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A CROSS-MODALITY PERSPECTIVE ON VERB AGREEMENT

ABSTRACT. Verb agreement in sign languages (illustrated here by Israeli Sign Language, ISL) seems to differ greatly from that of spoken languages, as it seems to be thematically oriented and is realized morphologically only on a subset of verbs in the language. These properties present both typological and theoretical challenges, since agreement is generally regarded as a structural relation, realized morphologically as inflectional affixes on the verbal element. These challenges are addressed here by applying a particular componential analysis (along the lines of Jackendoff 1990) to the class of verbs which inflect for agreement in ISL. This analysis enables us to capture and explain the similarities as well as differences between the agreement systems of signed and spoken languages. It argues that agreement is basically a structural relation in languages in both modalities. The unique properties of sign language verb agreement are attributed to the difference in the agreeing element: verbs and auxiliaries in spoken languages vs. a spatial predicate in sign languages. These conclusions have some significant theoretical implications, both for capturing aspects of the interaction between modality and the structure of language, and for imposing restrictions on the structure of the lexicon.

1. INTRODUCTION¹

Extensive research during the past forty years has proved that sign languages are full-fledged languages with complex structures and rules, on par with those characterizing spoken languages. Linguists working within various theoretical frameworks have demonstrated that sign languages

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share many structural and formational features with spoken languages. Researchers working in related fields such as neurolinguistics, psycholinguistics, and language acquisition found significant similarities in neurological organization, language acquisition, and language processing between signed and spoken languages. These corroborating pieces of evidence led to the conclusion that signed and spoken languages are governed by the same system of principles and parameters, namely universal grammar (UG). However, as sign language research continued to develop and expand and more sign languages were subject to linguistic investigation, this basic conclusion began to be questioned. It was found that all sign languages exhibit some features which are unparalleled by spoken languages. The existence of such universals seems to raise fundamental challenges to the standard view of the human language capacity.² The present paper aims to contribute to our understanding of the ways in which the structure of language interacts with other domains, such as the physical modality through which the language is transmitted, by addressing one grammatical phenomenon in languages of both modalities.

The focus of the present study is Israeli Sign Language (ISL), the natural language of the Deaf community in Israel. The particular phenomenon under investigation here is verb agreement, a central phenomenon in languages both spoken and signed, and one which has been extensively investigated in various theoretical frameworks. It has drawn much attention in sign language research, as it seems to be both very similar to and at the same time very different from verb agreement in spoken languages. The two main differences which will concern us here are the following: Verb agreement in ISL seems to be thematically, rather than syntactically determined, as the verb agrees with its *source* and *goal* arguments; and agreement morphology is not a general property of verbs in the language, in that only a subset of all the verbs in the language inflect for agreement. These facts present a real challenge for theories of agreement, as it is not at all clear how a unified theory of agreement can accommodate both spoken language verb agreement and the type of verb agreement found in ISL.

The present paper assumes (following Sandler 1993) that linguistic theory should be able to account for natural languages, irrespective of modality. Moreover, it should be able to predict, and hopefully explain, both similarities and differences between languages in the two modalities. The analysis presented in this paper is a step in that direction, as it identi-

² See Newport and Supalla (2000) for a survey of the developments in sign language research over the last forty years. See Sandler (1993) and Sandler and Lillo-Martin (2001) for a discussion of the challenges raised by sign language research for our understanding of the human language faculty and the relationship between language and cognition.

fies both the similarities and differences in the verb agreement systems of signed and spoken languages. It shows that agreement is a structural relation in languages of both modalities, despite its strong thematic flavor in sign languages. However, it also points to an important non-homogeneity between signed and spoken languages. The difference lies in the nature of the agreeing element. In spoken languages the element carrying agreement morphology is the verbal element (verb or auxiliary). In ISL, agreement morphology attaches to a directional morpheme (a bound preposition-like element) denoting motion along a Source-Goal path. Hence, this analysis challenges a strong version of the UG approach, as it argues that modality is involved in determining important differences in the linguistic structure of signed and spoken languages.

The paper is organized as follows. The remainder of section 1 begins with a brief presentation of some basic theoretical assumptions. Following is a discussion of general properties of verb agreement, which provides a common ground for dealing with verb agreement in languages of the visual modality. A description of ISL verb classes and verb agreement is next. This description gives special attention to one verb class in ISL, agreement verbs, as the morphological structure of this verb class is the key to understanding the problems raised by sign languages for linguistic theories (section 2). Section 3 presents an analysis of verb agreement (the Thematic Structure Agreement Analysis) in ISL. By means of this analysis, the seemingly unique properties of ISL verb agreement can be captured within the framework of general linguistic theory, showing agreement to be a unified phenomenon across the modality boundary (section 4). However, modality does play an important role in determining certain aspects of the structure of language, the significance of which is presented and discussed in section 5.

1.1. *Basic Theoretical Assumptions*

The analysis of verb agreement in ISL proposed in this work puts a strong emphasis on the lexicon, as one of its main claims is that in ISL the lexical-semantic structure of a verb determines whether or not it inflects for agreement. Therefore, the lexicon will figure prominently. The assumption I make here regarding the structure of the lexicon is that it contains the following components: one specifying the semantic structure of a lexical entry, one specifying its syntactically-relevant argument-taking properties, and one specifying its phonological form. Following current theories of the lexicon, I assume that the lexical-semantic information is represented at a Lexical Conceptual Structure (LCS), and that the argument-taking

properties are represented at the level of Predicate Argument Structure (PAS).³

The specific theoretical framework adopted here for the structure of the LCS is that of Jackendoff (1987, 1990). Jackendoff's theory seems to be the most adequate and explanatory for the analysis of sign languages given especially its approach to thematic roles. It draws a distinction between two types of roles – spatial roles and action roles – and it attributes each type to a different tier in the LCS representation. The spatial thematic tier encodes the spatial relations between a predicate and its arguments and is therefore related to thematic notions such as Source, Theme, and Goal. The action thematic tier captures the affectedness relations between the arguments. It contains two argument positions: the first argument of AFF(ect) is the actor or causer, and the second argument position is that of the affected argument.⁴ The distinction between the two thematic tiers is strongly supported by the morphology of ISL, especially by the two argument-marking morphological devices of the class of agreement verbs (see section 1.3.3).

I assume that positions on the LCS are mapped into the level of PAS by means of linking rules, by which more prominent positions on the LCS are mapped into more prominent positions of the PAS.⁵ Prominence is determined by the degree of embeddedness of the position: least embedded argument positions are more prominent than deeply embedded ones, and positions on the action tier are more prominent than positions on the spatial thematic tier (Jackendoff 1990, p. 258).

Syntax does not figure prominently in the analysis. This might seem surprising, because agreement is taken to be basically a syntactic relation, as it encodes relations between members of a clause. However, the argument-taking properties of a predicate and the semantic relations between a predicate and its arguments are already represented in the lexicon. And it is these properties which lie at the core of the analysis here. The syntactic configuration/domain where this relationship obtains is

³ See, for example, Zubizarreta (1987), Rappaport and Levin (1988), Rosen (1989) and Booj (1992). In Jackendoff's (1987, 1990) model there is no separate level of PAS; rather, the syntactic structure is derived directly from the LCS.

⁴ Under Jackendoff's theory, thematic roles are not considered theoretical primitives. Rather, they are defined as structural positions in the LCS "the names for them are just convenient mnemonics for particularly prominent configurations" (Jackendoff 1990, p. 47) in much the same way as 'subject' and 'object' are convenient labels for particular syntactic positions. In this paper, thematic role labels such as 'source', 'theme', and 'goal' are used for convenience, bearing in mind that they correspond to particular positions on the LCS.

⁵ In that respect I diverge from Jackendoff's Model, as he assumes that LCS is linked directly to the syntax.

defined here in the most general syntactic terms, as a relationship between a head and its dependents. More specific syntactic mechanisms or configurations are irrelevant for our purposes. Hence the analysis need not assume any specific syntactic theory. While it makes use of the terminology of the Minimalist Program (Chomsky 1995), there is nothing in this analysis that requires that specific theoretical framework; the analysis could be rendered in terms of other theories as well.

1.2. *Properties of Verb Agreement*

I assume here a very broad, descriptive definition of verb agreement. Such an approach is necessary in order to provide some basic criteria for determining whether a specific construction is an agreement construction or not. As we shall see, the challenges presented by verb agreement in sign languages are quite general in nature, and hold irrespective of the particular theory of agreement assumed.

