**The Expression of Non-Actual Motion in Swedish Sign Language**

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# Abstract

The use of motion expressions to describe objects that are actually static (e.g. "The train tracks curves through the mountain") has been of interest within the fields of linguistics and cognitive science for at least three decades (e.g. Langacker, 1990; Matsumuto, 1996; Talmy, 2000a; Matlock, 2004a; Zlatev & Blomberg, 2013). In this thesis, such descriptions will be referred to as Non-Actual Motion (NAM) sentences/expressions. On the basis of theoretical and empirical considerations of the spatial semantics and form-meaning mappings of Swedish Sign Language (SSL), a small elicitation study was conducted. The target stimuli of the study (i.e. pictures of spatial scenes with objects that are extended horizontally [e.g. roads and fences]) were expected to elicit a higher amount of NAM expressions compared to control stimuli (i.e. pictures of objects less extended in space [e.g. trees and benches]). Using the semantic framework of Holistic Spatial Semantics (HSS) (Zlatev, 2003), some patterns of NAM-expression were found to be similar to those of three spoken languages: Swedish, French and Thai (Blomberg, 2014). Target stimuli designed to cue a higher amount of NAM-expressions did so, which provides further support for theories suggesting that cognitive processes such as enactive perception and mental scanning motivate the use of NAM-sentences in SSL just as for spoken languages. However, SSL also showed a wide array of language- and modality- specific conventions: the iconicity in the modality of SSL allows more precise and dynamic descriptions of spatial experiences. For example, fewer overt expressions of NAM were used than in the spoken languages. Still, the expression of motion-related semantic categories through more or less iconic signs forms, such as depicting verbs and modified adverbs, were found in higher numbers in descriptions of stimuli pictures of objects that afford human translocation.

## Acknowledgments

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# 1  Introduction

The orientation and constant re-orientation of entities in our spatial surroundings, as well as our own positioning and re-positioning herein, are arguably some of the first structured impressions that we consciously perceive. Pointing to change in general and movement in particular as something fundamentally important to how and what we perceive, William James (1978[1890]: p. 429) stated:

> Susceptibility for being excited and irritated by the mere novelty, as such, of any movable feature of the environment must form the instinctive basis of all human curiosity.

Objects and persons exist and move in relation to our point of view, just as our own perspective changes as we ourselves move. The experience of spatial dynamism is believed to give rise to conceptualizations of how the world behaves interactively through time (Langacker, 1990; Talmy, 2000a; Matlock, 2004b, Zlatev & Blomberg, 2013). It might therefore not be surprising that utterances based on these spatial conceptualizations are in many languages readily used to describe experiences of other types of dynamism. For instance, while (1) expresses actual motion, (2) is an example of a spatial expression referring to a non-spatial experience, and (3) is a dynamic description of a static situation.

(1)    The dog goes through the tunnel.
(2)    Time flies.
(3)    The road zigzags downwards.

The use of motion expressions to describe experiences of stasis, such as in (3), will here be referred to as expressions of *non-actual motion (NAM)* (Blomberg & Zlatev, 2013). The use of such expressions has been argued to be motivated by "dynamic qualities of consciousness in the perception or imagination of situations that lack actual motion" (Blomberg, 2014: p. 10). Expressions of non-actual motion, just as expressions of actual motion, usually specify several aspects of the situation and the perspective through which it was perceived. Sentence (1), for example, specifies the trajectory travelled by *the dog*, while *flies* in sentence (2) expresses the way in which time moves in relation to the observer. In (3), the way in which the *road* moves is likewise expressed, even though the situation is static. How, then, is motion – both actual and non-actual – expressed across languages? What aspects of motion (if any) are universal, and

what are the parameters of variation? These are central issues of motion event typology (Talmy, 1991, 2000b; Slobin, 2004). Some core characteristics of motion expressions seem to be recurrent in many spoken languages, and even though the ways in which they are realized differ, they seem to do so in systematic ways (e.g. Blomberg, 2014).

While spoken languages mediate meaning mainly through one, the audible, modality, speakers of signed languages make use of the visual modality, involving all three dimensions of space. When referring to an audible experience, spoken language users can use iconic expressions motivated by the sound referred to, such as *meow* or *boom*. To some extent, also for descriptions of space and motion (Johansson & Zlatev, 2013; Imai & Kita, 2014), but apparently less than in signed languages. They then instead make use of lexemes such as *outside*, *walk* or *to*, whose connection to their referent is fully conventional.

Signed languages use space to represent space: in addition to lexical signs where one hand sign denotes to one conventionalized concept, hand motions also allow for more dynamic expressions. For instance, the lexical sign RUN in Swedish Sign Language (SSL) is produced by moving both arms, fists clenched, forth and back, similar to the arm motions of a running person. Though conventionalized, such signs are also clearly in an iconic (i.e. similarity-based) relationship with their referent (Peirce, 1931; Sonesson, 1989; Ahlner & Zlatev, 2010). In addition to this, speakers of SSL refer to the motion through space, which would result from the run, by reproducing the trajectory of the runner. This is done by moving one hand, shaped to classify a person, along a trajectory similar to that taken by the runner, thus reproducing the intended motion situation. Bergman (1982) refers to such signs as *movement-reproducing signs*.

Studies have been made on actual motion in signed languages, e.g. Dutch Sign Language (Slobin & Hoiting, 1994), but none have so far been concerned with non-actual motion. The linguistic forms of signed languages are characterized by extensive (actual) motion in space, but how does this affect the mappings between form and meaning within descriptions of spatial relations and motion? Does it lead to more, or perhaps less, NAM-expressions in descriptions of situations such as (3)? What properties, if any, would be shared by spoken and signed languages in this respect? These are the kind of questions that motivated this study. Following a review of some of the more influential theoretical frameworks regarding the semantics of space and motion, and a description of the linguistic forms of Swedish Sign Language, the research questions upon which this thesis is based are posed in Section 4.

The thesis is structured as follows. Section 2 starts with a recapitulation of some of what has been written on the subject of motion in language. After discussing Talmy's (2000b) oft-cited model of spatial semantic categories, an alternative analysis tool, *Holistic Spatial Semantics (HSS)* (Zlatev, 1997, 2003; Blomberg, 2014), which will be used in the present study, is introduced. In Section 3 the focus turns to signed languages in general and Swedish Sign Language (SSL) in particular. After a brief overview of SSL, the iconicity of its modality is discussed. Wallin's (1994) description of SSL, through Talmy's model, is explained and elaborated upon. Section 4 describes the method for a study into the expression of non-actual motion in Swedish Sign Language, the results of which are presented in Section 0. Section 6 concludes with a discussion of the research questions and suggestions for further research.

# 2 Motion semantics

We start with an overview of the field of spatial semantics. The influential Talmian model is described, followed by subsequent expansions and delimitations which have resulted in an alternative framework: *Holistic Spatial Semantics* (Zlatev, 1997, 2003). This framework is presented, preceding a description of how it can, and has, been used specifically to deal with non-actual motion (Blomberg, 2014).

## 2.1 Motion and motion event typology

Motion is not a homogenous phenomenon. One can move without changing location, for example when jumping up and down on a trampoline, just as one can change position without moving oneself, while riding in a car or on a train. Furthermore, the same expressions of motion can be used to describe situations where the speaker is on the move, as in situations where someone else is moving (Blomberg 2014). Events in which change of location takes place have been the focus of so-called motion event typology (Talmy, 1991, 2000b; Slobin, 2004; Bohnemeyer et al., 2007; Croft, 2007; Ibarretxe Antuñano, 2009). In looking at the expression of motion events cross-linguistically, a number of semantic categories seem distinguishable. Recurring elements are specifications as to the origin, destination and mode of motion.

### 2.1.1 The Talmian model

Leonard Talmy, in one of the first comprehensive analyses of the conceptual basis of motion event expressions, first introduced four decades ago (Talmy, 1975), proposed six categories relevant to spatial semantics: Motion, Figure, Ground, Path, Manner and Cause. According to Talmy (2000b), an utterance expresses the category of (translational) Motion if it represents an entity as translocating, i.e. changing its average location in relation to its surroundings (Ground), as in (4).

> (4)    The dog is running out of the forest.

The second spatial category, Figure, is the entity performing or being subjected to Motion, *the dog* in (4). *The forest* expresses the category Ground. A fourth category, essential for the discourse of motion, is that of Path. In Talmy's view, Path is the conceptualization of the trajectory along which the Figure moves. In (4), *out* would be the carrier of such Path-information. Leaving Cause aside, as it has less to do with spatial relations, the last of Talmy's motion categories is Manner. Manner is the way in which the Figure behaves during its Motion,

or by means of what mode of propulsion the Figure moves. Motion is rarely expressed alone, but is often co-expressed, or *conflated*, with other semantic categories (Talmy, 1991). For instance, *runs* in (4) conflates Motion and Manner.

As shown by the examples from sentence (4), the different categories take different forms in a sentence. Adding to Talmy's model, Sinha and Kuteva (1995) discuss the different ways in which the categories of spatial semantics can be divided, or *distributed*, across several word forms. When one category instead is expressed by a single constituent, they can instead be said to be in a *complementary* mapping pattern (Zlatev, 1997). The patterns of conflation and distribution of (4) is shown in Figure 2-1 below. As illustrated, the nominals, *the dog* and *the forest*, expresses only one category, i.e. a complementary relation. *Runs* instead conflates Motion and Manner, while Path is distributed between *out* and *of*.

| The dog | runs | | out | of | the forest |
|---------|--------|--------|------|-----|------------|
| Figure | Motion | Manner | Path | | Ground |

**Figure 2-1.** Patterns of conflation and distribution in English.

Building on his categories of motion, Talmy (1991, 2000b) proposed a dividing-line between languages with different conventions for the expression of Path (the crucial component or *core schema* of a motion event). He suggests a typology of languages based on whether Path is expressed in the main verb root or in a sister constituent to the main verb root, something he terms *satellites*. The two language types are, in Talmy's (1991) words, *v(erb)-framed languages*, in which Path is co-expressed by the motion verb, and *s(atellite)-framed languages*, in which Path is expressed by e.g. adverbs, verb particles, affixes to the verb or pre-verbs. As exemplified in Figure 2-2 below, German languages such as Swedish (and English) are considered to be S-framed languages, while Romance languages such as Spanish are analyzed as V-framed.

| Flaskan | flöt | | ut | ur | grottan | | La botella | salió | | la cueva | flotando |
|---------|--------|--------|-----|-----|----------|--|------------|--------|------|----------|----------|
| The bottle | floated | | out | of | the cave | | The bottle | exited | | the cave | afloat |
| Figure | Motion | Manner | Path | | Ground | | Figure | Motion | Path | Ground | Manner |

**Figure 2-2.** Conflation patterns of Swedish and Spanish.

## 2.1.2 Issues with the Talmian model

While influential and productive, Talmy's binary typology has also encountered some empirical and conceptual issues (Beavers, Levin & Tham, 2010; Croft et al., 2010; Zlatev, Blomberg & David, 2012). Some languages (e.g. Mandarin Chinese and Thai) make use of serial verb constructions that seem to code motion in a third way, bringing the bipartite division into question (Zlatev & Yangklang, 2004; Slobin 2004). Thai allows for several verbs, containing different types of motion information, to be stacked after one another, without any clearly discernible grammatical hierarchy. As shown in (5), *khâam* expresses Path, *doen* Manner, while *pai* is a deictic verb similar to *go* in English. To account for languages displaying such serial verb constructions, Slobin (2004) has suggested a third group: *e(quipollently)-framed languages*.

> (5) chán    doen    khâam    thànŏn    khâw    pai    naj    nuăn.
>      I       walk    cross    road      enter   go     in     park
>      'I walk across the road into the park.'
>
> (Zlatev & Yangklang, 2004: p. 160)

Another issue arises from the assumption that location-change from one place to another, i.e. Path, always co-occurs with Motion. Japanese is a language that, contrary to this belief, has been argued to separate Path from Motion (Kita, 1999). The Japanese verbs *hairu* and *deru* are similar in meaning to the English verbs *enter* and *exit*, respectively, but, in contrast, express Path but not necessarily Motion. Sentence (7) could thereby be translated as 'John ended up inside the room' (cf. (6)).

> (6) John entered the room.
>
> (7) Jon-ga       heya-ni       hait-ta.
>     John-NOM     room-LOC      enter-pst
>
> (Kita, 1999: p. 309)

Yucatec Maya makes a similar distinction between motion and change of location: when describing motion from one point, past another, to a third, each discrete point is expressed in a separate clause (Bohnemeyer, 2010). Talmy's view that Path pertains to a continuum of motion along a trajectory, does thereby not apply. The fact that some languages seem to semantically separate Motion from Path warrants a clearer separation and definition of the categories Motion and Path (Blomberg, 2014).

