored over object agreement.

The constraints on the agreement verbs suggest that their argument can be optional. The inflecting morpheme of the verbs can be either agreement markers or incorporated pronoun arguments depending on whether the verbal arguments are expressed or not, like Chichewa (Bresnan and Mchombo 1987).

The ASL person paradigm has a 1st vs. non-1st person distinction. Based on spoken languages, many scholars (Greenberg 1963, Corbett 2000, etc.) have argued that the first person is ranked above other persons in the person hierarchy (1 > 2 > 3): an NP denoting a group that includes the speaker triggers first person agreement. In ASL (1 > 2, 3), NPs including the signer trigger 1st person verb agreement, and the verb in non-1st person is ungrammatical. Hence ASL resembles spoken languages with respect to the person hierarchy.

Turning to number, this paper proposed grammatical numbers in ASL divided into *plural* vs. *non-plural* and the latter includes *singular* and *dual*. ASL shows a different aspect from the common one in spoken languages – singular stands alone but dual etc. are grouped with plural. While there exist number-incorporated pronouns (up to about 9), I proposed that the grammatical number values in hierarchy includes only singular, dual, and plural.

The verb has either *plural* or *non-plural* (*singular*). The plural verbs agree with only plural arguments. Otherwise, the verbs are in *non-plural*. The verb

does not show number agreement with the subject at all. These facts are captured by the constraints on the types *verb* and *number*.

Signed languages have been recently considered as natural languages. Thus, the studies on signed languages are still in the beginning stages. In visual-gestural modality, non-manual marker plays an important role in grammar. Further research is required to investigate the role of non-manual markers in agreement.

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