Agreement can be described as a linguistic phenomenon where “a grammatical element X matches a grammatical element Y in property Z within some grammatical configuration” (Barlow and Ferguson 1988, p. 1). Accordingly, verb agreement is defined as a phenomenon where the verbal element (a verb or an auxiliary) matches its syntactic argument(s) in their referential features (see Blake 1994, pp. 14, 197, and references cited there, and Lehmann 1988). This definition entails the following:

- (1)a. Agreement markers consist of the referential features (phi-features) of the arguments, or a subset of those features. As such they are part of the referential system of the language.
- b. Functionally, agreement is a grammatical device for the identification and keeping track of referents over a stretch of discourse (Lehmann 1988; Wunderlich 1994).
- c. There is a close relationship between agreement and structural positions in the syntax, in that the domain of agreement is defined over specific syntactic configurations. The semantic relations which hold between the verb and its arguments, especially spatial semantic roles such as source, goal, and theme, do not play a role in defining agreement relations.

- d. Agreement is realized morphologically in terms of inflectional affixes. As such, it is obligatory. That is to say, if a language has verb agreement, then *all* the verbs in the language are morphologically marked for agreement. When the verb has no arguments (as in the case of ‘weather verbs’ or impersonal verbs), or when the verb has no argument to agree with, as in Icelandic (Zaenen et al. 1985) when there is no nominative argument in a sentence, the morphological form of the verb contains nevertheless a default agreement marker: 3P singular in Spanish *llovía* (‘it rained’, lit. ‘rained 3P sg’); 3P singular masculine in Hebrew *hitxašek li* (‘I felt like’, ‘I had an urge to’, lit. ‘was-urged-3P-sg to-me’).

These properties hold in a vast number of cases cross-linguistically, and are thus taken here as criteria for identifying agreement constructions. They will serve as important guidelines when considering the status of agreement constructions in sign languages.

1.3. *Agreement in Sign Language*

Sign language researchers have identified several classes of verbs that differ from each other on the basis of the properties of the agreement affixes attached to them. As will become evident shortly, the identification of these constructions as agreement constructions is problematic, since verb agreement in sign languages seems to be characterized only by two out of the four properties mentioned above. The agreement affixes consist of the referential features of the arguments and are used to track referents over a stretch of discourse. However, they are not syntactically determined, and they attach only to a subset of the verbs in these languages. Nonetheless, the analysis of ISL verb agreement presented in section 3 will reveal that despite the apparent dissimilarities, verb agreement in a sign language, which is better termed ‘predicate agreement’, is characterized by the same properties characteristic of verb agreement in spoken languages.

The pioneering research on the classification of verbs in sign languages was conducted on American Sign Language (ASL) (Friedman 1975; Fischer and Gough 1978; Klima and Bellugi 1979; Padden 1983, among others), but subsequent research on other unrelated sign languages has identified verb classes with very similar properties, both morphologically and semantically, to those identified for ASL.⁶ This similarity among un-

⁶ Research on sign languages other than ASL includes, among others: British SL – Kyle and Woll (1985); Taiwan SL – Smith (1990); Italian SL – Pizzuto, Giuranna, and Gambino (1990); Australian SL – Johnston (1991); Danish SL – Engberg-Pederson (1993); SL of

related sign languages is quite remarkable and requires an explanation. I will return to this point in section 5. The examples in this paper are from ISL, but the classification holds for other sign languages as well.

1.4. *Verb Agreement in a Visual Language*

Before presenting the various verb classes in ISL, a description of ‘verb agreement’ in languages in the visual modality is in order. According to the definition of verb agreement in the previous section, a verb is said to agree with its arguments if the form of the verb is determined by the pronominal features of its arguments. In sign languages, nominals in a clause are associated with discrete locations in space, called ‘R(eferential)-loci’. This association is done by pointing to, or directing the gaze towards, a specific point in space. If the referent of that NP is present, the pointing is towards that referent. If the referent is not present, it is assigned a point in the signing space (by, e.g., signing the NP and then pointing towards or gazing at a specific point in space). Because of the visual modality, each nominal in the discourse can be assigned a distinct location, and therefore each location contains enough information to uniquely identify a referent. In that respect, R-loci are more like overt indices than grammatical categories such as gender and person (cf. Lillo-Martin and Klima 1990). These R-loci are used for anaphoric and pronominal reference for the nominals associated with them, and are therefore regarded as the visual manifestation of the pronominal features of the nominals in question (see, e.g., Klima and Bellugi 1979; Lillo-Martin and Klima 1990; Meier 1990; Janis 1992; Bahan 1996). However, it is important to emphasize that the mechanism of assigning R-loci in sign languages differs from the assignment of phi-features in spoken languages. In the latter, nominals are categorized on the basis of shared morphosyntactic features, e.g., gender or noun class. Pronominal reference to all members of a given category is made by using the same pronoun, for example *he* to all male referents in English and *she* to all females. Each pronoun is representative of a class sharing a certain lexical feature. In sign languages, each referent is associated with a unique location in space in each discourse. The assignment of R-loci does not involve classification. (The sign language referential system presents many interesting and intriguing challenges to linguistic theory that, however, lie outside the scope of the present work.)

Verb agreement in sign languages then takes the following form: a verb agrees with its arguments if its initial and final locations are determined

the Netherlands – Bos (1993, 1995); Japanese SL – Fischer (1996); Irish SL – McDonnell (1996, cited in Saeed and Leeson 1999); German SL – Glück and Pfau (1999).

by the R-loci of its arguments. For example, the verb HELP⁷ (ISL) agrees with its subject and object: the beginning point of the sign HELP is the location of the subject and its end point is the location of the object. If the subject is *I* and the object is *you*, the verb starts at the location of 1P (the signer's chest) and ends at the location of the addressee; the direction of the verb's path movement is from the signer towards the addressee. If the subject is *you* and the object is *me*, the direction of the path is reversed: it moves from the addressee towards the signer. These two forms of the verb HELP are illustrated in Figure 1. In sign languages, then, spelling out the pronominal features of the arguments on the verb means that the direction of the path movement of the verb is determined by the locations in space associated with these arguments. The agreement affixes are the location specifications of the verb.^{8,9}

Before proceeding to describe the three verb classes in ISL, a word is in order concerning its clausal structure. Subject and object are structurally distinct and the subject occupies a more prominent position. This distinction is supported by the phenomena of 'subject pronoun copy' and binding

⁷ Since there is no standard transcription system for ISL, the following notational conventions are used (following Padden 1983):

1. Signs in sign languages are represented with English glosses in capitalized letters.
2. For signs that are articulated in a specific locus position, this position is indicated by a subscript which follows the sign. Articulation at 1P locus is indicated with a 1 subscript. Articulation at 2P locus is indicated with a 2 subscript. Articulation at 3P locus is indicated with letters *a*, *b*, *c*. For signs which have a path movement (i.e., the articulation of the sign involves moving from one locus position to another), the subscript which precedes the sign indicates its beginning point and the subscript which follows the sign its end point.

⁸ Bahan (1996), developing the analysis in Aarons et al. (1992), presents a different analysis of verb agreement in ASL, according to which agreement is realized by non-manual markers, specifically eye-gaze and head-tilt. He further claims that these agreement markers attach to all verbs in the language. He thus draws a distinction between syntactic agreement, realized by non-manual markers, and morphological agreement, realized by the actual manual form of the verbs. The main concern of my paper is what Bahan calls 'morphological agreement'. Since there is not enough data concerning the role of the eye-gaze and head tilt in ISL, a discussion about the relationship between Bahan's analysis and mine is outside the scope of this paper.

⁹ Liddell (2000) argues that the location specifications of both pronouns and agreement verbs are non-morphemic since they do not have well-defined phonological specifications. He suggests that these locations are non-linguistic in nature and therefore are not part of the grammar of the language. Aronoff et al. (2000) argue, however, that such a view cannot be maintained, as there are several syntactic processes which are stated in terms of these location specifications. Drawing on their arguments, I take here the position that the location specifications are indeed agreement markers.

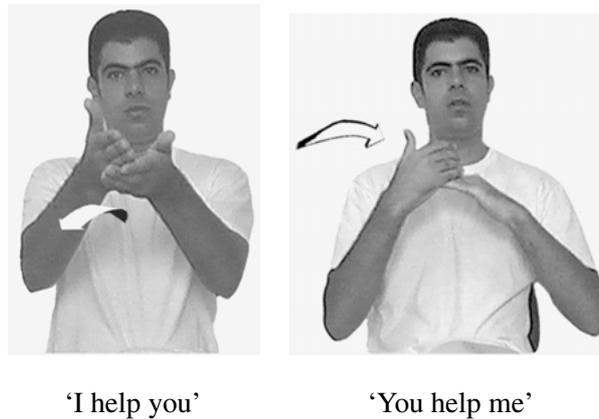


Figure 1. The form of agreement in ISL: inflected forms of the verb HELP.

(see Meir 1998b). I therefore assume that subject is in SPEC VP, and that the object is a sister of V. This structure holds for all verb classes in ISL, irrespective of the particular morphology of each class. These very basic assumptions are sufficient for our purposes here, and therefore I make no further claims with respect to the structure of the clause in ISL.