In Talmy's (2000b) framework the motion categories are somewhat loosely defined, and apart from the empirical issues discussed above, and to a large extent at the root of these, is a conceptual one. Talmy's influential framework analyzes the semantics of motion with focus on separate constituents of sentences. As shown by the different semantic content of *over* in (8) and (9), it becomes obvious that the meaning of an utterance is not merely the sum of its separate lexical and grammatical constituents.

(8)    The tablecloth is over the table.

(9)    The lamp is over the table.

*Over* in (8) denotes a specific spatial configuration in which there is contact between the two referred objects. The same constituent in (9) denotes a similar spatial configuration, though in this context the objects are understood as lacking contact with each other. *Over* in the sentences above, though a constituent clearly of a spatial nature, does not fit any of the presented categories – an expanded toolbox, with some fine-tuning of its parameters seem warranted.

## 2.2   Holistic Spatial Semantics

On the grounds of the empirical and conceptual issues brought to the fore above, the Talmian motion typology has since its formulation been further expanded upon. The theoretical model implemented in this study, *Holistic Spatial Semantics (HSS)*, as formulated by Zlatev (1997, 2003), is aimed to take these particular issues into account. Instead of dealing with semantic categories as expressed mainly through single constituents, HSS aims to examine expressions of motion on the level of utterances. Talmy (2000b) uses the term *motion event* in his analysis, which is mainly concerned with explicit expressions of location-change. To also encompass sentences that do not explicitly expresses location-change, even though such information is deducible from context, the term *motion situation* will be preferred, as it is more clearly defined (Zlatev et al., 2010). Following this argument, the dichotomy *translocative/non-translocative* will also be preferred to Talmy's (2000b) *translational/self-contained*.

HSS originally proposed seven universal categories in the expression of static or dynamic spatial meaning, rooted in sensorimotor experience (cf. Zlatev, 1997). These categories are: Figure, Landmark, Frame of Reference, Region, Motion, Path and Direction. I will however follow Blomberg (2014) in adding to these the category of Manner, due to its relevance to motion situations. Furthermore, I propose adding Shape as a separate category since it, as will

be shown, becomes important in the discussion of motion in Swedish Sign Language. This leaves us with nine categories, below sketched out as they will be applied herein.

### 2.2.1 Figure

The Figure is the entity that is moving in relation to a Frame of Reference (see below), in the motion situation. In sentence (10), *the man* expresses the category of Figure.

> (10) The man walks from his house to the store.

### 2.2.2 Landmark(s)

One or more entities in relation to which the Figure moves in the Object-centered Frame of Reference are Landmark(s). In (10), there are two such entities; one is expressed by *his house* and the other by *the store*.

### 2.2.3 Frame of Reference (FoR)

Motion is always relative to one or several Frames of Reference (FoRs). Levinson's (1996) proposal that exactly three frames of reference are possible along the horizontal plane is generally accepted in spatial semantics. In his framework, the three possible frames are: *intrinsic*: in relation to the spatial constitution of an object (e.g. 'in front of the building'); *relative*: using the line-of-sight from some real or imaginary viewpoint as reference (e.g. 'to the right of the tree'); and *absolute*: relative to some fixed axis according to one's world-view (e.g. 'north of' or 'downstream'). Zlatev's (2007) expanded definitions will here be used, since they in addition incorporate dynamism and the vertical plane, as well as objects that, unlike 'buildings', are not cognized as having intrinsic 'sides'. These FoRs are defined as:

- Object-Centered: Motion takes place in relation to Landmark(s). In (11) below, *the tree* defines the center of an Object-Centered FoR which is irrespective of the viewer's position and line-of-sight.
- Viewpoint-Centered: The perspective of the experiencer is assumed and the spatial configuration is thus understood in relation thereto. *To the left of*, in (12) denotes left in relation to the experiencers gaze, not to *the tree*, thus presupposing a Viewpoint-Centered FoR.

- Geocentric: Spatial descriptions understood in relation to fixed reference orientations. The expression of cardinal directions, such as *North* in (13), calls up a Geocentric FoR, as well as verticality-based expressions such as *up* or *down*.

    (11) The girl walked to the tree.

    (12) The girl stood to the left of the tree.

    (13) The girl then continued north.

### 2.2.4 Region

The category of Region says something about the spatial relation between the Figure and its Landmark(s). Expressions of Region are found in the examples below, where *into*, in (14), denotes the Interior Region of the Landmark (*the post office).* In (15), *on* expresses the Surface value of the same category.

    (14) The cat walked into the post office.

    (15) The cat stretched out on the keyboard.

### 2.2.5 Motion

The fact of motion, or the perception thereof, of the Figure. Motion can be translocative (from one place to another) or non-translocative (without location-change). Sentence (14) is an example of translocative motion, whereas sentence (15) rather expresses non-translocative motion.

### 2.2.6 Path

Following the argument that Path and Motion are separable in langauges such as Japanese and Yucatec Maya, the definition of Path in HSS is narrowed as from that of Talmy. Path is understood not as a trajectory, but rather as the expression of one or several of four possible values (Zlatev 1997, 2003). Path according to HSS is the BEG(inning), MID(-point), or END of translocative motion, or in cases of non-translocative motion: PLACE. In sentence (16), Path:PLACE is expressed by *on*; (17) expresses Path:BEG and Path:END through *from* and *to*; and in (18), *through* is an expression of Path:MID.

    (16) The woman is jumping in the park.

    (17) The boy walked from the school bus to his house.

(18)  The airplane flew through the cloud.

### 2.2.7  Direction

Translocative motion can be expressed without the specification of Path (see Zlatev, 2003; Zlatev, Blomberg & David, 2010), as in (19). To handle such cases, the category of Direction is invoked.

(19)  The ship sailed east.

### 2.2.8  Manner

The way in which the Figure moves. The verb commonly co-express Manner in English, e.g. *sailed* in (19), but it can also be expressed through adverbs such as *quickly*.

### 2.2.9  Shape

As exemplified by the verb *curves* in (20), information about the form of the trajectory of translocative motion is commonly conflated with Manner in NAM-expressions of spoken languages. In SSL, a clearer distinction is made between the two categories, which leads to adding a ninth category to the framework of HSS: Shape.

(20)  The railroad curves along the lake.

## 2.3  Non-Actual Motion (NAM)

Expressions of motion are found in all languages and in many languages, if not all, motion expressions are also used to describe situations other than those concerning objects in actual motion. As shown in sentences (1)–(3), repeated as (21)–(23) below, several different types of dynamic situations can readily be described using motion expressions.

(21)  The dog goes through the tunnel.
(22)  Time flies.
(23)  The road zigzags downwards.

In these sentences, motion expressions can be used to describe widely different experiences: actual motion (21); temporal dynamism (22); and static spatial extension (23) – almost anything, it seems, goes. In the current study, expressions of non-actual motion such as (23) are of most interest.

So what then is non-actual motion? Put simply, a NAM-expression, as it is understood here, is when words of motion are used to describe spatially extended objects. Several different theories have aimed to explain the processes that motivate such expressions. Consequently, *non-actual motion* is not the only term used in the literature. Talmy (2000a) uses *fictive motion*, Langacker (1990) uses the term *subjective motion* and Matlock (2010) prefers the term *abstract motion*. Blomberg (2014) proposes that the three terms are not synonymous, but point to different, not necessarily exclusive, explanations of the experiential and cognitive processes thought to motivate expressions such as (23).

### 2.3.1   Fictive motion

In Talmy's (2000a) explanation, the production and understanding of what here is termed *non-actual motion expressions* is based on an idea of three separate cognitive subsystems. These subsystems, which pertain to the veridicality of the conceptualization and expression of spatial experiences, are (I) the *factive* subsystem, (II) the *fictive* subsystem, and (III) the subsystem that allow us to distinguish between the first two. Sentences (24) and (25) are two possible linguistic representations of the same visual experience.

(24)   The road is located in such a way that its two extremities are at the city and at the mountain, respectively.

(25)   The road goes from the city to the mountain.

Sentence (24) would be a veridical, or *factive*, representation of the experience, while (25) would be a non-veridical, or *fictive*, representation. In the latter example, an expression of motion is used to describe a static situation. Talmy attributes our preference to use expressions such as (25), despite (24) being more veridical, to our "cognitive bias towards dynamism" – that is, our inclination to attend to that which is moving or changing, to a greater degree than to that which is static (2000a: p. 101). Experience and conceptualization of space and motion are not the only realms to which Talmy's fictive and factive representations are relevant. It should rather be understood as a continuum of palpability or abstractness along which many and widely varying perceptions and conceptions (or to use Talmy's neologism *ceptions*) are understood.

### 2.3.2   Subjective motion

Langacker (1990) instead points to a shift in focus from the described object to the way in which it is attended to. In his explanation, the (actual) motion expression in (26) is thought to be

cognized in very much the same way as the (non-actual) motion expression in (27). The difference between the two sentences being that in (26), the motion of the object is in focus, whereas in (27), the motion of one's perception of the object is in focus.

> (26)  The boat goes from Sweden to Denmark.
> (27)  The bridge goes from Sweden to Denmark.

In the same way that the boat traverses the intermediate sea through *conceived time* in (26), our attention to the bridge and its extent traverses the sea through mental *processing time*, in (27). Just as the boat comes into physical contact with each point in space along its path, our consciousness comes into mental contact with each point along the path of the bridge, as we gradually "build up" our conception thereof (Langacker, 1990). *Subjective motion* is in this way described by Langacker as a process of *subjectification*: placing ourselves and our attention in focus, instead of the object.

### 2.3.3   Abstract motion

It has been claimed that thinking about an action and actually performing it activate similar neurological processes (Barsalou, 1999; Pescher & Zwaan, 2005). Following such proposals, Matlock (2004a, 2010) explores whether expressions of non-actual motion instead might be motivated by *mental simulation* of motion. In a series of reaction-time experiments, she found shorter responses for expressions of NAM after participants having read about short, swift or obstacle-free (actual) motion, than after having read about lengthy, slow or hindered (actual) motion (Matlock, 2004a). In the same study it was shown that objects that allow for human translocation, such as roads and paths, also result in swifter understanding of NAM-expressions. In subsequent experiments, she suggested that even spatial descriptions that lack motion verbs, but express Path in prepositions, bring about simulations of self-motion (Matlock, 2010).

### 2.3.4   Non-actual motion

Building on the works of Talmy (2000a), Langacker (1990) and Matlock (2004a, 2010) sketched out above, a fourth explanation as to why we talk about static objects in terms of motion has been suggested by Blomberg and Zlatev (2013; Blomberg 2014). Their definition of what constitute an expression of NAM is "all sentences in which (minimally) a motion verb (e.g. go, run, crawl, follow) is used to denote a situation that lacks such observed motion" (Blomberg & Zlatev, 2013: p. 3). Pointing to the fact that widely varying spatial experiences

have been suggested to motivate NAM expressions, Blomberg and Zlatev argue that an explanation based solely on one of suggested theories is insufficient. Following re-interpretation and delimitation of these theories, they distinguish between three separate, but not mutually excluding, experiential motivations: (I) *enactive perception,* (II) *mental scanning* and (III) *imagination*.

Experiences of objects that afford or are even associated with human translocation (e.g. roads) may motivate NAM-sentences through *enactive perception.* This implies a close coupling between perception and the possibility for action, known as *affordances* (Gibson, 1979). Enactive perception, in Blomberg & Zlatev's (2013) view, motivates the NAM-expression in (28), but not that in (29) since fences do not afford human translocation.

> (28)  The road ran down the beach.
> (29)  The fence ran down the beach.

Instead, (29) could be seen as motivated by *mental scanning*. That is, the experience of our attention moving along a spatially extended object. However, while Langacker's explanation applies to expressions of widely varying meanings, Blomberg and Zlatev (2013) stress the importance of studying non-actual motion as a distinct phenomenon. For example, in Langacker's view, expressions of gradual change, as in (30), are motivated by similar conceptualizations as expressions of non-actual motion, as in (31). Only (31) would fit Blomberg and Zlatev's delimited definition.

> (30)  The forest thickened towards the valley.
> (31)  The forest stretches to the summit.

The third motivation for NAM-expressions builds on theories of mental simulation such as those explored by Matlock (2004a, 2010). Blomberg and Zlatev (2013) agree that conscious imagination, (rather than subpersonal processes of "simulation") may be involved in compressing sentences such as (32) into sentences such as (33), which would explain the results of Matlock's (2004a) response-time experiments.

> (32)  The path is located in such a way that it allows for people to travel between the house and the lake.
> (33)  The path goes from the house and the lake.
> (34)  The path crawls from the house to the lake.

Blomberg and Zlatev (2013) however emphasize the need to distinguish between the processes of imagination and perception. The previous two motivations, *enactive perception* and *mental scanning*, follow from perceptual processes. Imagination is a complementary third motivation based on "as if" metaphorical construals, resulting in sentences with motion expressions that more vividly depict the referent, e.g. (34).

