

THE MORPHOLOGICAL REALIZATION OF SEMANTIC FIELDS

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1 Introduction

Though the lexicon is sometimes referred to as 'a collection of idiosyncratic forms', it has nonetheless also been pointed out that there is a lot of regularity and generalizations that hold between different lexical items. Restricting ourselves to verbs, such systematic meaning relations may refer to aspectual notions, i.e., perfectivity, telicity, and stativity; to valence-changing operations such as causativization, passivization and reflexivization; and to systematic metaphorical extensions across different semantic fields, for example by using spatial lexical items to denote possessional or temporal notions (Rappaprot-Hovav & Levin (henceforth RH&L) 1998).

Quite often, systematic meaning relations among words are encoded morphologically. Many spoken languages have morphological markers for marking aspectual notions or for valence-changing operations. In Russian, for example, a telic verb may be derived from an atelic verb by affixation, as in (1). In Hebrew, many valence-changing operations are encoded by using the different verb patterns (the so-called *binyanim*), exemplified in (2). In such cases, there seems to be some kind of parallelism between the morphology and the semantics, in that morphological complexity corresponds to semantic complexity.

1. Russian: *pit* ('drink', atelic), *vyvit* ('drink up', telic)
2. Hebrew: *zaz* ('move', intr.) – *heziz* ('move', causative) – *huzaz* ('be-moved')

However, the third type of semantic relations mentioned above, systematic metaphorical extensions across different semantic fields, is not morphologically encoded in spoken languages. For example, a verb such as *go* and the prepositions *to* and *from* (in 3a-c below) are systematically polysemous when used in spatial, possessional or identificational semantic fields (Gruber 1965, Jackendoff 1990, 2002).

3. a. The messenger *went from* Paris *to* Istanbul.

- b. The inheritance finally *went to* Fred.
- c. The light *went from* green *to* red.

(Jackendoff 2002;356)

In (3a), the verb denotes actual motion along a path. In (3b-c), there is no actual motion; rather, the verb expresses that the subject argument underwent some kind of a change: change of possessors in (3b), and change of properties in (3c). The specific sense of *go* in each of these sentences is inferred from the nature of the complements of the prepositions *from* and *to* (locations, possessors or properties respectively). Using Jackendoff's terminology, we may say that each sentence denotes an event in a specific semantic field: spatial, possessional and identificational respectively. It is the specific semantic field that determines the special interpretation of *go*, *from* and *to*. However, though the meaning relationship between lexical items in different fields are systematic and recur in many lexical items within a language, and in many languages, such relations are not encoded morphologically. This is, by no means, a peculiarity of English. RH&L (1998;264) point out that "We know of no language in which the morphological shape of a verb reflects the semantic field it is being used in." This statement points to a gap in the relationship between morphology and semantics. Though semantic notions referring to aspect or to valance are often expressed in the morphology, semantic field features are not.

In this paper I argue that Israeli Sign Language, as a representative of sign languages in general, constitutes precisely such a language; that is, a language in which the morphological properties of a verb reflect and are determined by the semantic field the verb is being used in. By this claim I do not mean that there is a specific **morpheme** in the language encoding semantic field or indicating metaphorical use. Rather, different semantic fields have different morphological **properties** in ISL, which are reflected in the morphological properties of the verbs used in these fields.

I first examine the various manifestations of semantic fields in spoken languages (section 2), and then turn to look at the morphological properties of each of the fields in ISL (section 3-6). Section 7 examines the implications the analysis for general linguistic theory.

2 **Semantic field effects in spoken languages**

Before turning to ISL, let us first look at how the different semantic fields are manifested in the linguistic structure of spoken languages. The examples here are from English, but similar phenomena are attested in other spoken languages. The term 'semantic field' is used here in the sense of Jackendoff's lexical-semantic theory (1990, 2002), whereby a situation is encoded in terms of core conceptual functions around which situations are organized, such as BE, STAY, GO, the arguments of these functions, and a semantic field feature. The conceptual functions specify the type of situation expressed by the predicate, and determine the (number and type of) arguments participating in the event. The semantic field feature "... determines the **character** of the arguments and the sort of **inferences** that can be drawn." (Jackendoff 2002;360, emphasis mine, I. M.). The semantic structure of a predicate is given in a Lexical Conceptual Structure (LCS) schema.

