

The Syntax and Semantics of Directional Axial Expressions in Russian

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Introduction

In this paper we discuss the semantic and syntactic properties of a subclass of spatial expressions in Russian. Specifically, we focus on expressions involving *axial parts* (cf. Svenonius 2006, 2010), i.e. morphemes that encode reference to subparts of an object identified with respect to a certain axis (e.g. front – back, top – bottom, etc.). We will refer to them as *axial expressions*. The following table provides a list of Russian axial expressions that involve reference to the axes ‘front – back’, ‘top – bottom’, and ‘left – right’:

Table 1. Axial expressions in Russian

	Locative	Directional	
		Goal	Source
‘above’	<i>na-verx-u</i> on-top-LOC <i>v-verx-u</i> in-top-LOC <i>s-verx-u</i> s-top-GEN ¹	<i>na-verx</i> on-top.ACC <i>v-verx</i> in-top.ACC	<i>s-verx-u</i> from-top-GEN
‘under’	<i>v-niz-u</i> in-bottom-LOC <i>s-niz-u</i> s-bottom-GEN	<i>v-niz</i> in-bottom.ACC	<i>s-niz-u</i> from-bottom-GEN

¹ The standard use of the *s-* prefix is to form Source expressions. Its semantic contribution in Locatives is not completely clear to us, and this why we have glossed it simply as *s-* in these cases.

‘in front of’	<i>v-pered-i</i> in-front-LOC <i>s-pered-i</i> s-front-GEN	<i>v-perėd</i> in-front.ACC	<i>s-pered-i</i> from-front-GEN
‘behind’	<i>po-zad-i</i> at-back-LOC <i>s-zad-i</i> s-back-GEN	<i>na-zad</i> ² on-back.ACC	<i>s-zad-i</i> from-back-GEN
‘left’	<i>s-lev-a</i> ³ s-left-GEN	<i>v-lev-o</i> in-left-ACC <i>na-lev-o</i> on-left-ACC	<i>s-lev-a</i> from-left-GEN
‘right’	<i>s-prav-a</i> s-right-GEN	<i>v-prav-o</i> in-right-ACC <i>na-prav-o</i> on-right-ACC	<i>s-prav-a</i> from-right-GEN

Axial expressions in this table are classified into Locative and Directional expressions, and Directional expressions are further sub-classified into Goal and Source expressions. Locative expressions specify the spatial relation between a *Figure object* (the object whose location is specified) and a (possibly un-expressed) *Ground object* (the reference object with respect to which the Figure is being located, cf. Talmy 2000). For example, in the following sentence the Locative expression *pozadi* ‘behind’ identifies the location of the Figure object *mashina* ‘car’ with respect to the Ground object *dom* ‘house’:

- (1) Mašina stojala po-zad-i dom-a
 car stood at-back-LOC house-GEN
 ‘The car stood behind the house.’

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- 2 As pointed out by an anonymous reviewer, the expression *nazad* can have a restitutive meaning, similar to the English *back* (i.e. ‘She didn’t give it back’). But it can also have a purely spatial meaning, as the following example illustrates:

- (i) Ona šagnula nazad
 ‘She stepped back’

Here we are concerned only with the purely spatial meanings of axial expressions.

- 3 A reviewer has pointed out that *na-levo* and *v-vlevo*, which we listed as Directionals, can also be used in locative contexts. It is not clear, however, whether these uses should be equated with genuine Locatives, or should rather be analyzed as complex locative expressions built on top of directional ones (cf. the locative use of *across* in ‘Across the meadow a band is playing excerpts from *H.M.S. Pinafore*’, from Svenonius 2010).

Directional spatial expressions, rather than identifying the *location* of the Figure with respect to the Ground, specify the *motion trajectory* of the Figure. The following examples illustrate the use of Goal (2) and Source (3) axial expressions. We return to the discussion of the semantics of Goal and Source in the following sections.

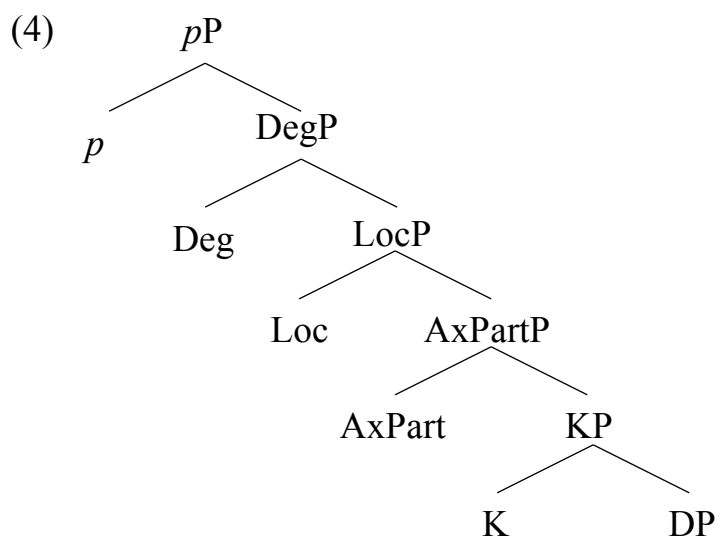
- (2) Ona pošla v-perëd.
 she walked in-front.ACC
 ‘She walked forward’
- (3) Kniga upala s-verx-u.
 book fell from-top-GEN
 ‘The book fell from above’