In an elicitation study comparing expressions of actual and non-actual motion in Swedish, French and Thai, Blomberg (2014) found that stimuli designed to cue *enactive perception,* on the one hand, and *mental scanning*, on the other, resulted in descriptions containing different degrees of NAM-expression. Experiences of spatially extended objects that afford human translocation, and that are viewed from a first-person perspective (for example a suspension bridge viewed from one of its ends, as opposed to a fence viewed from afar), were found to cue NAM-expressions to a higher degree.

It is reasonable to assume that, following the heterogeneity of the experiences that cue NAM-sentences, and the fact that such sentences do take different forms, any theory explaining the phenomenon as something brought about by a singular and unitary mental process, would be problematic. Because of this, and since the three complementary motivations for NAM-expressions suggested in Blomberg and Zlatev's (2013) explanation are clearly defined and thus operationalizable, they are adopted in the framework chosen for the current study.

## 2.4 Summary

*Holistic spatial semantics*, which will be used in the analysis of SSL in the following sections, is intended to offer a tool for analyzing spatial semantics as more than the composition of the constituents of an utterance (Zlatev, 1997, 2003). Following Blomberg and Zlatev (2013), I regard the three theories on NAM-expressions described by Talmy (2000a), Langacker (1990) and Matlock (2004a), as non-exclusive NAM-motivating factors. A fourth factor is linguistic conventions specific to different languages and modalities. A less maximal/holistic and more minimal/schematic interpretation of spatial expressions, disregarding linguistic and extra-linguistic context, would fail to account for the different meanings of the preposition *over* in sentences (35) and (36).

(35)  The girl went over the street.
(36)  The phone line went over the street.

Apart from expressing Path:MID, *over* is an overt expression of Region in both sentences – it explicitly specifies the spatial relation between Figure and Landmark – but the Region information is also restricted by the subject noun. Nouns typically express Figure or Landmark overtly but, as shown in (35) and (36), they can also, *covertly*, delimit the Region information conveyed by the sentence since we, through extra-linguistic knowledge, know that *girls* and *phone lines* usually go *over streets* in different ways. This framework takes all three patterns (i.e. complementarity, conflation and distribution) into consideration, as it aims to analyze expressions on an utterance level.

So far only expressions of motion in spoken languages have been discussed. Blomberg and Zlatev's (2013) theories and Blomberg's (2014) subsequent study, show how different types of spatial experience seem to motivate the use of NAM-expressions, while context and language-specific conventions modify which forms they will take. In the following, the conventions governing spatial- and motion- expressions Swedish Sign Language, will be described.

# 3 Swedish Sign Language (SSL)

Among the oldest references to signed language in Sweden dates back to 1759. This text describes the parish of Ålhem, on the East coast of Sweden, and its inhabitants. Among them is a man named Lars Nilsson who is said to have communicated with manual signs and, despite being deaf, was able to read, write and count (SOU, 2006:29). Since then, much has happened, though not rapidly. For a long time, signed language was banned as a school subject – deaf people were expected to learn lip reading and practice speaking Swedish. Even though some research and teachings began in 1808, it was not until 1981 that SSL became officially recognized, acquiring a status similar to that of minority languages. The current knowledge and status of SSL was clearly reached after a long and bumpy road. Still much is left to be researched and many misconceptions about SSL as a language, and about its speakers, remain.

Today, SSL is spoken by approximately 30,000 people. Sentences in SSL are predominantly of VOS- or SVO- word order, though sentences with pronominal subjects assume OSV-order (SOU, 2006:29). While signed languages do, like spoken languages, organize constituents sequentially through time, they also allow for the simultaneous production of several signs. The following descriptions are based on literature on Swedish Sign Language specifically. Other terms are used for other signed languages (e.g. The British Association of the Deaf, 1975; Stokoe, 1960), and any internationally agreed-upon analysis framework is still wanting.

Arranging signs in SSL into word classes is accomplished on the basis of syntax and semantics to a greater degree than through morphology (SOU, 2006:29). Whereas tense is not expressed by grammatical inflection, but rather periphrastically, other inflection patterns are similar to those found in some spoken languages. For example, to pluralize a noun, the sign is affixed by adding a lateral movement at the end of the articulation, iconically representing several instances of the same entity, stacked next to each other.

Many of the word classes found in spoken languages are also found in SSL, but some difficulties arise from the many aspects in which signed languages differ from spoken languages. The simultaneous expression of several types of meanings sometimes makes it difficult to attribute word-class affiliation to signs or sign components (SOU, 2006:29). The sign type that will receive most attention in this thesis, the *depicting verb* ("avbildande verb"), is a case in point. These expressions can be comprised of several sign components, each of which may possess qualities similar to those of verbs, substantives, adverbs, pronouns or adpositions. In an attempt

to avoid the pitfall of forcefully trying to fit constituents into pre-made categories from spoken language, the types of expressions found in the gathered data will also be analyzed on the basis of what meanings they convey in sentential context.

## 3.1 The form(s) of SSL

The area in front of the speaker, in which the signing takes place, is known as the *signing space*. The signing space can be used pronominally to refer to persons and places not present in the conversation. A referent usually retains its position in the signing space throughout a conversation, and is referred to deictically by pointing or looking in its direction. The pronouns *me* and *you* are also expressed deictically by pointing to the self or the other.

Spatial descriptions are always made and understood in relation to the signing space as a whole, and/or in relation to the speaker and/or other objects positioned in the signing space. If location is of no relevance to the utterance, the signing is done in the un-marked area at about chest-height in front of the signer's body – *the neutral position* ("neutrala läget") (Wallin, 1994). The size of the area that the signing space represents in any given utterance is relative to the scene that is being described, and can thus encompass anything from microscopic distances to the entirety of the known universe.

Apart from the two hands, other parts of the body, such as the eyes, eyebrows, mouth and arms can also express linguistic meaning. Such elements, referred to as *non-manual signs* ("icke-manuella tecken"), could for example be a facial expression signaling interrogative mode, a head movement negating the clause or a mouth movement distinguishing between two signs whose manual components are identical (SOU, 2006:29). Since the entirety of this rich plethora of linguistic elements cannot be encompassed in the scope of the current study, and since many of the non-manual signs are yet to be comprehensively documented, focus will be on manual signs only. Following international conventions, lexical signs will be glossed in uppercase letters throughout this text (Emmorey, 2014).

There are several categories of manual signs. Some parts of the vocabulary in SSL is related to Swedish: all letters of the Swedish alphabet have a corresponding sign in SSL, and some signs, known as *initial-letter signs* ("initialtecken"), are made up of the first letter of the corresponding Swedish word, followed by further manual and in some cases non-manual components (SOU 2006:29). Signs without loans from Swedish are known as *genuine signs* ("genuina tecken").

Signs in SSL can consist of one or several morphemes, realized sequentially or simultaneously. One- and two-morphemic signs are the most frequent.

There are 37 fixed hand shapes used to produce the different signs in SSL. Some signs are produced using a single hand motion, at the neutral position in front of one's body. Other signs warrant the use of both hands, and specific interactions between the two, at specific places in signing space. Any sign is comprised of three main components that, in turn, are made up of several separate modes of expression (Wallin, 1994).

### 3.1.1   Articulator

The *hand shape* (e.g. forming a fist or spreading one's fingers) of the active hand, or *articulator*, change the meaning of a sign. So does the angle of the hand and/or finger- and wrist movements. In most signs, the articulator assumes a static, lexical hand shape. However, if the referent is in an atypical orientation (e.g. a bicycle lying on its side), this can be expressed simply by changing the angle of the articulator to reproduce its orientation.

### 3.1.2   Articulation

There are three ways that the hand motion, or *articulation*, of a sign can express meaning. In lexical signs the *direction* of the hand motion (e.g. right/left or towards/away from the speaker) is conventionalized, but in freer forms, such as depicting verbs, the direction of articulation reproduces the direction of the motion referred to. The *type of hand motion* (e.g. motion in straight line or a circular motion) also expresses meaning. The *type of interaction* (e.g. continuous or reiterated contact) between the articulator and other parts of the sign (e.g. the passive hand) is the third linguistic element of the articulation.

### 3.1.3   Place of Articulation (PoA)

The location of the articulator during the articulation is also a meaning-bearing component. A sign can be produced near or in contact with the passive hand, some other body part, or in some specific location in the signing space.

## 3.2   Depicting verbs

Apart from lexical signs, dynamic depictions of more complex meanings with three or more morphemes are also possible. Through what are known as *depicting verbs* ("avbildande verb"), one can, in detail, reproduce the location, orientation, motion, or shape of a referent (Wallin,

1994). Because of the relatively free productivity of such signs, these cannot be described in lexicon.

Just as with lexical signs, the linguistic components involved in depicting verbs are the *articulator*, the *articulation* and the *place of articulation*. To understand the meaning intended by the articulator, linguistic and/or situational context is needed. An object descibed in a sentence is usually identified by a lexical noun prior to the depicting verb. The hand shape of the articulator then serves as a classifier, iconically reproducing its location or motion through articulation (Wallin 1994). Either one or both hands can be used to make up one such classifier. In other cases, the hand shape instead follows the contours of an object, depicting its shape through articulation. Simper-Allen (2013) recognizes three types of hand shapes used in depicting verbs: *substitutors*, *manipulators* and *descriptors*. These are used to describe self-contained motion, caused motion and spatial configuration, respectively.

### 3.2.1 Substitutor

If the articulator iconically represents an entire entity, its location or motion can then be expressed through the motion of the depicting verb. In such signs, the most prominent spatial feature of the object is reproduced by the hand shape. A person, for example, being extended mainly in the vertical dimension, is classified by an extended index finger, whereas a ball is classified by clenched fist. In this way, the classifier *substitutes* for the referent.

### 3.2.2 Manipulator

When describing motion caused by the subject of the sentence, the hand shape instead reproduces the hand shape assumed by the causer, when performing such action. Pinching ones index finger and thumb is a reproduction of the hand shape assumed when *manipulating* the location of a small object, such as a pencil. A clenched fist can instead be used to reproduce the caused motion of an object with a handle, such as a tankard.

### 3.2.3 Descriptor

For spatially extended objects, one instead uses a hand shape that reproduces one, two or even three dimensions of the object. While the hand shape shows the dimension(s) along which the object is the least extended, the hand motion *describes* its most prominent dimension. Index finger and thumb forming a closed circle can in that way reproduce the circumference of a pipe.

If one instead "measures up" a certain distance between the two fingers, the hand shape can stand for the width of a road.

In depicting the shape of a symmetrical object, both hands can sometimes be used simultaneously. In such depictions the hand shapes and the motions of the hands mirror each other. It is only in cases of symmetrical articulation, that both hands are moved simultaneously. The passive hand can also stand as a static reference point to the articulator in signing space. Such a reference point can be at a distance from, or in contact with the articulator at some point in the articulation. In expressions of location, the articulator is moved into contact with the passive hand, in such a way that it imitates the spatial relation of the referents.

In cases of motion or spatial extension, the contact can be at the beginning, or end of the articulation. The type of articulation shows whether the expression is to be understood as a specification of location or as a depiction of an object's motion or spatial extension. If the articulation is a short downwards motion with an abrupt stop, it means that something is positioned at a certain location. This might be thought of as a motion similar to that involved when actually putting an object in a certain position. Existential copulas such as *is/be* are not used. A protracted articulation instead expresses motion along a certain trajectory, or the shape of a spatially extended object.

Distinguishing between motion and spatial extension is not always straightforward – linguistic and/or situational context may be required. However, some hand shapes (e.g. an extended index finger, which, inter alia, classify erect people) are more commonly associated with motion and others (e.g. measuring a distance between index finger and thumb) with spatial extension. When describing non-translocative motion, or any action performed in situ, the expression is similar to that of location. The type of motion/action is expressed using a lexical verb which is followed by a depicting verb that describes the relative position at which the action is performed.

## 3.3   Form-Meaning Mappings in SSL

In spoken languages as well as in signed ones, the relationship between form and meaning – expression and content – can be more or less motivated. The meaning of most spoken words, like *house*, *thought* or *outside*, cannot be deduced from their form – they are, like most words according to the Saussurean view on language, *arbitrary* (Saussure, 1916). The arbitrariness of spoken languages has more recently been called into question, and iconicity and sound-symbolism have been found to be much more extensive than earlier assumed (Ramachandran

& Hubbard, 2001; Bergen, 2004; Spector & Mauer, 2009; Ahlner & Zlatev, 2010; Perniss et. al., 2010). Still, the spatial-visual modality of signed languages, as Bergman (1982) points out, allows for expressions that reproduce several visual aspects of spatial referents, such as their shape or motion, thus allowing a greater degree of iconicity than in spoken languages. There are a number of different ways in which signs can be motivated by its meaning. A sign can display iconic resemblance to either a part, or the entirety, of the meaning intended. Bergman (1982) describes three types of signs, based on the different iconic relationship they have to their referent: *shape-reproducing*, *relationship-reproducing* and *movement-reproducing* signs.

