# Paths and Places: Aspects of Grammar and Acquisition

—

Natalia Mitrofanova
A dissertation for the degree of Philosophiae Doctor – August 2016
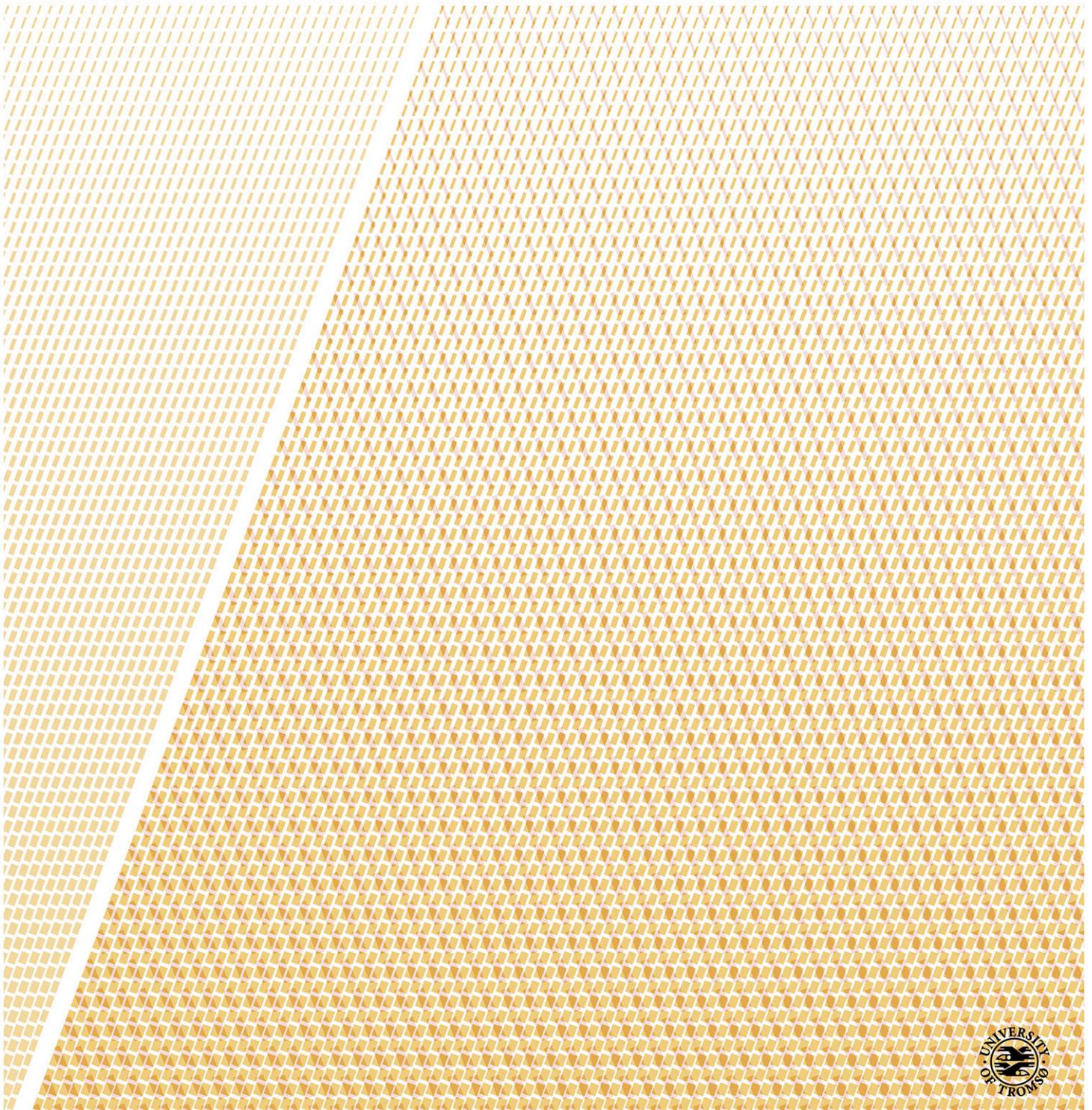
Paths and Places:

Aspects of Grammar and Acquisition

Natalia Mitrofanova

A thesis submitted for the degree Philosophiae Doctor

University of Tromsø

Faculty of Humanities, Social Sciences and Education

Department of Language and Culture

August, 2016

Contents

Acknowledgements

There are so many people who have influenced and supported me, in one way or another, during the four years of my PhD journey, that it will probably not be possible to mention everybody. But I want to acknowledge at least some of those who helped this dissertation to become a reality.

First and foremost I want to thank Marit Westergaard for being the perfect PhD supervisor in so many respects. Marit's supervision style achieves an ideal balance between being accurate, demanding and very supportive at the same time. After each and every one of our supervision meetings I would leave with a clear plan about what to do next and feeling enthusiastic about getting to it. No less important was Marit's ability to inspire by setting a personal example of balancing research, dissemination, teaching, networking, organizing and more – and all this in a very efficient and elegant way.

Peter Svenonius was my second supervisor and I am very grateful to him for reading and commenting on this thesis. Needless to say that Peter's theoretical ideas have influenced this dissertation greatly, which will be obvious to everybody who decides to read this thesis further.

Irina A. Sekerina can truly be considered my third, un-official, supervisor, given all the support, advice and feedback on my work that she generously provided throughout the last three years of my PhD studies. I am also greatly indebted to Irina for helping me with designing and conducting two eye-tracking experiments, one of which is included in this thesis.

Being part of CASTL (Center for Advanced Studies in Theoretical Linguistics) research comminity has always felt like a big honor. I enjoyed and benefitted greatly from courses and seminars led by Gillian Ramchand, Peter Svenonius, Tarald Taraldsen, Marit Westergaard, Merete Anderssen and Martin Krämer. I also feel really lucky to have had the chance to attend a multitude of exciting conferences, defences, colloquia and seminars organized by CASTL.

In the LAVA research group, I learned a lot from my colleagues with a shared interest in language acquisition and theoretical linguistics. I am very grateful to Merete Anderssen, Kristine Bentzen, Tammer Castro, Antonio Fábregas, Martin Krämer, Björn Lundquist, Roksolana Mykhaylyk, Yulia Rodina, Olga Urek, Øystein

Abbreviations

1 – First person

2 – Second person

3 – Third person

ACC – Accusative case

CDS – Child-directed speech

DAT – Dative case

DEF - Definite

DIM - Diminutive

F - Foot

FEM – Feminine

GEN – Genitive case

INSTR – Instrumental case

LC – Logophoric center

LOC - Locative case

MASC – Masculine

N –Neuter

NOM – Nominative case

PAST – Past

PERF – Perfect

PL - Plural

PREP – Prepositional case

SG -Singular

SLI – Specific language impairment

SFLP – Short Form Locative Particle

LFLP – Long Form Locative Particle

SUB - Subitive

TSS – Telegraphic speech stage

VWP – Visual World Paradigm

Abstract

This dissertation explores the underlying structural properties of spatial expressions, and the acquisition of these structures by children. In the first part of the dissertation I focus on directional axial expressions in Russian, and argue that their distributional and semantic properties are tightly related to their underlying syntactic structure. I present an original analysis of these items, and further suggest that the application of this analysis to a wider class of unbounded directional expressions in English and Russian makes it possible to compositionally derive their semantic properties from the underlying syntactic structure. In the second part of the dissertation I turn to the acquisition of spatial expressions by children. I report on a series of production and comprehension studies with monolingual Russian and Norwegian children, and propose a model for the acquisition of locative PPs, which states that child grammars at early stages involve an underspecified Place category associated with a generalized locative semantics. Finer-grained locative contrasts are taken to develop gradually, based on the acquisition of individual locative items from the input.

List of papers

Paper 1

Mitrofanova, Natalia and Minor, Serge. 2013. "The Syntax and Semantics of Directional Axial Expressions in Russian". In U. Junghanns et al. (Eds.), *Formal Description of Slavic Languages: The Ninth Conference: Proceedings of FDSL 9*. Frankfurt am Main: Peter Lang International, pp. 171-190.

Paper 2

Mitrofanova, Natalia. 2016. "Early Underspecification of Functional Categories: Evidence from the Acquisition of Locative PPs in Russian", submitted to *Language Acquisition*.

Paper 3

Mitrofanova, Natalia and Sekerina, Irina A. 2016. "Comprehension of Locative Prepositions by Young Children: An Eye-tracking Study". Ms.

Paper 4

Mitrofanova, Natalia and Westergaard, Marit. 2016. "Acquisition of Locative PPs in Norwegian: Structure Building via Lexical Learning", submitted to *Journal of Child Language*.

Part I: Introduction

The articles collected in this dissertation address a variety of research questions, focus on two different languages, and employ a diverse range of research methods. Three of the articles explore issues related to language acquisition, while one deals with the syntactic properties of adult grammar. Similarly, three of the articles examine data from adult and child Russian, while one focuses on Norwegian. The methods used include grammaticality/acceptability judgments and elicitation of intuitions about truth conditions from adult participants, as well as elicited production (picture description), semi-structured elicitation, sentence-picture-matching (pointing-out), on-line eye-tracking (Visual World Paradigm), and corpus analysis in the studies focusing on child language.

Despite the diversity of the questions addressed, all the articles in this dissertation are unified by a set of common themes and assumptions. First, all our papers are focused on the properties of spatial expressions in natural language. The acquisition part of the thesis deals with locative prepositions, which identify the spatial position of one object (the Figure) relative to another (the Ground). The chapter on the structural aspects of the adult language is concerned with the properties of directional expressions, i.e., items that encode the movement trajectory (or path) of a Figure object relative to a Ground. The two types of spatial expressions are closely related, both conceptually and structurally. Conceptually, directional expressions identify paths by specifying the location of certain points on those paths (e.g., the initial, final or intermediate point). In other words, directional expressions involve the concept of spatial location as part of their meaning. Structurally, directional expressions have been argued to be built on top of locatives, i.e., to contain the structure associated with locative items as part of their own underlying functional structure (cf. Koopman 2000; Svenonius 2006, 2010, 2013).

Another common feature unifying all the papers in this thesis is a broadly generative approach to grammar and language development, in the sense that we assume that grammar, and in particular syntax, is structured and rule-based from the early stages of acquisition to the adult state. At the same time, the acquisition model proposed in this thesis emphasizes the role of input in the transition from an initially non-target-like (underspecified) grammatical system to adult-like grammar. Specifically, we argue that structural development proceeds in parallel with the acquisition of individual lexical items associated with particular grammatical representations (cf. Clahsen et al. 1996).

Finally, throughout the thesis we hold the assumption that there exists a tight link between the domains of syntax and semantics. In the first paper, which focuses on a class of directional items in adult Russian grammar, we observe that distinct syntactic and semantic properties of these expressions go hand in hand, and propose an analysis that aims to capture the interdependence between syntax and semantics. In the papers exploring the acquisition of locative expressions in child language, we similarly observe that syntactic and conceptual development proceeds in parallel, with more general and basic (both conceptually and syntactically) locative constructions being acquired prior to expressions with a more complex conceptual and syntactic structure.

The Introductory chapter is organized into three sections. Section 1 gives an overview of the theoretical background related to the syntactic and semantic decomposition of spatial expressions, summarizes the findings of Paper 1, and proposes possible extensions of the analysis developed in this paper. Section 2 begins with a review of existing approaches to the development of functional categories in child grammars and to the acquisition of locative prepositional phrases across languages. Next, we summarize the findings of Papers 2 and 3, and discuss the Underspecified P Hypothesis (UPH) developed in this thesis. We then move on to the summary and discussion of Paper 4, which investigates the influence of a variety of lexical factors on the acquisition of locative items. Section 2 ends with a summary of the model that we propose to account for the acquisition of locative PPs by children. Finally, in Section 3 we discuss a number of open questions left for future research and provide a brief conclusion.

1. Theoretical Background – Decomposition of Spatial PPs

Formal theoretical research on the syntax and semantics of spatial expressions across languages has yielded a number of important generalizations, decomposing the underlying structure of spatial expressions into more abstract syntactic and semantic primitives. Spatial expressions fall into two basic categories: Locative and Directional. Locative expressions describe the location of an object (the Figure) relative to another object (the Ground, cf. Talmy 1983), while Directional expressions identify the motion trajectory, or path, of the Figure with respect to the Ground (see Jackendoff 1983; den Dikken 2010; Koopman 2000; Kracht 2002; Svenonius 2010; van Riemsdijk and Huijbregts 2001; Zwarts 2008, Zwarts & Winter 2000, among many others).

1.1 Locative PPs

As pointed out above, locative expressions specify the spatial relation between a Figure object (the object whose location is being determined) and a Ground object (the reference object with respect to which the Figure is being located). Thus, the locative PP *above the house* restricts the location of the Figure object to the space projected from the top of the house, which functions as the Ground object. Structurally, locative prepositions have been analyzed as corresponding to a designated syntactic head, encoding the locative semantics (**Place** in Koopman 2000, Svenonius 2006, **P$_{Loc}$** in den Dikken 2010). Furthermore, certain sub-types of locative PPs have been argued to involve a number of additional functional layers, such as **AxPart** and **Deg**, which I will address in turn.

Many languages have specialized words or morphemes referring to specific parts of the landmark, e.g., 'front', 'back', 'top' etc., which function as parts of complex locative prepositions, e.g., *in front of, on top of*, etc. These elements are often derived from common nouns, but have a number of distinct syntactic and semantic properties. Svenonius (2006) presents a set of arguments that justify postulating a new syntactic category that he calls AxPart (for 'Axial Part'), which is distinct from N (see examples 1-3 from Svenonius 2006)[1]. As opposed to nouns, AxParts cannot be pluralized (1), and cannot be replaced by a pro-form (2).

(1)   a) There were kangaroos in the fronts of the cars.
         b) * There were kangaroos in fronts of the cars.

(2)   a) The kangaroo was in [the front of the car]$_i$, but the koala wasn't in it $_i$.
         b) The kangaroo was in [front of the car]$_i$, but the koala wasn't in it $_{*i}$.

Furthermore, P stranding is allowed with DPs, but ungrammatical with AxParts (3):

(3)   a) It was the front of the car that the kangaroo was in.

         b) * It was front of the car that the kangaroo was in.

Based on these data, Svenonius (2006) postulates a distinct AxPart projection as a complement to Place, as illustrated in Figure 1:[2]

---

[1] See also cross-linguistic examples of *AxParts* in Svenonius 2006 and articles in Nordlyd 2006, Special Issue on Adpositions.

[2] Regarding the function of the K head, see Svenonius 2006, 2010, and the discussion below.

```
                          PlaceP
                    ╱              ╲
             Place                   AxPartP
              in                 ╱          ╲
                            AxPart             KP
                            front          ╱      ╲
                                        K            DP
                                       of        the car
```
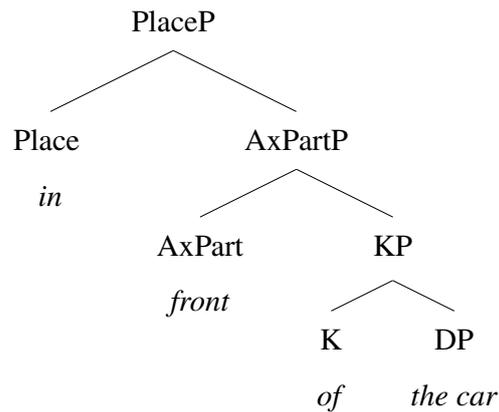
Figure 1

A further grammatical layer has been argued to exist within the decomposed structure of projective prepositions, distinguishing them from non-projective ones. A number of researchers have argued that projective locative prepositions allow measure phrase modification, while non-projective Ps do not (cf. 4 from Winter 2001, see also Koopman 2000; den Dikken 2010; Svenonius 2010):

(4)   a)   The bird is ten meters above/behind/outside the house.

             b)   The bird is ten meters *near/*on/*in/?inside the house.

Following Koopman's (2000) work, den Dikken (2010) and Svenonius (2010, 2012a) argue for a designated projection, Deg, as a component of Place within the functional structure of projective prepositions. On this analysis, measure phrase modifiers like *ten meters* are taken to occupy the specifier position of Deg.

AxPart and Deg are incorporated into the decomposed structure of Locative PPs, proposed by Svenonius (2008, 2010), and represented in Figure 2:

```
                     pP
                 ╱        ╲
              p             DegP
                         ╱        ╲
                     Deg            LocP
                                ╱        ╲
                             Loc           AxPartP
                                       ╱          ╲
                                  AxPart             KP
                                                 ╱      ╲
                                               K          DP
```
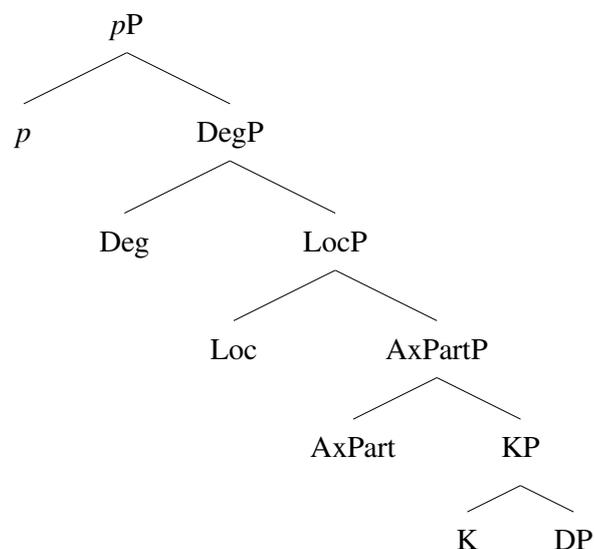
Figure 2

This functional structure (illustrated in Figure 2) is built on top of the DP referring to the Ground object, with each new layer in the sequence being assigned a specific semantic function, based on the vector space semantics proposed by Zwarts and Winter (2000). Thus, **K** maps the Ground object represented by the DP onto the region of space occupied by that object (cf. *Eigenplace* in Wunderlich 1991 and Zwarts & Winter 2000) and is spelled out as case on the complement DP. **AxPart** maps *eigenplaces* onto their subparts based on the axial structure of the Ground object (e.g., *front* vs *back, top* vs *bottom*, etc.). **Loc** maps regions onto vector spaces projected from those regions; e.g., in the structure of the English complex preposition *in front of*, Loc maps the front region of the Ground object onto the vector space projected from that region (cf. Zwarts & Winter 2000).[3] **Deg** maps vector spaces, which are the output of Loc, onto regions picked out by the relevant vectors. Finally, *p* introduces the Figure object, locating it in the region defined by *p*'s complement, e.g., *in front of* locates a Figure object in the region which is projected from the front side of the Ground. Svenonius (2010) also assumes that the semantics of containment and contact/support (lexicalized by e.g., English *in* and *on*) is encoded by the *p* head. Of these heads, *p* and **K** are taken to be present in the structure of all locative expressions, **Loc** and **Deg** are restricted to projective expressions (e.g., *behind*, but not *between*), while **AxPart** is present only in those expressions that make reference to the axial structure of the Ground object (e.g., *above*, but not *at*).