1.4.1. *ISL Verb Classes*

ISL has three verb classes: plain verbs, spatial verbs, and agreement verbs. These classes were first identified by Padden (1983, 1990) with respect to ASL. Her classification holds for ISL, as well as for all well-studied sign languages. The basic dichotomy is between verbs that do not inflect for agreement (‘plain verbs’) and those that do. Verbs that inflect for agreement are further divided into those agreeing with subject and object (‘agreement verbs’) and those agreeing with locatives (‘spatial verbs’).

Plain verbs are those which do not inflect for agreement. That is to say, the form of the verb is not determined by the referential features of its arguments. The plain verb EAT, for instance, has the same form regardless of the R-loci of its arguments. Examples of plain verbs in ISL include: BEG, BEGIN, CRY, DECIDE, EAT, FINISH, HAVE-FUN, KNOW, LIKE, LOVE, ORDER, POSTPONE, THINK, and WAIT. The plain verbs EAT and CHECK are shown in Figure 2.

Spatial verbs agree with spatial referents, i.e., locations. The beginning and end points of these signs are associated with actual locations, the source of motion (the beginning point) and the goal of motion (the end point). For example, in the ISL sentence meaning *I moved the cup from location A to location B*, the verb MOVE-CUP agrees with locations A

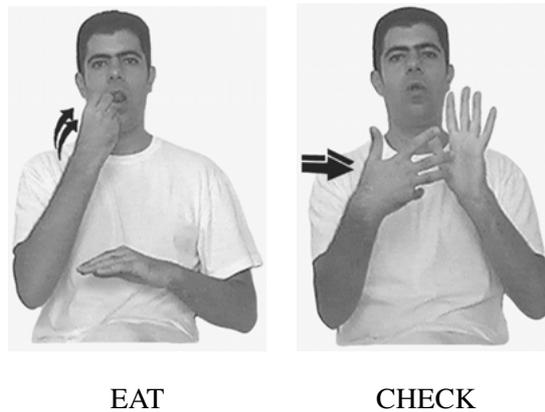


Figure 2. The plain verbs EAT and CHECK.



MOVE-CUP (from A to B)

Figure 3. The spatial verb 'MOVE-CUP from location A to location B'.

and B. The verb's path movement is from location of A to location of B, as shown in Figure 3. Notice that the location assigned to the subject *I* is irrelevant for determining the form of spatial verbs.

Agreement verbs agree with their subject and object. For example, in the ISL sentence meaning *John gave Mary the cup*, the verb GIVE agrees with *John* and *Mary*: the path movement of the verb starts at the R-locus of *John* and ends at the R-locus of *Mary*. That is to say, the path is determined by the loci of the subject and object arguments.¹⁰ Agreement verbs are

¹⁰ If an agreement verb is triadic, then it agrees with its dative object. This object is usually the indirect object or the object of a preposition (*to*-phrase or *from*-phrase) in English. However, the terms Direct Object, Indirect Object or *to/from*-phrases seem inappropriate

further divided into two groups (as first noticed by Padden 1983): regular verbs, e.g., GIVE, PAY, SEND, ANSWER, HELP, FAX, INFORM, LIE-TO, and TEACH, and backwards verbs, such as TAKE, GRAB, ADOPT, COPY, CHOOSE, and SUMMON. These two groups differ with respect to the linear ordering of the agreement affixes. The morphology of agreement verbs is rather complex and deserves a more extensive discussion, which I will turn to shortly.

The verbal classification is semantically grounded (following Meir 1998b):

- (2)a. Agreement verbs denote *transfer* (in the sense of Gruber 1976 and Jackendoff 1990), whether concrete (as in the verbs GIVE, TAKE, SEND) or abstract (as in the verbs TEACH, TELL, INFORM, HELP¹¹).¹²
- b. Spatial verbs denote *motion* from one location to another.
- c. Plain verbs are defined negatively, as denoting *neither* transfer *nor* motion.

This classification is somewhat oversimplified. There are cases of verbs in ISL denoting transfer but displaying the morphology of plain verbs rather than that of agreement verbs (e.g., BUY, STEAL) because of their phonological structure. However, the phonological constraints on agreement

with respect to ISL. The dative complements of triadic verbs such as GIVE and TAKE, and the sole complements of monotransitive verbs as HELP and ADOPT all exhibit the same syntactic and morphological properties. Therefore, there is no justification for applying different terms to them in ISL. It might be the case that ISL is better described in terms of primary and secondary objects (cf. Dryer 1986) instead of IO and DO. I leave this for future research.

¹¹ Jackendoff (1990, pp. 130–135) does not regard *help* as a transfer verb, but rather as a verb denoting a specific type of causation (as was pointed out to me by an anonymous reviewer), formalizing ideas developed in Talmy (1985). He therefore focuses on the causal and affectedness relationship between the arguments of the verb. This approach, however, does not exclude the possibility of analyzing *help* as a type of transfer verb as well, where the agent transfers help to the patient. The affectedness relations will be encoded on the action tier, while the spatial relations will be expressed on the spatial thematic tier. Such an approach is supported by the existence of light verb constructions such as *to give/offer help*, which highlight the transfer event, and by the fact that in many languages (e.g., German, Danish, Hebrew) the verb *help* assigns dative case to its internal argument. (I thank Yehuda Falk for these observations.)

¹² The notion of ‘transfer’ may be not so easy to define. However, an event of transfer has certain characteristics that can be used as guidelines for classifying agreement and non-agreement verbs in a non-circular manner. See section 3.1 below.

morphology can be stated explicitly, and therefore it is possible to predict which verbs will not be able to display the morphology of agreement verbs (cf. Meir 1998b).

1.4.2. *The Morphology of Agreement Verbs*

The argument-marking morphology of agreement verbs is more complex than that of spatial verbs, since agreement verbs use two morphological mechanisms of argument marking: the direction of the path movement, and the facing of the hands. The morphological analysis of agreement verbs assumed here is based on Meir (1995, 1998a). Since this analysis is subsumed by the agreement analysis presented in section 3, its main points are presented in the present section.

As mentioned above, agreement verbs fall into two types – regular and backwards. Recall that these groups differ from each other with respect to the linear ordering of the agreement affixes. With regular agreement verbs, e.g., GIVE, PAY, SEND, and TEACH, the path moves from the subject R-locus to the object R-locus. With backwards verbs, e.g., TAKE, CHOOSE, and SUMMON, the path moves from the object R-locus to the subject R-locus. Notice that there is also a semantic difference between the two classes. In regular agreement verbs, the subject NP is the thematic source and the object NP the thematic goal. In backwards verbs, the relationship between the syntax and semantics is reversed: the subject is the thematic goal, while the object is the thematic source.

Two approaches have been suggested in order to account for the morphology of agreement verbs. The semantic approach (Friedman 1975; Shepard-Kegl 1985; Bos 1998) maintains that the linear order of affixation is determined by the spatial thematic role of the arguments: the path movement is from source to goal for both types of agreement verbs. By assuming such an approach, there is no need to draw a distinction between regular and backwards verbs, as the morphology of both groups is accounted for by a single generalization. The syntactic approach, advocated by Padden (1983), argues that the agreement morphology of agreement verbs is best accounted for in syntactic terms, since there are certain phenomena that can be captured straightforwardly only if the generalization is stated syntactically. For example, Padden describes the phenomenon of ‘agreement marker omission’, where one agreement marker can be deleted. The deletable agreement marker is always the subject marker, whether it occurs at the beginning of the sign (in regular agreement verbs) or at the end of the verb (as in backwards verbs). This phenomenon can be captured by a single generalization by referring to the syntactic function of the agreement markers, namely that the *subject* agreement marker can be optionally deleted.

However, if agreement is stated semantically, two separate generalizations are needed: with regular agreement verbs the source agreement marker can be omitted, while with backwards verbs it is the goal marker that can be omitted. Therefore Padden concludes that agreement in ASL is better accounted for in syntactic terms: the path movement of the verb is from subject to object. Backwards verbs, under this analysis, will be marked in the lexicon as morphologically ‘reverse’.

Each of these approaches captures one aspect of the behavior of agreement verbs, while failing to account for another. It seems we need both the syntax and the semantics in order to account fully for the behavior of both types of agreement verbs. The problem is to find two distinct mechanisms in what seems to be one morphological system.

The analysis suggested in Meir (1995, 1998a) overcomes these difficulties by showing that indeed two argument-marking systems are involved in the morphology of agreement verbs. This analysis is based on the observation that agreement verbs mark their arguments not only by changing the direction of the path movement, but also by changing the facing (orientation) of the hands. I argue that these two mechanisms serve different functions in the language. The direction of the path marks the semantic-thematic relations of the arguments, whereas the facing marks their syntactic functions. The two mechanisms are independent of each other, yet they are articulated simultaneously. These mechanisms adhere to the following principles:

- (3) Principles of Sign Language Agreement Morphology:
 - a. The direction of the path movement of agreement verbs is from source to goal.
 - b. The facing of the hand(s) is towards the object of the verb (whichever of source or goal is not subject).