### 3.3.1   Shape-reproducing signs

The sign BALL, as shown in Figure 3-1, is expressed by 'drawing up' a round shape with one's cupped hands, while ELEPHANT (Figure 3-2) resembles an elephants' trunk: starting from one's own face and moving an o-shaped hand in along trunk-like trajectory.
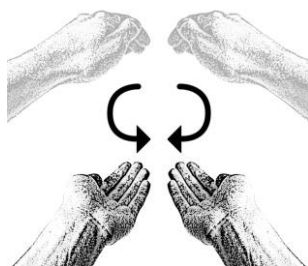


**Figure 3-1.** Lexical noun BALL.



**Figure 3-2.** Lexical noun ELEPHANT.

### 3.3.2   Relationship-reproducing signs

*Relationship-reproducing* signs show the spatial orientation, such as *on* or *behind of*, of a referent in relation to another by reproducing the intended relationship in signing space (Bergman 1982). For example, to denote a spatial relationship in which a ball is located on top

of a table, speakers of SSL place their active hand, shaped to classify round objects, on the passive hand, shaped to classify flat objects, as shown in Figure 3-3.
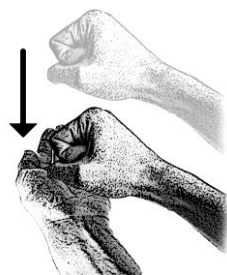


**Figure 3-3.** Depicting verb showing the position of *a ball* on *a table*.

### 3.3.3 Movement-reproducing signs

Bergman (1982) lists five different ways in which a sign can relate to different aspects of the movement of a referred-to object. In such *movement-reproducing* signs, the articulation can be iconic in the following ways:

1. A sign can be iconic of a hand gesture associated with the referent: rubbing one's belly to denote *being full* or patting one's leg to denote *dog*.

2. Iconic signs can also imitate our movement as we handle an object: moving one's hand as when turning a key can denote either *key* or *to lock*, the distinction being made by non-manual signs.

3. A third kind of iconicity is when a sign resemble the motion of an object as we handle it: reproducing cutting-motions with the index and middle fingers can refer to either *scissors* or *to cut*.

4. When producing the sign *walk*, the index and middle fingers are instead iconic of one's legs when performing such action. In this case the hand stands for one's whole body, rather than part of it.

5. The fifth type of iconicity is when the hand and its motions reproduce the object and its motions, differing from (3) in that the referent is independent from the speaker, and the motion is not necessarily one caused by the agentive actions of the subject. The sign MONKEY, for example, is an imitation of how a monkey stereotypically scratches itself (Bergman 1982).

### 3.3.4 Depictive signs

While many lexical signs can be seen as more or less motivated by iconicity, depicting verbs seem to be those which are the most iconic, as their form is a *reproduction* of certain properties of the referent. By the use of a depicting verb, it is possible to refer to an object as well as specify its size; describe an object in motion and indicate its velocity; or describe an action as well as specify the ease or difficulty with which it is performed (Bergman, 1982).

There are also ways in SSL to denote change-of-position, without specifying any other aspects of the translocation. In such expressions, the object and the destination are first specified, followed by an arcing 'leap' with the articulator, index finger extended to point in a forwardly direction, to the destination in the signing space. Such a description denotes an object coming to be at the destination, but indicates nothing as to the motion, or manner of motion, involved in getting there (J. Mesch & L. Wallin, personal communication).

The expressions described so far share a spatially iconic relationship to their referent, by re-producing its shape, or a spatio-temporally iconic relationship, by imitating its motion. A further type of expression in SSL are instead in, one might say, a solely temporal iconic relationship with the referent, in that the velocity of the progress of the articulation itself can express meaning. Depicting verbs can be modified velocity-wise to express whether the referred-to motion situation took place in a swift or slow way (SOU, 2006:29). There are also temporally expressed meanings that change, or add to, the meaning of an utterance, by abruptly arresting the articulation at its beginning or end. If one assumes the hand shapes, angles and positions to express a motion-depicting verb but stops and holds still just as one was about to articulate, one conveys the meaning that something was about to happen or move, but never got around to, or was stuck (SOU, 2006:29). By briefly arresting the articulation at its beginning, end-point or both, one can also denote that something has moved from point A, to point B, or both (Wallin, 1994).

### 3.3.5 Summary

The opposition between more arbitrary/conventionalized lexical signs and more iconic/freer depictive signs is not a clear-cut distinction. It might be more fruitful to view it as a gradient scale, along which all linguistic forms are found. In this thesis, the term *lexical* is therefore used as a relative term. We have seen that the three components: *articulator*, *articulation* and *place of articulation*, all convey meaning. Most signs do however allow some degree of modification
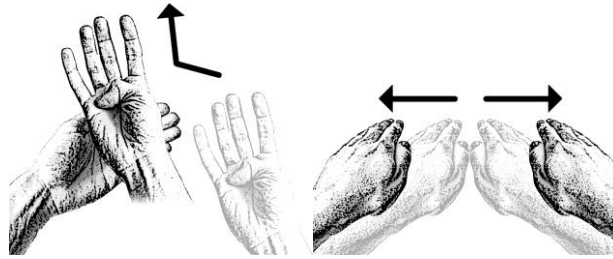
to each of these components. Adjusting the angle or shape of the articulator or modifying the speed, place or direction of articulation, can alter the semantic content of an utterance. In spatial descriptions, the articulation of lexical signs, such as nouns, can be modified to express or co-express the direction of motion (Liddell, 2003).

The type of hand shapes can be decisive of whether such modifications are possible, and what they express. Returning to the signs BALL and ELEPHANT, the former represents the whole of its referent, while the latter represent only a part. Since the sign ELEPHANT shares an iconic relationship with only part of its referent, modification to the sign does not intuitively apply to the entire entity, and would be ungrammatical (Bergman, 1982). The size of an elephant would instead be described paraphrastically. The sign BALL, on the other hand, can be modified, e.g. by reproducing a larger or smaller sphere to specify the relative size of its referent. For the same reason, only signs that are understood as representing the entirety of an object (i.e. substitutors) can reproduce its motion. What is said to be lexical herein, is only more so than forms that allow higher freedom of modification.

## 3.4   Spatial Descriptions in SSL

We have seen how expressions in SSL are iconic to a considerable degree – reproducing different aspects related to their referents. It has also been shown how relative positions, motion and spatial extension in a spatial scene can be described through the iconic reproduction of referents therein. In this section the spatial semantics of SSL will be explored. First a typical sentence of (actual) motion in SSL will be dissected, and then it will be analyzed using the framework of *Holistic Spatial Semantics*, as introduced in Section 2.

In describing a spatial scene in SSL, Landmarks surrounding the described object are introduced by nouns and depicting verbs, followed by the subject noun. Figure and Landmark are referred back to by the articulator and PoA of the subject depicting verb (SOU, 2006:29). This part of the utterance sets the scene for the narration, e.g. by specifying the shape and material of objects in the periphery and of the ground/floor. Such information can also be added parenthetically throughout the utterance or at its end. As shown in Figure 3-4, such descriptions usually consist of a lexical noun followed by a depicting verb that reproduces the location, shape and size of the referent, in this case a lawn.
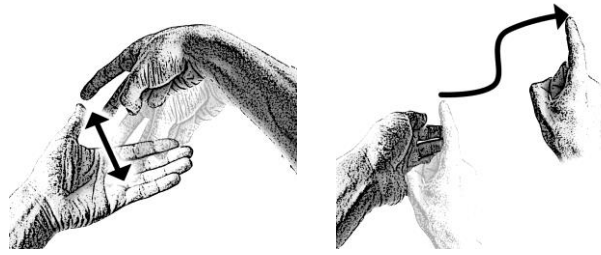
**Figure 3-4.** Lexical noun GRASS and a depicting verb showing its extension.

The articulation of the GRASS consists of a motion that brings the articulator into brief contact with the passive hand. It is then moved upwards so that, from the perspective of the addressee, the four extended fingers of the articulator appear from behind the passive hand, iconic of strands of grass. This motion is reiterated once. In this example, a flat lawn is depicted by symmetrically moving two flat hands apart, specifying horizontal extension but not depth or vertical features. Having described the surroundings, one typically goes on with describing the focal object(s). The location of an object can thereby be understood in relation to its surroundings. Figure 3-5 introduces the subject of the sentence: a *man* or *boy*.



**Figure 3-5.** Lexical noun MAN/BOY.

To articulate the sign MAN/BOY, one starts by positioning the articulator at one's face, with the index finger in contact with the forehead and the thumb in contact with the cheek, just below the eye. The thumb and index finger then converges as they are moved away from the face, throughout the articulation. Next, Figure 3-6 shows the lexical verb WALK, and a depicting verb describing the trajectory of motion.

**Figure 3-6.** Lexical verb WALK, and depicting verb showing the trajectory of motion.

The sign WALK consists of the articulator, in a v-like hand shape, twice performing a motion outwards, from being in contact with the center of the palm of the passive hand. The depicting verb shows that the man/boy walked along an s-shaped trajectory. The hand shape of the articulator classifies the object in motion. A hand shape with an extended index finger classifies objects extended in mainly one dimension, such as erect people. In this example, the passive hand (PoA) acts as a classifier, even though its referent is not identified in the sentence. This sign component is included to show all the ways in which depicting verbs can convey meaning. The hand shape assumed by the passive hand in the depicting verb classifies an object mainly extended in two dimensions, such as a wall, but could only be understood through context.



**Figure 3-7.** Lexical adverb INSIDE.

Figure 3-7 shows the lexical adverb INSIDE. To produce this sign, the index finger of the articulator is extended in the direction of articulation. The articulator is then moved down under the slightly cupped passive hand (PoA) in a downward-arcing motion. The lexical noun HOUSE is exemplified in Figure 3-8.
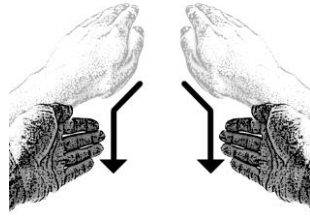
**Figure 3-8.** Lexical noun HOUSE.

HOUSE is expressed using both hands with fingers together and extended. Starting with the hands in contact at an angle, the articulation consists of a symmetrical motion of the hands, apart and downwards in the shape reminiscent of a house with a slanted roof.

## 3.5 Patterns of conflation/distribution in SSL

Taken together, the signs shown in Figures 3-4 to 3-8, repeated in Figure 3-9, would translate into something like 'A man/boy walks on a flat lawn (away from an afore-mentioned wall), along an s-shaped trajectory, ending up inside a house'.
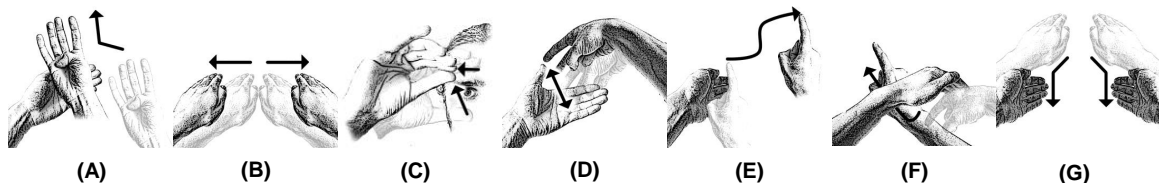


**Figure 3-9.** (Actual) motion sentence in SSL.

In an earlier analysis, using Talmy's (2000b) categories of motion, the hand shape of the articulator in (E) is seen as expressing the category Figure and the hand shape of the passive hand as expressing Ground (Wallin, 1994). Wallin analyzes the articulation of the depicting verb as an expression of Motion (or location) and the lexical verb (D) is taken to express Manner. Following instead Holistic Spatial Semantics, additional categories can be identified, and a re-analysis of their patterns of distribution/conflation is possible.

### 3.5.1 Figure

The category Figure is distributed across the lexical noun (C) and the classifier hand shape of the articulator in (E). Being specifically identified in (C), the classifier in (E) is only understood through linguistic context.

### 3.5.2 Landmark

References to two landmarks are included in the sentence shown in Figure 3-9. First, the hand shape of the passive hand in (E) classifies an object that is extended mainly in two dimensions. As with the hand shape of the articulator, its referent can only be understood when given the situational or linguistic context. The second Landmark is expressed by the lexical noun HOUSE (G). Landmark information can thus either be expressed by a lexical noun, or be distributed between the depicting verb and lexical nouns.

### 3.5.3 Frame of Reference

The spatial meaning of the sentence is understood in reference to both Landmarks. The denoted motion starts at the wall (understood contextually) and ends inside the house. One could thereby argue that the main FoR is Object-Centered. However, the description is a reproduction of the experience from the point of view of the beholder. It thereby also, however covertly, presupposes a Viewpoint-Centered FoR as well.

### 3.5.4 Region

Several spatial relations can be conveyed in the same utterance in SSL. Through the relation between the depicting verb (E) and the description of the surroundings (A) and (B), one covertly expresses that the motion takes place on the lawn. That the motion starts by a wall and ends inside the house are instead explicit expressions of Region, conveyed by the depicting verb (E) and the adverb INSIDE (F).