The paper is organized as follows. In Section 1 we discuss the proposals on the syntactic and semantic decomposition of Locative and Directional axial expressions, which we will take as a starting point for our analysis. Specifically, we focus on the proposals by Svenonius (2006, 2010) and Zwarts (2005). Section 2.1 argues that Russian Directional axial expressions exhibit unusual syntactic behavior in that they generally disallow overt DP or PP complements. In this respect Directional axial expressions contrast with some of their Locative counterparts, and this poses a difficulty for analyzing these expressions along the lines of the proposals outlined in Section 1. In Section 2.2 we show that the semantics of these expressions is more restrictive than that predicted by the standard decomposition of Directional expressions discussed in Section 1. Section 3 presents an analysis of Russian directional expressions, which captures their distinctive syntactic and semantic properties. We argue that these expressions involve a distinct directional Path_{Dir} head, which specifies both the initial and the final point of the Figure’s trajectory, making reference to the Ground object itself. This accounts for their restrictive semantics. The unavailability of overt complements is shown to follow from the semantic requirements of the Path_{Dir} head. Section 5 concludes the paper.

1. The structure of Axial Expressions

1.1. The Composition of Locative Expressions

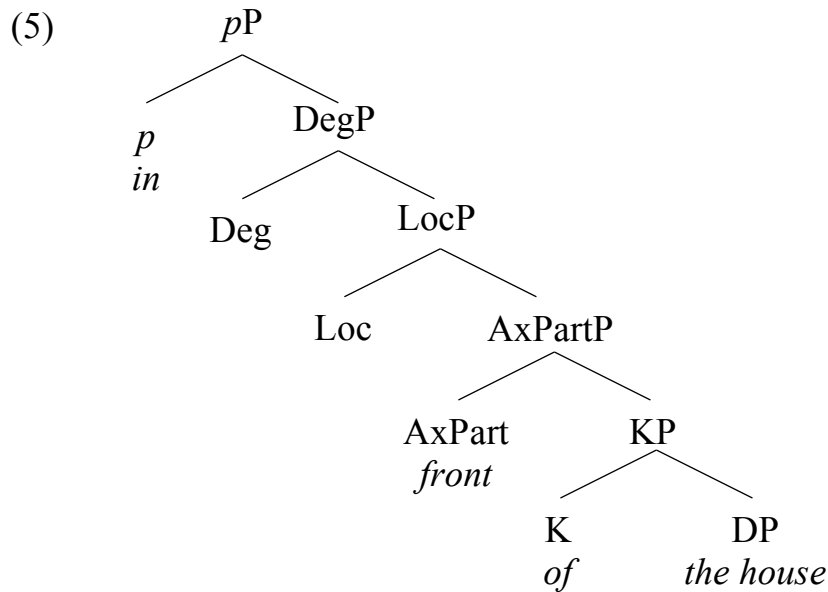
Svenonius (2010) has argued that the underlying structure of Locative expressions can be decomposed into several distinct layers:



Each layer in this sequence has a specific semantic function:

- The complement DP represents the Ground object;
- K is spelled out as case on the complement DP, and maps the Ground object onto the region of space occupied by that object (cf. *Eigenplace* in Wunderlich 1991);
- 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 2005, Zwarts and Winter 2000);
- Deg maps vector spaces which are the output of Loc, onto regions picked out by the relevant vectors;
- *p* encodes the relational notions of containment, attachment, and support, spelled out as *in* or *on* in English. E.g. *in front of* specifies that the Figure object is contained in the region which is projected from the front side of the Ground.