1.2 Directional PPs

Rather than identifying the *location* of the Figure with respect to the Ground, Directional spatial expressions specify the *motion trajectory* of the Figure with respect to the Ground. It has been argued that structurally Directional expressions are built on top of Locatives, i.e., directional semantics is encoded by Path heads which take *p*Ps as complements (cf. Koopman 2000; Svenonius 2006, 2010; Pantcheva 2010, 2011; see Figure 3):

PathP

Path   *p*P
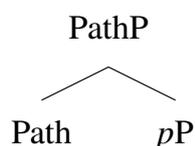
Figure 3

---

[3] **Loc** corresponds to **Proj** in Svenonius (2012a, 2013).

There are three canonical varieties of Path heads, depending on which points of the trajectory are taken to be located in the region denoted by pP:

- Goal heads restrict the **final point** of the trajectory to the region denoted by the pP (e.g., <u>*to*</u> *in front of the house* denotes a trajectory whose end point is located in front of the house);

- Source heads restrict the **initial point** of the trajectory to the region denoted by the pP (e.g., <u>*from*</u> *in front of the house* denotes a trajectory whose initial point is located in front of the house);

- Route heads restrict **intermediate points** of the trajectory to the region denoted by the pP (e.g., <u>*through*</u> *the tunnel* denotes a trajectory whose intermediate points are located in the tunnel).

Based on a large survey of cross-linguistic data, Pantcheva (2011) argues that Path heads must themselves be organized into a hierarchical structural sequence, with Source building on top of Goal and Route on top of Source. Thus, the decomposed syntactic structure of Route directional expressions is taken to be the following:

RouteP
Route   SourceP
Source   GoalP
Goal pP
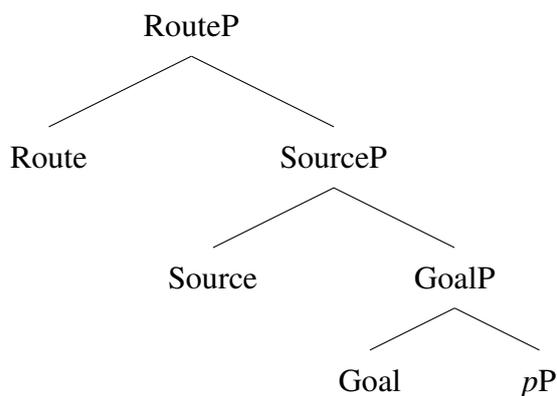
Figure 4

Two types of evidence are used to argue for this syntactic organization of heads: morphological complexity and syncretism. Pantcheva (2011) shows that while Source paths can be formed by adding a special morpheme to the Goal head (which is the case in e.g., Quechua, Bulgarian and Chamalal), there seem to be no cases of Goal expressions being built from Source expressions. The second piece of evidence comes from systematic patterns of syncretism observed across languages. Out of five possible patterns of Source – Goal – Location syncretism, only three are observed in the languages of the survey (cf. 5 from Pantcheva 2010, 2011):

(5)   a. Location ≠ Goal ≠Source (L≠G≠S)

        b. Location=Goal ≠ Source (L=G≠S)

        c. Location=Goal=Source (L=G=S)

        d. *Location=Source ≠ Goal (L=S≠G)

        e. *Location≠Goal=Source (L ≠G=S)

Similarly, the fact that Route=Goal syncretism with the exclusion of Source was unattested in the sample, while Route=Source syncretism exists in a range of languages (in e.g., Hindi, Basque etc.) is taken by Pantcheva as evidence for the Route projection being adjacent to the Source head.

However, there are a number of exceptions to the patterns of syncretism predicted by the syntactic structure in Figure 4. For instance, Pantcheva (2011) notes that in North Sami, Locative case can be used to encode both Source and Location, but not Goal, for which a separate Illative case is used (cf. ex. 6 from Svenonius 2009, cit. by Pantcheva 2011: 240-241):

(6)   a.   *Joavnna   viegai viesus.*
                    Jon   ran   house.LOC
                    'Jon ran in the house.' (Locative)

            b.   *Joavnna   viehka-l-ii   viesus.*
                    Jon   run-SUB-PAST house.LOC
                    'Jon suddenly ran off from in the house.' (Source)

Another exception, not mentioned in Pantcheva's (2011) study, is Russian, where a series of items involving the source prefix *s-* (*szadi* 'from behind', *speredi* 'from the front', *sverhu* 'from above', *snizu* 'from below') are ambiguous between a Locative and a Source semantics, while the Goal meaning is expressed by a different set of items   (*nazad* 'backward', *vperëd* 'forward', *vverh* 'upward', *vniz* 'downward'). Compare examples (7):

(7)   a.   *Mashina   pod'jehala   szadi.*
                car   drove   from.behind
                'The car approached from behind.'

        b.   *Mashina   priparkovana szadi   doma.*
                car   is.parked   from.behind house
                'The car is parked behind the house.'

The existence of this kind of syncretism (Location=Source≠Goal) in North Sami and Russian indicates that Pantcheva's (2011) model may need to be extended. We leave this issue for future investigation.

Note that the heads represented in the complex decomposed structures discussed in the last two sections do not necessarily correspond to separate morphemes in the surface structure of specific spatial expressions. For instance, the English locative preposition *behind* corresponds to the whole sequence of heads in Figure 2 (it is projective, hence requires Deg and Loc heads, and it makes reference to the *front-back* axis, hence requires AxPart), but morphologically it consists of at most two individual morphemes (see below). Similarly, the Route directional preposition *along* must correspond to the whole sequence in Figure 4, even though on the surface it consists of at most two morphological components. This means that the surface structure and the underlying structure of spatial expressions are not isomorphic. To deal with this issue, we follow an approach that assumes that single morphemes can correspond to (or *lexicalize*) whole series (or *spans*) of underlying heads (see Svenonius 2012b, Pantcheva 2011; for a general discussion cf. Starke 2009). Under this approach, *behind* can either be analyzed as a single lexical item which lexicalizes the whole sequence *p* – Deg – Loc - AxPart, or it can be divided into two lexical items: *hind* lexicalizing the AxPart head, and *be* lexicalizing the functional sequence *p* - Deg – Loc. A similar analysis applies to *along, beside, around* etc.

Note also that while some researchers have analyzed spatial adpositions as functional items on top of DPs (Svenonius 2010, 2013), others have argued for their lexical nature (den Dikken 2010). Thus, den Dikken (2010) postulates functional projections for *aspect*, *deixis* and *complementiser* in the extended projection of a lexical P (either locative, P_{Loc}, or directional, P_{Dir}), arguing for a parallel sequence of functional projections above N, V and P:

(8)   a. $[_{CP}$ $C^{[FORCE]}$ $[_{DxP}$ $Dx^{[TENSE]}$ $[_{AwpP}$ $Asp^{[EVENT]}$ $[_{VP}$ V ...]]]]
          b. $[_{CP}$ $C^{[DEF]}$ $[_{DxP}$ $Dx^{[PERSON]}$ $[_{AspP}$ $Asp^{[NUM]}$ $[_{NP}$ N ...]]]]
          c. $[_{CP}$ $C^{[SPACE]}$ $[_{DxP}$ $Dx^{[SPACE]}$ $[_{AspP}$ $Asp^{[SPACE]}$ $[_{PP}$ P ...]]]]

Under this approach, the aspectual projection in the P domain comes in two variants: $Asp^{[PLACE]}$ (locative aspect) and $Asp^{[PATH]}$ (directional aspect). According to den Dikken (2010), both flavors of Asp encode the distinction between delimited/bounded and non-delimited/unbounded aspect. Thus, the Path in *walk into the house* is bounded, while *walk around the house* encodes an unbounded Path (see also Jackendoff 1983; Piñon 1993; Pantcheva 2011; Zwarts 2005, 2008). For the locative aspect, the difference is between punctual, bounded location as opposed to non-punctual, unbounded location (e.g., Italian

sopra il tavolo 'on the table' versus *sopra al tavolo* 'on to-the table', where the former example denotes a specific point on the table, while in the latter example the figure is spread out all over the table; examples from Tortora 2006 cit. by den Dikken 2010). The projection *deixis* also comes in two varieties: $Dx^{[\text{PLACE}]}$ (locative deixis) and $Dx^{[\text{PATH}]}$ (directional deixis) and distinguishes between 'here' ('at the speaker') and 'there' ('not at the speaker') in the locative domain and between orientation 'towards the speaker' and 'away from the speaker' for directional expressions. For instance, German particles *her* 'towards the speaker' and *hin* 'away from the speaker' that combine with locative prepositions are analyzed as lexicalizing $Dx^{[\text{PATH}]}$. Finally, additional projections CP and DegP (which in turn come in $_{\text{PLACE}}$ and $_{\text{PATH}}$ varieties) are postulated to account for the placement of Place and Path modifiers and R-words in Dutch (see den Dikken 2010; Koopman 2000). Note that this model allows for complex structures, such as $P_{\text{Dir}}P$ on top of $P_{\text{Loc}}P$; however, each extended projection is required to have a lexical P host at the bottom of the structure (see den Dikken 2010: 23). Having summarized the necessary background, we can now turn to the discussion of Paper 1.

1.3 Discussion of Paper 1

1.3.1 Semantic and Syntactic Properties of Directional Expressions in Russian

In our first paper we examine the internal structure of directional axial expressions in Russian, e.g., *v-perëd* 'forward (lit. to-in front)', *na-verx* 'upwards (lit. to-on top)', *s-zadi* 'from behind (lit. from-back)', etc. Morphologically, these expressions appear to fit nicely with the structure proposed for PathPs in Svenonius (2010). They contain an AxPart component (*perëd* 'front', *zad* 'back', *verx* 'top', *niz* 'bottom', etc.) combined with one of the basic directional prepositions (*v* 'to-in', *na* 'to-on', *s* 'from'). It is thus tempting to assign such expressions a structure analogous to that of English directionals in Svenonius (2010), such as *to in front of the house*.

PathP
├── Path_GOAL
│   *v* 'in'
└── *p*P
    ├── *p*
    └── DegP
        ├── Deg
        └── LocP
            ├── Loc
            └── AxPartP
                ├── AxPart
                │   *perëd* 'front'
                └── KP
                       pro

Figure 5a

PathP
├── Path_SOURCE
│   *s* 'from'
└── *p*P
    ├── *p*
    └── DegP
        ├── Deg
        └── LocP
            ├── Loc
            └── AxPartP
                ├── AxPart
                │   *zad-i* 'back'
                └── KP
                       pro
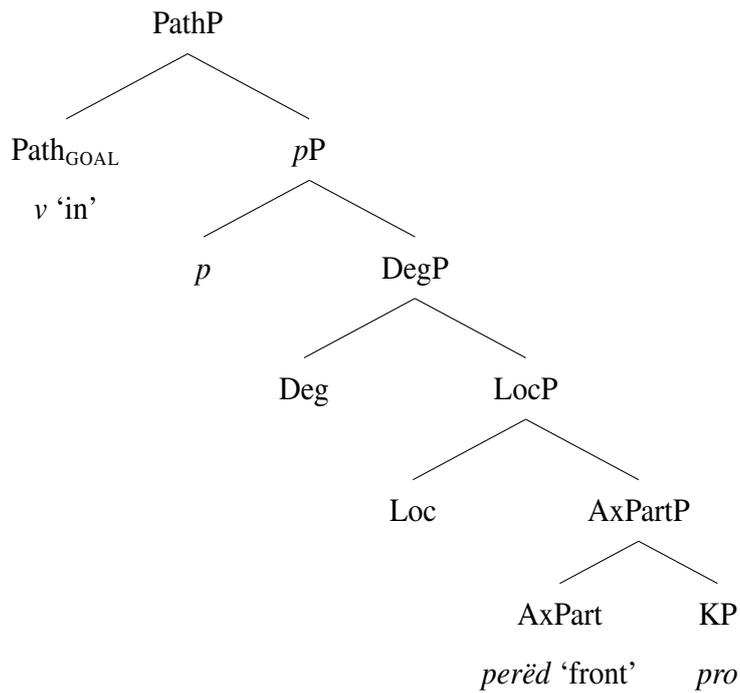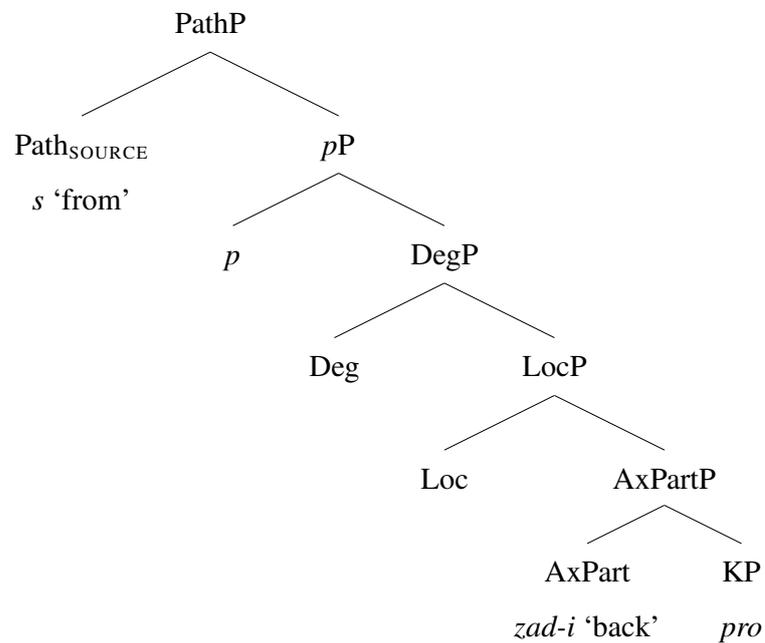
Figure 5b

However, as we argue in the paper, the structures in Figures 5a and 5b fail to adequately capture the syntactic and semantic properties of Russian directional axial expressions. Syntactically, these expressions do not combine with overt ground DP

complements, as illustrated in (9) and (11). This is unexpected given the structures in Figures 5a and 5b.

(9) *Oni šagnuli v-perëd mašin-y
    they step in-front.ACC car-GEN
    Intended: 'They stepped to in front of the car.'

(10) Oni šagnuli v-perëd
    they step in-front.ACC
    'They stepped forward.'

(11) *Oni otošli/podošĺi s-zad-i (ot) dom-a
    they walked.away/walked.to from-back-GEN from house-GEN
    Intended: 'They walked from behind the house.'

(12) Oni podošli s-zad-i
    they walked.to from-back-GEN
    'They approached (something) from behind.

Note that corresponding *locative* axial expressions in Russian *do* combine with overt grounds, as shown in (13)-(14).

(13) Oni stojali v-pered-i mašin-y
    they stood in-front-LOC[4] car-GEN
    'They stood in front of the car.'

(14) Oni stojali po-zad-i dom-a
    they stood on-back-LOC house-GEN
    'They stood behind the house.'

The first puzzle is, then, why AxParts in Russian Locatives, but crucially not in Directionals, are able to take overt DP/KP complements.

Furthermore, the semantics of Russian directional axial expressions is more restrictive than that predicted by the structures in Figures 5a and 5b. For example, take the Goal directional *v-perëd* 'forward (lit. to-in front)', and let us assume for a moment that the underlying structure of this expression is as in Figure 5a, with a null pronominal (*pro*) functioning as the silent ground object. If we adopt the semantics proposed for such structures

---

[4] The ending *–i* is a reflex of the old locative case form of the feminine nouns *pered'* 'front' and *zad'* 'back', which have been replaced in Modern Russian by cognate masculine nouns *perëd* 'front' and *zad* 'back'.

in Svenonius (2010), we expect *v-perëd* to denote a set of paths whose end points lie within the space projected from the front of a contextually defined ground object (i.e., the referent of *pro*), as illustrated in Figure 6:
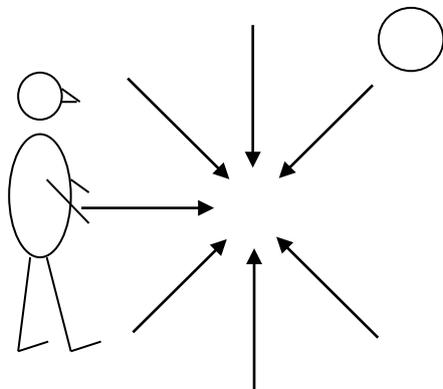
Figure 6

However, *v-perëd* is only compatible with paths that *point forward* with respect to some contextually defined ground, i.e., paths that start at the ground and end in the space projected from the front part of that ground, as illustrated in Figure 7:
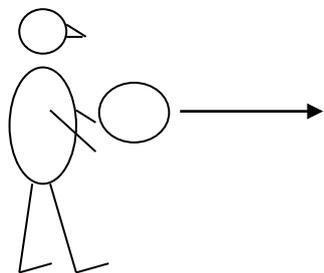
Figure 7

For instance, the following sentence (ex. 15) is compatible with a scenario where the speaker, who may count as a salient ground referent, threw a ball into the space in front of her. But it is not compatible with a situation where the ball flew into the space in front of the speaker from some other direction:

(15)   Mjač   poletel   v-perëd
       ball   flew   in-front.ACC
       'The ball flew forward.'