The combination of the two principles accounts for the actual form of agreement verbs. We will illustrate this with the following verb forms (shown in Figure 4):

- (4)a. $_1$ SEND $_2$ ‘I send (to) you’.
- b. $_2$ TAKE $_1$ ‘I take from you’.

In (4a) the source argument is *I*, the goal argument is *YOU*. Thus the path is from the signer’s chest towards the location of the addressee (outwards). The object of the verb is *YOU*, and hence the palm faces the R-locus of



${}_2\text{TAKE}_1$
'I take from you'



${}_1\text{SEND}_2$
'I send (to) you'

Figure 4. The verb forms ${}_2\text{TAKE}_1$ and ${}_1\text{SEND}_2$.

YOU (i.e., outwards). In (4b) the source is *YOU*, the goal *I*. The path therefore moves from the R-locus of the addressee towards the signer's chest (inwards). The object of the verb is *YOU*, hence the palm faces the addressee (outwards). The two verbs have the same syntactic structure, which is reflected by the fact that the facing is outwards (towards the addressee's locus) in both. However, they differ with respect to their source-goal structure, which is manifested by the opposing directions of their path movements.

By analyzing agreement verbs as morphologically complex, this analysis has the advantages of both the semantic and syntactic approaches mentioned above, while avoiding their pitfalls. Backwards verbs need not be marked *ad hoc* in the lexicon as such, as their morphology follows the

same general principles suggested for regular agreement verbs. The difference between backwards verbs and regular agreement verbs stems from the different association between their syntactic and thematic structures. The syntactic generalizations, which were problematic for the semantic approach, find a natural solution under the analysis suggested here. For example, agreement-marker omission can be handled in one statement: the agreement marker that is not marked by the facing of the hands can be deleted.

Under this analysis, then, agreement verbs are regarded as morphologically complex: they mark morphologically both the spatial thematic roles of their core arguments and their syntactic roles. It follows, then, that each argument is double-marked: it is marked as a source or a goal by the direction of the path; it is also marked as the object (and by default subject) by the facing of the hands.¹³

The two mechanisms for argument-marking are of different natures. The path is related to the *spatial* notions of source and goal, and is determined by *two* arguments. The facing is related to *syntactic* roles, and is determined by *one* argument, the syntactic object. These differences motivate the following modification to the analysis developed so far: the facing should be analyzed as a verbal affix assigning dative case, rather than as an agreement marker. Notice that the facing marks the (dative) object NP, and therefore the subject NP is morphologically unmarked. Furthermore, the subject agreement marker is optional, whereas the object marker is not (see 'agreement-marker omission' above, described by Padden for ASL, but which holds for ISL as well). Cross-linguistically, it is very unusual for a language to have object agreement without subject agreement. Case marking, on the other hand, works out reversibly: in nominative-accusative languages, there are ample examples where the nominative case is unmarked, while accusative or dative cases are morphologically marked (e.g., Hebrew, Turkish, Hindi, Spanish, and Romanian).

What is somewhat unusual in the ISL system is the fact that case is marked on the verb. Cases are usually marked on nouns. However, in a variety of languages (most notably head-marking languages in the sense of Nichols 1986), case *relations* are marked by verbal affixes. Mithun (1991, p. 271) provides an example of a benefactive affix in Maricopa:

¹³ Some verbs exhibit only one argument-marking mechanism, either the path (e.g., SHOW, ASK) or the facing (e.g., LOOK-WITH-ADMIRATION). These deficiencies in the verbs' forms are due to phonological factors, namely that the verb root contains phonological specifications which clash with those of the path and/or the facing. For a detailed phonological analysis of these factors, see Meir (1998b).

- (5)a. va chew-k
house make-REALIS
 He built a house.
- b. va ny-chew-i-k
house 3/1-make-BENEFFECTIVE-REALIS
 He built a house *for* me.

Similar affixes occur in a variety of language families. For example, consider the applicative affixes of the Bantu languages, whose function is to increase the theta grid of the verb, thus allowing it to license an additional argument, usually with a specific thematic role (see Baker 1992 and references cited there). Other languages, most prominently the Philippine languages, have verbal affixes indicating the case of the Topic argument in the clause. Such affixes have been analyzed as case assigners (e.g., Guilfoyle et al. 1992 for Malagsi). I suggest that ISL, as a typical head-marking language, also marks some case relations on the verb: the facing is a verbal affix marking the dative argument of the verb, in a similar fashion to the verbal affixes mentioned above. Such an analysis provides a natural account of the prominence of the object marking in ISL and to the different nature of its two argument-marking mechanisms.¹⁴

The ISL agreement facts are summarized below:

- (6)a. In ISL, agreement is realized as the location specifications (the beginning and end points) of the verb in question.
- b. There are two main types of verbs in the language: verbs which do not inflect for agreement (plain verbs), and verbs which agree (agreement verbs and spatial verbs).
- c. The path movement of spatial and agreement verbs is from the location of the *source* argument to the location of the *goal* argument. Thus, agreement can be said to be thematically determined.

¹⁴ Another possibility would be to regard the facing as an additional agreement mechanism, thus accepting that sign languages differ from spoken languages in allowing two different agreement markings on the verb, and in having an object agreement marker, but not subject agreement marker. Since these differences are accounted for by assuming that the facing is a case assigner, I shall not pursue this second possibility here.

- d. The facing of the hands in agreement verbs is a mechanism distinct from the direction of the path movement. The facing of the hands is towards the R-locus of the syntactic object, and is analyzed here as a dative case assignor.

2. CHALLENGES RAISED BY ISL VERB AGREEMENT

Verb agreement in ISL, as presented in the previous section, is characterized by only two of the four defining properties for agreement constructions. Though the agreement markers (the loci in space) consist of the referential features of the verb's arguments, and as such they are used as a referent tracking device, these arguments are not defined syntactically, but rather according to their spatial thematic roles. Additionally, agreement inflection is not a general property of all the verbs in the language; one of the three verb classes does not inflect for agreement. This raises an acute problem, both typologically and theoretically.

From a typological point of view, no spoken language I am aware of associates agreement with spatial (Source-Goal) thematic roles. Rather, agreement is related to syntactic functions (Subject, Object, Indirect Object). In a few cases it has been suggested that the relevant notions are 'Agent' and 'Patient' (e.g., Lakhota, in Mithun 1991, pp. 515–516). Though these notions are also thematic in nature, they correspond to the syntactic functions of Subject and Object in a much more straightforward manner than the thematic roles of source and goal. In contrast, the source argument can be mapped either to the subject position (e.g., GIVE) or to the object position (e.g., TAKE), and the same holds for the goal argument. Therefore, a linguistic phenomenon captured in source-goal terms cannot be straightforwardly rendered in syntactic terms. Additionally, as was pointed out in section 1.2, agreement morphology is inflectional, and as such it is obligatory. One may account for cases of absence of agreement in otherwise agreeing systems either on syntactic grounds¹⁵ or on morphophonological grounds (i.e., as verbs with deficient paradigms). Argumentation along these lines, however, cannot explain the sign language verb classification, since plain verbs do not differ syntactically from spatial and agreement verbs, and there are many plain verbs whose phonological form does not prevent them from displaying agreement morphology. Therefore, the agreement system of sign languages is unique.

¹⁵ In the Celtic languages, for example, there is a complementarity of inflected forms of the verb and overt subjects. See McCloskey and Hale (1984), and Doron (1988).

From a theoretical point of view, agreement which is thematically determined is very problematic. In various linguistic theories, such as Principle and Parameters approaches (Chomsky 1981, 1986; Chomsky and Lasnik 1993), LFG (Bresnan 1982), and even a lexicon-based theory of agreement (Wunderlich 1994), agreement is defined over specific *syntactic* configurations. It is generally assumed, and has been well motivated, that the semantic content of thematic role labels such as Agent, Patient, Source, Goal, and Theme do not play any role in syntactic processes (see, e.g., Rappaport and Levin 1988; Grimshaw 1990). The situation in ISL clearly poses a problem for this theoretical assumption. Since in ISL the Source and Goal nominals can be *either* the subject *or* the object, the agreement features associated with these thematic roles cannot be located in a particular position in the syntactic configuration. Hence these features cannot be checked.

It would seem, then, that the thematic agreement displayed by agreement verbs cannot be accounted for by existing linguistic theories. One way to approach this problem would be to admit two significantly different types of agreement mechanisms in UG. But a more parsimonious approach would be to require linguistic theory to account for both signed and spoken languages without having to stipulate different mechanisms for the two types of languages. In the following section I will show that this approach is in fact tenable.