Let us look at a set of sentences expressing a CHANGE event in four different semantic fields (the first three sentences were presented above (3a-c), and are repeated here for convenience):

4. a. The messenger *went from* Paris *to* Istanbul. [location]
- b. The inheritance finally *went to* Fred. [possession]
- c. The light *went from* green *to* red. [identification]
- d. The meeting was changed *from* Tuesday *to* Monday. [temporal]

(Jackendoff 2002;356-357)

All of these sentences denote a CHANGE event: the subject of each sentence undergoes some kind of change; it is being characterized as being at state 1 at the beginning of the event, and at state 2 at its end. This is represented schematically by the LCS in (5), where the change is captured by the GO function, and state 1 and state 2 by the arguments of the FROM and TO functions:

5. GO (X, [_{Path} FROM (Y) TO (Z)])

The sentences in (4a-d) differ with respect to the nature of the arguments, that is, the variables in the LCS. This is determined by the specific semantic field, as summarized in Table 1:

The semantic field	X	Y and Z
Spatial	An object	Locations
Possession	An object (concrete or abstract)	Human beings (possessors)
Temporal	An event	Points in time
Identificational	Entity	Properties of the entity

Table 1: The nature of arguments in different semantic fields

In addition to determining the nature of the arguments, semantic fields often determine specific lexical choices. For example, in sentences denoting states in English, each semantic field employs a different preposition (or none at all), as illustrated in (6a-d). The choice of verb may also vary depending on the field: the verb *go* is used in the spatial, possession and identificational fields, as shown in sentences (4a-c) above, but in the temporal field a different verb is used, *be-moved* or *be-changed* (ibid., p. 359):

6. Choice of prepositions:

- a) The book is *in* the drawer.
- b) The meeting is *on* Monday.
- c) The money is *with* Fred.(?)
- d) The light is \emptyset green.

7. Choice of verb:

- a) He *went* to Istanbul.
- b) The meeting (**went*) *was changed* from Tuesday to Wednesday.

(Jackendoff 2002, 359)

Another difference between the fields is in the variety of prepositions that can be used. The spatial semantic field allows for finer (gradient) distinctions (exemplified in 8), while other fields are much more restricted (9-11).

8. He went *to/towards/in the direction of/closer to* the hill.
9. He gave the book *to/*towards/*in the direction of/*closer to* Tom.
10. The light changed *to/*towards/*in the direction of/*closer to* green.

11. The meeting was moved *to/ closer to /*towards/*in the direction of* Monday.

Jackendoff attributes this difference to the nature of the semantic field in question. He points out (ibid., p. 361) that possession, for example, unlike space, is discontinuous; there are no intermediate points between one possessor or another. Hence the only specifiable points on the possessional 'path' are the initial and final points, that is, the former or future possessors.

The effects of the semantic fields in English, then, are mainly on the types of arguments and possible inferences, on lexical choices and on some aspects of the syntactic structure of the sentences. There are no effects on the form of the verbs. We now turn to a language in a different modality, the visual-spatial modality, and examine the effects of the semantic fields in this language. My claim is that in visual-spatial languages, illustrated here by ISL, the semantic field effects are manifested in the morphology of the verbs as well. The reason is that each semantic field has distinct morphological properties, which determine at least some of the morphological properties of verbs and predicates in that field. These properties have to do with two factors: 1. whether or not R-loci are employed; 2. the nature of use of space. The next three sections examine the morphological properties of the four semantic fields in ISL with respect to these factors.

3 Spatial and possessional fields in ISL

Verbs denoting change in the spatial and the possessional semantic field show strong morphological resemblance. In both types of verbs, the beginning and end points are not lexically specified, but are rather determined by locations in space associated with the arguments of the verb. These points, often referred to as R-loci, determine the direction of the path movement of the verb. R-loci lie at the heart of the referential system of sign languages, and are central to understanding the morphological properties of the different semantic fields. Therefore they are described in some detail here.

In sign languages, nominals in a clause are associated with discrete locations in space, called 'R(eferential)-loci'. This association is usually achieved by signing a

NP and then pointing to, or directing the gaze towards, a specific point in space.¹ 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, among others, Bahan 1996, Janis 1992, Klima and Bellugi 1979, Lillo-Martin and Klima 1990, Meier 1990). Note, however, that these locations are not determined by categories of features like e.g., gender or noun class. Each argument is assigned its own R-locus, and therefore it can be regarded more as an index than as feature complex. Sign languages, then, have overt R-indices (Lillo-Martin and Klima, 1990).