A similarly restrictive semantics is characteristic of source axial directionals in Russian, such as *s-zadi* 'from behind (lit. from back)'. The structure in Figure 5b predicts that

this expression should denote a set of paths whose initial points lie within the space projected from the back part of a contextually defined ground, as illustrated in Figure 8.
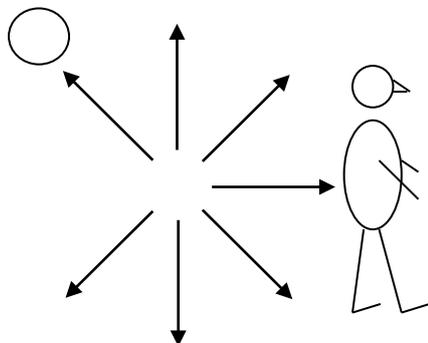
Figure 8

However, in fact, *s-zadi* defines a set of paths which is a subset of those illustrated in Figure 8. Specifically, it defines the set of paths *pointing towards* the contextually salient ground object, whose initial points lie behind that object, as shown in Figure 9.
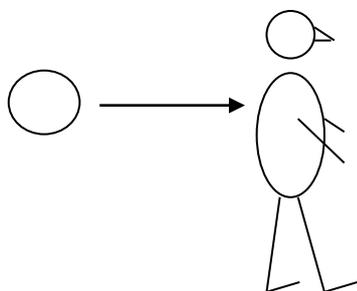
Figure 9

We can illustrate this with examples such as (16):

(16)   Mjač   letel   s-zad-i
       ball   flew   from-back-GEN
       'The ball flew from behind'.

This sentence will be true in a situation where the ball flew towards a contextually salient ground object (e.g., the speaker) from the space behind that object. However, it will be false if the ball flew along a path that started in the space behind the ground object, but was not directed at that object.

1.3.2 Proposal: Path$_{dir}$ as a Variant of Path

In Paper 1 we propose an analysis of Russian directional expressions that aims to account for both of these unexpected properties: the incompatibility of such expressions with overt ground complements and their restrictive semantics. The core of the analysis is the idea that Russian directional axial expressions involve variants of Goal and Source Path heads, which we call Goal Path$_{Dir}$ and Source Path$_{Dir}$ and which are semantically distinct from the standard Path heads as defined in Svenonius (2010) and Pantcheva (2011), see above. Like the standard Path heads, Path$_{Dir}$ heads combine with *p*Ps and return sets of paths. But unlike the standard Goal and Source Path heads, which define a single point of the path, i.e., the end point for Goal and the initial point for Source, Path$_{dir}$ heads place restrictions on both the initial and the end points. Specifically, given the semantics of Russian directional expressions illustrated in Figure 7 and Figure 9, we take Goal Path$_{Dir}$P to define the set of paths that begin at the ground object and end in the region defined by the *p*P with respect to that ground object. Similarly, we take Source Path$_{Dir}$P to define the set of paths that begin in the region defined by the *p*P with respect to the ground object and end at that ground object, as illustrated in the following examples.

(17)   Goal Path$_{Dir}$P: [[*v-perëd* 'to-in front']] = λp. ∃x. the final point of p is in the space projected from the front of x, and the initial point of p is at x

(18)   Source Path$_{Dir}$P: [[*s-zad-i* 'from behind']] = λp. ∃x. the initial point of p is in the space projected from the back of x, and the final point of p is at x,

where p is a variable over paths, and x is a variable over individuals.

However, if the position of the ground argument is occupied by *pro*, as in the structure depicted in Figures 5a and 5b, there is no way to derive the semantics in (17) and (18), which require for the initial and the end points of the paths to be defined with respect to *the same* ground object. To solve this problem, we propose that Path$_{dir}$ heads combine with functions from individuals to regions, which are syntactically derived by moving a silent operator from the position of the ground argument to the specifier of the complement of Path$_{dir}$:[5]

---

[5] The *X* head in Figure 10 represents the head of the complement of Path$_{Dir}$P, which hosts the raised operator in its specifier position. It is not to be confused with the variable *x* which occurs in e.g., the formulas in (19)-(20). In the paper, we chose to remain agnostic as to the exact nature of this projection. Below, however, we propose a decomposition of Path$_{Dir}$, where *X* is identified with Path.

Path$_{dir}$P
Path$_{dir}$ XP
   Op   X'
      X   *p*P
         p   DegP
            Deg   LocP
               Loc   KP
                  ACC   AxPartP
                     AxPart   *Op*
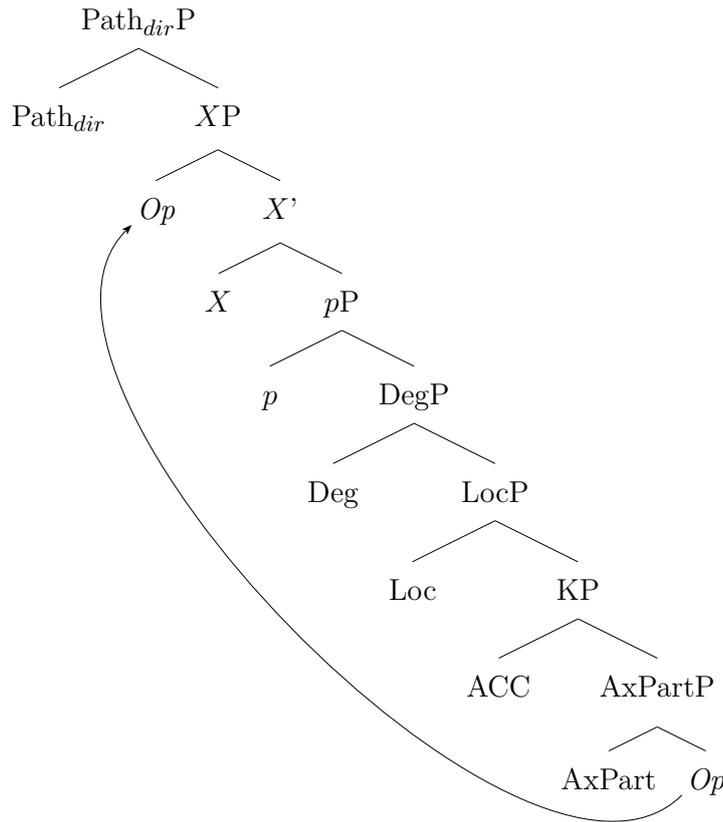
Figure 10

This ensures that the complement of Path$_{Dir}$ denotes an expression of type *(er)*, i.e., a function from individuals to regions (represented by Q in 19-20). The Path$_{Dir}$ heads can then be assigned the denotations in (19) and (20):

(19)   [[Goal Path$_{Dir}$]] = λQ$_{(er)}$. λp. ∃x. the final point of p is in Q(x), and the initial point of p is at x

(20)   [[Source Path$_{Dir}$]] = λQ$_{(er)}$. λp. ∃x. the initial point of p is in Q(x), and the final point of p is at x

The fact that Path$_{dir}$ heads require complements of type *(er)*, which are derived via movement of a silent operator from the position of the ground object, explains why this kind of directional expressions is incompatible with overt ground complements. Thus, the proposed analysis correctly accounts for both the semantic and the syntactic properties of Russian axial directional expressions.

It is interesting to note that although Path$_{dir}$ heads are treated as variants of Path in our paper, we may in fact decompose them into two distinct layers: a standard Path head combined with an additional projection, call it Dir$_{LC}$, encoding the contextually determined

logophoric center, *LC*.[6] Dir_{LC} can then be viewed as part of the deictic layer above Path, as proposed by den Dikken (2010), see above.
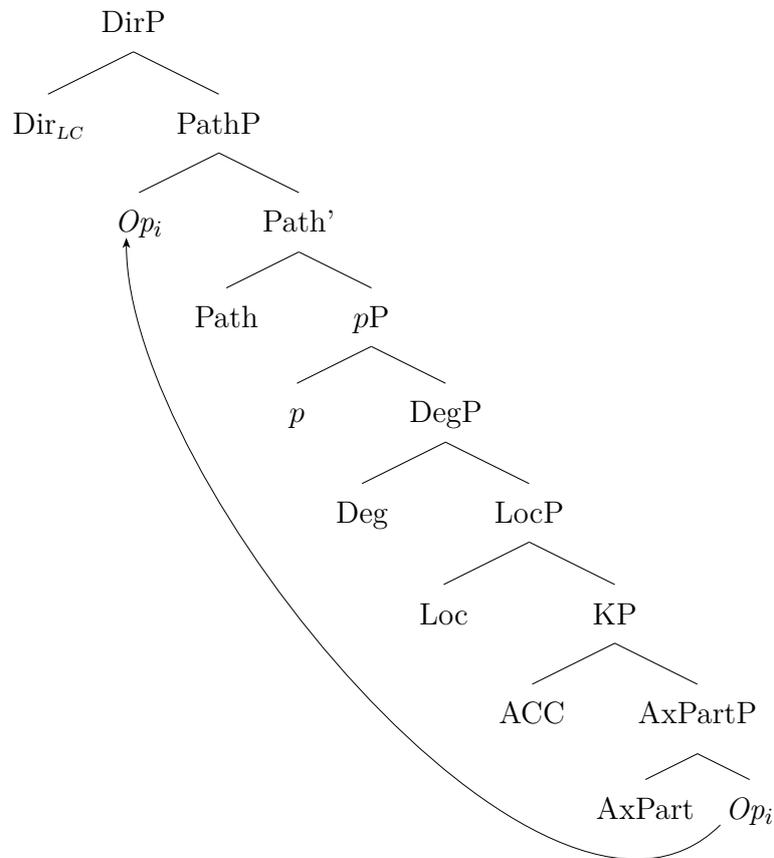
Figure 11

The combination of Path with *p*P defines a set of paths in the standard way (cf. Svenonius 2010; Zwarts 2005, 2008; Pantcheva 2011). The movement of a silent operator from the position of the ground argument into the specifier of PathP triggers lambda-abstraction of a variable in its base position, thus PathP is interpreted as a function from individuals to sets of paths. Dir_{LC} then combines with such functions and returns, again, a set of paths. Like Path, the Dir_{LC} head comes in two variants, Goal and Source, which restrict the initial and the end point of the path, respectively, to the logophoric center:

(21) $[[\text{Goal Dir}_{LC}]] = \lambda Q_{e(pt)}. \lambda p. Q(LC)(p)$ and the initial point of p is at *LC*.

(22) $[[\text{Source Dir}_{LC}]] = \lambda Q_{e(pt)}. \lambda p. Q(LC)(p)$ and the final point of p is at *LC*,

where Q is a function from individuals to sets of paths, and *LC* is the contextually determined logophoric center.

---

[6] I thank Serge Minor for suggesting this decomposition, and discussing with me the semantic aspects of the resulting structure. Of course, all errors remain my own.

For example, in the structure of *v-perëd* 'to-in front', the Goal PathP will be interpreted as the following function: λx. λp. the final point of p is in the region projected from the front of x. This is then combined via function argument application with the interpretation of Goal Dir$_{LC}$ in (21), to give the following interpretation for *v-perëd* 'to-in front':

(23)   [[*v-perëd* 'to-in front']] = λp. the final point of p is in the region projected from the front of *LC*, and the initial point of p is at *LC*,

where *LC* is the contextually determined logophoric center.

1.3.3 Possible Extensions of the Proposal in Paper 1

In this section, I explore the possibility that the analysis we have proposed for directional axial expressions in Russian can be extended to a wider range of directional expressions in e.g., English and Russian, and can provide new insight into the composition and semantics of a range of *unbounded path expressions* (cf. Zwarts 2005, 2008).

Consider, first, English directional adverbials like *forward(s)* and *backward(s)* (cf. also *leftward(s), rightward(s),* etc.), which are the direct translations of the Russian *v-perëd* 'forward (lit. to-in front)' and *na-zad* 'backwards (lit. to-on back)', analysed above. Like their Russian counterparts, *forward(s)* and *backward(s)* do not combine with DP complements and are morphologically decomposable into two elements: an axial component (*for-* and *back-*) and a directional morpheme *–ward(s)*. Following the analysis developed in Paper 1, I suggest that the underlying structure of these adverbials is analogous to that proposed for directional axial expressions in Russian, with *for-* and *back-* spelling out AxPart, and *–ward(s)* lexicalizing the Goal Dir head (see Figure 12):

DirP
Goal Dir$_{LC}$ PathP
-ward(s)
Op_i Path'
Goal Path pP
p DegP
Deg   LocP
Loc   AxPartP
AxPart Op_i
for-
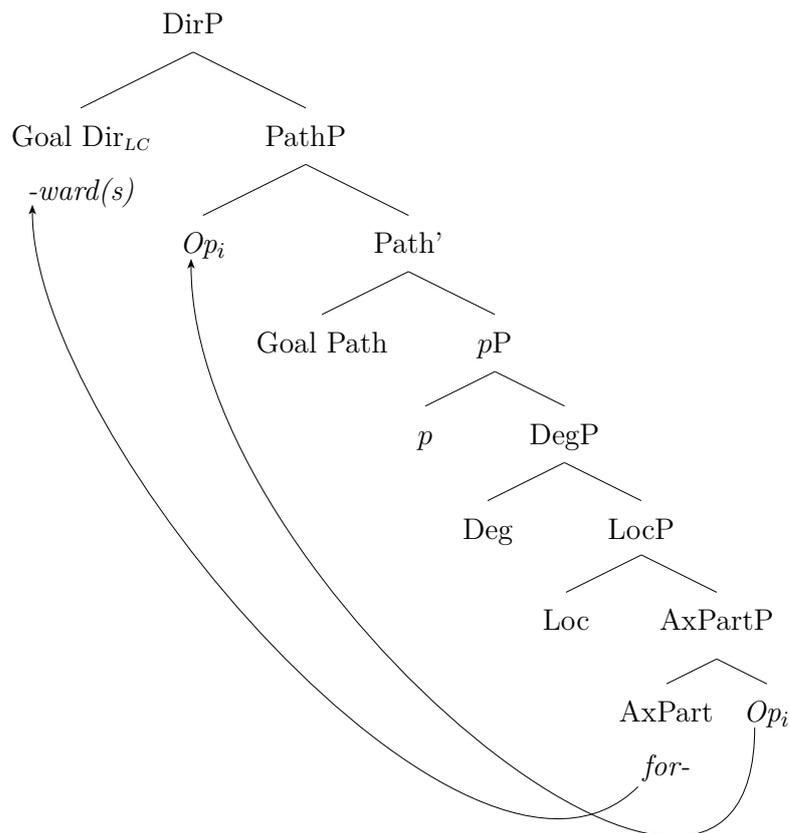
Figure 12

Then, the semantics of *forward(s)* is as proposed above in (21), defining a set of paths that start at the contextually defined logophoric center and end in the space projected from the front of that logophoric center. However, morpho-syntactically, *forward(s)* and *backward(s)* differ from Russian axial adverbials like *v-perëd* 'forward (lit. to-in front)', in that *–ward(s)* triggers the incorporation of the AxPart head.

Next, consider directional expressions such as *seaward(s), mountainward(s), riverward(s), cityward(s)*, etc. Like *forward(s)* and *backward(s)*, these adverbials contain the directional morpheme *–ward(s)*. However, their first component is not itself an AxPart, but rather a nominal root which names the object towards which the defined paths are oriented. The challenge is, then, to find an analysis of such expressions, which would be compatible with the proposed analysis of *forward(s)* and *backward(s)*. I suggest the following structure for expressions like *seaward(s)*:
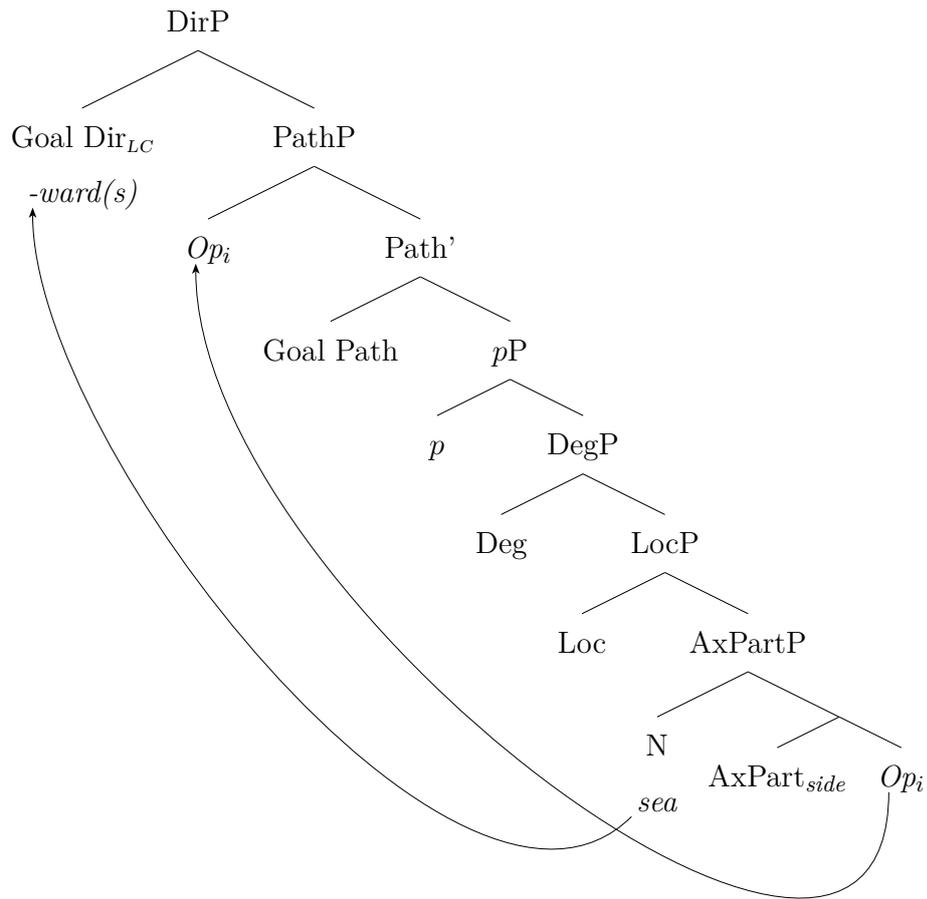
Figure 13

As Figure 13 illustrates, the underlying structure of directional expressions like *seaward(s)* involves a null AxPart*side* head, whose specifier position is occupied by a nominal root and whose complement is a null operator, representing the ground object. This AxPart*side* head maps the ground object onto its side which faces the object referred to by its specifier; e.g., in the case of *seaward(s)* the AxPart*side* head maps the ground object onto its side which faces the sea. The rest of the structure is identical to that proposed for expressions like *forward(s)* and *backward(s)* above, except that in the case of *seaward(s)* it is the nominal specifier of AxPart*side* that incorporates into the Dir*LC* head, lexicalized by *–ward(s)*. The semantics of *seaward(s)* can then be derived in the same way as for *forward(s)* and Russian *v-perëd* 'forward (lit. in-front)':

(24) [[*seaward(s)*]] = λp. the final point of p is in the region projected from the side of *LC* facing the sea, and the initial point of p is at *LC*,

where *LC* is the contextually determined logophoric center.