3. THE THEMATIC STRUCTURE AGREEMENT (TSA) ANALYSIS¹⁶

The analysis presented in this section shows that in spite of its strong thematic flavor, ISL verb agreement is in fact a structural relation which obtains between a head and its complements. The novel point here is in identifying the element which is marked for agreement in ISL. This element is not the entire verb, but rather only one component of the verb, namely a spatial predicate indicating direction of motion.

¹⁶ This section is based on the analysis developed in Meir (1998b), but differs from it in two important respects. First, Meir (1998b) postulates the existence of another predicate in the structure of agreement verbs, namely, TRANSFER, a predicate denoting a change of possession. However, since the notion of transfer can be read off directly from the LCS of transfer verbs, there is no need to postulate such a predicate, and it is omitted in the present analysis. Secondly, the treatment of the directional morpheme in the earlier analysis is inconsistent, since it is treated both as part of the verb's meaning and as a syntactic complement of the verb. (I thank an anonymous reviewer for pointing this out to me.) In the present analysis, this morpheme is licensed by the verb's LCS, but it is not syntactically selected by it. The present analysis is therefore simpler and more coherent.

3.1. *An Overview of the Analysis*

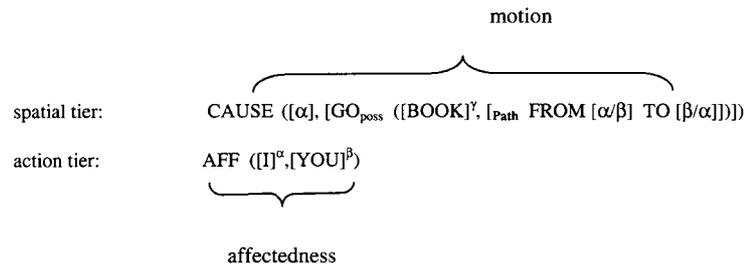
My analysis of agreement verbs takes as its point of departure the morphological analysis presented in section 1.3.3., according to which agreement verbs are morphologically complex. Their morphological complexity is a reflection of their inherent lexical complexity. Agreement verbs consist of three components: the verb root, denoting an event of transfer; a directional morpheme, indicating the direction of motion of the theme argument; and a verbal affix assigning dative case. The two latter components are realized phonologically by the direction of the path movement and the facing of the hands, respectively. The verb root is phonologically manifested by the handshape, location, and manner of movement specifications of the verb.

Let us begin with a discussion of the verb root. Agreement verbs denote an event of transfer. The verb roots of different agreement verbs denote different events of transfer, whether the transferred entity is concrete (e.g., GIVE, TAKE, SEND, PAY), or abstract (as in TEACH, INFORM, ASK, ANSWER). Any event of transfer involves three participants: the two possessors and the transferred entity. It is composed of two sub-events: a motion component, that is, the motion of the transferred entity from one possessor to another, and the causation or instigation of the event by one of the possessors (former possessor in GIVE-type verbs or future possessor in TAKE-type verbs). The event caused by the causer argument affects the other possessor, in that it either acquires or is deprived of a possession.¹⁷ The two possessors are involved in both the affectedness component and the motion component. One possessor is an affector, the other an affectee; additionally, one is the Source and the other the Goal of motion of the transferred entity. Importantly, their roles in the motion part are independent of the affectedness part: the causer can be a source (as in GIVE) or a goal (as in TAKE), and the affected possessor is then a goal or a source respectively.

The lexical structure of an event of transfer is represented in (7), in the notation developed in Jackendoff (1987, 1990):

¹⁷ In case of verbs of transfer of information (e.g., COPY, EXTRACT-INFORMATION (against somebody's will)), the former possessor is not deprived of the information by having it taken from him/her. (I thank an anonymous reviewer for this point.) However, this argument can still be regarded as affected by the transfer event, as the information was released non-voluntarily. Such arguments can occur in sentences such as *What happened to x is that y copied (something)/extracted information from x*. Such sentences are taken as indicative of affectedness (cf. Jackendoff 1990, p. 125).

(7) Lexical Conceptual Structure of Verbs of Transfer



Jackendoff's framework is particularly suitable for representing the lexical structure of ISL agreement verbs. In his approach, the relationship between a predicate and its arguments is captured in terms of two types of thematic relations: spatial (such as Source, Theme, and Goal), and affectedness (Agent-Patient relations). Consequently, an LCS representation is comprised of two tiers: a spatial-thematic tier, and an action (affectedness) tier. The distinction between the two tiers is significant for capturing the thematic structure of verbs of transfer, as they consist of both a motion component and an affectedness component. Each tier is associated with one sub-event of the transfer. The event of motion is related to the spatial thematic tier, and the affectedness relation is represented mainly on the affectedness (AFF) tier. The double-role of the possessor arguments is expressed by the co-indexing between the relevant positions on the two tiers. However, the values for the positions of the motion part are independent of the affectedness part, and could be either $\alpha - \beta$ or $\beta - \alpha$.

The second component of agreement verbs is the direction of the path movement. I suggest that this is comparable to directional morphemes which occur in many spoken languages. These are morphemes (sometimes cognate with prepositions) indicating motion of one of the arguments to or from the speaker/subject. The examples below are from German, where in many cases the base verb is neutral with respect to the direction of motion of the arguments, and morphemes are added (*ein*, *aus*, or *ver*) as prefixes to indicate motion towards or from the speaker/subject. (*Aus* also occurs as a free preposition in the language, meaning 'out of', 'from').¹⁸

¹⁸ I thank Penny Boyes Braem for bringing these verb prefixes to my attention.

(8) Directionals in German:

fahren – to travel	<i>ein</i> fahren – to bring in, to enter	<i>aus</i> fahren – to take out for a drive
gehen – to go, walk,	<i>ein</i> gehen – to arrive, come in	<i>aus</i> gehen – to go out, come out
nehmen – take, accept	<i>ein</i> nehmen – to take, receive	<i>aus</i> nehmen – to take out
senden – to send, transmit	<i>ein</i> senden – to send in, contribute	<i>ver</i> senden – to send off, export
brechen – to break, quarry	<i>ein</i> brechen – to break in	<i>aus</i> brechen – to break out, escape
kaufen – to buy		<i>ver</i> kaufen – to sell
leihen – borrow		<i>aus</i> leihen – lend
berufen – to call, appoint	<i>ein</i> berufen – to convene, summon	

Other spoken languages make an extensive use of directionals. In Jakaltek (A Mayan language) there is no word meaning *push* or *pull*, just one word meaning ‘induce something to move’. A prefix indicating direction gives the reading of one verb or the other (Van Valin and La Polla 1997, p. 43). Samoan also has particles that indicate “direction away [from] . . . (or) towards the speaker” (Marsack 1980, p. 73). For example, the verb *fa’atau* means ‘to exchange goods for money or money for goods’. The appropriate sense of ‘buy’ or ‘sell’ is achieved by means of the directive particles *atu* ‘away’ and *mai* ‘towards’.

(9)a. *fa’atau atu* ‘to sell]

b. *fa’atau mai* ‘to buy’ (Marsack 1980, p. 73)

Several language families in North America, such as Sahaptian and Iroquoian, have directive affixes that indicate motion towards or away from the speaker or other deictic center (Marianne Mithun, personal communication).

Turning to ISL again, I suggest that the path movement is a directional morpheme. The verb root in verbs of transfer is unspecified for the direction of motion of the theme argument, the transferred entity. The information about the direction of motion of the theme is added by the path movement. The path movement indicates whether the causer is the source or goal of the motion, that is, whether it is a former possessor, as in GIVE, or a future possessor, as in TAKE. I gloss this directional morpheme as DIR(ectional).¹⁹ As is the case with *aus* in German, DIR can be realized

¹⁹ In earlier works (Meir 1998b, 2001b), I glossed this morpheme as PATH. However, it was pointed out to me (by an anonymous reviewer) that the PATH function in the Jackendovian sense need not involve motion, as in *The road goes from New York to San Francisco* (Jackendoff 1990, p. 44). Furthermore, PATH need not require Source and Goal, as in *through the woods, along the river*. ISL can express such paths by using morphological devices referred to as ‘Classifier Complexes’, which are used *inter alia* to depict shapes of objects, surfaces, and paths. However, such a mechanism does not involve agreement as defined in this paper. Agreement in ISL is restricted to motion with a Source-Goal path, which I gloss as DIR.

both as an independent word, and as a bound morpheme in the language. Unlike directionals in spoken languages, DIR is not linearly affixed to the stem, but occurs simultaneously with it. It can be regarded as an instance of non-concatenative affixation, not unlike the fusion of roots and patterns of the lexicon in Semitic languages (see Sandler 1989). The properties of DIR are further examined in the next subsection.

As noted in section 1.3.3, I analyze the facing as a verbal affix assigning dative case to the possessor argument affected by the transfer event. In ISL, the facing is determined by the R-locus of the object argument. Therefore, we may say that the dative case also encodes person (referential) distinctions.