### 3.5.5 Motion

Even though the articulator in (E) moves throughout the articulation, it does not unequivocally mean that the category of Motion is expressed. The depicting verb can take identical forms when expressing spatial extension, as when expressing motion. The main carrier of Motion information could therefore be claimed to be the lexical verb (D). However, it is also possible to express Motion using only a depicting verb. When describing an apple falling from a tree, one can produce the sign APPLE and then only reproduce the trajectory of the fall, leaving the Manner of motion (i.e. falling) unspecified, but deducible from context (L. Wikström, personal communication). This is also the case for the change-of-location expressions discussed in Section 3.3.4.

### 3.5.6 Path

Several types of expressions can convey Path information in SSL. Using lexical signs, such as FROM, PAST and TO, is one way. Another is through the iconic relationship between the hand shapes that classifies Figure and Landmark in depicting verbs: in a depicting verb, such as (E), the fact that the articulator starts near or in contact with the passive hand signals Path:BEG. The articulation can also start at some unspecified point in signing space, and move to a position near, or in contact with, the passive hand. This would signal Path:END. As was described in Section 3.3.4, velocity, or in this case the lack thereof, can also be used to express some of the motion categories. Arresting the articulation of a depicting verb at its end, expresses Path:END. The change-of-location expressions, that were discussed in the same section, can be seen as overt expressions of Path:BEG and Path:END that only imply motion covertly. Finally, the adverb INSIDE that overtly expresses Region: Interior, can in combination with a motion verb be seen as a covert Path expression, comparable to the Japanese verb *hairu* ('enter'), discussed in Section 2.1.2.
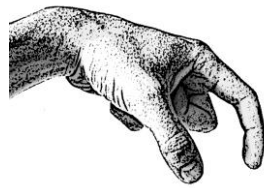
### 3.5.7 Direction

The depicting verb (E) indicates Direction through its articulation. Lexical signs such as THIS WAY, TOWARDS, AWAY FROM and LEFT/RIGHT can also be used. In spoken languages, this category is only relevant in spatial descriptions that leave Path:END unexpressed. Given that any spatial expression in SSL can be understood in relation to the experiencer, and usually also to the surroundings and some reference point(s) therein, Direction information can usually be deduced without having been overtly expressed.

### 3.5.8 Manner and Shape

The lexical verb (D) is the main carrier of Manner information. It is also possible to express Manner through the depicting verb. Here, context is crucial since the same motion (e.g. moving the articulator forward in small steps/jumps) could express either Manner (e.g. in a step-by-step motion, as when walking), or Shape (e.g. when the trajectory of the articulation reproduces an extended object of a certain shape).

The main difference between expressions of motion and descriptions of spatially extended objects in SSL is the motion verb preceding the depicting verb (J. Mesch & L. Wallin, personal communication). Looking at the iconicity of the depicting verb, (E), there are a few further

clues. Some classifier-hand shapes are seldom used to describe spatial extension, while others are seldom involved in motion (ibid.). The hand shape of the articulator in (E) tends to denote entities that are extended vertically, but not horizontally. When instead describing something that is extended along both these planes, one would prefer using a flat hand as classifier, such as the passive hand in (E). Conversely, the hand shape shown in Figure 3-10 is generally used as a descriptor: 'measuring up' the shape of an object (e.g. the width of a road), and not a substitutor that depicts motion.

**Figure 3-10.** Hand shape *measuring hand* ('måtthand').

However, in a situation where a toy car is being moved along a similar trajectory, the very same hand shape might be used. It then serves as manipulator hand shape, reproducing the caused motion of the toy car (ibid.).

# 4 Looking for NAM in SSL

Through *Holistic Spatial Semantics (HSS)*, we have a suitable framework for investigating the expression of non-actual motion in a signed language. We also have sufficient insight into the spatial semantics of Swedish Sign Language. Returning to the general questioned posed in Section 1, these can now be more specifically formulated as follows:

1. Which conventions affect the forms of spatial and motion expressions in SSL, with respect to conflation/distribution patterns?

2. Is non-actual motion (NAM) expressed in Swedish Sign Language, and if so, how?

3. What can be said about the universality of NAM in experience and expression, on the basis of the answers to question 1 and 2?

To explore these questions, a small-scale elicitation study was designed. The next section will describe the method of the study, and the results will be presented and discussed in section 5. The method is similar to that of Blomberg's (2014) elicitation study of actual and non-actual motion in Swedish, French and Thai, which allows for easier comparison with his findings.

## 4.1 Material

The elicitation material consisted of 36 pictures of spatial scenes, 12 of which were control stimuli showing objects that are less markedly extended along the horizontal axis (e.g. benches, trees and houses). The remaining 24 were target pictures intended to elicit NAM-sentences. These showed different types of objects (e.g. bridges and fences) with a more marked spatial extension. In addition, two practice pictures were included. These were shown prior to the target and control pictures to familiarize the participants with the task.

The target stimuli were designed to cue NAM-expressions through mainly two of the motivations discussed in Section 2.3: *enactive perception* and *visual* scanning. For this purpose, the central objects of the target pictures varied with respect to affordance for human translocation (+/-Aff) and perspective (1pp/3pp). Objects such as bridges, roads and paths were represented for stimuli pictures with '+Aff' and for '−Aff', objects such as fences, pipes and lined-up lounge-chairs. First-person perspective was achieved by placing the viewer close to one side of the Figure, and third-person perspective conversely by positioning the viewer at a

greater distance, viewing the Figure from the side. The four possible combinations of these variables are shown in Figure 4-1 and Figure 4-2 shows a control picture.



**Figure 4-1.** Target pictures with the four possible combinations of +/-Aff and 1st/3rd-person perspective.



**Figure 4-2.** Control picture.

## 4.2 Participants and procedure

A total of nine recordings were made with L1- as well as L2-speakers of SSL. The participants were recruited through personal acquaintances, Lund's regional division for the deaf as well as through various online forums for associations for the deaf and hearing-impaired. After a quick

examination of the data, I decided against incorporating the L2-data in the study, leaving six L1-data-sets. The main reason for excluding the L2-data was that some of the L2-paticipants differed substantially from the L1-speakers in their descriptions of spatial relations. For example, while all but one of the L1-descriptions assumed an identical viewpoint as that seen in the stimulus picture, a greater number of the L2-speakers shifted viewpoint in their descriptions. The different constituents (e.g. nouns and depicting verbs) also seemed to be more distinctly separated by the L2 SSL speakers than in the L1-data. Including the L2-descriptions in the analysis would have necessitated an in-depth discussion of how different levels of linguistic proficiency, and patterns loaned from spoken Swedish, can affect spatial descriptions in SSL. This was found to be beyond the scope of the present study, but remains a question for further research. The remaining six L1-participants were two males and four females in the ages 25-71 years (mean = 33 years; *s.d* = 18).

Three randomly ordered sets of pictures were viewed – each set by two participants. After being briefly informed about the procedure and having signed a consent form, the participants were asked to sit down in front of a laptop with a 16.3" screen with one of the three stimuli-sets prepared. The participants were seated at one side of a table with the screen slightly to their right. The camera was placed to their left at an angle to make sure that the screen did not obscure any part of the manual signs. The elicitations were performed in a quiet and bright enough room, either at Lund University, or at the office of the participant. The participants were instructed to describe the pictures in one sentence. After describing the two practice pictures, the participants were asked if the task was clear. Apart from technical questions, such as which key to press to move to the next picture, a few of the participants asked whether they should use only SSL, or whether they also/instead should describe the pictures in Swedish. They were asked to only use SSL. After answering any questions, the proper test began.

## 4.3   Coding

The collected data was reviewed and analyzed on the basis of the expression of the semantic categories described in Section 2.2, on the level of constituents as well as sentences. For each constituent and sentence, the semantic categories were coded into an Excel data sheet to enable quantitative analyses. Each row of the data sheet made up one description. The different constituents of target expressions (i.e. the part of the utterance that concerned the central object of the picture) were coded along the columns. Table 4-1 displays the abbreviations used

throughout the code and in following sections, and Table 4-2 is a compressed sample from the data sheet.

**Table 4-1.** Abbreviations used throughout the code for form-classes (left) and semantic categories (right).

| | | | |
|---|---|---|---|
| LN | Lexical noun | F | Figure |
| LV | Lexical verb | L | Landmark |
| DV | Depicting verb | FoR | Frame of Reference |
| A:or | Articulator | R | Region |
| A:on | Articulation | Mo | Motion |
| Ang | Angle of articulator | P | Path |
| PoA | Place of Articulation | D | Direction |
| Adv | Adverb | Ma | Manner |
| Adp | Adposition | S | Shape |
| Adj | Adjective | | |

**Table 4-2.** Coding sample from Excel data sheet (see text).

| Part | +/-Aff | 1/3pp | Picture description | BD | 1st LN | Adv/ Adp | LV | 1st DV A:or | A:on | PoA | Ang | Adv/ Adp | Adj | 2nd LN | 2nd DV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.2 | Control | Control | monument-in-square | | F | R | | F | R | L,R | | R | | L | |
| 3.1 | 0 | Prox | fence-beach-proximal | | F,D | | | F | D,P | P | | R | | F,D | F,L,D |
| 3.2 | 0 | Dist | fence-beach-distal | L | F,D | | | F | D,R,P | L,P | | | | | |
| 2.1 | 1 | Prox | bridge-cliff-proximal | | F | | | F | D,P,S | P | | R,P | | | F,L,Mo,Ma,D,S |
| 1.2 | 1 | Dist | bridge-cliff-distal | | F | | Ma,Mo | F | D,S,P | L,P | | | | | F,Mo,Ma,D,S |

The metadata in the first four columns displayed a code for each participant, the stimuli variables Afford and Perspective and a short description of the stimuli picture. The different form classes, or types of signs (see Section 3.1), distinguished in the code were lexical nouns, lexical verbs, depicting verbs, adverbs, adpositions and adjectives. These word forms were each given a column in the data sheet. The column abbreviated as BD stands for background description (see Section 3.4). In the full-size data sheet, this section consisted of separate columns for form classes that preceded the target expression, but expressed or co-expressed, some of the categories relevant for the target expression.

Not one but rather two or three depicting verbs are sometimes used to describe the same object. In some cases these can be identical repetitions for clarification, but often they express a richer depiction of the referred object. Where identical depicting verbs were used, the repetitions were excluded from the analysis. To account for multiple depicting verbs and spatial references outside of the target expressions, additional sets of columns were added to the right and left of the columns shown in the compressed sample. Furthermore, the depicting verb was sub-divided into three columns, one for each of the three different components: *articulator*, *articulation* and

*place of articulation*. The angle and/or finger and wrist movements of the articulator, though in previous analysis (Wallin 1994) classified as a part of the articulator (see Section 3.1), was given a separate column, since the hand shape of the articulator in motion situations *substitute* the Figure and any change in angle or tilt or any finger movements must be seen as expressions of some other of the nine semantic categories.

The framework for coding semantic categories was mainly given by the analysis of motion semantics presented in Section 3.3, but was partly refined as the work progressed. The dynamism on the expression level of SSL led to some delimitations of the framework. For example, SSL allows for several meanings to be expressed simultaneously (see Section 3.1) and an articulator expressing Figure-information in one depicting verb might retain its hand shape and position throughout subsequent signs, seamlessly turning into a conveyer of landmark-information. A 'minimal analysis' of the descriptions, as will be described below, was first implemented. Such an analysis is less holistic in that any potential, but arguably *covert* (see Sections 2.2 and 3.3), expressions of motion were excluded. It does not recognize syntactic or non-simultaneous (sign-) spatial relations between constituents as expressions of spatial meaning. Throughout the discussion of the results, both a minimal and a maximal analysis will be taken into account, but since a fully holistic analysis (e.g. also including and fully analyzing non-manual signs) is not possible as of yet, the coding and some of the quantitative results will be based on the minimal analysis.

### 4.3.1   Figure, Landmark and Region

The category Figure was coded for any noun describing the central object of the picture, and for depicting verbs co-referring to the central object. Landmarks were recognized where the passive hand was used simultaneously with the articulator expressing Figure through nouns and depicting verbs, and where explicit Region-expressions were made through adverbs or adpositions. As mentioned in Section 3.1, Region and Landmark can also be expressed covertly through the spatial relation between two subsequent signs.

### 4.3.2   Frame of Reference (FoR)

Any description that expresses Figure and Landmark, i.e. the majority of the descriptions in the data, can be said to express an Object-centered Frame of Reference. Descriptions that expresses the location and stance of the viewer through a depicting verb, as well as explicit statements of

FoR through the sign AS-SEEN-FROM-HERE, was considered overt expressions of a Viewpoint-centered FoR.

### 4.3.3  Path

Path was coded for adpositions, such as TO, and for depicting verbs where the articulator started or ended up in contact with the PoA (i.e. the passive hand). Path was then seen as distributed between the two form-classes. A less minimal analysis would recognize the adverb INSIDE as conflating Region and (covertly) Path and/or Direction. A maximal analysis of INSIDE, that might also find Figure, Landmark and Motion, will be further discussed in Sections 0 and 6.