In addition to pronominal signs, verbs denoting motion (change of location) and transfer (change of possession)² also make use of the system of R-loci: the initial and final points of the verbs are not lexically specified. Rather, they are determined in each discourse with the locations in space associated with the R-loci established for the source and goal arguments of the verb. The verb's path movement, then, is from the R-locus associated with the source argument to that associated with the goal argument.

The two ISL sentences in (12-13) below denote a change of location and a change of possession. In both, two arguments are associated with specific locations in space, and the verb's path moves from the source location to the goal location.

12. JERUSALEM INDEX_a, TEL-AVIV INDEX_b, CAR_aPATH_b.

'The car went from Jerusalem to Tel-Aviv.'

13. BOY INDEX_a, GIRL INDEX_b, BOOK_aGIVE_b.

'The boy gave the book to the girl.'

The two pointing signs in (12), INDEX_a and INDEX_b, are associated with locative referents, that is, locations. The same two signs in (13) are associated with human referents, the two possessors (former and future possessor) in the giving event depicted in the sentence. In both sentences, the predicate is a sign whose path movement is variable, in the sense that its initial and final points are determined by

¹ The pointing sign is often glossed as INDEX, and the subscript following it indicates a specific point in space.

² Motion and transfer verbs are often called 'spatial verbs' and 'agreement verbs', respectively, based on Padden's (1988) classification of verbs in ASL.

the points in space established by the INDEX signs. And in both sentences, the path moves from source to goal.

The spatial and possessional semantic fields, then, both make use of R-loci in a similar way. In verbs in both fields, the initial and final points are associated with R-loci of the Source and Goal arguments of the verbs (Meir 2002). Yet there are important differences between the two fields. These differences have to do with the use of space. In the spatial semantic field, the signing space is taken as an analogous representation of real world space, which is continuous. In the semantic field of possession, the signing space consists of discrete points/sub-parts. This difference, between a continuous and a discrete use of space, determines the interpretation of the relationship between the R-loci, and the possible forms of the path movement of the verb.

The differences between the two uses of space can be illustrated by the following example: Consider two loci A and B in the signing space. In (a) these loci correspond to locations, while in (b) they correspond to persons³.

- 14.
- | | | |
|---|---|---|
| o | o | o |
| A | C | B |
- a) A=Jerusalem B=Tel-Aviv
I LIVE INDEX_A 'I live in Jerusalem'
- b) A=John B=Mary
INDEX_A HAPPY. 'He (John) is happy.'

The difference between the two types of pronouns emerges when the signer points to point C, a location close to, but not identical with point A. In the case of (b), this phonetic variation does not result in a change of the meaning of the sentence. As long as point C is closer to A than to B, the sentence would still mean 'John is happy'. In the case of (a), however, the sentence would have a different meaning: 'I live in a place between Jerusalem and Tel-Aviv which is closer to Jerusalem'. The difference between (a) and (b) when pointing to C rather than to A, highlights the differences

³This example is based on Janis's example for ASL (Janis 1992:135), but it holds for ISL as well.

between the two uses of space. This difference manifests itself in various aspects of the morphological behavior of R-loci and verbs in the two fields, described in (i-iv):

- i. Phonetic variations: Variations in the actual forms of pointing signs, that is, pointing to locations close to each other, but not to the same location, are regarded as phonetic variations in the case of personal pronouns, but as meaningful distinctions in the case of locative pronouns, as illustrated above.⁴
- ii. Expression of spatial relations: Locative forms express spatial relations, whereas personal pronoun forms do not. Therefore, loci assigned to personal referents do not imply any spatial relations between these referents; but with locative referents, the relative position with respect to each other is representative of the spatial relations between them.
- iii. The space between two loci: Since locative forms express spatial relations, establishing two locative loci necessarily assumes that there is space between them. Thus the notion ‘between x and y’ is implicitly expressed (Janis 1992;137). In other words, the space between two locative pronouns is meaningful, and can be later referred to in the discourse. In the case of personal pronouns, on the other hand, the space between two pronouns is non-meaningful.
- iv. Introducing a new locus: Since the space between two locative pronouns is meaningful and in a sense implicit, there is also the implication that there are other loci in that space. Hence, when the signer points at a new locus not mentioned previously (such as point C in the example above), this locus is interpreted with respect to the already established spatial relations that hold between A and B. That is, it is interpreted as a point (or a location) between A and B, but closer to A. The situation is different when A and B are associated with non-locative referents: the space between A and B is not meaningful. Therefore, no other loci are implicated. When a new locus is pointed at, there are two possibilities: either the new point is construed as one of the existing loci (if it is closer to one than to the other), or the new locus is uninterpretable since the locus has not been associated with a referent.
- v. Modification of path movement: The path movement of spatial verbs can be modified to reflect the shape of the path traversed by an entity, e.g., zig-zag, circles, ascending, descending etc. The path in change of possession verbs cannot