Finally, consider the English preposition *toward(s)*, which is morphologically decomposable into the basic goal preposition *to* and the directional morpheme *–ward(s)*. Unlike *forward(s)* and *seaward(s)*, it is compatible with overt DP complements, as shown in (25):

(25)   John ran towards the sea.

Semantically, PPs involving *toward(s)*, e.g., *towards the sea*, appear to be very close to their N+*ward(s)* counterparts, i.e., *seawards*. Given this semantic similarity, and the fact that morphologically, *toward(s)* includes the same directional element (*–ward(s)*), this preposition may in fact be analysed as another instance of Dir$_{LC}$P. I suggest that like N+*ward(s)* directionals, the underlying structure of *toward(s)* involves a null AxPart$_{side}$ head, which maps the ground object to its side which faces the object referred to by the specifier of AxPart$_{side}$. However, in the case of *toward(s) the sea* this specifier position is occupied by a full DP (in this case, *the sea*), rather than a bare nominal root:
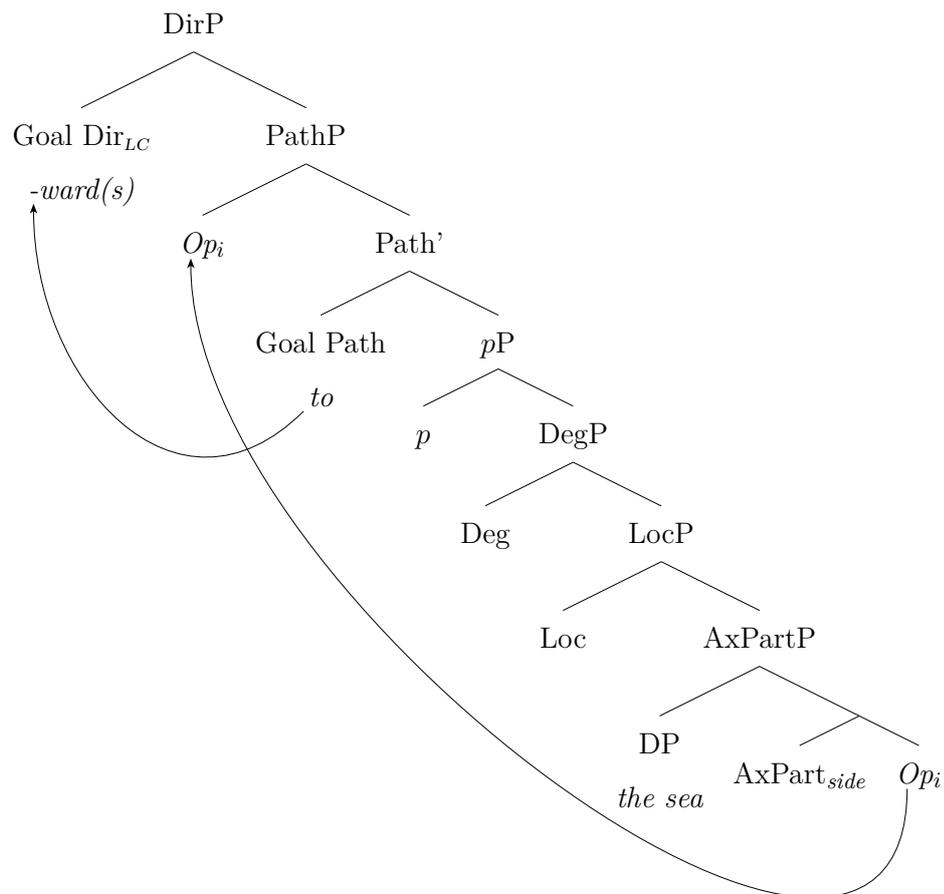
Figure 14

Another difference between the structure of PPs involving *toward(s)* (Figure 14) and N+*ward(s)* directionals such as *seaward(s)* (Figure 13) is that the former involves a Goal Path head lexicalized by *to*, rather than a null Goal Path. We may hypothesize that *to* is required in

the structure in Figure 14 for two reasons: first, it may be necessary to assign case to the DP in the specifier of AxPart (on the assumption that the null Goal Path head does not assign case). Second, it may be needed to provide morphological support for the *–ward(s)* morpheme, which lexicalizes the Dir_{LC} head.

Given the structure in Figure 14, the semantics of PPs involving *toward(s)* is predicted to be analogous to that of the corresponding N+*ward(s)* directionals:

(26)   [[*toward(s) the sea*]] = λp. the final point of p is in the region projected from the side of *LC* facing the sea, and the initial point of p is at *LC*,

where *LC* is the contextually determined logophoric center.

Thus, examples such as (25) will be interpreted as involving movement from the logophoric center, which in this case is naturally taken to be John himself in his initial location, to the region projected away from the side of John facing the sea. I leave a further elaboration of this analysis for future research.

Above, I have sketched out an analysis of a range of directional expressions in English, involving the morpheme *–ward(s)*, suggesting that such expressions are similar to Russian directional axial expressions discussed in Paper 1, in that they involve a Dir_{LC} head in their structure.[7] This analysis has a number of advantages. First, it provides a unified account of a diverse set of directional expressions, such as *forward(s) / backward(s), seaward(s) / mountainward(s) / cityward(s)*, and PPs such as *toward(s) the sea*. Second, with respect to all of these expressions, the proposed analysis delivers a compositional interpretation based on the semantics of their morphological sub-components. For example, we are able to provide an analysis of *toward(s)* in terms of the independently established properties of the Goal Path preposition *to* and the directional morpheme *–ward(s)*. Finally, the compositionally derived semantics of *toward(s)* PPs captures the fact that complement DPs in such constructions do not specify the end point of the path as in standard path expressions (e.g., *to the sea*), but rather its orientation (i.e., such paths are *unbounded*, in the sense of Zwarts 2005, 2008). In the proposed analysis this distinction correlates with the syntactic position of the complement DP: in standard path expressions such as *to the sea* the complement DP occupies the position

---

[7] I have not considered the structure of another class of directional expressions containing *–ward(s)* – those that involve the combination of *–ward(s)* with directional particles, e.g., *upward(s), downward(s), outward(s)*, etc. The analysis of such expressions requires a better understanding of the semantics of the directional particles such as *up*, *down*, *out*, etc., which in English occur in a wide range of contexts both within locative and directional PPs (cf. Svenonius 2010, 2013).

of the ground object, while in PPs involving *toward(s)* the complement DP occupies the specifier position of an AxPart*side* head, specifying the orientation of a particular side of the logophoric center.

The analysis proposed above for N+*ward(s)* directional expressions such as *seaward(s)* and PPs involving *toward(s)* is dependent on the idea that the structure of such expressions involves an AxPart*side* head, which returns a side of the ground object based on its orientation with respect to another object, referred to by the specifier of AxPart*side*. The postulation of AxPart*side* can be further justified based on the structure of directional expressions such as (27) and (28) in Russian:

(27) Mjač   letel   v   storon-u   morj-a
      ball   flew   to-in   side-ACC   sea-GEN
      'The ball flew towards the sea.'

(28) Mjač   letel   so   storon-y   morj-a
      ball   flew   from   side-GEN   sea-GEN
      'The ball flew from the direction of the sea.'

As evident from the translation, semantically directional expressions involving *v storonu* 'towards (lit. to-in side)', as in (27), are similar to English PPs involving *toward(s)* in that they define paths directed at the object denoted by the complement DP. Moreover, exactly as in the case of *toward(s)* PPs in English, the complement DP in such constructions does not encode the end point of the path, but rather defines its orientation. Similarly, source directional expressions such as *so storony* 'from the direction of (lit. from side)' denote paths whose initial points are located in the direction of the object denoted by the complement DP, but do not necessarily start at that object itself.

Morphosyntactically, such directional expressions are composed of the basic goal and source prepositions (*v* 'to-in' and *s* 'from') combined with *storona* 'side', which carries a case marking determined by the preposition, and a DP complement in the genitive. I suggest that the underlying structure of such expressions is analogous to that of *toward(s)* PPs in English (cf. Figure 14), except that in this case the AxPart*side* head is overtly lexicalized by *storona* 'side' (as illustrated in Figure 15):

```
                              DirP
                         ╱          ╲
              Goal Dir_LC              PathP
                               ╱              ╲
                          Op_i                  Path'
                                           ╱          ╲
                                  Goal Path             pP
                                  v 'to-in'         ╱        ╲
                                               p              DegP
                                                          ╱         ╲
                                                       Deg           LocP
                                                               ╱          ╲
                                                            Loc            AxPartP
                                                                       ╱          ╲
                                                                    DP         AxPart_side  Op_i
                                                               morja 'sea'    storonu 'side'
```
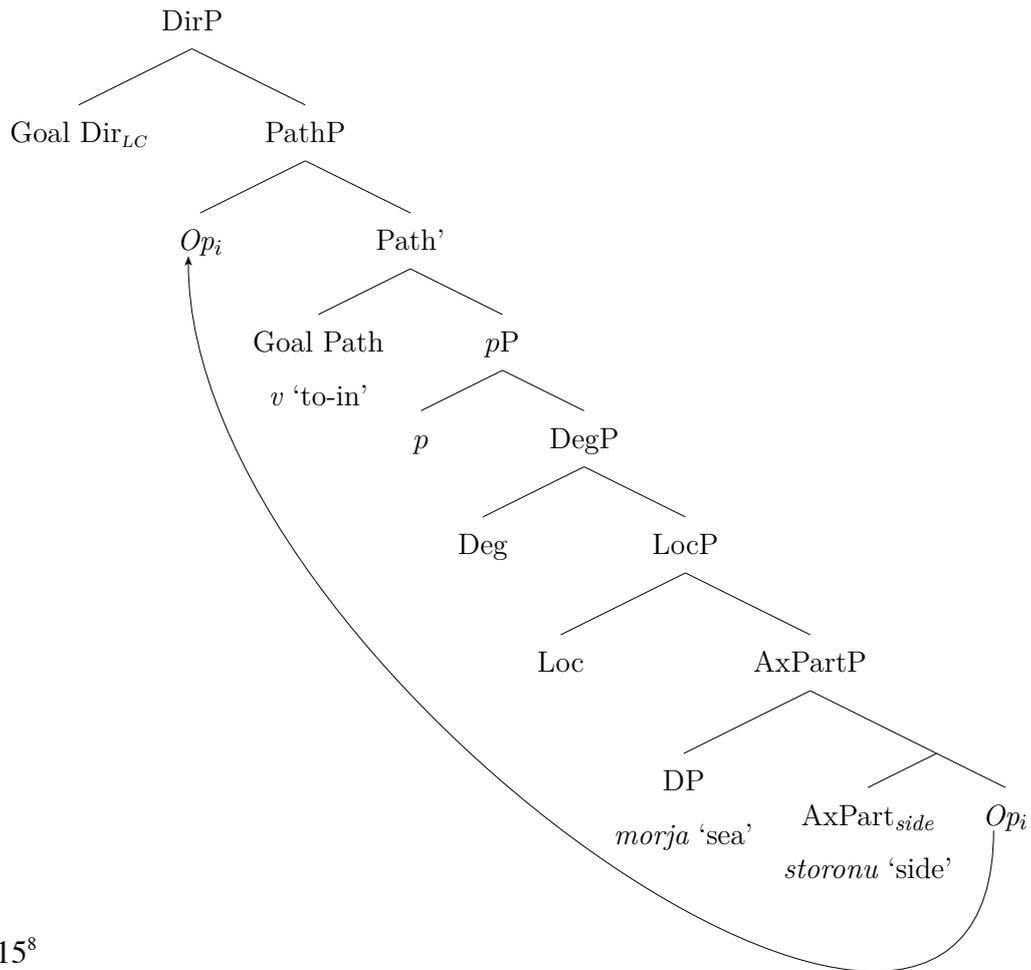
Figure 15[8]

The semantics of Russian expressions such as *v storonu morja* 'towards the sea (lit. to-in side of the sea)' in example (27) corresponds to the interpretation in (26) and can be compositionally derived from their structure.

Source directional expressions such as *so storony morja* 'from the direction of the sea (lit. from side of the sea)' can be assigned an analogous structure, with the Goal Dir$_{LC}$ and Goal Path heads replaced by their Source counterparts, as shown in Figure 16:

---

[8] The surface order of the AxPart$_{side}$ *storona* 'side' and its genitive specifier DP is the same as the standard order between head nouns and their genitive modifiers in Russian, with the head noun preceding the modifier.
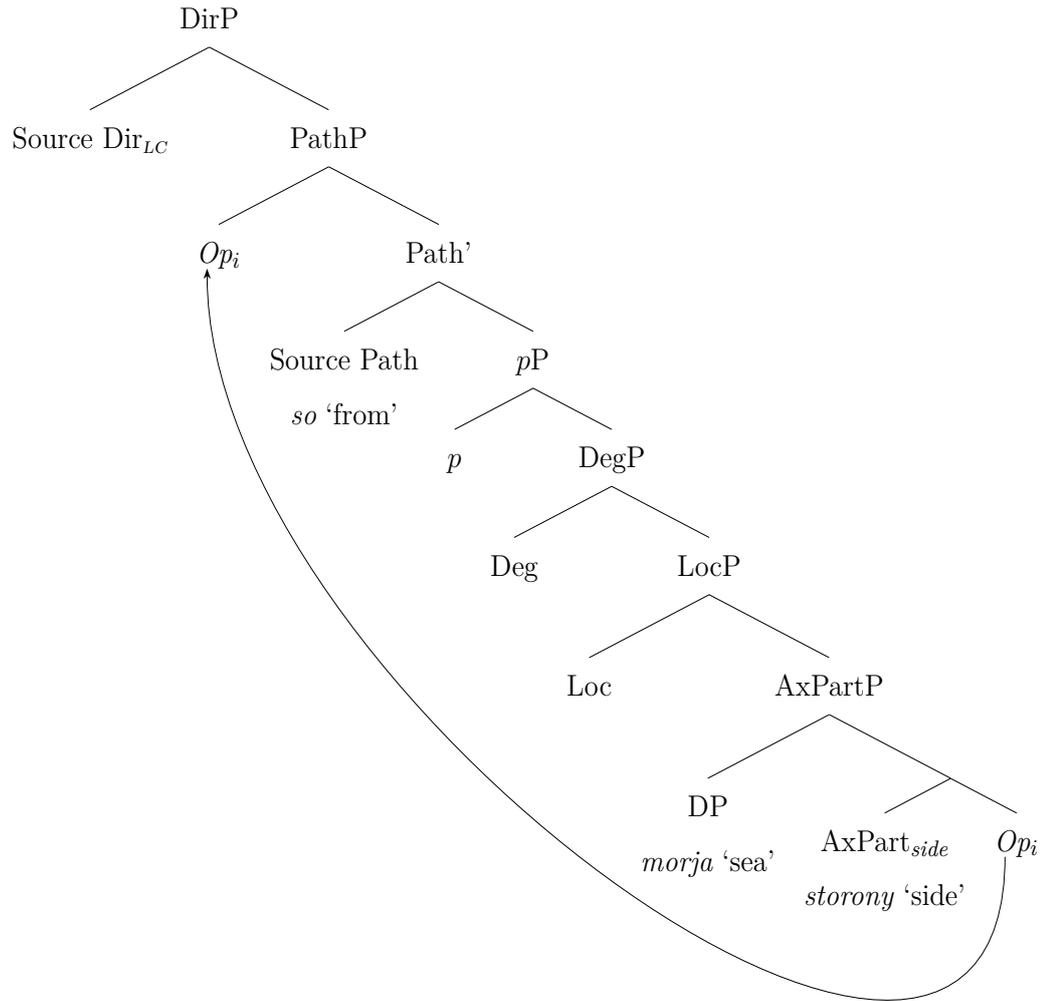
Figure 16

Given the adopted semantics for Source Path and Source Dir_{LC}, we arrive at the following interpretation for *so storony morja* 'from the direction of the sea (lit. from side of the sea)', as in example (29):

(29) [[*so storony morja* 'from the direction of the sea (lit. from side of the sea)']] =

λp. the initial point of p is in the region projected from the side of LC facing the sea, and the final point of p is at LC,

where LC is the contextually determined logophoric center.