Of these heads, Loc and Deg are restricted to projective expressions, while Ax-Part is present only in those expressions that make reference to the axial structure of the Ground object. Consider the structure of the English complex preposition *in front of*:

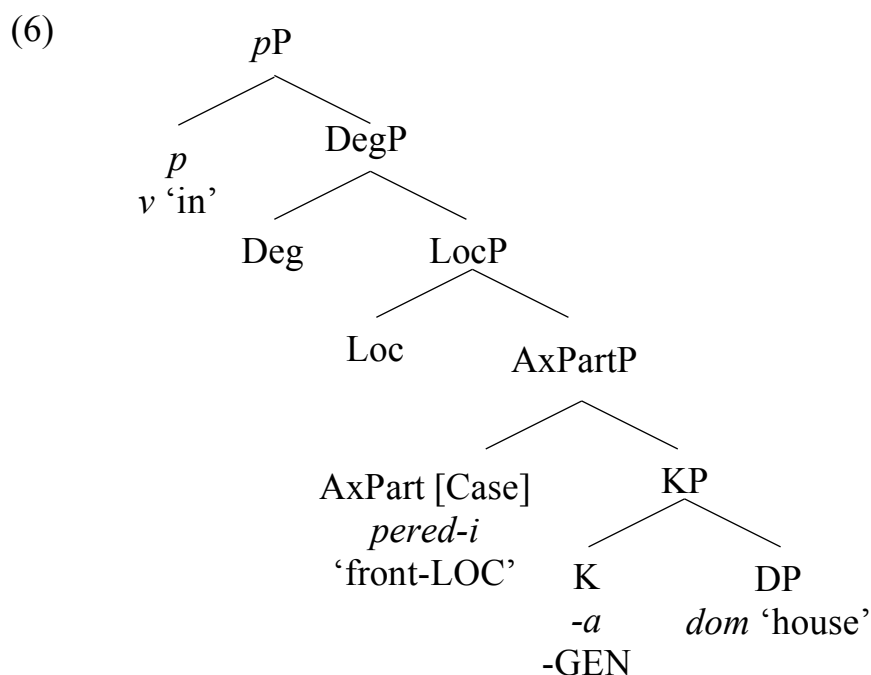


In this case, the *p* head is spelled out as *in*, *front* is the AxPart, and K is spelled out as the genitive preposition *of*. Deg and Loc remain null.

Note that just like *in front of*, the spatial expressions in Table 1 are morphologically complex. They all contain three distinct morphological elements:

- locative prefixes: *v* ‘in’, *na* ‘on’, *po* ‘at’, *s* ‘from’ for Locative; *v* ‘in’, *na* ‘on’ for Goal; and *s* ‘from’ for Source;
- axial stems referring to a certain side of an object: *verx* ‘top’, *niz* ‘bottom’, *pered* ‘front’, *zad* ‘back’, *lev* ‘left’, *prav* ‘right’;
- case endings: (archaic) Locative or Genitive for Location; Accusative for Goal; (archaic) Genitive for Source.

These elements can be mapped onto the structure in (4). E.g. the PP *v-pered-i doma* ‘in front of the house’ can be decomposed in the following way:



This structure is different from the one in (5) in that the AxPartP head is taken to host a Case feature, which is spelled out by the case endings. The value of this feature is determined by *p* in Locative expressions, and presumably, by the Path head in Directional ones (see below). The exact mechanism of case assignment is not relevant for the main point of this paper, and we shall not discuss it further.

The K head is subcategorized by AxPart, and spelled out as the genitive case ending on the Ground noun. Some AxParts subcategorize for particular prepositions, instead of K. E.g. AxParts *lev* ‘left’ and *prav* ‘right’ require a PP complement headed by the preposition *ot* ‘from’, as in (7). We take this to be a lexical property of particular AxPart heads.

- (7) S-*lev*-a *(ot) dom-a roslo derevo
 s-left-GEN from house-GEN grew tree
 ‘A tree grew to the left of the house.’

To conclude, the structure in (4) is successful in capturing the composition of Russian Locative axial expressions. The only required modifications include positing an additional [Case] feature on AxPart, and allowing for certain AxParts to subcategorize for PPs instead of KPs as complements.

1.2. The Structure of Directional Expressions

It has been argued that Directional expressions are built on top of Locatives, i.e. directional semantics is encoded in Path heads which take locative structures as complements (cf. Koopman 2000, Dikken 2010, Svenonius 2006, 2010, Pantcheva 2011). E.g. the structure of *from in front of the house* is given in (8):

- (8)
-
- ```

graph TD
 PathP --> Path
 PathP --> pP
 Path --- from[from]
 pP --- locative[]
 locative --- in[in front of the house]
 style locative fill:none,stroke:none

```

Semantically, the Path head maps the region denoted by the complement phrase (*pP in front of the house* in (8)) onto a set of trajectories in space (or *paths*), such that certain points of the trajectories are restricted to that region. There are three canonical varieties of Path heads: Goal heads restrict the *final*

point of the trajectories to the region denoted by the complement (e.g. *to in front of the house* denotes a set of trajectories whose end points must be located in front of the house). Source heads, on the other hand, specify that the *initial* points of the trajectories must be located in the region denoted by the complement (e.g. *from in front of the house* denotes a set of trajectories whose initial points must be located in front of the house). Finally, Route heads determine that some of the *intermediate* points of the trajectories are located in the region denoted by the complement.