These three components, the verb root, the direction of movement, and the facing, are fused together, both phonologically and semantically. Phonologically, they are articulated simultaneously,²⁰ resulting in one phonological word. This is possible because each component is manifested by independent phonological specifications.²¹ Semantically, they all are parts of one unified event, with one set of tense and aspect specifications. After further examining the properties of DIR in 3.2., the fusion of the three components is presented in 3.3.

3.2. *The Properties of DIR*

DIR is a morpheme denoting the *path* or *trajectory* a referent traverses, from one point in space to the other. In other words, it denotes motion along a Source-Goal path. Its LCS is represented in (10):

$$(10) \quad \text{DIR(ectional): } [\text{GO } ([]^\gamma, [\text{Path FROM } []^\alpha \text{ TO } []^\beta)]$$

As its meaning indicates, DIR is a member of the set of predicates denoting spatial relations.²² I claim that spatial predicates in ISL form a natural class, on the basis of their semantic and morphological properties.

²⁰ Simultaneous morphology is very typical of sign languages, and much less so of spoken languages. This difference has captured the attention of many researchers. Works which have addressed this issue include Klima and Bellugi (1979), Deuchar (1984), Kyle and Woll (1985), Emmorey (1995, in press), Aronoff et al. (2000), among others.

²¹ If the verb stem is specified for direction of movement or direction of facing (in addition to being specified for handshape, location, and manner of movement), then a phonological clash occurs, blocking the DIR morpheme or the dative case assigner from surfacing. See Meir (1998b, ch. 5) for a precise formulation of these clashes.

²² Predicates denoting spatial relations in Hebrew, English, and many other spoken languages are usually members of the class of prepositions. I refer to the analogous predicates in ISL as ‘spatial predicates’ rather than prepositions, since these predicates in ISL may differ substantially from their Hebrew or English counterparts.

Semantically, as the name implies, they denote spatial relations. Important to my analysis here is the morphological characteristic of their location specifications being determined by the R-locus of their complement(s).²³ Since the form of these predicates (particularly, their location specifications) is determined by the referential features of their complements, they are said to *agree* with their complements. DIR, being a member of the set of spatial predicates, also exhibits this property. In Figure 5, DIR appears as an independent sign moving from the location of its Source (HOME_a) to the location of its Goal (WORK_b).

DIR agrees with two loci: the locus of the Source (the initial point) and the locus of the Goal (the end point). This reflects its argument structure: DIR takes an ordered paired complement, the source and goal.²⁴ The linear order of the arguments is determined by their semantics: Source precedes Goal.

DIR can appear as an independent sign, as exemplified in Figure 5. It can also appear as a bound morpheme, a directional, in verbs denoting motion from one location to another. The motion can be literal (as in 11) or abstract, in the semantic field of possession (as in 12). When DIR appears as a bound morpheme, it is realized phonologically as the direction of the path movement of the verb, exemplified by the spatial verb _aCL:B(vehicle-move)_b and the agreement verb ₁TEACH₂ in Figure 6.

(11) CAR BLUE _aCL:B(vehicle-move)_b 'The blue car went(drov) from A to B.'

DIR

(12)a. BOOK INDEX_a ₁GIVE₂ 'I gave you this book.'

DIR

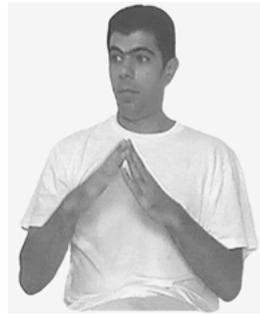
b. INDEX₁ ₁TEACH₂ 'I taught you.'

DIR

As can be seen from sentences (11)–(12), _aDIR_b occurs in a variety of constructions in the language, both as a free form and as a bound directional

²³ This is reminiscent of the analysis of ASL verbs suggested by Gee and Kegl (1982), where the basic verb stems (which are spatial in nature, e.g., IN, ON, AT, TO, FROM) are said to agree with their complements, and the agreement process involves location (p. 187).

²⁴ I treat the source and goal complements of DIR as an ordered pair (and not two distinct roles), since both co-occur in the form of DIR, each role presupposes the other, and there is no hierarchy between them. An alternative analysis is to regard DIR as composed of two combined morphemes, FROM and TO, each taking one complement. (An analysis along these lines is suggested for ASL in Gee and Kegl 1982). Since I have found no morphological or syntactic evidence in ISL for decomposing DIR, I prefer to regard those roles as paired. However, nothing in the analysis developed here hinges on this assumption.



HOME

INDEX_a

WORK

INDEX_b_aDIR_b

Figure 5. HOME INDEX_a WORK INDEX_b _aDIR_b.

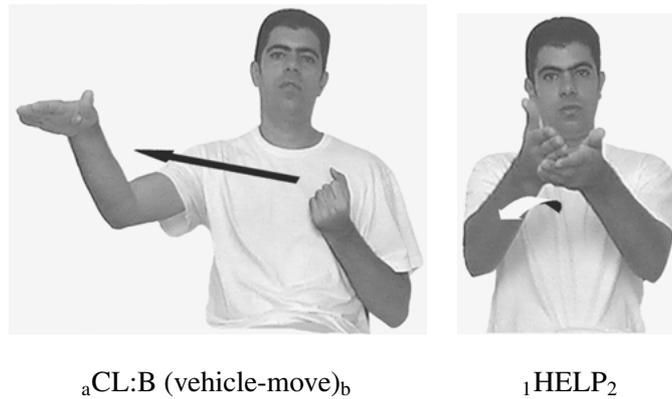


Figure 6. DIR as a component in verbs denoting motion: ${}_a\text{CL}:\text{B}$ (vehicle-move) $_b$ and ${}_1\text{HELP}_2$.

morpheme in verbs denoting motion and change of possession. Notice that in all of its varied occurrences, DIR retains its semantic, phonological, and lexical properties. Semantically, all these sentences involve the meaning of motion from one point to another (whether the motion is literal or abstract). Phonologically, all the above forms contain a path movement on the horizontal plane moving from one location in space to another. Lexically, DIR takes an ordered paired internal argument, to which it assigns the thematic roles of source – goal. DIR agrees with its internal arguments; its initial and final location specifications are determined by their R-loci.

3.3. *The Fusion of the Root and DIR*

DIR as a bound directional morpheme fuses with the different verb roots of verbs denoting transfer. The fusion of the verb root and DIR can be regarded as a unification of their LCSs. When DIR unifies with the verb root, it indicates which of the verb's arguments is the source and which is the goal. That is, unification has the automatic effect of adjusting the α and β in the CAUSE constituent to match those of DIR. In (13) DIR marks α as Source and β as Goal, while the reverse holds for (14).

$$(13) \quad \left(\begin{array}{l} \text{CAUSE} ([\alpha], [\text{GO}_{\text{poss}} ([]^\gamma, [\text{Path FROM } [\alpha/\beta] \text{ TO } [\beta/\alpha]])]) \\ \text{AFF} ([]^\alpha, []^\beta) \\ \cup [\text{GO} ([]^\gamma, \text{Path FROM } []^\alpha \text{ TO } []^\beta) \end{array} \right)$$

$$(14) \quad \left(\begin{array}{l} \text{CAUSE} ([\alpha], [\text{GO}_{\text{poss}} ([]^{\gamma}, [\text{Path FROM } [\alpha/\beta] \text{ TO } [\beta/\alpha]])]) \\ \text{AFF} ([]^{\alpha}, []^{\beta}) \\ \cup [\text{GO} ([]^{\gamma}, [\text{Path FROM } []^{\beta} \text{ TO } []^{\alpha}])] \end{array} \right)$$

The fusion sets the values for the complements of *Path* in the combined LCS, which will result in two different LCSs, one for GIVE-type verbs, and one for TAKE-type verbs ((15a) and (15b), respectively):

- (15) The derived LCS of regular and backwards agreement verbs:
- a. GIVE-type: CAUSE ([α], [GO_{poss} ([BOOK] $^{\gamma}$, [$\text{Path FROM } [\alpha] \text{ TO } [\beta]$])])
AFF ([$^{\alpha}$], [$^{\beta}$])
 - b. TAKE-type: CAUSE ([α], [GO_{poss} ([BOOK] $^{\gamma}$, [$\text{Path FROM } [\beta] \text{ TO } [\alpha]$])])
AFF ([$^{\alpha}$], [$^{\beta}$])

Notice that in order for DIR to set the values for these positions, it needs to 'decide' which argument is the source and which is the goal *before* the fusion with the root. In other words, DIR assigns thematic roles and agrees with its arguments before fusing with the verb root. At this stage of the derivation DIR does not check the referential features of its arguments. This will be done after the fusion with the verb root, as DIR shares its arguments with the verb and is subordinated to it. The features of the shared arguments will be checked in the syntax by the complex verb. However, the assignment of the source-goal roles by DIR, which determines the linear order of affixation in the verb's phonological structure, occurs prior to the fusion of DIR with the verb root.²⁵

The derived LCSs in (15) are mapped into the level of PAS by a set of linking rules, by which more prominent positions on the LCS are mapped into more prominent positions of the PAS. Prominence is determined by the degree of embeddedness of the position: least embedded argument positions are more prominent than deeply embedded ones, and positions on the action tier are more prominent than positions on the thematic tier (Jackendoff 1990, p. 258). Since both GIVE-type and TAKE-type agreement verbs have the same AFF tier, the two types of verbs will have the same PAS, illustrated in (16) below. The first argument of AFF is linked to the external argument position, the second argument of AFF to the internal argument, and the theme argument, the complement of the GO function

²⁵ In this sense we may say that DIR agrees with its arguments before fusing with the verb root. This may be regarded as an instance of inflection inside derivation. While quite rare, Booij (1993) argues that such an ordering is manifested in various morphological phenomena cross-linguistically.

on the thematic tier, is the second internal argument. The positions of the complements of FROM and TO are not linked to syntactic positions, as they are bound by the more prominent positions on the AFF tier. However, their referential specifications contribute to the semantic interpretation of the arguments of AFF as source or goal. They will also contribute to the phonological interpretation of the form of the verb at spell out, as the source-goal order determines the direction of the path movement.