Thus, in sentence (28) the ball must have moved along a path that started in the region projected from the side of the logophoric center (e.g., the speaker) facing the sea and ended at that logophoric center, which corresponds to the actual meaning of this sentence.

Additional evidence for the analysis of *storona* 'side' as the realization of $AxPart_{side}$ in Russian directional expressions comes from the fact that it passes the morphosyntactic tests proposed by Svenonius (2006) to distinguish AxParts from nouns (and full DPs). Thus, it is

incompatible with demonstrative determiners (30) and adjectival modifiers (31), and cannot be pluralized (32):

(30)   *Mjač   letit   v   tu   storon-u   morj-a
       ball   flies   to-in that.ACC side-ACC   sea-GEN

(31)   *Mjač   letit   v   dal'n'juju storon-u   morj-a
       ball   flies   to-in distant.ACC side-ACC   sea-GEN

(32)   Mjač-i   let'jat   v   storon-u/*storon-y   morj-a
       ball-PL   fly   to-in side-ACC/ side-PL.ACC   sea-GEN
       'The balls are flying towards the sea.'

We thus conclude that the semantic and morpho-syntactic properties of Russian directional expressions involving *storona* 'side' provide evidence for the existence of AxPart*side* as a distinct variant of the AxPart head.

To sum up, in Paper 1 we proposed an analysis of the syntactic and semantic properties of directional axial expressions in Russian and argued for the existence of a distinct type of Directionals headed by a variant of the Path head, Path$_{\text{Dir}}$ (or alternatively, as suggested here, by Dir$_{LC}$ which takes PathP as its complement), which semantically restrict both the initial and end points of the path with respect to a contextually determined logophoric center. Furthermore, I have suggested that this analysis can be extended to a range of directional expressions in English involving the morpheme *–ward(s)*, e.g., *forward(s), seaward(s), toward(s)*, etc. This extension led to the postulation of AxPart*side* as a variant of the AxPart head, which takes the ground argument as complement and introduces another argument as its specifier, and semantically maps the ground argument onto its side oriented at the object denoted by the specifier. I have also suggested that the distinct semantic properties of the English preposition *toward(s)*, as opposed to *to*, are correlated with the underlying syntactic position of the complement DP, which in the case of *toward(s)* functions as the specifier of AxPart*side* rather than as the ground object. Finally, I provided some further arguments for the existence of AxPart*side* based on the structure and semantics of Russian directional expressions involving *storona* 'side'.

To conclude, in this section of the Introductory Chapter we have discussed studies that argue for a complex decomposed structure of locative and directional expressions. I have presented and discussed Paper 1 included in the thesis and its extensions for English and Russian. In the next part we turn to the questions concerning the acquisition of spatial expressions.

2. Acquisition of Spatial PPs

In the previous section we discussed arguments for a complex underlying structure of spatial expressions in natural language. The question for acquisition is how such complex structures are acquired. Several options are conceivable: spatial PPs are acquired i) simultaneously, in one fell swoop; or ii) gradually with the acquisition of some parts of the complex structure preceding the acquisition of other parts. To answer this question it is necessary to turn to the earliest stages of children's grammatical development, starting from the Telegraphic speech stage (TSS, see Brown & Fraser 1964). We argue that the structure of children's locative utterances at the TSS, and the later transition to more adult-like use of locative constructions, is consistent with a model that assumes gradual development from a structure involving an underspecified locative projection to more complex and elaborated structures.

2.1. Telegraphic Speech Stage: Acquisition of Grammatical Categories

Omission of functional elements is a typical feature of child language at the TSS, which generally occurs between 20 and 36 months of age (cf. Brown & Fraser 1964). According to Brown (1973), early child English sentences tend to be combinations of lexical items without the so-called 'little words' (in terms of Brown 1973), i.e., functional words such as determiners, prepositions, and auxiliaries (see also Brown & Bellugi 1964; Bloom 1970; Bowerman 1973; Braine 1976; Echols 1993; Echols & Newport 1992). Existing accounts of the omission of functional elements at the TSS fall into two groups: those that assume full target-like grammatical competence at the telegraphic stage, and those that do not presuppose adult-like competence.

The general assumption behind full-competence approaches is that all functional projections are present in children's grammars from the beginning of language development (Boser et al. 1992; Crain 1994; Hyams 1992; Lust 2006; Poeppel & Wexler 1993; Santelmannet al. 2002; Weissenborn 1990, 1992). According to these approaches, children's grammars follow the principles of UG at all stages, and the observable deviations from target grammars are due to the fact that children need to gradually trace and map the specific parameters of the language they are acquiring (see Boser et al. 1992; Lust 1999, 2006; Poeppel & Wexler 1993; Weissenborn 1992, 1994;). Other studies attribute the observed discrepancies between child and adult language to factors outside of syntax proper, such as phonological or processing limitations, the child's limited vocabulary, lack of pragmatic

knowledge, limited attention and working memory span etc. (see e.g., Boser et al. 1992; Demuth 1994, 2014; Gerken et al. 1993; Schaeffer & Matthewson 2005).

In a related vein, various studies have shown that young infants in their first year of life are already sensitive to the presence and absence of functional items (Shady 1996; Shi & Gauthier 2005), and use them as cues to infer the syntactic categories of adjacent novel words (e.g., Bernal et al. 2007; Fisher et al. 2006; Höhle et al. 2004, 2006; Santelmann & Jusczyk 1998; Shady 1996; Shi 2014). Furthermore, young children have been shown to use the syntactic category of a novel word to draw inferences about its potential meaning (cf. Bernal et al. 2007; Fisher et al. 2006). However, it should be emphasized that early sensitivity to the presence and the type of grammatical elements doesn't necessarily entail target-like competence with respect to these elements. There may indeed be a stage when children are already aware of the obligatory presence of certain grammatical elements in the structure, but haven't yet completely acquired their distributional properties (cf. e.g., Belikova et al. 2009; Dąbrowska 2001; Eisenbeiss 2000; Tremblay 2005 on generalization patterns and the use of fillers instead of functional morphemes which contradict the predictions of early-competence approaches).

The second group of approaches does not assume target-like syntactic representations at the TSS, and attributes the observed discrepancies between child and adult utterances to differences in the underlying syntactic structure. Proponents of the *maturational approach* (Borer & Wexler 1987, 1992; Felix 1984, 1987; Lebeaux 2000; Radford 1990, 1992) assume that the parts of grammar associated with functional categories need more time to mature than those associated with content categories. For example, Radford (1990) proposes that grammatical development proceeds through a set of biologically predetermined stages starting from the so-called *pre-categorical* stage associated with single-word utterances, which is followed by a *lexical* stage where the grammar only contains content categories such as nouns, verbs and adjectives, which is in turn followed by the *functional* stage when functional categories emerge. According to this approach, the omission of grammatical elements including bound morphemes (e.g., tense and plural marking) and free morphemes (e.g., determiners, auxiliaries, prepositions, complementizers) before around 3 years of age is taken as evidence for the initial absence of the corresponding functional categories in children's grammars. Phrasal projections associated with the missing elements are taken to emerge when the grammar naturally 'matures', in a manner similar to how children start teething or crawling (cf. Radford 1990, 1992; see also Deprez & Pierce 1994; Guilfoyle & Noonan 1992; Tsimpli 1991; Vainikka 1993). Some versions of the maturational approach assume gradual

emergence of functional structure, with some projections maturing before others. For instance, the lack of complementizers in young children's speech has been argued to indicate the absence of CP in early grammars at a stage when other (lower) functional projections, such as IP, may already be in place (see Meisel & Müller 1992).

Finally, structure-building approaches (Clahsen 1990; Clahsen & Penke 1992; Clahsen et al. 1994; Duffield 2008; see also Westergaard 2009) assume gradual 'building' of underlying structures based on the linguistic input that the child receives. It is argued that the development of grammatical representations is constrained by the principles of UG; however, the presence of all functional projections in the child's grammar from the very beginning is not presupposed. For example, Clahsen (1990) has argued that children's grammars at early stages involve only one underspecified verbal functional projection (associated with underspecified tense/aspect semantics), which gradually develops into a sequence of fully-specified functional projections (cf. Duffield 2008). The acquisition of functional categories is taken to be dependent on the lexical properties and distribution of individual grammatical elements lexicalizing these categories (see Clahsen et al. 1994: 86).

2.2. Prepositions at the Telegraphic Speech Stage: Paper 2

Prepositions are among the elements that children omit at the TSS. Multiple studies have shown that children's early locative utterances may contain bare nouns denoting landmarks without overt locative prepositions that take these nouns as their complements in the adult language. Examples from early English illustrate this pattern:

(33)   *Baby highchair* instead of *Baby is in the highchair* (Brown & Bellugi 1964, cit. by Clark 1973:59)

(34)   *Draw paper* instead of *Draw on paper* (Tomasello 1987: 85)

(35)   *Have gum mouth* instead of *Have gum in my mouth* (Tomasello 1987: 85).

(36)   *Mummy bathroom* instead of *Mummy is in the bathroom* (Felix 1992:30)

As in the case of other functional categories, two types of explanations have been proposed for the phenomenon of preposition omission at the TSS: a lack-of-competence and a full-competence account. Radford and Ramos (2001) investigate a corpus of one English SLI child and argue for a maturational explanation, proposing that at the stage of preposition omission the category P has not yet matured in the child's grammar. They suggest that the object in preposition-less utterances is in fact "a caseless noun expression which has no case-

feature to be valued" (Radford & Ramos 2001: 51). Nicholas (2011), on the other hand, has argued that children's grammar at the stage of preposition omission is in fact target-like, and that omissions must be attributed to factors outside of the grammar, such as underdeveloped performance/production skills. The arguments in favor of this explanation come from child Icelandic. In Icelandic the majority of locative prepositions mark their complement nouns with dative case, while directional prepositions assign accusative. Nicholas (2011) conducted a series of production experiments with young Icelandic children, which showed that they consistently mark nominals with dative and accusative case in locative and directional contexts, respectively, even in the absence of overt prepositions. Nicholas (2011) interprets this as evidence that individual locative and directional prepositions are underlyingly present in the children's utterances, are target-like, and are able to assign case to their complement nouns. Nicholas' (2011) results are corroborated by Thordardottir and Weismer's (1998) corpus study of the speech of Icelandic-speaking children with an MLU ranging between 2.39 and 4.31, which found that in spatial PPs children consistently drop prepositions, but mark the nouns for dative in locative expressions, and for accusative in directional expressions, consistent with the cases typically assigned by locative and directive prepositions in the target grammar.

Furthermore, similar patterns of case assignment to nouns in spatial contexts as described by Nicholas (2011) with respect to Icelandic, have been observed for child Russian. Various studies report that case forms start to appear earlier than case-assigning prepositions in child Russian (Gvozdev 1961; Leikin 1998; Slobin 1984; Elivanova 2004, 2007; Gagarina & Voeikova 2009).[9] Thus, Russian children have been shown to produce locative and directional utterances lacking overt prepositions, but to mark the nouns with prepositional and accusative case, respectively. Gvozdev (1961/2007: 174) provides examples involving the use of accusative in directional contexts at the age of 1;11, as illustrated in examples (37)-(39).

(37) *Nalej*   *vody*   *kružku,*   *čašku*
      pour   water.GEN   mug.ACC   cup.ACC
      'Pour some water into the mug, the cup'

(38) *Gus'ki*   *kantinku*   *kladil*
      toys   basket.ACC   put.PAST.MASC
      'I/he put the toys into the basket'

---

[9] Gagarina & Voeikova (2009: 182) point out that "the omission of prepositions in prepositional phrases alongside with correctly used inflectional endings is typical in child Russian".

(39) *Jaičko   letelo   dunduk*
      egg   flew   box.NOM/ACC
      'The egg flew to the box' (Zhenya 1;11)

In all of the above examples the directional preposition, which is obligatory in adult Russian, is missing. However, the ground nominal bears the target-consistent accusative marking. Similarly, Gvozdev's corpus contains utterances involving nouns marked for prepositional case with a locative meaning, in the absence of overt locative prepositions, as shown in (40)-(41). In adult Russian, the use of overt prepositions is obligatory in these contexts.

(40)   *Stole*
       table.PREP
       'On the table'

(41) *Stul'ki*   *sidit*
      chair.DIM.PREP   sit.3SG
      'He is sitting on the chair' (Zhenya 1;11)

Such examples are also attested in the CHILDES corpus (Bar-Shalom & Snyder 1997; MacWhinney 2000) and Elivanova's (2007) study:

(42) *Kajaski*   *isit*
      stroller.PREP   hangs
      'It is hanging on the stroller' (CHILDES, Varvara 1;8.24)

(43) *Isu*
      forest. PREP
      'In the forest' (Elivanova 2007: 332, Lisa 1;10.06).

We thus have a diverse range of data indicating that children acquiring languages with overt morphological case use target-like case marking to distinguish between locative and directional utterances at the stage of P omission. Note, however, that these data do not provide direct evidence for the presence of fully specified, target-like prepositions in children's grammars, as argued by Nicholas (2011). In the paper "Early underspecification of functional categories: Evidence from the acquisition of locative PPs in Russian" (Paper 2) we propose an alternative account, which is in line with Clahsen and colleagues' weak continuity approach to the acquisition of functional categories (see above) and assumes that children pass through a stage where their grammars contain underspecified locative and directional categories, but lack fully specified structures associated with individual prepositions in the target grammar. Finer-grained distinctions within the locative domain are acquired gradually

together with the acquisition of individual locative prepositions encoding these distinctions. We refer to this account as the Underspecified P Hypothesis (UPH).

We present the results of two production and one comprehension experiments with monolingual Russian children aged 2-5, aimed at exploring the underlying structure of utterances involving P omission in early child grammar. Russian provides a suitable testing ground for distinguishing between the two competing approaches described above, i.e., Nicholas' full-specification analysis and an alternative account, which assumes an underspecified locative structure (the UPH). In Russian, individual locative prepositions differ with respect to the case that they assign to their complements. Thus, prepositions *v* 'in' and *na* 'on' assign prepositional case to their complement nouns, while *pod* 'under' and *za* 'behind' assign instrumental case, as illustrated in (44).

(44)   *v / na meshk-e*   in/on bag- PREP [10]
       pod / za meshk-om   under/behind bag-INSTR

The full-specification hypothesis predicts that the case marking on nouns in children's locative utterances involving P omission would depend on the case-assigning properties of the omitted preposition, i.e., children would produce nouns in the prepositional case form in contexts corresponding to the relations IN and ON, and nouns in the instrumental form in contexts corresponding to UNDER and BEHIND[11]. On the other hand, if children's utterances involving P omission are associated with an underspecified locative structure, we expect the case-marking on nouns in such utterances to be uniform across all locative contexts.

The results of an elicited production picture description experiment showed that the rate of preposition omission in the responses of the 2-year-olds was significantly higher than that in the older age groups (32% vs 6% for the 3-year-olds and 1% for the 4-year-olds). Furthermore, in utterances involving P omission, children overwhelmingly produced nouns in the prepositional case form, independently of the described spatial configuration. That is, even in UNDER and BEHIND contexts, the prepositional case from was used significantly more often than all other case forms, and there was no significant difference in case assigning

---

[10] Note that prepositional case forms are often stressed and not syncretic with other case forms in the 2nd declension (most masculine and neuter nouns), and syncretic with dative in the 1st declension (typically, feminine nouns). Prepositional case forms are not syncretic with instrumental case forms.

[11] Throughout this thesis small caps are used to refer to concepts.

patterns between the different spatial configurations. These results support the hypothesis that children's utterances lacking overt locative prepositions involve an underspecified locative category, which is uniformly associated with prepositional case marking in child Russian.

Furthermore, Nicholas's (2011) full-competence hypothesis and the UPH make contrasting predictions with respect to children's comprehension of locative prepositions. If the full-competence hypothesis is correct, and P omission is due solely to performance limitations, we expect to find no correlation between the rate of P omission in production and the level of comprehension of individual locative prepositions. If, on the other hand, utterances involving P omission are to be analyzed as involving an underspecified locative category whose acquisition precedes that of individual locative Ps, we expect children who exhibit high rates of P omission to score lower on preposition comprehension tasks, as compared to children who do not omit prepositions in production, or do so at a lower rate. The results of a sentence-picture-matching comprehension experiment reported in Paper 2 indeed showed a strong negative correlation between the rate of preposition omission in production and the level of comprehension of individual locative prepositions, thus supporting the UPH over the full-competence approach.

2.3. Online Comprehension of Locative PPs by Young Children: Paper 3

We have argued that the experimental results reported in Paper 2 indicate that, at the stage of preposition omission, children do not yet distinguish reliably between individual locative Ps, which in turn is consistent with the presence of an underspecified locative category in children's grammars instead of fully-fledged structures associated with specific locative prepositions. There is, however, a potential complication with this argument, as it comes from comprehension results obtained in an offline sentence-picture-matching task. Offline tasks only measure children's reactions after they have heard the experimental sentence, and thus a number of confounding factors, such as children's short attention and/or working memory span, difficulty following the instructions, etc. might mask children's sentence comprehension in real time (cf. e.g., Sekerina et al. 2004; Sekerina 2015 for a discussion of contrasting results obtained on offline and online tasks). In order to avoid the complications associated with offline tasks, we designed and conducted a Visual World eye-tracking experiment with a group of monolingual Russian children aged 2-4 (see Paper 3, "Comprehension of Locative Prepositions by Young Children: An Eye-tracking Study", included in this dissertation). The results of the experiment reported in Paper 3 revealed that 2-year-old children performed

significantly worse than 3-year-olds on the experimental trials that tested the comprehension of locative prepositions. At the same time, the eye movement patterns of 2-year-olds were not significantly different from those of 3-year-olds in the control trials, which required the correct comprehension of common nouns referring to figure objects. This indicates that the underperformance of the 2-year-olds on the experimental trials cannot be attributed to general limitations, such as attention deficit, task difficulty, etc. Rather, 2-year-olds faced difficulties specifically in cases when the identification of target pictures depended on the comprehension of locative prepositions. We interpret this result as providing further support for the diminished-competence approaches, which predict young children's comprehension of functional elements to be non-target-like at the stage of their omission in production (see the discussion of Paper 2 above).