### 4.3.4  Direction

All depicting verbs with a non-circular and non-reiterated articulation were coded as expressions of Direction. Direction was also recognized for every noun, adverb or adposition whose articulation was modified to reproduce the direction of the object in the picture (see Section 3.3.4). So were all explicit expressions of Direction through adverbs/adjectives (dependent upon whether the expression is seen as expressing motion).

### 4.3.5  Shape

Even though a sign articulated in a straight trajectory might be a description of a straight referent (i.e. an expression of Shape) it would be impossible to judge whether it in fact is the correct interpretation. For this reason, only depicting verbs articulated with a non-straight trajectory were coded as expressions of Shape. Shape was also coded for explicit expressions such as the sign STRAIGHT.

### 4.3.6  Motion and Manner

The lexical verbs WALK and DRIVE, and motion-depicting verbs that reproduce, for example, walking motion by the use of a substitutor hand shape, can be said to express Motion and Manner, since they represent and reproduce Figures moving in a certain way. The motion experience can be said to be reproduced through primary iconicity in depicting verbs, and represented more schematically (secondary iconicity) in lexical verbs (Ahlner & Zlatev, 2010).

# 5 Results and discussion

This section presents qualitative and quantitative analyses of the gathered data. The three research questions posed in Section 4 are subsequently discussed in Section 6 on the basis of both a minimal and a maximal analysis (see Section 2.2). Even when analyzing the sentences minimally (i.e. excluding covertly expressed spatial information), the amount of semantic categories found in the descriptions of the target stimuli was much greater than for control descriptions. The elicitations were thereby, even in a minimal and more schematic analysis, successful.

## 5.1 Qualitative analysis

Below, a semantic analysis is presented of six sample sentences from the SSL-data. First we analyze a typical description of a control stimuli picture and subsequently four target stimuli descriptions, one of each of the four possible stimuli variations. Among these are three typical target descriptions that express different degrees of dynamicity. We will also analyze one seemingly rare description, in which NAM is expressed through a lexical Manner verb, and lastly one description displaying an adverb that has been iconically modified to express spatial meaning.

While the first sentence is a description of a control picture, in which no motion is expressed, the subsequent examples are chosen since they, in contrast, express higher degrees of dynamism. These sentences will be discussed from different perspectives along a cline from a minimal (more schematic) to a maximal (more holistic) analysis.

### 5.1.1 Static descriptions

Starting with more static expression patterns, Figure 5-1 shows typical description of a control picture, glossed using a minimal analysis, with the abbreviations introduced in Table 4-1.

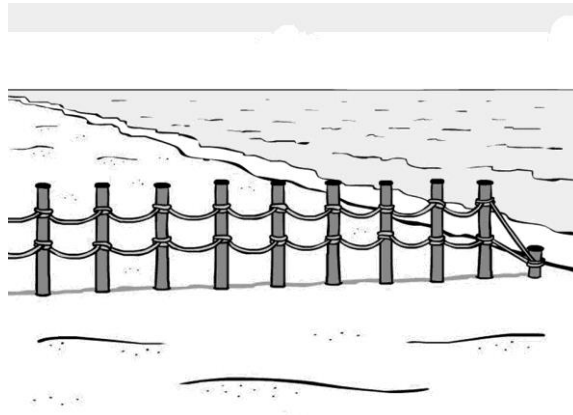| SQUARE | ON | ROCK | DV | DV | | | AROUND | HOUSE |
|--------|-----|------|----|----|---|---|--------|-------|
| L | R | F | | F | L | R | R | L |
| A stone object of a certain shape on | | | | | | | | |
| a square, surrounded by houses | | | | | | | | |

**Figure 5-1.** Glossed description of a control picture.

In the description, the categories Figure, Landmark and Region are distributed between lexical signs, such as nouns and adverbs, and more iconic sign forms, depicting verbs. The postpositions AROUND and ON show a complementary distribution pattern, i.e. one value of the category Region is expressed by one sign. The sign ROCK describes the material of an object, and the following depicting verb "draws up" the shape of the rock object (the monument). The depicting verb, even analyzed minimally, conflates the categories Figure, Landmark and Region. These categories are recognized since the articulation simultaneously reproduced the spatial location of a Figure in relation to a flat Landmark, expressed by the passive hand (PoA).

The depicting verb is articulated through mirrored motion of both hands, using typical descriptor hand shapes. In the target descriptions, no depicting verbs with a "two-hand-articulator" were used. The symmetry of the sign indicates stasis, and the use of descriptors rules out the possibility to interpret this, even in a maximal analysis, as expressions of (actual or non-actual) motion. If the sign were seen as an expression of motion, the use of both hands would imply two (non-actually) moving Figures, which does not match the stimulus picture.
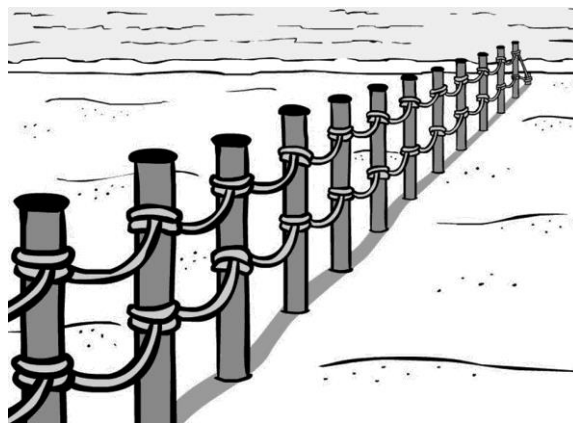
### 5.1.2 Path and Direction

Figure 5-2 and Figure 5-3 show descriptions of an object viewed from a third- and first-person perspective, respectively. The represented object lacks affordances for human translocation (and may even be said to prevent it).

| WATER | DV | | FENCE | | DV | | | | DV | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | | L R | F | D | F | L | R | D | F | L | R | D |
| A fence extends laterally, relative to the sea | | | | | | | | | | | | |

**Figure 5-2.** Glossed description of a −Aff+3pp picture.



| FENCE | | DV | | | ON | SAND | FENCE | | DV | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F | D | F | P | D | R | L | F | D | F | P | D |
| A fence extends non-laterally, relative to one of its extremeties | | | | | | | | | | | |

**Figure 5-3.** Glossed description of a −Aff+1pp picture.

Both descriptions express the more static categories Figure, Landmark and Region in a pattern similar to that of the control picture description: in the former sentence distributed between two nouns and two depicting verbs; in the latter through nouns and also by the use of the adposition ON. Both sentences are analyzed as expressing Direction since their articulation, as opposed to that of the depicting verb in Figure 5-1, was constituted of a non-symmetrical and non-reiterated trajectory.

Though not a pattern specific only for 1pp, the description glossed in Figure 5-3 also overtly expressed Path through the type of articulation (i.e. contact between Figure-classifier and Landmark-classifier). The articulation of this sign consisted of the articulator (the main hand) starting in contact with the PoA (the passive hand) and moving away, reproducing the trajectory of the fence in relation to one of its ends. The articulation is non-reiterated and asymmetrical, thus iconically reproducing categories more associated with motion: Direction and Path. Since no lexical motion- or manner- verb is used, and since the hand shape of the articulator is a typical descriptor, the category Motion is not expressed. These Motion-less expressions of Path and Direction can be compared to expressions of *Non-Actual Path/Direction* found by Blomberg (2014) in Swedish. But while expressions of non-actual path in Swedish, such as that shown in (37), may be said to express some degree of motion through the adverb *ut*, the use of a descriptor hand shape in the description glossed in Figure 5-3 signals lack of motion.

(37) Ett         rör      ut    genom     en          tunnel.
       DET.INDF    pipe    out    through    DET.INDF    tunnel
       'A pipe out through a tunnel.'

(Blomberg, 2014: p. 203)

In Figures 5-2 and 5-3, the categories Figure and Direction are analyzed as distributed between the noun FENCE and the following depicting verb. Throughout the data, nouns were often articulated more or less indistinctly from subsequent depicting verbs. Where the articulator of the noun was the same as that of the depicting verb, the two signs sometimes "morph" and become barely distinguishable from each other. This could be viewed as a continuum of overtness where distinct nouns are seen as overt expressions of Figure, whereas and less distinct, morphed, nouns additionally are seen as covert expressions of Direction. Such modified sign forms will be further discussed in Sections 5.2.3 and 6.
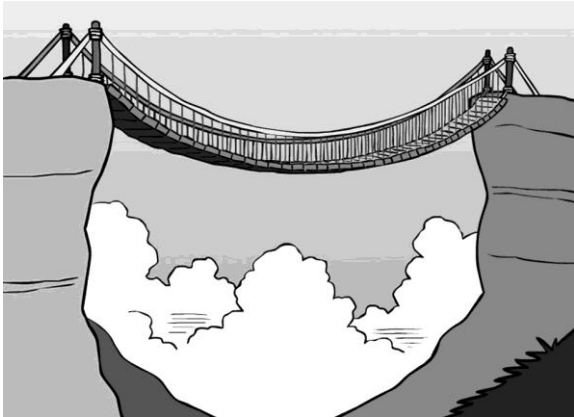
Before moving on to motion expressions, let us look closer at the depicting verbs used in Figures 5-2 and 5-3. In both descriptions, the participants made use of two separate depicting verbs to describe the same referent. While the second depicting verb in Figure 5-3 was just a repetition of the first, the two depicting verbs in Figure 5-2 were expressed with different articulators. In the first of these, the articulator formed the *index finger hand* ('pekfingerhanden') (index finger extended and pointing upwards), reproducing the vertical poles holding up the fence. The

articulator of the second depicting verb reproduced the ropes running along the fence, by assuming the *w-hand* ('w-handen') (index-, long- and ring-fingers extended horizontally).

The index finger hand, as discussed in Section 3.2.1, is a typical substitutor hand shape. The first depicting verb could thereby be seen as expressing motion. However, an alternative, and arguably more plausible, analysis would consider its articulation as expressing plural. The distinction between motion and pluralization in this sentence is likely made by the use of non-manual signs, such as oral gestures. As such sign forms are not included in this analysis, this will be left an open question. The question as to whether or not expressions of Direction and Path should be seen as associated with motion even in SSL, is further explored in Section 6.

### 5.1.3   Non-Actual Motion-depicting verbs

Figure 5-4 and Figure 5-5 display glossed descriptions of +Aff-stimuli pictures, the former 3pp, and the latter 1pp.



| ROCK | DV | ROCK | DV | BRIDGE | DV | | | | | LV | | DV | | | | |
|------|----|------|----|--------|----|----|----|----|----|----|----|----|----|----|----|----|
| | | | | F | F | L | P | D | S | Mo | Ma | F | Mo | D | Ma | S |
| (Between two cliffs,) a walking bridge extends laterally in a certain direction. It is walkable. | | | | | | | | | | | | | | | | |

**Figure 5-4.** Glossed description of a +Aff+3pp picture.

| BRIDGE | DV | | ROCK | DV | ROCK | DV | DV | | | | |
|--------|----|----|------|----|------|----|----|----|----|----|----|
| F | F | D | S | | | | | F | Mo | D | Ma | S |
| A bridge extends non-laterally (between two cliffs), a walking bridge. | | | | | | | | | | | |

**Figure 5-5.** Glossed description of a +Aff+1pp picture.

The first four signs in Figure 5-4 and those in the middle of Figure 5-5 are, following a minimal analysis, not understood as expressing any semantic categories of relevance to the target expression. In both descriptions, the signs describing the two cliffs are articulated at specific points in signing space. The relation between the articulation of these signs and articulation of BRIDGE and its depicting verb are iconic reproductions of the relative positions of the objects in the picture, even though not expressed simultaneously. A more maximal analysis would recognize these as covert expressions of Landmark and Region, is discussed in Section 5.1.4.

The first depicting verb in both sentences describes the bridge by means of a typical descriptor hand shape (see Section 3.2). These depicting verbs are articulated along a downward-arcing trajectory, overtly expressing the categories Figure, Direction and Shape. The latter additionally expresses Landmark, Region and Path through the simultaneous reproduction of the spatial relation between the extension of the bridge and one of its ends, by means of the passive hand (PoA). In the second depicting verb of both descriptions, the finger movements of the articulator iconically reproduce a person walking along the trajectory of articulation. In the description glossed in Figure 5-4 the lexical verb WALK was also used. Both these signs are seen as overt expressions of motion.

Figure 5-5 shows the most typical way of expressing non-actual motion is SSL. No such motion-depicting verbs were expressed without a preceding depicting verb that described the form of the referent. Thereby the only new information in the second depicting verb is Motion

and Manner. Five out of the nine depicting verbs describing non-actual motion were found in descriptions of the same two stimuli pictures, which show a bridge from different perspectives. Expressions of Motion and Manner through lexical motion verbs were sparse in the data, only found in three descriptions. One such sentence will be further analyzed in the following section. Figure 5-4 however, is an exception in this respect as it is the only description where both lexical and depicting verbs were used.