⁴ This difference was mentioned by Padden (1988) as the most salient criterion for distinguishing between agreement and spatial verbs, but holds of pronouns as well, as pointed out by Janis 1992.

be modified in such way. It has a stable form, specified for each lexical entry. For example, the verbs SEND and HELP have a straight path movement; GIVE, TELL, ASK have an arc path movement; the verbs TEACH and EXPLAIN have a short double movement. It is not possible to change the inherent movement features of these verbs.⁵

- vi. The relationship between the path and the R-loci: In the spatial domain, if the path movement does not reach point B, the interpretation is that the entity in motion has not reached the location associated with B. In the possessional domain, what is important is the general direction of the path. Whether it actually starts at A or ends at B does not result in change of meaning.

Though there are clear distinctions between the two uses of space, they can also overlap. First, when referents are present, pointing signs are directed towards their actual location. In such cases, phonetic variations of the pointing signs (i.e., pointing in a direction close to the location of a referent) are more likely to be interpreted as distinctive than when the referents are not present. That is, though the signs are used to refer to persons and not to locations, the use of space seems to be continuous rather than discrete in these contexts.

Second, sometimes an event involves both a change of motion and of possession. Take for example a sentence such as *'Mary handed Harry the book.'* In such cases, the verb may exhibit either continuous or discrete use of space, depending of whether change of location or change of possession is highlighted (Meir 1998).

In sum, verbs in the spatial and possessional semantic fields share a common morphological structure: in both fields, the phonological specifications for the beginning and end points are determined by the R-loci associated with the verb's argument, and the direction of the path movement is from source to goal. They differ in the way they use space. In the spatial domain, space is continuous; R-loci are part of a continuum, so that by establishing R-loci, the continuum between them is also established. Other points on this continuum and the relationship between different

⁵ The path movement of verbs of transfer, as well as other verbs in the language, can be modulated to express aspectual modulations, such as continuative and iterative (see Meir and Sandler 2007 for ISL; Klima & Bellugi 1979 for ASL). Another possible modulation is the height of the path. As has been noticed by Liddell (1990) for ASL, and holds for ISL as well, when one of the arguments is taller than the other, the path will go from a lower to a higher R-loci, or the reverse. For example, when the arguments of the verb ASK are a mother and a child, the path of the verb is from a higher to a lower point if the mother is asking the child a question, and from a lower to a higher point in the reverse case.

points along it (the 'between' sense), are all implied in that system. In the possessional domain, on the other hand, space is comprised of discrete sub-parts: each R-locus represents a discrete independent unit. Therefore, what matters is that the loci are distinct from one another, but the spatial arrangement or relationship among the units is irrelevant.

4 **Temporal semantic field**

In many languages, temporal concepts are often expressed by using spatial expressions, such as spatial propositions and verbs of motion, e.g., *the coming year*, *the time ahead of us*, *the worst period is behind us*, *a year ago*.⁶ Sign languages, as languages articulated in space, can incorporate these spatial notions in the forms of signs themselves. In many sign languages, vocabulary items denoting temporal concepts are located on an imaginary time line, a horizontal line located at cheek or shoulder height. On this line, the signer's body constitutes a reference point denoting the present. The past is conceptualized as the area behind the shoulder or cheek, while the future occupies the area in front of the signer. The direction of the movement in signs denoting time concepts expresses temporal relation. An example will help. The signs YESTERDAY and TOMORROW in Figure 1a-b are a minimal pair. They have the same hand configuration and location, but differ in the direction of movement. In YESTERDAY the hand moves backwards, and in TOMORROW the hand moves forwards. Other pairs of signs in ISL are also similarly distinguished by the direction of the path, e.g., 'last week/year' vs. 'next week/year'.⁷