The above conclusion regarding young children's diminished comprehension of locative prepositions is in line with a series of studies that argue that children's comprehension of functional elements (e.g., plural marking, verbal agreement, etc.) may remain non-target-like until pre-school age (Beyer & Hudson Kam 2009; Johnson et al. 2005; Miller & Schmitt, 2012). It may appear that these findings contradict the results of another set of studies, demonstrating children's early *sensitivity* to the presence and type of grammatical elements (see e.g., Bernal et al. 2007; Höhle et al. 2004, 2006; Santelmann & Jusczyk 1998; Shady 1996; Shi 2014; Shi & Gauthier 2005). However, it has been argued that sensitivity to grammatical elements does not in fact entail and may greatly precede target-like comprehension of these elements (Soderstorm 2008: 675). From a theoretical point of view, early sensitivity to the presence and type of functional elements, on the one hand, and the lack of target-like comprehension of these items at an early age, on the other, can be reconciled under an approach that assumes that functional categories are present, but not yet fully specified in early grammars, as suggested in Paper 2 (cf. also Clahsen 1990). Specifically, as we hypothesize in Paper 3, grammatical items can become associated with underspecified functional categories present in children's grammar from early on, thus accounting for young children's sensitivity to these items. At the same time, the individual lexical and grammatical properties of these items may take substantially more time to acquire, leading to diminished comprehension at early stages. We leave further investigation of this hypothesis for future research.

2.4. The Issue of Optionality of P Omission

An interesting result of the experiments presented in Paper 2 concerns the optionality of P omission in children's speech. A large portion of our 2-year-old participants omitted prepositions only in some of their responses, and produced them in others (see the discussion in Paper 2).[12] A similar pattern has been reported for other functional elements as well, see the examples in (45)-(47) (from Radford 1996), where children produce utterances containing overt functional elements on a par with utterances lacking them.

(45)   *I teasing Mummy* and *I'm teasing Mummy* (Holly, 24 months)

(46)   *I having this one* and *I'm having 'nana* (Olivia, 27 months)

(47)   *We been there* and *We've been there* (Robert, 26 months)

In the literature, such optional omission has been attributed to bigrammaticality / incomplete mastery of functional categories (Radford 1990, Roeper & de Villiers 1991, Roeper 1999), optional presence of functional projections (Rizzi 1993), or optional underspecification of functional categories (Wexler 1994). Thus, Radford (1990) suggests that children between approx. 2 and 3,5 years of age may be "bigrammatical" (cf. also Roeper 1999). He hypothesizes that these children may be in a transition period between Early Child English grammar, which is lexically-based, and the fully developed adult (lexically- and functionally-based) grammar. Thus, at this stage both grammars are active simultaneously, resulting in the production of structures that contain functional elements on a par with structures that lack them. On the other hand, Rizzi (1993) argues that at the so-called 'optional infinitive' stage, the syntactic structure of children's utterances may be optionally "stripped off" of some external clausal layers. Thus, Rizzi notes that so-called root infinitive constructions never contain elements that attach high, such as Wh-words, subject clitics, etc., suggesting that the underlying structure of these utterances is truncated, and does not contain functional projections above the V head. Finally, analyzing the 'optional infinitive' stage in a range of child languages, Wexler (1994) proposes that the T(ense) head is optionally underspecified in child grammars, i.e., it may be either strong or weak. The strong T head triggers verb movement, and the child produces finite verb forms, while the weak (underspecified) T head does not license verb raising and results in children producing

---

[12] A similar pattern of "optional P omission" was observed in the responses of Norwegian children in an analogous picture-description task, presented in Paper 4 (see below).

utterances with infinitives. Wexler concludes that the phenomenon of 'optional infinitives' should not be attributed to some sort of derivational optionality (verb raising always happens when the T head requires feature-checking), but rather to the co-existence of two variants of the T head in early grammars: one that is adult-like and fully specified, and another one that is radically underspecified and thus does not trigger feature checking and verb raising (see Phillips 2010 and references therein for subsequent studies that build on this proposal).

In Paper 2 we propose an analysis of what we refer to as the 'optional P stage', i.e., a stage when children produce utterances containing overt locative Ps on a par with utterances lacking them, which is in line with Wexler's (1994) proposal. We suggest that in order to become adult-like with respect to the structure of locative PPs in Russian, children not only need to acquire the syntactico-semantic contrasts associated with the individual locative Ps in Russian, but also to establish that the Place head cannot be left underspecified, thus unlearning the underspecified Place variant. We propose that the optional P stage corresponds to the period when children have already acquired one (or more) individual locative Ps, but have not yet unlearned the underspecified locative structure. Thus several variants of the locative P structure co-exist in the child grammars at this stage: one that involves an underspecified Place head encoding a general locative relation, and others that are fully specified and lexicalized by individual overt Ps.[13]

2.5. Factors Influencing the Acquisition of Overt Ps: Paper 4

In the previous section we argued that children's grammar at the stage of preposition omission involves an underspecified Place category with a very general locative semantics. We argued that this is not simply a conceptual, but a distinct linguistic/grammatical category, which is consistently expressed in children's early multiword utterances. In languages with overt morphological case it manifests itself in consistent oblique case marking on object nominals in locative constructions (e.g., dative case in Icelandic, prepositional case in Russian etc.). We have also proposed an acquisition model in line with the structure-building approach (see e.g., Clahsen 1990; Clahsen et al. 1996; see also Westergaard 2009), which assumes

---

[13] The acquisition of individual Ps generally entails the acquisition of their case-assigning properties. Thus, when children's utterances involve a fully specified prepositional structure lexicalized by an overt preposition, the case-assigning properties of the Ps are overwhelmingly target-like. On the other hand, in utterances involving P omission, when, as we have argued, the Place head is underspecified, object nouns are uniformly marked with prepositional case (see the discussion in Paper 2).

input-driven acquisition and which relies heavily on lexical learning of individual grammatical morphemes. In this section we focus on the role of input and discuss Paper 4 of the current dissertation, which investigates the role of lexical properties in the acquisition of locative structures.

Let us start by reviewing possible mechanisms of acquisition of functional categories proposed in the literature, such as maturation, item-by-item learning, and structure-building. The radical maturation approach discussed in the previous section (e.g., Radford 1990) argues that functional categories mature independently of input and follow a genetically predetermined biological program. Crucially, according to Radford (1990), all functional categories are assumed to mature simultaneously, when children reach the *functional* stage of development.[14] Thus, if the mechanism underlying acquisition is taken to be simultaneous maturation of functional projections in children's grammars, it is predicted that there would be no difference in the acquisition rate of analogous structures between different languages, and that the lexical properties of individual items that spell out these structures should have no effect on the rate of acquisition within and across languages.

Constructionist item-base/usage-based approaches (e.g., Tomasello 2003, 2006; Lieven et al. 2003; Ambridge et al. 2006) generally assume that children start out by memorizing unanalyzed chunks, and begin making generalizations only after a considerable amount of such individual chunks has been accumulated. The primary factor influencing the rate of such item-by-item learning is argued to be frequency in the input (Lieven et al. 2003; Theakston et al. 2004; Tomasello 2006; Lieven 2010; Ambridge 2015; cf. also the articles in Gülzow & Gagarina 2007). This approach predicts that the lexical properties of individual items would play an important role in the rate of acquisition, with the acquisition of more frequent items generally preceding that of less-frequent items.

Finally, structure-building approaches (e.g., Clahsen 1990; Clahsen et al. 1996; see also Westergaard 2009) also predict the acquisition to be input-driven and the rate of acquisition to rely heavily on the lexical properties of the acquired items. Importantly, it is not presupposed that frequency would necessarily be the sole factor determining the rate of acquisition (see e.g., Anderssen 2005; Anderssen & Westergaard 2010 for evidence against the leading role of frequency).

---

[14] In his later work, Radford himself adopts a structure-building model of development, which assumes that functional projections emerge gradually and that acquisition is driven by lexical learning (Radford 1996).

Paper 4, entitled "Acquisition of Locative Utterances in Norwegian: Structure-building via Lexical Learning", aims at testing the predictions of the approaches described above. We present the results of two production experiments with monolingual Norwegian children aged 2-5 as well as one corpus study of a monolingual Norwegian child aged 1;8-3;3. The paper focuses on the role played by lexical factors in the acquisition of locative expressions. Norwegian presents a good testing ground for such a study because it possesses a richer and more diverse system of locative prepositions than, e.g., English or Russian. Specifically, there are two types of locative items in Norwegian: (i) highly frequent monosyllabic prepositions, which are morphologically simple and ambiguous between locative and non-locative meanings (e.g., *i* 'in', *på* 'on'), and (ii) morphologically complex and less frequent prepositions, which are phonologically strong and unambiguously locative in meaning (e.g., *oppå* 'on', *inni* 'in(side)', *oppi* 'in'). We use the terms *weak* and *strong* prepositions for the first and second group of Norwegian locative items, respectively.

A range of lexical factors that potentially influence the rate of acquisition has been proposed in the literature, in addition to overall frequency. We focus on the following six factors: *conceptual hierarchy*, *morphological complexity*, *overall frequency*, *phonological salience*, *homonymy* and *lexical diversity*. Johnston & Slobin (1979) examined the acquisition of locative terms by monolingual children learning four different languages (English, Italian, Serbo-Croatian and Turkish) and proposed that a number of factors facilitate/slow down the rate of acquisition. The crucial finding of this study is that the acquisition order of locative terms across languages reflects a hierarchy of spatial concepts, with terms for more simple concepts, such as IN, ON and UNDER, emerging before terms for more complex concepts, such as BEHIND and IN FRONT OF (see also Caselli et al. 1999).[15] Johnston and Slobin (1979) argue that in addition to the conceptual hierarchy, the rate of acquisition is influenced by such factors as morphological complexity, semantic transparency and lexical diversity. Thus, a high degree of morphological complexity of locative terms is predicted to slow down acquisition, while semantic transparency (lack of homonymy) is predicted to have the opposite effect. Furthermore, languages differ with respect to how many alternative items they employ for lexicalizing a single locative concept. For instance, Turkish has only one locative term for the notion of proximity (*yaninda*), while English employs several items,

---

[15] Note, that under the assumption that locative structures are decomposable (as discussed in Part 1 of this Introduction), this acquisition pattern can also be stated in terms of *structural* complexity, since BEHIND and IN FRONT OF are taken to have a more complex syntactic structure than IN and ON.

(*beside*, *near*, *next to*, *by*, *close to* etc.). Johnston and Slobin (1979) argue that lexical diversity is responsible for the fact that locative items encoding proximity generally emerge later in the speech of English children as compared to their Turkish peers. Finally, we also examine the role of phonological salience, as it was shown to have an effect on the acquisition rate of functional morphemes, with phonologically more salient items being acquired earlier than unstressed, less acoustically/phonologically salient items (e.g., Slobin 1985).

The factors described above make contrasting predictions with respect to the acquisition of locative prepositions in Norwegian. Johnston and Slobin's (1979) *conceptual hierarchy* predicts that the terms for simpler concepts, i.e., IN and ON will be acquired earlier than the terms for more complex concepts, i.e., UNDER or BEHIND. At the same time, synonymous terms for the relations IN and ON in Norwegian are expected to appear approximately at the same time. However, if the rate of acquisition is taken to be inversely correlated with the degree of *morphological complexity*, weak prepositions, which are morphologically simple, should be acquired earlier than their morphologically complex strong counterparts. Similarly, if *overall frequency* is taken to play the leading role in acquisition, as predicted by the usage-based approach, we would expect the highly frequent weak prepositions to be acquired earlier than the less frequent strong ones. On the other hand, if *phonological salience* and/or *lack of homonymy* are the leading factors, we expect phonologically strong and semantically unambiguous items to be acquired prior to their phonologically weak homonymous counterparts. Finally, to test the effects of *lexical diversity*, we can compare Norwegian, which has several terms for the relations of containment IN and support ON, with Russian, which employs only one locative preposition for each of these relations (*v* 'in' and *na* 'on'). Thus if lexical diversity is the leading factor, we expect Russian children to acquire prepositions encoding IN and ON relations earlier than their Norwegian peers.

In order to test these predictions, we conducted two production experiments and a corpus study investigating the acquisition of locative PPs in Norwegian. The first study was modeled after the elicited production picture-description task with Russian children discussed in Paper 2 (see the overview above). We tested 70 monolingual typically-developing children aged 2-5 acquiring a dialect of Norwegian spoken in Tromsø. In addition we tested 13 adult participants as controls. The results of this experiment show that children at age 2 regularly produce locative utterances lacking overt prepositions, with the rate of preposition omission decreasing rapidly by age 3 (a pattern that is similar to the one observed for Russian children). However the rate of preposition omission is lower than that of the Russian children (17% in

the Norwegian group and 32% in the Russian group), which suggests that lexical properties of locative items influence the rate of acquisition. The results of the experiment with Norwegian children also show that strong locative items (e.g., *oppå* 'on', *inni* 'in(side)', *oppi* 'in') generally appear earlier in children's utterances than their weak counterparts (e.g., *i* 'in', *på* 'on'). This conclusion is confirmed by a longitudinal corpus study, which shows that the use of strong locative items becomes adult-like earlier than that of weak Ps. These results contradict the predictions of the usage-based approach, which assumes that *overall frequency* should play the leading role in the rate of acquisition. The results also suggest that *morphological complexity* either plays no role in the acquisition rate or may be overridden by stronger factors. On the other hand, the results of the experiment support the hypothesis that such lexical properties as *phonological salience* and/ or *lack of homonymy* play an important role in facilitating the acquisition of locative items. Finally, the comparison between Norwegian and Russian does not support the prediction that *lexical diversity* is a major factor, since prepositions encoding IN and ON relations do not appear in the speech of Russian children significantly earlier than in the speech of their Norwegian peers (see the discussion in Paper 4).

2.6. Summary of the Acquisition Model Proposed in this Thesis

In this section we summarize and discuss the model that was proposed in this dissertation to account for children's acquisition of locative PPs. This is a generative model because it argues for the existence of productive locative structures in children's grammars from the early stages. However, this is also a model that acknowledges a prominent role of the input that the child receives, since the transition to target grammars is argued to be input-driven. The model can be summarized as follows:
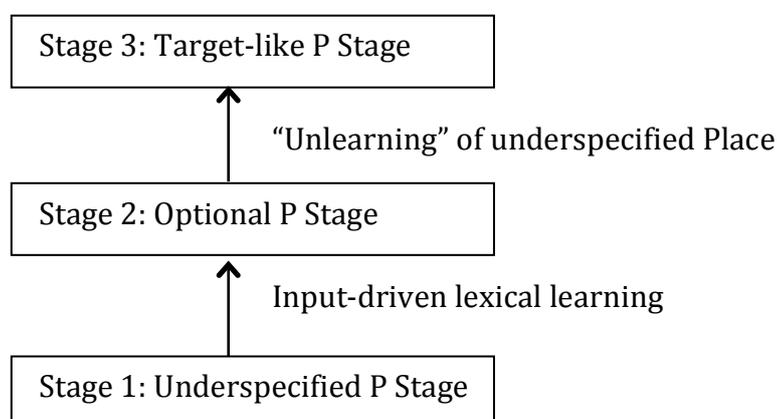

Figure 17

As numerous studies have shown, LOCATION is a very salient conceptual category before age 2, and children start producing locative utterances from the earliest stages of verbal development (see e.g., the references discussed in the background section of Paper 4). Furthermore, as evident from various experimental and corpus data discussed above, LOCATION becomes not only a conceptual, but also a *grammatical* category early on: in languages with overt morphological case it is consistently expressed via oblique case marking on nouns even in the absence of overt locative prepositions. We have proposed that at this early stage the category Place is present in children's locative structures, but appears in an underspecified form and encodes a general locative semantics. This underspecified locative projection is associated with oblique case marking on nouns. In Paper 2 we considered two alternative analyses of the relation between the underspecified Place head and overt case marking on the noun: the underspecified Place head may either be phonologically null in children's grammar, assigning a specific oblique case to its complement noun, or be directly lexicalized by the case marking itself (see the discussion in Paper 2). As an alternative strategy, typical of some children, the underspecified Place head may be overtly realized by a "dummy" preposition. In the experimental data presented in Papers 2 and 4, four out of 23 two-year-olds in the Russian group, and one out of 22 two-year-olds in the Norwegian group consistently used a dummy preposition ("a") in place of all locative prepositions.

We have proposed that the acquisition of locative structures proceeds incrementally and that individual locative contrasts emerge gradually based on the features associated with individual locative prepositions that the child encounters in the input. In Paper 4 we have argued that certain lexical factors may facilitate or slow down the acquisition of locative terms. Thus, phonologically salient and semantically unambiguous locative Ps become target-like earlier than their unstressed homonymous counterparts in Norwegian, despite a significantly higher frequency of the latter items in child-directed speech.