### 5.1.4 Lexical and modified forms of NAM-expressions

Only three lexical motion verbs were found in the data, two instances of WALK, and one instance of DRIVE. The latter is first glossed using a minimal analysis in Figure 5-6.



| ROCK | DV | DRIVE | | ROAD | INSIDE |
|------|----|-------|-----|------|--------|
| | | Mo | Ma | F | R |
| A road drives inside (of a mountain) | | | | | |

**Figure 5-6.** Minimal analysis of a +Aff+3pp picture description.

In this utterance, the noun ROAD was articulated lexically, i.e. with no (additional) iconic modification, and no depicting verb followed the noun. Instead the adverb INSIDE was used, here minimally analyzed as expressing Region. As a display of the dynamicity of SSL however, the articulation of INSIDE was greatly modified: the trajectory of articulation was prolonged, as shown in Figure 5-7, in comparison to the "more lexical" articulation of the sign shown in Figure 5-8.
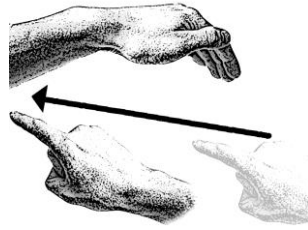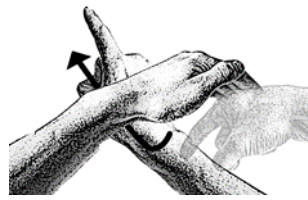
**Figure 5-7.** Modified adverb INSIDE.



**Figure 5-8.** Lexical adverb INSIDE.

In this description, INSIDE was articulated in the direction of the object in the picture. A less minimal analysis would thereby see this as a covert expression of the category Direction. Still, a maximal analysis might find even more. Illustrating the dynamicity of SSL, Figure 5-9 suggests a more maximal analysis of the same sentence.

| ROCK | DV | | DRIVE | | ROAD | INSIDE | | | | |
|------|----|----|-------|----|------|--------|---|---|---|---|
| L | | L | R | Mo | Ma | F | | F | L | R | P | D |
| A road drives straight, in a certain | | | | | | | | | | |
| direction, into a mountain | | | | | | | | | | |

**Figure 5-9.** Maximal analysis of a +Aff+3pp picture description.

Here, the relative position in signing space of the background description is understood as covert expressions of Landmark and Region. The category Landmark is distributed between the noun ROCK and its depicting verb, which also conflates Region through the spatial relationship with the PoA of the adverb INSIDE. DRIVE was expressed lexically and thereby overtly expressing Manner and Motion. The noun ROAD was also articulated lexically, expressing Figure. A greater deal of motion-iconicity was found in the modified form of the adverb INSIDE, which in most respects cannot be distinguished from a depicting verb. If analyzed as such, it would be seen as expressing at least Figure, Landmark, Region, Path and Direction. What differs is the choice in hand shape: in the data, all depicting verbs describing roads and paths were either articulated with a typical descriptor hand shape (the *measuring hand*

['*måtthanden*'], discussed in Section 3.5.8), possibly in combination with NAM-depicting verb. In the adverb INSIDE, the articulator used is instead the *index finger hand* ('pekfingerhanden') pointing in the direction of articulation. In a possibly too maximal analysis, this sign would be seen as an expression of motion similar to those found in NAM-depicting verbs. But even though Figure, Landmark and Motion are in the form, the question as to whether or not some cognitive process of NAM is involved will be left for further research (discussed in Section 6).

The "motion content" of some of the modified signs forms, such as INSIDE discussed above, would benefit from an even more holistic analysis (e.g. including also non-manual signs such as oral gestures, posture and gaze). In the next section, a quantitative analysis of the data will be presented, showing a correlation between some of the suggested motivators for NAM-expressions and the distribution of overt NAM-expressions through lexical and depicting verbs, as well as possibly covert NAM-expressions through the iconic modification of nouns, adpositions and adverbs.

## 5.2   Quantitative analysis

This second part of the discussion will show some quantitative evidence in support of the motivations for the use of NAM-expressions suggested by Blomberg (2014). As in the previous section, more minimal and more maximal analyses will be discussed, and finally compared to Blomberg's findings for Swedish, French and Thai. Given the relatively low number of participants in the study, only descriptive statistics are presented. These statistics are not based on a fully holistic analysis – since a comprehensive framework for analyzing e.g. non-manual signs is still wanting, no reliable analysis of some of the covert spatial- and motion expressions could be made. Table 5-1 shows that the elicitations were successful in cueing expressions of the semantic categories discussed in Section 2.2. Even in a more minimal analysis, the target descriptions in SSL elicited similar proportions of spatial expressions (i.e. sentences describing at least a Figure in relation to a Landmark) as Swedish, French and Thai.

**Table 5-1.** Percentage of target-descriptions expressing semantic categories.

|         | SSL     | Swedish | French  | Thai    |
|---------|---------|---------|---------|---------|
| Target  | 95.8 %  | 95.3 %  | 89.7 %  | 89.5 %  |
| Control | 72.2 %  | 87.0 %  | 88.5 %  | 86.3 %  |

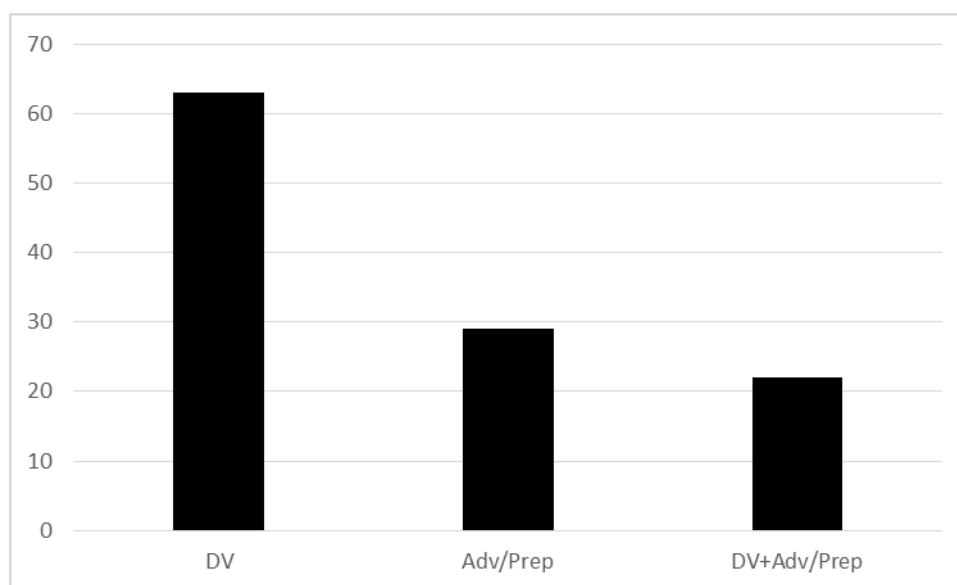(Data on Swedish, French and Thai from Blomberg 2014:p. 210)

### 5.2.1 Expressions of motion-related semantic categories

As Table 5-2 shows, the target stimuli cued higher amounts of the categories involved in motion expressions (Motion, Path, Direction, Manner and Shape) than the control stimuli. None of the control pictures cued Motion or Manner, and the amount of expressions of Path, Direction and Shape were markedly lower than in the target descriptions.

**Table 5-2.** Distribution of semantic categories between target- and control- stimuli. Motion-related categories in bold

|          | Figure | Landmark | FoR  | Region | **Motion** | **Path** | **Direction** | **Manner** | **Shape** |
|----------|--------|----------|------|--------|------------|----------|---------------|------------|-----------|
| Target   | 95,1%  | 62,5%    | 7,6% | 59,7%  | **8,3%**   | **78,5%** | **95,1%**     | **8,3%**   | **28,5%** |
| Control  | 72,2%  | 65,3%    | 2,8% | 65,3%  | **0,0%**   | **1,4%**  | **6,9%**      | **0,0%**   | **9,7%**  |
| Total no.| 189    | 137      | 13   | 133    | **12**     | **114**   | **142**       | **12**     | **48**    |

The most common combination of categories in the target descriptions was Figure, Landmark, Region, Path and Direction. The more static categories, i.e. Figure, Landmark and Region, were expressed in the same way as in the control descriptions. Path was expressed complementarily through either adverbs or adpositions, through depicting verbs, or both in a few descriptions where Path:BEG as well as Path:END was expressed. As shown in Figure 5-10, the most common pattern for Path expression was through depicting verbs only.



**Figure 5-10.** Percentage of form classes expressing Path, out of 114 instances total

No lexical expressions of Direction were found; instead Direction was always expressed by depicting verbs and possibly co-expressed by modified nouns, adverbs or adpositions. All depicting verbs that described motion or spatial extension were also analyzed as expressing Direction. Where Direction was distributed between "morphed" nouns and depicting verbs, the

articulator of the depicting verb was identical to that of the noun. None of the control descriptions cued such morphed nouns since their hand shapes were different from those of the following depicting verbs. In the control data, five instances of Direction were found, expressed through the angle of the articulator of the depicting verb. Such expressions of Direction however seem differ semantically from expressions of Direction in spoken languages: these were all descriptions of bench(es) that also specified in which direction the object was facing, i.e. not direction of motion. This arguably implies that Direction and Orientation should be seen as two separate semantic categories in analyses of the spatial semantics of SSL, and possibly signed language in general.

Shape was expressed mainly by depicting verbs, but it was also, in two instances, expressed by the lexical adjective STRAIGHT. Shape was also recognized in seven control picture descriptions, most commonly in descriptions of sizable objects such as islands. In all of these, descriptor hand shapes were used.

### 5.2.2   Overt and covert expressions of NAM

Motion and Manner were overtly expressed in nine descriptions – too few instances to constitute a basis for any elaborated quantitative analysis. These categories were expressed by lexical verbs in two descriptions and depicting verbs in six descriptions. In the description shown in Figure 5-4, both lexical and depicting motion verbs were used. The two lexical verbs found, WALK and DRIVE, conflate Motion and Manner. Motion-depicting verbs were found to conflate at least Figure, Direction, Manner and Motion; at most Figure, Landmark, Region, Motion, Path, Direction, Manner and Shape. All of these motion verbs were preceded by depicting verbs with descriptor hand shapes, which conflate and co-express the less motion-related semantic categories, i.e. Figure, Landmark and Region. Since the spatial configuration is fully described in the first depicting verb, the only new information in the second depicting verb is (non-actual) motion.

In a less minimal analysis, modified adverbs and adpositions might be considered as covert expressions of Motion (see Section 5.1.4). All but one of the instances of INSIDE were found in descriptions of stimuli pictures showing pipes, paths and roads extending into tunnels. While the questions as to whether such sign forms should be seen as covert NAM-expressions will be left for further research, their distribution suggests that enactive perception and mental scanning might be motivating factors, as we shall see below.

### 5.2.3 Correlations to stimuli variables

Following the discussion of possible experiential motivators for NAM-expressions (see Section 2.3), the highest amounts of motion expressions were expected in descriptions of objects that afford human movement and that are viewed from a first person perspective (Blomberg, 2014). As mentioned above, the number of explicit expressions of Motion and Manner were too few to be analyzed quantitatively. Nonetheless, the fact that all such expressions were found in +Aff-descriptions suggests that enactive perception may be involved.

Expressions of the motion-related semantic categories (Path, Direction and Shape) did show some variation with respect to the two parameters Afford and Perspective. However, as illustrated in Figure 5-11, the variation did not follow the expectation that higher amounts of motion-related categories would be found in +Aff and 1pp, and lower amounts in −Aff and 3pp. While 1pp-stimuli elicited slightly higher amounts of Path and Direction than 3pp-stimuli, afford did not have any motivating effect. And while expressions of Shape were most common in the +Aff+1pp-descriptions, as expected, the other three variable combinations did not show any patterns indicating that Shape-expressions are associated with the suggested motivations for NAM-expression in SSL.
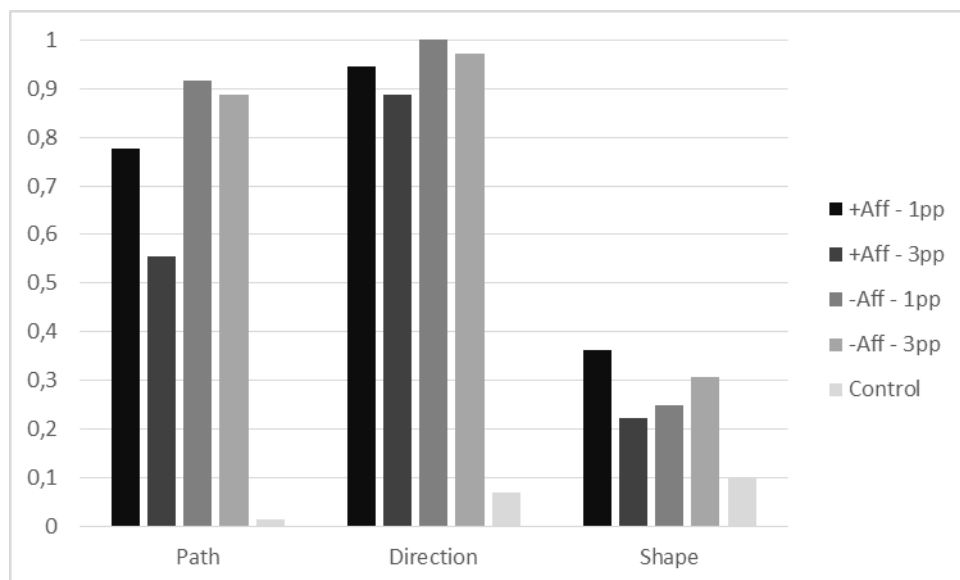


**Figure 5-11.** Proportions of sentences expressing Path, Direction and Shape with respect to the variables Afford and Perspective.