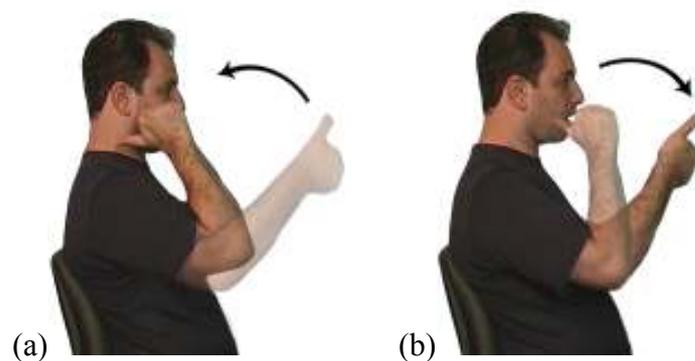


Figure 1: (a) YESTERDAY (b) TOMORROW

⁶ Lyons (1977:718) points out that "The spatialization of time is so obvious and so pervasive a phenomenon in the grammatical and lexical structure of so many of the world's languages that it has been frequently noted, even by scholars who would not think of themselves as subscribing to the hypothesis of localism."

⁷ For a detailed analysis of the use of the time line in temporal expressions in ASL, see Taub 2001, ch. 7.

Since temporal notions and relations are expressed as motion along a time line, one might expect that the structure of signs denoting change of time would be very similar to that of verbs denoting change of location, since change of time could be expressed as a change in spatial location on an imaginary time line. And indeed, there are some similarities in the structure of verbs in the two domains; in both, the sign consists of a path movement whose direction is variable. However, there are important differences as well. These differences stem from two facts: (a) In ISL temporal expressions are not localized, and (b) The nature of the space is different: temporal expressions, unlike spatial expressions, are located on specific **axes** in space, not in a three dimensional space.

Let us look at an ISL sentence expressing a CHANGE event in the temporal domain, that is, re-scheduling an event in time:

15. MEETING TOMORROW INDEX_a POSTPONE NEXT-WEEK.

'The meeting was postponed from tomorrow to next week' (or – 'The meeting scheduled for tomorrow was postponed to next week.')

As is evident from the ISL glosses, the temporal expressions TOMORROW and NEXT-WEEK are not associated with R-loci in space. Therefore, the initial and final points of the verb cannot be determined by association with previously established R-loci. The direction of the verb's path movement is determined by its meaning. Since the verb POSTPONE means 'moving forward in time', the direction is from the signer's body forward, that is, from a point proximal to the signer to a distal point. Moving from a distal to a proximal point has the meaning of 'pre-pone', moving backwards in time. The initial and final points, then, are not associated with specific loci in space. Rather, it is the spatial relationship among them (proximal or distal with respect to the signer's body) that encodes the direction of the temporal change.

Some signers localize the event, the meeting in (15) (MEETING TOMORROW **INDEX_a**). The initial temporal expression is a modifier of the noun ('the meeting tomorrow') and not an independent phrase. The verb then moves from the R-locus assigned to the event either forward or backward, depending on whether the event was postponed or pre-poned. This is in contrast with verbs of change of

location or possession, where the direction of the path is fully determined by the locations in space associated with the source and goal argument.

The prepositions *from* and *to* are used in English not only to express change in time (as in 16), but also to express a stretch of time (as in 17):

16. The meeting was moved *from* 2 *to* 4.

17. The meeting is *from* 2 *to* 4.

ISL differs in that respect: for re-scheduling events, the forward-backward axis is used (that is, an axis perpendicular to the signer's chest, as in Figures 2a-b). A stretch of time, in contrast, is expressed by employing the side-to-side axis (the axis parallel to the signer's chest, illustrated in Figure 2c).