One question that arises with respect to the gradual acquisition of locative items is the following: is this process limited to lexical acquisition, or is it accompanied by the development of a more elaborated underlying syntactic structure? The answer largely depends on the theoretical assumptions about the internal structure of locative PPs in the target grammar. Traditionally, it has been assumed that all locative PPs have an identical underlying structure, and their acquisition has been viewed as a purely lexical process with the order of acquisition determined by conceptual complexity (see Johnston & Slobin 1979; Caselli et al. 1999; Terzi & Tsakali. 2015). Thus, prepositions expressing simpler spatial concepts, e.g., IN and ON, are taken to be acquired prior to prepositions encoding such relations as e.g.,

BETWEEN and BEHIND, which arguably have a more complex conceptual structure. If on the other hand, we assume a decomposed structure of spatial PPs as proposed by Svenonius (2006, 2010), den Dikken (2010), Pantcheva (2011) and discussed in Part 1 of this Introductory chapter, we can argue that the transition from underspecified locative structures to PPs involving fully-specified locative Ps involves the acquisition of a range of additional syntactic features and functional projections. E.g., the acquisition of prepositions encoding IN and ON relations must involve the addition of [+containment] and [+support] features to the Place head. Similarly, the acquisition of projective axial prepositions expressing the relations UNDER and BEHIND must include the development of extended functional structures involving AxPart, Deg and Loc heads (see Part 1 of this Introductory chapter). From this structural point of view, the acquisition of locative PPs can be viewed as a gradual development which proceeds from the most basic, minimally necessary locative structure (underspecified Place) to more elaborated structures which involve syntactic features and/or functional layers present only in certain subclasses of locative expressions.

As we show in the presentation of Paper 2 above, children go through a stage when they produce both types of structures: full PPs containing an overt preposition and locative structures involving P omission.[16] We refer to this period as the *optional P stage*, and have argued that at this stage structures involving the underspecified Place head co-exist with more elaborated structures corresponding to overt locative Ps. Thus, the acquisition of individual locative Ps does not entail immediate transition to target-like production. As argued in the discussion of Paper 2 above, the transition to the target P stage involves both the acquisition of individual locative prepositions and the unlearning of the underspecified Place structure.

The model for the acquisition of locative PPs proposed in this thesis can be characterized as 'mildly' generative and is in agreement with the structure-building approach to language acquisition, as discussed above (Clahsen 1990; Clahsen et al. 1994, 1996; Duffield 2008). It also shares key features with the micro-cue model of language acquisition developed by Westergaard (2008, 2009, 2016, cf. also Westergaard & Bentzen 2007; Anderssen & Westergaard 2010). Namely, both models assume the existence of structure and rules in early grammars while simultaneously emphasizing the role of input.

---

[16] Above we discussed this stage with respect to Russian. However, this pattern is also typical for Norwegian: 13 out of 22 Norwegian two-year-old participants produced utterances without locative Ps on a par with utterances involving overt prepositions (see the results of Study 1 in Paper 4).

On the other hand, the findings reported in this dissertation go against pure item-by-item usage-based approaches, which presuppose a complete lack of structural generalizations at early developmental stages (e.g., Tomasello 2003, 2006). What we find is the opposite: the category LOCATION manifests itself as a linguistic category early on and is initially less specified than the corresponding adult structures. In Russian, we observe an overgeneralization of a specific case marking across all locative contexts, while target-like case assignment, which depends on finer-grained distinctions within the locative domain, emerges later together with the acquisition of individual locative Ps.

3. Open Questions and Future Research

3.1 The Structure of Bounded and Unbounded PathPs

In the first paper of this thesis and in Part 1 of this Introductory chapter we discussed the structure of a class of directional expressions in Russian and English. One of the hypotheses that we put forward concerned the distinction between bounded and unbounded Path expressions (e.g., '*to* DP' vs '*toward* DP' in English, cf. Zwarts 2008 a.o.). Specifically, we argued that this distinction is not limited to the lexical semantics of the corresponding directional items, but is tied to a difference in the underlying syntactic structure. A further investigation of these structures is required to test this hypothesis.

3.2 Acquisition of Directional PPs

In Papers 2, 3, and 4 of this thesis we have focused on the acquisition of locative expressions. A natural extension of this project would be to address the acquisition of the second type of spatial expressions, i.e., directional PPs. With respect to locatives, we have proposed that the acquisition process begins at the so-called underspecified Place stage. The child's grammar at this stage includes only the most basic locative structure involving the Place projection in an underspecified form. Structurally, the Place functional layer is present in all locative expressions, whereas other syntactic features and functional projections are present only in certain subclasses of locative expressions (see Part 1 of this Introductory chapter). One question that we can ask is whether the acquisition of directional expressions follows a similar developmental path. Recall that Pantcheva (2010, 2011) argues that Path expressions can be decomposed into a series of functional projections, with Goal being the structural layer

that is present in all Path expressions, and Source and Route being cumulatively added in the structure of source and route expressions, respectively (see Part 1 of this Introductory chapter). If we assume the structural decomposition proposed by Pantcheva, we may hypothesize that the development of Path expressions will proceed from the most basic/minimally necessary layer present in all expressions (the Goal functional projection), with further layers being built incrementally. This predicts that the acquisition of Goal expressions will precede the acquisition of Source and Route directional expressions. Some primary evidence supporting this prediction comes from corpus data (e.g., Gvozdev 1961/2007), where the available early directional utterances involving preposition omission are uniformly translated as Goal expressions (see also Lakusta et al. 2007). However, further corpus and experimental investigation is needed to test this prediction.

3.3 Preposition Omission: Interplay of Syntax and Phonology?

Finally, in the discussion of Paper 2 above we have focused on syntactic accounts of the optionality of functional elements in children's speech. At the same time, factors outside of syntax proper have also been invoked to account for the optional omission of functional elements. Thus, various studies in phonological acquisition have argued that young children's production of unstressed grammatical morphemes correlates with the position of these morphemes within the prosodic word (Anderssen 2005; Demuth 1995, 2014; Lleó & Demuth 1999; Kupisch et al. 2008; Bassano et al. 2008, 2013, etc.).

Gerken and colleagues (Gerken & McIntosh 1993; Gerken 1994, 1996) show that determiners are more likely to be produced by English-speaking 2-year-olds when the determiner can form a trochaic foot with the preceding monosyllabic verb (48a), than when it is unfooted (48b):

(48)   (a) He (kicks <u>the</u>)$_F$ piggy.

(b) He (catches)$_F$ <u>the</u> piggy.

At the same time, it was suggested that the contrast observed between Romance and Germanic languages with respect to the acquisition of determiners correlates with the prosodic pattern typical of the two groups of languages. The Romance iambic pattern has been argued to facilitate early production of determiners, whereas the Germanic trochaic pattern has been taken to slow down the emergence of determiners in children's language

(Lleó & Demuth 1999; Kupisch et al. 2008; Bassano et al. 2008, 2013). Furthermore, within Romance languages, determiners have been shown to appear significantly earlier in contexts where they can form an iambic foot with the following monosyllabic nouns than when they remain unfooted (Lleó & Demuth 1999; Demuth 2001; Demuth & Tremblay 2008, see also Anderssen 2005 for a similar argument concerning the acquisition of enclitic determiners in Norwegian).

To sum up, a growing body of research coming from studies on phonological acquisition indicates that the omission of functional morphemes may at least partly be attributed to an under-developed prosodic component. We may, thus, hypothesize that since basic locative prepositions in Russian are generally prosodified together with the following word, prosodic factors may also play a role in determining the rate and distribution of preposition omission. The experiments presented in Paper 2 (see above) do not provide enough data to test whether this is indeed the case. One way to approach this question would be to test whether appearance in the immediate pre-tonic syllable (a "strong" prosodic position in Russian)[17] would facilitate the production of overt unstressed prepositions as compared to other pre-tonic positions. I leave this question, as well as other issues discussed in this section, for future research.

Conclusions

In this Introductory chapter I have presented the four papers included in this dissertation, putting them in a broader context and discussing their implications and potential extensions. In the first paper we focus on directional axial expressions in Russian. As we demonstrate, this class of spatial items possesses a number of distinct syntactic and semantic properties not predicted by existing analyses of directional expressions. We put forward a decompositional analysis of Russian directional axial expressions, which allows for a unified explanation of the observed properties.

In the series of acquisition papers that comprise the second part of this thesis, we focus on the acquisition of locative prepositions encoding the basic spatial relations IN, ON, UNDER and BEHIND. On the production side, we observe that young Russian children tend to omit locative prepositions, but retain oblique case endings on the referent nouns.

---

[17] The prosodic "strength" of this position manifests itself in so-called moderate vowel reduction, as opposed to radical vowel reduction in other un-stressed syllables.

Interestingly, children largely overgeneralize a specific oblique case across all locative contexts, irrespective of the case-assigning properties of individual locative Ps. On the comprehension side, we observe that the level of comprehension of locative prepositions correlates negatively with the rate of P omission in production. This conclusion is supported by an on-line eye-tracking study. Based on the evidence coming from production and comprehension experiments, we put forward a model for the acquisition of locative PPs by young children. According to this model, children's grammars at early stages involve an underspecified Place category, associated with a generalized locative semantics. Finer-grained locative contrasts develop gradually, based on the acquisition of individual locative items from the input. Furthermore, as we find in our investigation of locative PP acquisition in Norwegian, this process is influenced by the lexical properties of the acquired locative items. Specifically, the results of our study suggest that phonologically salient and semantically unambiguous locative items are acquired prior to their phonologically weak and ambiguous counterparts, despite the fact that the former are morphologically more complex and substantially less frequent in the input than the latter. Crucially, however, the acquisition of one or more fully specified locative prepositions does not in itself entail the loss of the underspecified Place category in the child grammar. On the contrary, the proposed model predicts that the underspecified Place category will co-exist in the child's grammar with fully specified overt prepositions for a certain period of time. Given the lack of negative evidence in the input, the child faces the difficult task of 'unlearning' the underspecified Place structure based solely on positive evidence of target locative expressions. This prediction is supported by evidence from our study of both Norwegian and Russian, which indicates that children pass through a stage when PPs headed by overt prepositions co-occur in production with locative expressions involving P omission.

Of course, many open questions remain. Among those mentioned in this chapter are issues related to the dissociation between sensitivity to functional categories and comprehension, the influence of phonological/prosodic factors on the patterns of omission at the telegraphic speech stage, the acquisition of directional PPs, and the interplay of syntax and semantics in the analysis of unbounded directional expressions. A broader question relates to the application of our findings regarding the acquisition of locative prepositions to a wider range of functional categories. We leave all these questions, and many others, for future research.

References

Ambridge, B., Theakston, A. L., Lieven, E. V. M., & Tomasello, M. (2006). The distributed learning effect for children's acquisition of an abstract syntactic construction. *Cognitive Development, 21*(2), 174-193.

Ambridge, B., Kidd, E., Rowland, C. F., & Theakston, A. L. (2015). The ubiquity of frequency effects in first language acquisition. *42*(2), 239-273.

Anderssen, M. (2005). *The acquisition of compositional definiteness in Norwegian.* PhD Dissertation. University of Tromsø, Tromsø.

Anderssen, M., & Westergaard, M. (2010). Frequency and economy in the acquisition of variable word order. *Lingua, 120*(11), 2569-2588.

Bar-Shalom, E., & Snyder, W. (1997). Optional infinitives in Russian and their implications for the pro-drop debate. In M. Lindseth & S. Franks (Eds.), *Formal approaches to Slavic linguistics: The Indiana Meeting 1996*. Ann Arbor: Michigan Slavic Publications.

Bassano, D., I. Maillochon, & S. Mottet. (2008). Noun Grammaticalization and determiner use in French children's speech: A gradual development with prosodic and lexical influences. *Journal of Child Language, 35*, 403-438.

Bassano, D., Korecky-Kröll, K., Maillochon, I., van Dijk, M., Laaha, S., van Geert, P., & Dressler, W. (2013). Prosody and animacy in the development of noun determiner use: A cross-linguistic approach. *First Language, 33* (5), 476-503.

Belikova, A., Kupisch, T., Özçelik, Ö., & Sadlier-Brown, E. (2009). Fillers as Functional Categories: Evidence from German-English Bilingual Acquisition. In J. Crawford , K. Otaki, & M. Takahashi (Eds.), *Proceedings of the 3rd Conference on Generative Approaches to Language Acquisition North America (GALANA 2008)*. Somerville, MA: Cascadilla Proceedings Project.

Bernal, S., Lidz, J., Millotte, S., & Christophe, A. (2007). Syntax Constrains the Acquisition of Verb Meaning. *Language Learning and Development, 3*(4), 325-341.

Beyer, T., & Hudson Kam, C.L. (2009). Some cues are stronger than others: The (non)interpretation of 3rd person present —s as a tense marker by 6- and 7-year-olds. *First Language, 29*(2), 208-227.

Bloom, L. (1970). *Language development : form and function in emerging grammars* (Vol. 59). Cambridge, MA: MIT Press.

Borer, H., & Wexler, K. (1987). The Maturation of Syntax. In T. Roeper & E. Williams (Eds.), *Parameter Setting*. Dordrecht: Springer Netherlands.

Borer, H., & Wexler, K. (1992). Bi-unique relations and the maturation of grammatical principles. *Natural Language & Linguistic Theory, 10*(2), 147-189.

Boser, K., Lust, B., Santelmann, L. & Whitman, J. (1992). The syntax of V-2 in early child German grammar: The Strong Continuity Hypothesis. Proceedings of the Northeast Linguistic Society, 22.

Bowerman, M. (1973). *Early syntactic development: a cross-linguistic study with special reference to Finnish*. Cambridge: Cambridge University Press.

Braine, M. (1976). *Children's first word combinations*. Monographs of the Society for Research in Child Development, 41, 1.

Brown, R. (1973). *A first language : the early stages*. Cambridge, Mass: Harvard univ. press.

Brown, R. & Bellugi, U. (1964). Three processes in the child's acquisition of syntax. *Harvard Educational Review, 34*, 133-151.

Brown, R., & Fraser, C. (1964). The Acquisition of Syntax. *Monographs of the Society for Research in Child Development*. Vol. 29. No.1. Wiley

Caselli, C., Casadio, P., & Bates, E. (1999). A Comparison of the Transition from First Words to Grammar in English and Italian. *Journal of Child Language, 26*(1), 69-111.

Clahsen, H. (1990). Constraints on Parameter Setting: A Grammatical Analysis of Some Acquisition Stages in German Child Language. *Language Acquisition, 1*(4), 361-391.

Clahsen, H., & Penke, M. (1992). The Acquisition of Agreement Morphology and its Syntactic Consequences: New Evidence on German Child Language from the Simone-Corpus. In J. Meisel (Ed.), *The Acquisition of Verb Placement*. Netherlands: Springer.

Clahsen, H., Eisenbeiss, S., & Penke, M. (1996). Lexical Learning in Early Syntactic Development. In H. Clahsen (Ed.), *Generative Perspectives on Language Acquisition: Empirical findings, theoretical considerations and crosslinguistic comparisons*. Amsterdam: Benjamins.

Clahsen, H., Eisenbeiss, S., & Vainikka, A. (1994). The seeds of structure: a syntactic analysis of the acquisition of case marking. In T. Hoekstra & B. Schwartz, D. (Eds.), *Language Acquisition Studies in Generative Grammar*. Amsterdam: Benjamins.

Clark, H. H. (1973). Space, time, semantics, and the child. In T. Moore (Ed.), *Cognitive development and the acquisition of language*. New York: Academic Press.

Crain, S. (1994). Language acquisition in the absence of experience. In P. Bloom (Ed.), *Language acquisition: Core readings*. Cambridge, MA: MIT Press.

Dąbrowska, E. (2001). Discriminating between Constructivist and Nativist Positions: Fillers as Evidence of Generalization. *Journal of Child Language, 28*(1), 243-245.

Demuth, K. (1994). On the 'underspecification' of functional categories in early grammars. In B. Lust, M. Suñer, & J. Whitman (Eds.), *Syntactic Theory and First Language Acquisition: Cross-Linguistic Perspectives* (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum.

Demuth, K. (1995). Markedness and the Development of Prosodic Structure. In Beckman, J. N. (Ed.). *Proceedings of the North East Linguistic Society 25*. Amherst MA: Graduate Linguistic Student Association, University of Massachusetts.

Demuth, K. (2001). Prosodic constraints on morphological development. In J. Weissenborn & B. Höhle (Eds.), *Approaches to bootstrapping* (Vol. II). Amsterdam, The Netherlands / Philadelphia, PA: John Benjamins.

Demuth, K. (2014). Prosodic Licensing and the development of phonological and morphological representations. In A. Farris-Trimble, W. & J. Barlow, A. (Eds.), *Perspectives on Phonological Theory and Development: In honor of Daniel A. Dinnsen*. Amsterdam: Benjamins.

Demuth, K., & Tremblay, A. (2008). Prosodically-conditioned variability in children's production of French determiners. *Journal of Child Language 35*, 99-127.

den Dikken, M. (2010). On the Functional Structure of Locative and Directional PPs. In G. Cinque & L. Rizzi (Eds.), *Mapping Spatial PPs: The Cartography of Syntactic Structures*. Oxford: Oxford University Press.

Deprez, V. & Pierce, A. (1994). Crosslinguistic Evidence for Functional Projections in Early Child Grammar. In Hokstra & Schwartz (eds.), *Language Acquisition Studies in Generative Grammar*. John Benjamins, Amsterdam, The Netherlands.

Duffield, N. (2008). Roots and Rogues in German Child Language. *Language Acquisition, 15*(4), 225-269.

Echols, C. H. (1993). A perceptually based model of children's earliest productions. *Cognition, 46,* 245-296.

Echols, C. H., & Newport, E. L. (1992). The role of stress and position in determining first words. *Language Acquisition, 2*, 189-220.