As described Section 5.1.4, lexical signs, such as nouns, adverbs and adpositions, can be modified to, more or less covertly, conflate several semantic categories beyond those expressed by their non-modified form. Figure 5-12 illustrates that sentences with nouns (e.g. PATH and

ROAD) that were modified to conflate Figure and Direction were most common in +Aff-descriptions, while lexically articulated nouns, that only express Figure, were most common in descriptions of −Aff-stimuli. +Aff+1pp-pictures cued the highest number of modified nouns.
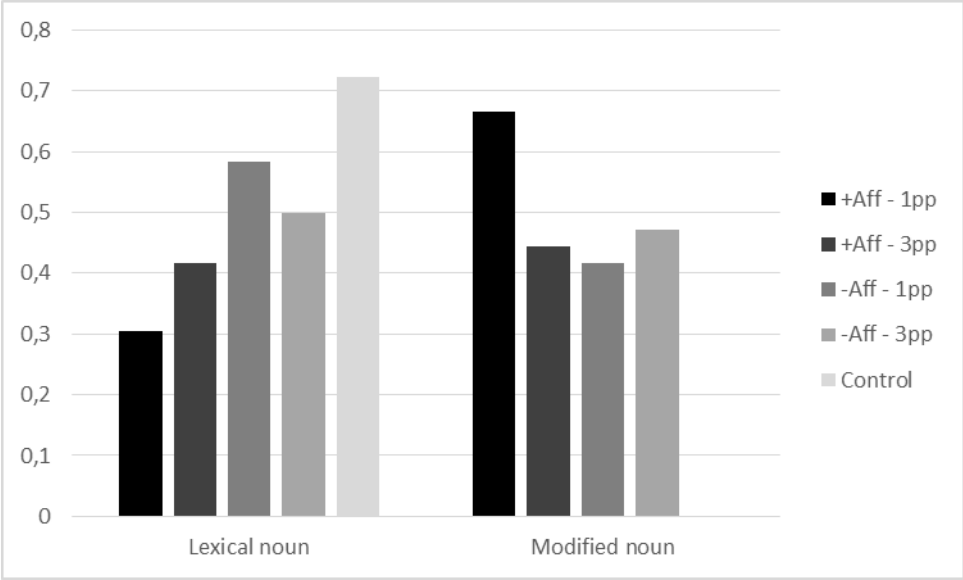


**Figure 5-12.** Proportions of lexical and modified nouns, with respect to stimuli variation.

Similar patterns were found in the distribution of modified adpositions and adverbs. The distribution of such sign types, with regard to the different types of stimuli, is shown in Figure 5-13.
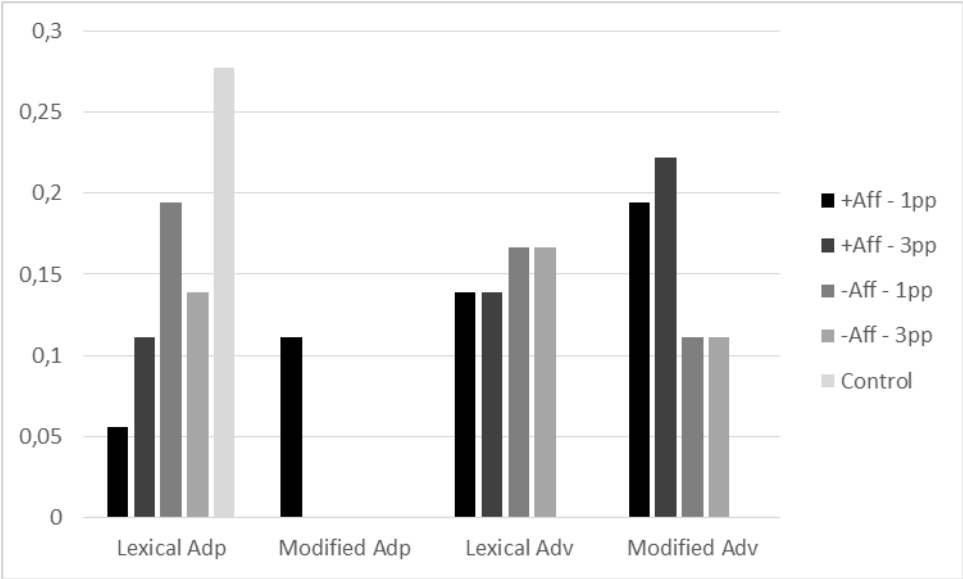


**Figure 5-13.** Proportions of lexical and modified adpositions and adverbs, with respect to stimuli variation

While only lexically articulated adpositions (e.g. ON and AROUND) were found in the control descriptions, the postposition TO, modified to conflate Path and Direction, was only cued by the +Aff+1pp stimuli. Lexically articulated adverbs (e.g. INSIDE) were more common in descriptions of objects that lack affordance for human translocation, and twice as many of the modified adverbs were found in the +Afford-data.

To sum up, this section has shown the conventional ways for expressing the nine semantic spatial categories (see Section 2.2) in SSL. "More lexical" signs (e.g. lexically articulated nouns and adverbs) take complementary values similar to those of Swedish. "Less lexical" and more iconic signs (e.g. depicting verbs and modified adverbs) allow the conflation of a higher number of semantic categories than form classes used in spoken languages. Though only found in relatively modest numbers, overt NAM-expressions through lexical and depicting verbs were only elicited by stimuli pictures showing objects that afford human translocation. A similar pattern was found for modified adverbs and adpositions, which also were more common in descriptions of objects viewed from a first-person perspective.

# 6 Conclusions

This thesis has suggested a method for holistically analyzing the spatial semantics of Swedish Sign Language, which takes a wide array of different sign components into account. It has also described how SSL typically expresses the semantic categories associated with space and motion. The visual modality of SSL allows for rich and dynamic reproductions of spatial scenes, displaying extensive iconicity. The fact that both lexical and depictive signs readily can be modified to conflate several of the semantic categories is a feature that clearly distinguishes it from languages with spoken modality. Even though the lack of a comprehensive framework that also includes non-manual signs, in some aspects, has necessitated an arguably too minimal analysis, we have been able to show that some of the suggested NAM-motivations are relevant also in SSL. On the basis of the discussion of the semantics and form-meaning mappings of NAM on SSL, the research questions can now be addressed.

- *Which conventions affect the forms of spatial and motion expressions in SSL, with respect to conflation/distribution patterns?*

In spatial descriptions in SSL, nouns and depicting verbs typically co-express Figure and Landmark, while Region is expressed by the spatial relation between the Figure- and Landmark-reproducing hand shapes of the depicting verbs. Lexically articulated adverbs and adpositions tend to take the complementary values Region and Path, while modified forms of nouns, adpositions and adverbs co-expressed at least Direction through iconic modifications. Depicting verbs were found to express or co-express all of the nine spatial categories. Apart from Figure, Landmark and Region, depicting verbs also express Path, Direction and Shape through the motion of the main hand (articulator). Motion and Manner can additionally be expressed through the finger movements of the articulator. Such expressions were only found in the second depicting verb of the sentence. Even though typical descriptor hand shapes, in a few exceptional contexts, can be used to express Motion, the choice in hand shape marks whether a depicting verb expresses motion or spatial extension. Shape can also be expressed complementarily by the adjective STRAIGHT.

- *Is non-actual motion expressed in Swedish Sign Language and, if so, how?*

Clearly, there were differences between the descriptions of the control and target pictures. The articulation of the target descriptions consisted of much higher proportions of the motion-related categories Path, Direction and Shape than the controls. However, there was no tendency

to use more such NAM-expressions in the conditions +Aff and 1pp, as was the case in previously investigated (spoken) languages. This suggests that these three categories may be less intrinsically associated with motion in SSL than in spoken languages, possibly due to the dynamicity of its modality.

Overt expressions of non-actual motion are similar to expressions of actual motion in Swedish Sign Language, with two key differences. First, few lexical manner verbs are used. This pattern resembles those found by Blomberg (2014), with for example fewer manner verbs in the verb-series of Thai descriptions of non-actual motion compared to descriptions of actual motion. Second, and this time differently from spoken languages, using a descriptor hand shape instead of a substitutor signals that no actual motion takes place. As discussed in Section 3.2, only an articulator that classifies the entirety of the referent, i.e. a substitutor, can reproduce the motion of the entire referent.

Still, despite the fact that SSL possesses resources to distinguish between spatial extension and motion, some explicit expressions of motion are used to describe static spatial situations, through both lexical and depicting verbs. The most common, though still relatively rare (found in only six descriptions), form of overt NAM-expression is through motion-depicting verbs. All such signs in the data were reproductions of a Figure walking along a trajectory of a specific Shape and Direction, relative to a Landmark. The sign thus conflates (co-expresses) all categories relevant for the motion situation. In two descriptions, lexical motion verbs were also found, and in one description, both lexical and depicting verbs. All NAM-expressions were found in descriptions of objects that afford human (and in one instance vehicular) translocation.

Using the analysis framework developed in Sections 2 and 3, a third possible way of expressing NAM in SSL has also been suggested. Modified nouns, adpositions and adverbs, such as those described in previous section (e.g. PATH, TO and INSIDE), can be very similar in form to NAM-depicting verbs as their articulation consists of an articulator moving along a trajectory, in relation to a place of articulation. Such arguably motion- or change-of-location-indicating signs were also much more common in descriptions of objects that afford human translocation. Modified nouns and adpositions were also found in greater numbers in descriptions of objects viewed from a first-person perspective.

- *What can be said about the universality of NAM, on the basis of the answers to question 1 and 2?*

Swedish Sign Language is highly iconic and its forms allow for detailed reproductions of spatial experiences. The fact that there is motion in the form of every sign in SSL does not mean that there is motion in the content: one can express lack of motion by dropping the lexical verb and by using a descriptor hand shape. Interestingly, despite such resources, overt expressions of motion are still used to describe static objects, and at least one of the suggested NAM-motivations (enactive perception) seems to affect their distribution. This gives further support to the theory that some universal pre-linguistic motion experiences are involved when visually perceiving spatially extended objects (Blomberg & Zlatev, 2013). Overt NAM-expressions were only found in descriptions of objects that afford human translocation, which was to be expected. Modified sign forms that iconically reproduce spatial relations also followed patterns expected of NAM-expression, which indicate that this is a topic that calls for further studies.

Future research should also take into consideration improvements in the elicitation set-up. To semantically chart a wider scope of different spatial configurations could provide valuable clues to the conventions involved in expressing spatial meanings in SSL. Some stimuli-variations that might be added are:

- Objects bounded in different ways (e.g. one or two visible end-points, mid-points, obscured or visible bounds).
- More variation in trajectory shapes (e.g. extended objects with more varied vertical and horizontal features).
- Objects associated with other manners of NAM with more/less "inherent" motion (e.g. train tracks, rivers and ski-lifts).

Furthermore, viewing a picture and at the same time describing it might have a positive or negative effect on the amount of NAM being expressed. Asking participants to describe each picture from memory, after it has disappeared from the screen, might result in a more natural form of description. So might including an addressee to whom the pictures are described. A larger number of participants will also be needed for the findings to become more reliable. Including participants with both L1- and L2-competence could also give a deeper understanding of the similarities and differences in the semantics of languages with spoken and signed modalities.

Finally, however holistic the framework for spatial analysis of SSL has been made, it is by no means holistic enough. Widening the array of modes of expression in the coding would benefit

any semantic analysis. A more holistic analysis should preferably include temporally expressed meanings, such as the relative sign duration and signs that retain their PoA throughout the articulation of one or several subsequent signs. Such features might be indicative of motion. In the same way that oral expressions are used to differentiate between the meanings of some lexical signs, it often seems to be the case that signs such as INSIDE, when modified iconically, are elongated temporally as well as spatially. Including non-manual signs (such as gaze, posture, oral expressions, vocalization, inhalations and exhalations) would also be necessary for a more comprehensive semantic analysis of iconic signs that reproduce spatial relations and motion, such as depicting verbs and modified adverbs. In sum, studies of signed languages such as Swedish Sign Language have much to contribute to the typology of actual and non-actual motion!

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