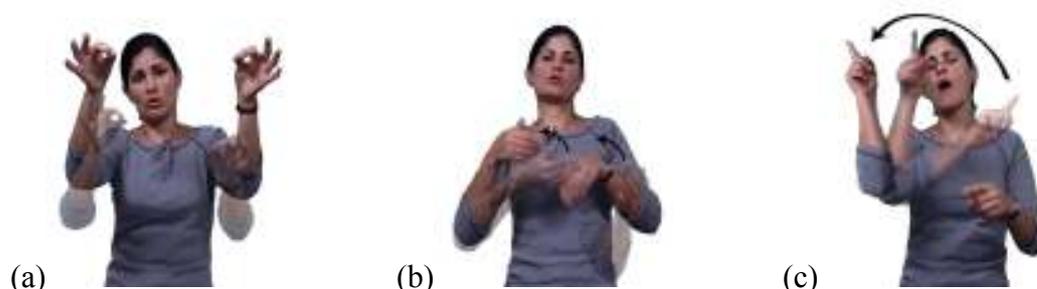


Figure 2: Axes in the temporal field: (a) POSTPONE, (b) PREPONE, (c) time stretch.

The temporal semantic field, then, differs from the spatial and possessional fields in that its Y and Z arguments are not localized. Additionally, verbs in this field move along specific axes in space: the signer-forward axis, and the side to side axis. In ISL, it seems that no reference is made to specific points along these axes; what matters is the relationship between the initial and final points. However, other sign languages may exhibit different behavior. According to Wilbur (in press, 17), in ASL

"It is also possible for the time of the event to be meaningfully manipulated in appropriate contexts (18 [her 15]). In (18b), the final occurrence of the sign POSTPONE can be made with two forward movements, one stopping at a point (p_1) for one week, and the second at a more distal point for two weeks (p_2). The discourse context determines how these time points are interpreted (weeks, minutes, etc.)."

18. a. WEDDING MUST $_X$ POSTPONE $_Y$
 'The wedding had to be postponed.'

b. ONE-WEEK TWO-WEEK WANT $_X$ POSTPONE $_Y$ WHICH
 $_X$ POSTPONE $_{YZ}^{++}$
 'Do you want to postpone it for one week or two?'

In both languages, however, the temporal domain makes use of specific axes in space, unlike the spatial and possessional domains, which employ a 3-dimensional space, whether continuous or discrete.

5 Identificational semantic field: change of properties

Change of properties in spoken languages is often denoted by change-of-state (COS) verbs (*blush, redden, get-well*). A COS verb encodes as part of its meaning the final state of the argument undergoing change. The verb *redden*, for example, specifies that a referent has reached the state of being red. The initial state is implied, and can be characterized as "not Final State". That is, COS verbs can only mean 'changing from not-A to A'. The verb *redden* can only mean 'change from not red to red'; it cannot mean 'change from yellow or from any other color to red' (Carter 1976). When expressing a CHANGE event where the initial and final states are not reverse values of the same property, spoken languages often use a spatial template, in which the initial and final states are marked as source and goal respectively, by the prepositions *from* and *to* (or *into*, in some cases), as in (19-22):

19. The light went *from* green *to* red.
20. Things went *from* bad *to* worse.
21. The witch turned the frog *into* a prince.
22. He changed *from* this nice young guy *into* a horrible nerd.

In such sentences, change of properties is conceptualized in terms of change of location. According to Lakoff and Johnson (1999;52), our conceptualization of change of state draws on the primary experience of motion along a path, where change of state is experienced as part of the change of location as one moves.

English, then, as well as other spoken languages, expresses change of state either by lexical means (COS verbs, which are non-spatial in nature), or by a spatial syntactic template, where spatial prepositions mark the initial and final states as source and goal.

ISL, like English, has both lexical means and grammatical means to express change of state. Like English, ISL COS verbs do not have spatial morphology. Yet

unlike English, ISL does not use a spatial template to denote change of state. Let us look first at COS verbs.

Verbs denoting change of properties in ISL often have a path movement as part of their phonological structure. However, the direction of the path is not variable; it is lexically fixed, often expressing the direction of a specific change in an iconic way. So in a verb meaning 'to become fat', the hands move away from each other, while in its antonym the hands move towards each other; a verb meaning 'to grow up/grow tall' has an upward moving path, while 'becoming shorter' has a downward moving path. In other cases, the direction of the path has a less straightforward meaning. In BECOME-BETTER/IMPROVE (Figure 3a), there is a rotation of the wrist outwards; in BLUSH (Figure 3b) the hand moves upwards along the face, whereas in GET-PALE (Figure 3c) the hands move downwards⁸. COS verbs, then, differ from verbs in the spatial, possessional and even temporal domains in that the initial and final states are not independently specifiable, and the path movement of the verb is not variable but rather is lexically determined.