(16) PAS of verbs of transfer:

	$\langle \alpha, \beta, \gamma \rangle$	
case:	dative	acc.

The complex verb assigns an inherent dative case to its possessor internal argument and an accusative case to the theme argument. The dative case, which is assigned to the affected possessor $\langle \beta \rangle$ (in both types of verbs) is realized morphologically as setting the value of the facing of the hands: the hands are facing the R-locus of $\langle \beta \rangle$. Since the facing encodes the referential features of the argument as well, these features will be checked together with the dative case it assigns. The accusative case is not realized by overt morphology, and hence it will not be further dealt with here. The external argument, the argument which is not case-marked by the verb, will raise to TP in order to check its nominative case and referential features. The fact that these arguments are also the [source] and [goal] of DIR is irrelevant for the syntax. These features therefore have no syntactic realization. However, they are realized at PF as a linear ordered pair of the affixes; the R-locus marked as [source] will attach to the prefixal location slot, while the [goal] R-locus will attach to the suffixal slot.

In sum, agreement verbs are complex verbs. They consist of a verb root and a directional morpheme. The directional morpheme agrees with its paired internal arguments, and therefore sets the values for the source and goal arguments in the LCS of the complex verb. The verb also assigns dative case to the affected possessor, which is phonologically realized as the facing of the hands. The referential features of the arguments of the complex verb are checked when the verb checks its nominative and dative cases. The source-goal features are irrelevant for the syntax, but are interpreted at PF as instructions for the linear order of the affixes.

4. SOLVING THE REMAINING ISL PUZZLES

I now return to the challenges posed to linguistic theory by the ISL verb agreement facts: accounting for thematic agreement and explaining the existence of plain verbs in the language.

How can the TSA analysis presented in section 3 explain these puzzles? The answer to this lies in the fact that such an analysis makes it possible for us, and in fact requires us, to focus on each component separately. By doing this, the precise nature of agreement in ISL emerges: agreement is a property of spatial predicates, not of verbs *per se*. Spatial predicates in ISL agree with their internal arguments, in that their location specifications are determined by the referential features (the R-loci) of their arguments, as pointed out in section 3.2. Verbs, on the other hand, are not inherently marked for agreement. The agreement features of agreement verbs and spatial verbs are actually ‘inherited’ from the directional morpheme DIR, which is attached to them.

By assuming that agreement is a property of DIR and not of the verbs themselves, the agreement relations *per se* no longer need to refer to thematic (Source/Goal) terms. DIR agrees with its paired internal arguments. Agreement is a relation which obtains between a head and its complement, and therefore can be stated in purely configurational terms. Taking the definition of agreement in section 1, “a grammatical element X matches a grammatical element Y in a property Z within some grammatical configuration”, we may state the ISL agreement facts in (17):

- (17) DIR matches its complements in their R-loci (referential features).

The thematic notions of Source and Goal are not mentioned in this definition. The thematic ‘flavor’ of agreement in ISL is due to the close relationship between the thematic roles which DIR assigns to its arguments and the agreement slots these arguments are associated with. DIR assigns the thematic roles of Source and Goal to its internal arguments. The association of these arguments to the two available agreement slots expresses the thematic distinction between them: the Source argument is linked to the prefixal slot, and the Goal argument to the suffixal slot. Therefore, each agreement slot is always associated with a specific spatial thematic role. The agreement relation is stated in configurational terms as a head-complement relation, and need not be stated in thematic terms. In other words, agreement in ISL is related to specific spatial thematic roles because of the spatial nature of the *agreeing element*, and not because of the agreement relations.

The second puzzle also finds a natural explanation by the assumption that in ISL, overt agreement inflection is a property of spatial predicates rather than of verbs. Since agreement is not a property of verbs, it is expected that verbs do not inflect for agreement. The fact that some verbs do so is the result of incorporating an element that is marked for agreement – DIR in our case – in the structure of some verbs. Only verbs that fuse with DIR show overt agreement morphology, since only these verbs contain an element which is morphologically capable of being inflected for agreement. Other verbs lack the morphological ability to mark agreement overtly. These constitute the class of plain verbs. Whether or not a verb co-occurs with DIR is determined by its meaning. DIR is licensed by the [_{Path} [FROM, TO]] category in the verb's LCS. Only verbs denoting motion from source to goal can license DIR. Plain verbs are neither motion nor transfer verbs, and therefore cannot license it. The Thematic Structure Agreement analysis, therefore, both explains the existence of plain verbs and makes predictions concerning the members of this class.

Let us return to the defining properties of verb agreement presented in section 1.2. Of the four properties mentioned, two seemed problematic with respect to the ISL data: agreement as a syntactic phenomenon, and agreement morphology as a general property of verbs in a given language. The TSA analysis shows that agreement in ISL does in fact follow these guidelines. The term 'verb agreement', though, is somewhat misleading, as agreement in ISL is not a property of verbs, but rather of spatial predicates. A more adequate term might be 'predicate agreement'. In ISL, then, predicate agreement is a relationship which holds between a predicate and its complements (that is, it is defined syntactically), and is a general property of the class of spatial predicates. Therefore, predicate agreement in ISL is justifiably regarded as an instance of agreement.

5. THE IMPACT OF MODALITY

The main conclusion of the TSA analysis is that agreement is basically a syntactic relation between a head and its dependents in both signed and spoken languages. Thus, languages in both modalities can be accounted for by the same theoretical apparatus. Yet, verb agreement in sign languages still looks very different from agreement constructions in spoken languages. The tripartite classification – plain, agreement, and spatial verbs – which seems to characterize sign languages in general (Newport and Supalla 2000; Sandler and Lillo-Martin 2001) has no equivalent in spoken languages. And though this classification has been shown to follow general linguistic principles, nonetheless it still sets sign languages apart as

a group. The question that arises, then, is why there should be such a difference? If agreement is essentially a unified phenomenon, why do sign languages seem so different? There are two facets to this difference: the first is the fact that no spoken language I am aware of exhibits the tripartite verb classification of ISL. The second is the striking cross-linguistic similarity between different sign languages regarding verb classification. Notice that the similarity is both in the morphological form and in the semantics of these verb classes. An equivalent in spoken languages would be for all spoken languages to have the Semitic 'binyanim' (verb classes), and, even more than that, for all spoken languages to have precisely the same classes, both in form and in meaning or syntactic valency. Clearly, no such uniformity is found across spoken languages. This root and pattern morphological trait is a property of only one specific language family, and within that family, the number of forms and their associated meanings vary from language to language.²⁶

Considering sign languages in the context of cognitive modularity, Sandler (1993) argues that a comprehensive theory of language should not only highlight the similarities between signed and spoken languages, but should also pinpoint where the two types of languages differ from each other and, ultimately, offer an explanation for these differences. Since verb agreement is a central aspect of the grammar of sign languages, it is both a fitting and a useful vehicle for examining sign languages in this broader theoretical context. In the remainder of this section, I focus on the differences between languages in the two modalities with respect to agreement and suggest some possible directions for examining these factors and their theoretical significance.