Eisenbeiss, S. (2000). The acquisition of the Determiner Phrase in German child language. In M.-A. Friedemann & L. Rizzi (Eds.), *The Acquisition of Syntax: Studies in Comparative Developmental Linguistics*. London: Longman.

Eisenbeiss, S. (2009). Generative approaches to language learning. *Linguistics, 47*(2), 273–310.

Elivanova, M. A. (2004). *Formirovanije kategorii lokativnosti v jazykovoj sisteme detej doshkolnogo vozrasta.* [The development of the locative category in the language system of preschool children]. PhD Dissertation. RSPU, St.Petersburg.

Elivanova, M. A. (2007). Kategorija lokativnosti i jeje vyrazhenije v detskoj rechi. [The locative category and its expression in child speech]. In S.N. Ceytlin (Ed.), *Semanticheskije kategorii v detskoj rechi*. [Semantic categories in child speech]. St.Petersburg: RAS, Institute of linguistic studies.

Felix, S. (1984). *Two Problems of Language Acquisition*. University of Passau, Germany.

Felix, S. (1987). *Cognition and Language Growth*. Dordrecht: Foris.

Fisher, C. (2002). Structural limits on verb mapping: The role of abstract structure in 2.5-year-olds' interpretations of novel verbs. *Developmental Science*, 5, 55-64.

Foley, C., Lust, B., Battin, D., Koehne, A., & White, K. (2000). On the Acquisition of an Indefinite Determiner: Evidence for Unselective Binding. *BUCLD 24*, 286- 298.

Friederici, A.D. (1983). Children's Sensitivity to Function Words During Sentence Comprehension. *Linguistics 21*, 717-739.

Gagarina, N., & Voeikova, M. (2009). Acquisition of Case and Number in Russian. In U. Stephany & M. Voeikova (Eds.), *Development of Nominal Inflection in First Language Acquisition: A Cross-Linguistic Perspective*. Berlin, Germany: Mouton de Gruyter.

Gerken, L. A. (1994). A metrical template account of children's weak syllable omissions from multisyllabic words. *Journal of Child Language 21*, 565–584.

Gerken, L. A., & B.J. McIntosh. (1993). The interplay of function morphemes and prosody in early language. *Developmental Psychology 29*, 448-457.

Gerken, L. A., McIntosh, B. J., & Zahn-Waxler, C. (1993). Interplay of Function Morphemes and Prosody in Early Language. *Developmental Psychology, 29*(3), 448-457.

Gerken, L.A. (1996). Prosodic structure in young children's language production. *Language 72*, 683–712.

Guilfoyle, E. & Noonan, M. (1992). Functional Categories and Language Acquisition. *Canadian Journal of Linguistics, 37*, 241-272.

Gülzow, I. & Gagarina, N. (2007). *Frequency effects in language acquisition: defining the limits of frequency as an explanatory concept*. Berlin: Mouton de Gruyter.

Gvozdev, A. N. (1961/2007). *Voprosy Izuchenija Detskoj Rechi [Issues in Child Speech Research]*. Moscow.

Höhle, B., Schmitz, M., Santelmann, L. M., & Weissenborn, J. (2006). The Recognition of Discontinuous Verbal Dependencies by German 19-Month-Olds: Evidence for Lexical and Structural Influences on Children's Early Processing Capacities. *Language Learning and Development*, 2(4), 277-300.

Höhle, B., Weissenborn, J., Kiefer, D., Schulz, A., & Schmitz, M. (2004). Functional elements in infants' speech processing: the role of determiners in the syntactic categorization of lexical elements. *Infancy*, 5 (3), 341–353.

Hyams, N. (1992). The genesis of clausal structure. In J. Meisel (ed), *The Acquisition of Verb Placement*, Kluwer Academic Publishers, Dordrecht.

Jackendoff, R. (1983). *Semantics and Cognition*. Cambridge, Mass. The MIT Press.

Jensen de López, K. (2002). Language-Specific Patterns in Danish and Zapotec Children's Comprehension of Spatial Grams. In Clark, E. (Ed.) *The 31st Stanford Child Language Forum*. Stanford, CA: CSLI/University of Chicago Press.

Johnson, V. E., de Villiers, J. G., & Seymour, H. N. (2005). Agreement without understanding? The case of third person singular /s/. *First Language*, 25(3), 317-330.

Johnston, J. R., & Slobin, D. I. (1979). The Development of Locative Expressions in English, Italian, Serbo-Croatian and Turkish. *Journal of Child Language, 6*(3), 529-545.

Koopman, H. (2000). Prepositions, postpositions, circumpositions, and particles In *The Syntax of Specifiers and Heads. Collected Essays of Hilda J. Koopman*. London: Routledge.

Kracht, M. (2002). On the Semantics of Locatives. *Linguistics and Philosophy: An International Journal, 25*(2), 157-232.

Kupisch, T., Anderssen, M., Bohnacker, U., & Snape, N. (2008). Article acquisition in German, English, Norwegian and Swedish. In Leow, R. W., Campos, H. & Lardiere, D. (Eds), *Georgetown University Round Table on Languages and Linguistics (GURT 2007 Proceedings)*. Washington: Georgetown University Press.

Lakusta, L., Wagner, L., O'Hearn, K., & Landau, B. (2007). Conceptual foundations of spatial language: Evidence for a goal bias in infants. *Language Learning and Development, 3*: 179–197.

Lebeaux, D. (2000). *Language Acquisition and the Form of Grammar*. Amsterdam & Philadelphia: John Benjamins.

Leikin, M. (1998). Acquisition of Locative Prepositions in Russian. *Journal of Psycholinguistic Research, 27*(1), 91-108.

Lieven, E. (2010). Input and first language acquisition: Evaluating the role of frequency. *Lingua, 120*(11), 2546-2556.

Lieven, E., Behrens, H., Speares, J., & Tomasello, M. (2003). Early Syntactic Creativity: A Usage-Based Approach. *Journal of Child Language, 30*(2), 333-370.

Lleó, C., & Demuth, C. (1999). Prosodic constraints on the emergence of grammatical morphemes: Cross-linguistic evidence from Germanic and Romance languages. In Greenhill, A., Littlefield, H. & Tano, C. (Eds.), *Proceedings of the 23rd annual Boston University conference on child language development*. Somerville, MA: Cascadilla Press.

Lust, B. (1999). Universal Grammar: The Strong Continuity Hypothesis in First Language Acquisition. In W. Ritchie and T. Bhatia (eds.), *Handbook of Child Language Acquisition*. New York: Academic Press.

Lust, B. (2006). *Child Language: Growth and Acquisition*. Cambridge University Press.

MacWhinney, B. (2000). *The CHILDES project: tools for analyzing talk* (2nd ed.). Hillsdale, N.J: L. Erlbaum.

Meisel, J. M., & Müller, N. (1992). Finiteness and Verb Placement in Early Child Grammars: Evidence from Simultaneous Acquisition of French and German in Bilinguals. In J. M. Meisel (Ed.), *The Acquisition of Verb: Functional Categories and V2 Phenomena in Language Acquisition* (Vol. 16): Springer Netherlands.

Miller, K. & Schmitt, C. (2012). Variable Input and the Acquisition of Plural Morphology. *Language Acquisition, 19*(3), 223-261.

Nicholas, K. E. (2011). *Children's omission of prepositions in English and Icelandic*. PhD Dissertation. University of Arizona.

Pantcheva, M. (2010). The syntactic structure of Locations, Goals, and Sources. *Linguistics, 48*(5), 1043-1081.

Pantcheva, M. B. (2011). *Decomposing path: the nanosyntax of directional expressions*. PhD Dissertation. University of Tromsø, Tromsø.

Phillips, C. (2010). Syntax at Age Two: Cross-Linguistic Differences. *Language Acquisition, 17* (1-2), 70-120.

Piaget, J., & Inhelder, B. (1956). *The child's conception of space*. London: Routledge & Kegan Paul.

Piñón, C. J. (1993). Paths and their names. In Beals, K., Cooke, G., Kathman, D., Kita, S., McCullough, K-E., & Testen, D. (Eds.) *Papers from the 29th Regional Meeting of the Chicago Linguistic Society*. Vol. 2. CLS, Chicago.

Poeppel, D. & Wexler, K. (1993). The Full Competence Hypothesis of clause structure in early German. *Language, 69* (1), 1-33.

Radford, A. (1990). *Syntactic theory and the acquisition of English syntax : the nature of early child grammars of English*. Oxford: Blackwell.

Radford, A. (1992). The Grammar of Missing Arguments in Early Child English. In R. Tracy (Ed.), *Who Climbs the Grammar Tree*. Tübingen: Niemeyer.

Radford, A. (1995). Phrase structure and functional categories. In P. Fletcher & B. MacWhinney (Eds.) *The Handbook of Child Language*. Oxford: Blackwell.

Radford, A. (1996). The Nature of Children's Initial Clauses. In M. Aldridge (Ed.), *Child language*. Clevedon: Multilingual Matters.

Radford, A. & Ramos, E. (2001). Case, Agreement and EPP: Evidence from an English-speaking child with SLI. *Essex Research Reports in Linguistics*.

Rizzi, L. (1993). Some Notes on Linguistic Theory and Language Development: The Case of Root Infinitives. *Language Acquisition, 3*(4), 371-393.

Roeper, T. (1999). Universal bilingualism. *Bilingualism, Language and Cognition, 2,* 169–186.

Roeper, T. & de Villiers, J. (1991) Introduction: acquisition of Wh-movement. In T.I. Maxfield & B. Plunkett (Eds.), *Papers in the Acquisition of WH*. Amherst: GLSA Publiciations.

Santelmann, L., & Jusczyk, P. (1998). Sensitivity to discontinuous dependencies in language learners: evidence for limitations in processing space. *Cognition*, *69*, 105–134.

Santelmann, L., Berk, S., Austin, J., Somashekar, S. & Lust, B. (2002). Continuity and development in the acquisition of inversion in yes/no-questions: Dissociating movement and inflection. *Journal of Child Language 29*, 813–42.

Schaeffer J., & Matthewson, L. (2005). Grammar and Pragmatics in the Acquisition of Article Systems. *Natural Language and Linguistic Theory*, *23*, 53-201.

Sekerina, I. A. (2015). Online evidence for children's interpretation of personal pronouns. In Serratrice, L., & Allen, S. (Eds.), *The Acquisition of Reference*. John Benjamins.

Sekerina, I. A., Stromswold, K., & Hestvik, A. (2004). How Do Adults and Children Process Referentially Ambiguous Pronouns? *Journal of Child Language*, *31*(1), 123-152.

Shady, M.E. (1996). *Infants' sensitivity to function morphemes*. Doctoral dissertation. The State University of New York: University at Buffalo.

Shi, R. (2014). Functional Morphemes and Early Language Acquisition. *Child Development Perspectives 8*(1), 6–11

Shi, R., & Gauthier, B. (2005). Recognition of function words in 8-month-old French- learning infants. *Journal of the Acoustical Society of America*, *117*, 2426-2427.

Sinha, C. Thorseng, L. Hayashi, M., & Plunkett, K. (1999). Comparative Spatial Semantics and Language Acquisition: Evidence from Danish, English and Japanese. *Journal of Semantics 11*, 253-287.

Slobin, D. I. (1985). *The Crosslinguistic study of language acquisition : Vol 1 : The data*. Hillsdale, N.J: Lawrence Erlbaum.

Snyder, W. (2007). *Child language: The parametric approach*. Oxford/New York: Oxford University Press.

Soderstrom, M. (2008). Early perception–late comprehension of grammar? The case of verbal - s : a response to de Villiers & Johnson (2007). *J. Child Lang*., *35*(3), 671-676.

Starke, M. (2009). A short primer to a new approach to language. In Svenonius, P., Ramchand, G., Starke, M., & Taraldsen, K.T. (Eds.). *Nordlyd 36* (1): *Special issue on Nanosyntax*. University of Tromsø, Tromsø.

Svenonius, P. (2006). The Emergence of Axial Parts. *Nordlyd, 33*(1), 49-77.

Svenonius, P. (2008). Projections of P. In Asbury, A., Dotlacil, J., Gehrke, G., & Nouwen, R. (Eds.). Syntax and Semantics of Spatial P. Amsterdam: John Benjamins.

Svenonius, P. (2009). *Location and Source in North Sámi*. Talk given at Arctic Languages: Syntax, Morphology, and Lexicon. University of Tromsø.

Svenonius, P. (2010). Spatial P in English. In G. Cinque & L. Rizzi (Eds.), *Mapping Spatial PPs: The Cartography of Syntactic Structures*. Oxford University Press.

Svenonius, P. (2012a). *Structural decomposition of spatial adpositions*. UiT, The Arctic University of Norway. Ms.

Svenonius, P. (2012b). *Spanning*. UiT, The Arctic University of Norway. Ms

Svenonius, P. (2013). *P: The category and the extended projection*. UiT, The Arctic University of Norway. Ms.

Svenonius, P. & Pantcheva, M. (Eds.). (2006). *Nordlyd 33: Special issue on Adpositions*. University of Tromsø, Tromsø.

Talmy, L. (1983). How Language Structures Space. In H. L. Pick & L. P. Acredolo (Eds.), *Spatial Orientation: Theory, Research, and Application*. Boston, MA: Springer US.

Taraldsen, K. T., & Svenonius, P. (2007). *The construct state in Norwegian prepositional phrases, Ms*. University of Tromsø.

Terzi A., & Tsakali V. (2015). Does Language Structure Affect Acquisition of Spatial Terms? *The 35th Annual Meeting of Linguistics Dept., Univ. of Thessaloniki*.

Theakston, A. L., Lieven, E. V. M., Pine, J. M., & Rowland, C. F. (2004). Semantic Generality, Input Frequency, and the Acquisition of Syntax. *Journal of Child Language, 31*(1), 61-99.

Thordardottir, E. T., & Weismer, S. E. (1998). Mean Length of Utterance and Other Language Sample Measures in Early Icelandic. *First Language, 18*(1 [52]), 1-32.

Tomasello, M. (1987). Learning to use prepositions: a case study. *Journal of Child Language, 14*(1), 79-98.

Tomasello, M. (2003). *Constructing a language: A usage-based theory of language acquisition*. Cambridge, MA: Harvard University Press.

Tomasello, M. (2006). Acquiring linguistic constructions. In D. Kuhn & R. Siegler (Eds), *Handbook of child psychology*. Hoboken, NJ: Wiley.

Tortora, C. (2005). *The Preposition's Preposition in Italian: Evidence for Boundedness of Space*. Amsterdam, Netherlands: Benjamins.

Tremblay, A. (2005). *Fillers in early French: what the child knows*. Somerville, MA: Cascadilla Press.

Tsimpli, I.M. (1991). On the maturation of functional categories: early child speech. *UCL Working Papers in Linguistics*.

Vainikka, A. (1993). Case in the development of English syntax. *Language Acquisition*, *3*, 257-325.

van Riemsdijk, H., & Huijbregts, R. (2007). *Location and Locality*. Amsterdam, Netherlands: Amsterdam, Netherlands: Benjamins.

Weissenborn, J. (1990). Functional Categories and Verb Movement: The Acquisition of German Syntax Reconsidered *Linguistische Berichte (Special Issue Vol.3)*.

Weissenborn, J. (1992). Null subjects in early grammars: implications for parameter- setting theories. In J. Weissenborn, H. Goodluck & T. Roeper (Eds.), *Theoretical issues in language acquisition*. Erlbaum Press: Hillsdale, N.J.

Weissenborn, J. (1994) Constraining the Child's Grammar: Local Wellformedness in the Development of Verb Movement in German and French. In B. Lust, J. Whitman, & J. Kornfilt, (Eds.) *Syntactic Theory and First Language Acquisition: Cross Linguistic Perspectives, Volume II: Binding, Dependencies and Learnability*. Lawrence Erlbaum.

Westergaard, M. & Bentzen, K. (2007). The (non-) effect of input frequency on the acquisition of word order in Norwegian embedded clauses. In Gülzow, I. & Gagarina, N. (Eds.), *Frequency Effects in Language Acquisition: Defining the Limits of Frequency as an Explanatory Concept*. [Studies on Language Acquisition]. Berlin/New York: Mouton de Gruyter.

Westergaard, M. (2008). Verb Movement and Subject Placement in the Acquisition of Word Order: Pragmatics or Structural Economy? In Guijarro-Fuentes, P., Larranaga, P., & Clibbens, J. (Eds.), *First Language Acquisition of Morphology and Syntax: Perspectives across languages and learners*. [Language Acquisition and Language Disorders 45]. Amsterdam: John Benjamins.

Westergaard, M. (2009). *The Acquisition of Word Order: Micro-cues, Information Structure and Economy*. [Linguistik Aktuell/Linguistics Today 145], Amsterdam: John Benjamins.

Westergaard, M. (2016). Word order and finiteness in acquisition: A study of English and Norwegian wh-questions. In K. M. Eide (Ed.), *Finiteness matters. On finiteness-related phenomena in natural language,* 257-286. Amsterdam: John Benjamins.

Wexler, K. (1994). Finiteness and head movement in early child grammars, In D. Lightfoot & N. Hornstein (Eds.), *Verb Movement*. Cambridge University Press.

Wunderlich, D. (1991). How do prepositional phrases fit into compositional syntax and semantics? *Linguistics 29*, 591–621.

Zwarts, J. (2005). Prepositional Aspect and the Algebra of Paths. *Linguistics and Philosophy, 28*(6), 739-779.

Zwarts, J. (2008). Aspect of a typology of direction. In S. Rothstein (Ed.), *Theoretical and crosslinguistic approaches to the semantics of aspects*. Amsterdam & Philadelphia: John Benjamins.

Zwarts, J., & Winter, Y. (2000). Vector Space Semantics: A Model-Theoretic Analysis of Locative Prepositions. *Journal of Logic, Language and Information, 9*(2), 169-211.

Part II: Papers