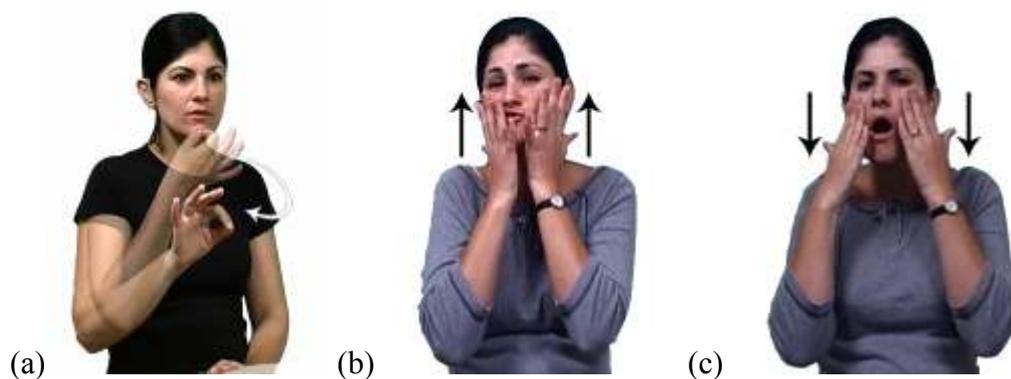


Figure 3: COS verbs in ISL: (a) (GET)-BETTER, (b) BLUSH, (c) GET-PALE.

What happens when there is no one lexical item to express a specific change of state? As (19-22) show, English uses a spatial template. If ISL were to use spatial means to express change of properties, a sentence meaning 'The leaves turned from green to yellow' would take the following form:

23. *LEAVES, GREEN INDEX_a, YELLOW INDEX_b, CHANGE
_aPATH_b

⁸ Hebrew has idiomatic expressions that draw on similar metaphors: *ha-dam ala lo lapanim* ('Blood got up his face', meaning 'His face got red (usually from anger)'); *ha-dam azal mi-panav* ('Blood ran out of his face', meaning 'He got very pale').

In such a hypothetical sentence, the initial state GREEN is localized in point (a), the final state YELLOW in point (b), and the change from one to the other would be denoted by a sign whose path movement is from (a) to (b). However, as the asterisk indicates, such a sentence is ungrammatical in ISL. The ungrammaticality stems, first of all, from the fact that the initial and final states cannot be localized. This may be part of a general restriction in the language that only referential expressions can be localized. The states in the above sentences are predicates, not arguments, hence non-referential, and therefore cannot be localized (Meir 2004). Any R-locus established in this discourse would be interpreted as associated with the referential expression in the sentence (LEAVES), rather than with its properties. Moreover, since there is only one referential expression in the sentence, the sentence cannot contain two R-loci, since each R-loci is expected to be associated with a different referent. Therefore, a spatial template cannot work for expressing change of state in ISL.

How does the language express such events, then? There are two possibilities. One is to use the verb BECOME/CHANGE-TO, the final state would be expressed as a complement of the verb, and the initial state as a modifier of the nominal referring to the entity undergoing change, as in (24). The second is to use a temporal template, where the initial and final states are marked by the temporal adverbials THEN and NOW, as in (25-26):

24. LEAVES GREEN CHANGE YELLOW.

'The green leaves turned yellow.'

25. DOCTOR INDEX_a **THEN** FAT **NOW** CHANGE THIN.

'The doctor that used to be fat has become thin.'

26. BOY INDEX_a **THEN** SICK **NOW** HEALTHY.

'The boy that was sick became healthy.'

A CHANGE event in the identificational domain, then, differs considerably from similar types of events in other semantic fields. COS verbs have an invariant path movement, fully specified in the lexicon. Furthermore, the initial and final states (the Y and Z arguments in the LCS) cannot be localized. Therefore, no spatial means is available in this domain, and the language resorts to non-spatial morphology and sentence structure to express a change of property event.