5.1. *In What Ways Do Sign Languages Differ from Spoken Languages?*

5.1.1. *The Nature of the Agreeing Element*

The first major difference between the agreement systems of languages in the two modalities lies in the nature of the agreeing element: in spoken languages the agreeing element is the verb or the auxiliary, while in sign languages, according to the analysis proposed here, it is spatial predicates, DIR in particular. Spatial predicates differ from adpositions in spoken languages in an important respect. Sign language spatial predicates are

²⁶ It is important to stress that the similarities between unrelated sign languages are much more striking than is the case for unrelated spoken languages, and that these common traits appear in all levels of linguistic structure (Newport and Supalla 2000; Sandler 1993; Sandler and Lillo-Martin 2001). Furthermore, the particular combination of properties found in sign languages generally is not found in any spoken language (Gee and Goodhart 1988; Sandler and Lillo-Martin 2001).

iconic: their form is a transparent representation of the spatial relation they represent.²⁷ For example, DIR, which is phonologically realized as a path movement on the horizontal plane from one location to another (see Figure 5), is an iconic representation of the semantic notion ‘path’, a space which is one dimensional and has a direction (Jackendoff 1996, p. 320). In spoken languages this possibility is not available: sounds emitted by the vocal tract cannot represent spatial relations in the direct manner which is possible in the visual modality.

5.1.2. *The Morphological Marking of Spatial Relations*

Both signed and spoken languages have directionals (see examples (8–10)). However, there is a difference in the extent and regularity to which this device is used by languages of the two modalities. There are many spoken languages whose morphology does not reflect the direction of motion at all. And even in those languages where motion is encoded morphologically, this coding is not regular. For example, the German particles in (8) do not reflect motion towards or away from the speaker in all of their occurrences in the language. In sign languages, on the other hand, spatial relations are reflected by the morphology of a sign whenever its meaning has a spatial component in it. As claimed here, all verbs whose meanings involve motion from source to goal (a path) license a DIR morpheme in their morphology.²⁸ Thus, large portions of the signs in the sign language lexicon reflect the motion aspect of the spatial tier of their LCS in their morphology.

5.2. *The Structure of the Lexicon and Other Theoretical Implications*

The comparison between signed and spoken languages in the previous section pointed out two important ways in which they differ: in the choice of the agreeing element and in the morphophonological realization of spatial relations. These differences have significant theoretical implications, both for the interaction between modality and the structure of language, and for restrictions that modality imposes on the structure of the lexicon.

The first point is especially intriguing. Sign language agreement is tied to a particular predicate directly related to the spatial thematic tier of the LCS. Spoken language verb agreement is not related to the conceptual

²⁷ Gee and Kegl (1982) agree; they describe predicates denoting spatial relation (their ‘locative/directional verbs’) as verbs “whose phonetics and semantics are isomorphic” (p. 199). See also Schick (1990).

²⁸ This generalization is too strong, since there are some cases of verbs which denote transfer, yet DIR is blocked from surfacing for phonological reasons, as pointed out in section 1.3.2.

structure of the verb, but rather to strictly syntactic positions.²⁹ Why should modality make such a difference? I would like to sketch a possible, though admittedly tentative, explanation, one which has to do with the function of agreement.

It has been pointed out (by Lehmann 1988 and Croft 1988, among others) that the function of agreement is to keep track of individual referents over a stretch of discourse. The arguments most likely to trigger such a mechanism are those which are stable, in the sense that they persist throughout this stretch of discourse. In spoken languages, the arguments cross-referenced by agreement are the most salient ones, that is, the arguments most closely involved in the described event (Croft 1988). Saliency correlates with syntactic prominence, as well as with being high on the animacy and definiteness hierarchies, “since the most salient entities are those most closely involved in the described event, closest in nature to the speaker, and most easily identifiable” (Croft 1988, p. 168). Referent tracking is therefore closely related to the way an event is encoded in the syntactic structure of the language. The element carrying the agreement marking is the verbal element, the element that represents the eventuality.

In sign languages, saliency may be encoded not only in syntactic terms, but also by visual-spatial means. Indeed, the mechanism of referent identification is achieved by means of spatial localization (see the establishment of referential-loci in space, section 1.3.1). Referent tracking, which is built on the identification mechanism, also employs visual-spatial cognition. In an event of motion, the most salient entity is the moving entity, as movement enhances perception (Movshon 1990). However, the most stable referents in space are those which do not move. In an event of motion, those are the source and goal arguments. They serve as anchor points in space, while the theme argument moves between them. Referent tracking in a visual-spatial system is linked to the anchor points in an event of motion. Hence, agreement in a visual-spatial language is marked on a predicate encoding an event of motion between points in space, which is precisely what DIR encodes.

Yet another question remains: Why is it that sign languages show clear-cut preference for using a visual-spatial tracking device over a syntactic mechanism? It is possible that in a visual-spatial system, identification via localization is easier to process and to retain in memory than identification via abstract, arbitrary morphological categories such as gender, person, and number. I leave this question open.³⁰

²⁹ I thank an anonymous reviewer for this point.

³⁰ That spatial localization aids memory for signers has been demonstrated experimentally by Wilson and Emmorey (2000, and references cited there). They found that in serial

A second important difference between languages in the two modalities concerns the phonological realization of spatial relations. In sign languages, spatial predicates are iconic. Their form is a direct manifestation of the relationship they represent. In spoken languages, predicates denoting spatial relations cannot be iconic. The nature of the acoustic signal is so different from the three-dimensional space where spatial relations take place as to render impossible any direct mapping between spatial relations and sounds. The availability of iconicity in signed language spatial predicates may offer a partial explanation for the striking cross-linguistic resemblance in verb classes between unrelated sign languages. Predicate agreement in sign languages is anchored in a spatial predicate, namely, DIR. The visual modality enables visual languages to express DIR iconically. Sign languages exploit this possibility, which results in a similar meaning-form mapping in different visual languages, and hence their similarity in form and meaning with respect to verb classes.³¹ Spoken languages cannot exploit this possibility. The expression of spatial relations in speech is necessarily arbitrary. Consequently, there is a wide variety of forms for conveying spatial relations in languages transmitted in the auditory modality, as the above examples from German show.

The modality particular characteristics of sign language verb agreement impose some demands on the structure of a theory of the lexicon. First, important aspects of sign language morphology are best captured in spatial terms. Therefore, sign languages support a model of the lexicon in which generalizations can be made by using spatial conceptual categories. Moreover, the distinction between the direction of the path and the facing of the hands in the morphology of agreement verbs (section 1.3.3) shows that it is necessary to distinguish formally between spatial and non-spatial thematic roles. The double marking of the arguments of agreement verbs (section 1.4) further suggests that an argument may be assigned two thematic roles, one of each kind. This necessitates a model of the grammar that allows for such double theta-role assignment. The iconicity of spatial predicates in sign languages indicates that there must be a direct link between certain semantic components of a predicate and its phonological form. That is, the semantic component and the phonological component of a lexical item must be allowed to interact directly. Finally, if

recall tasks, performance was improved when signers signed each item in a different location in space. These results indicate that spatial coding is used as a memory device which assists performance in such tasks. These findings may also shed light on linguistic processes involving retaining referents in memory, such as agreement.

³¹ See Johnston (1991) and Taub (1997) for similar conclusions regarding the role of iconicity in explaining some striking cross-linguistic similarities among unrelated sign languages.

the explanation proposed above regarding the preference of sign languages for a visual-spatial agreement system is on the right track, then a model of the grammar must allow for interaction between language and other cognitive abilities, e.g., visual-spatial perception and cognition.³²

A model compatible with these features has been suggested by Jackendoff (1990, 1997). This model was constructed on the basis of spoken languages only. Hence the data and analysis of ISL presented here constitute important evidence supporting this model as a model of natural language, and not only of spoken languages. However, the contribution of sign languages is not merely in providing supportive evidence for such a theory. Rather, they offer special insight into what the structure of spatially-based grammatical models might be, because of the transparent nature of certain aspects of their morphology.

5.3. *Conclusions*

The study of verb agreement in ISL has been instructive from two different points of view: the study of agreement and the study of the role of modality in determining linguistic structure. The analysis presented in this paper shows that predicate agreement is a unified mechanism in both signed and spoken languages, as it can be captured in configurational terms. Agreement is a head-dependent relationship, by which the phi-features of the dependent are marked on the head, thus enabling the identification of the dependents grammatically. However, although languages of different modalities share many significant formal features, the physical modality of languages cannot be ignored. It determines important aspects of linguistic structure, i.e., the nature of the elements participating in a construction and the way in which thematic notions are mapped into the morphology. It is important to note that similar conclusions about the interaction between linguistic structure and modality were arrived at in studies of other linguistic phenomena, including the phonological structure of sign languages (Sandler 1993; Uyechi 1994; Brentari 1999; van der Hulst 1993), the inflection of nouns in Italian SL (Pizzuto and Corazza 1996), and Noun Incorporation in ISL (Meir 2001a). This indicates that the role of modality is restricted neither to one particular phenomenon nor to one linguistic level; its effects are much more general. Obviously, then, restricting linguistic investigation to languages of one modality would hinder the development of a theoretical framework which will explain this interaction. Sign lan-

³² Such a conclusion was reached by Sandler (1993), on the basis of investigating (mainly) the phonological structure of ASL. The analysis suggested here provides additional evidence in support of this conclusion by looking at verb agreement.

guages are therefore indispensable for a full understanding of the nature of language.

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