6 Summary: The morphological properties of the four semantic fields

Verbs denoting CHANGE in the four semantic fields examined here have different morphological properties. In the spatial and possessional fields, the initial and final locations of the signs are not lexically specified, and are determined by the R-loci of the source and goal (Y and Z) arguments of the verbs. These loci, in turn, determine the direction of the path movement of the verb. The difference between the two fields is in their use of space – continuous vs. discrete. Space in the spatial domain is analogous to real-world space, and hence is continuous. The spatial relationship between R-loci represents relationship between locations, and the space between these locations is meaningful. In the possessional domain, R-loci represents referents, not locations. The spatial relations between the R-loci is non-meaningful, and no space in between them is implicated.

The temporal and identificational fields do not make use of R-loci; both temporal expressions and properties cannot be localized. Therefore sentences denoting a CHANGE event in these domains do not involve localization of the initial and final points of the event. Rather, the referent undergoing change (the X argument in the LCS) may be localized, the initial point (the Y argument) is often expressed as a modifier of that nominal, and the final point (the Z argument) as a complement of the verb. Thus the structure of sentences in these domains may be quite similar. The two domains differ in the use of space. The temporal domain makes use of axes in space, where the direction of the movement of the verb encodes relative order (sequencing) of events. Verbs in the identificational field do not have spatial morphology at all; their path movement, if there is one, is fully specified for each verb in the lexicon, and cannot be modulated to express motion along different paths in space.

The morphological properties of the different semantic fields are summarized in Table 2:

	Use of space	R-loci
Spatial	Continuous, Analogous	Locations
Possessional	Discrete	Referents
Temporal	Consists of axes	-----
Identificational	----- (no directional use of space)	-----

Table 2: Morphological properties of semantic fields

7 Conclusions and consequences

The theoretical significance of the morphological realization of these semantic fields is three-fold. First, it fills a lacuna in the relationship between semantics and morphology. As pointed out in section 1, of the three systematic meaning relations mentioned in RH&L (1998), only two – aspectual and valence changing relations – are encoded morphologically. The third type, the systematic polysemy of lexical items used in different semantic fields, is not encoded morphologically in spoken languages. Yet, as this paper has shown, it is encoded in a language transmitted in the visual-spatial modality, ISL, and quite possibly in other sign languages as well. This suggests that no systematic meaning relations among lexical items is exempt in principle from being encoded by morphological means. The question still arises as to why is it that only sign languages encode semantic fields morphologically. I leave this question open at present. It probably has to do with the fact that sign languages are articulated in space, and have space at their disposal for expressing spatial relations, as well as other types of relations which are metaphorically built on the spatial domain. However, a full explicit explanation has yet to be formulated.

Second, morphological form is often taken as evidence for the existence of the specific semantic categories expressed by these forms. RH&L (1998;260) note, for example, that the existence of morphemes in some languages that express certain

semantic distinctions (such as telicity) can be taken as supportive evidence for analyses which assume semantic primitives corresponding to such distinctions. In a similar vein, the morphological differences between the classes of verbs in different semantic domains in ISL may be regarded as support for theories assuming the existence of semantic fields, such as Jackendoff (1990, 2002). Furthermore, the morphological properties of the different fields may provide some insights for their properties. For example, Jackendoff suggests (2002; 361) that the possessional 'space' is discrete. He arrives at this conclusion only on the basis of possible inferences ("something cannot be half way between belonging to A and belonging to B"). Yet in ISL this difference is explicitly evident in the morphological behavior of transfer verbs vs. spatial verbs, thus supplying strong supportive evidence for Jackendoff's suggestion.

Third, the morphological distinctions between the semantic fields, once identified, may be able to support one specific analysis over another. For example, there is a controversy whether COS verbs are similar in nature to change of location verbs. Localistic approaches, e.g., Andersen (1971), advocate for a unified analysis for both types of verbs. Jackendoff in his earlier works (e.g., 1983) argues for a unified analysis as well, but changes his approach in later works (1990, 2002), where he suggests that COS verbs have an INCH(ative) function in their LCSs, rather than a GO function. RH&L (2002, 2005) present strong arguments showing the COS verbs differ from other kinds of verbs in the way their semantic arguments are realized in the syntax. The fact that in ISL COS verbs do not have spatial morphology may present additional support for a non-locative analysis over a locative one of COS, and for assigning different analyses for a CHANGE event in the spatial, possessional and temporal fields vs. a CHANGE event in the identificational field.

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