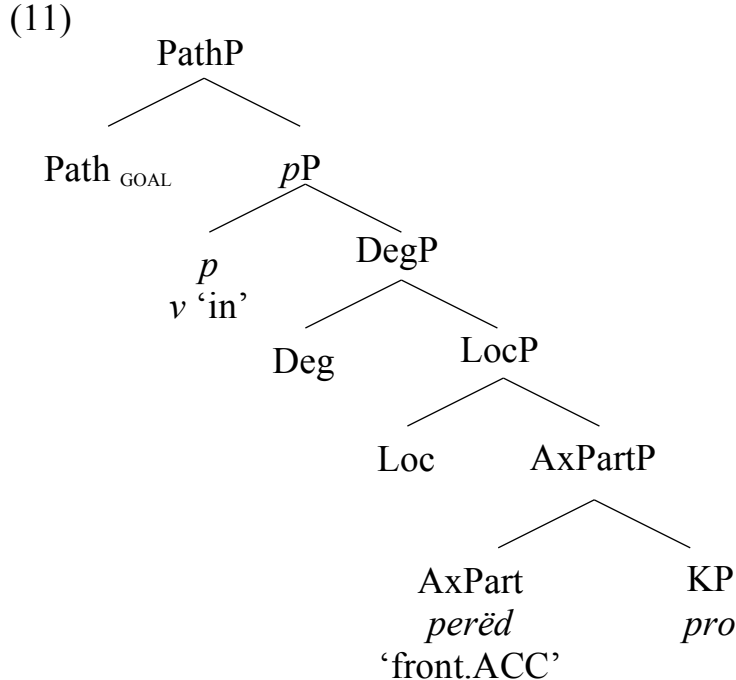
In this paper, we will be concerned with Goal and Source paths. The following interpretations are simplified versions of the semantics of Path proposed in Zwarts 2005:

(9)  $\text{Path}_{\text{GOAL}}: \lambda R. \{p: p(1) \text{ is at } R \text{ and } p(0) \text{ is not at } R\}$

(10)  $\text{Path}_{\text{SOURCE}}: \lambda R. \{p: p(0) \text{ is at } R \text{ and } p(1) \text{ is not at } R\},$

where  $R$  is a variable over regions,  $p$  is a variable over paths,  $p(1)$  represents the end point of a path, and  $p(0)$  represents the initial point of the path.

Under this analysis, the full structure of e.g. the Goal expression *v-perëd* ‘lit. to front’ would be the following:



Following the semantics in (10), this expression must denote a set of paths  $p$ , such that  $p(1)$ , the end point of the path, is located within the region denoted by  $pP$ , i.e. the region in front of a certain Ground object referenced by a phono-

logically null pronoun *pro* in (11), while  $p(0)$ , the path's initial point, is not located within that region.

We will see below, that this interpretation is not accurate. Generally, we will show that the structure as in (11), and the semantics in (9) and (10) cannot adequately capture the properties of Russian Directional axial expressions.

## 2. Russian Directional Axial Expressions

### 2.1. Restrictions on Overt Complements

The first peculiar property of directional axial expressions in Russian is that they do not combine with overt DP or PP complements. Consider the following examples:

(12) \*Mjač            poletel            v-verx            dom-a  
       ball            flew            in-top.ACC      house-GEN

(13) Mjač            poletel            v-verh  
       ball            flew            in-top.ACC  
       ‘The ball flew upwards.’

Example (12), which involves a Goal expression taking a DP complement, is ungrammatical. On the other hand, example (13) with a directional expression lacking an overt complement, is fine.

In many cases Directional expression disallow overt complements even though their Locative counterparts freely combine with overt DPs or PPs, e.g.:

(14) Oni    stojali            v-pered-i            mašin-y  
       they stood            in-front-LOC      car-GEN  
       ‘They stood in front of the car.’

(15) \*Oni šagnuli            v-perėd            mašin-y  
       they step            in-front.ACC      car-GEN  
       Intended: ‘They stepped to in front of the car.’

(16) Oni    šagnuli            v-perėd  
       they step            in-front.ACC  
       ‘They stepped forward.’

In (14) the locative expression *vpered* ‘in front of’ combines with a DP complement *mašiny* ‘car’ marked with genitive. The ungrammaticality of (15) shows that the corresponding directional expression *vperėd* ‘lit. to front’ cannot



co-occur with an overt DP complement. The sentence is acceptable only if the complement is omitted, as in (16). This contrast is surprising if the Directional expression is derived from the Locative one by adding the Path<sub>GOAL</sub> head, as in (11). It is unclear how attaching an additional head on top of the structure could lead to the unavailability of overt complements much lower in the tree. The semantics of Path<sub>GOAL</sub>, given in (9), does not provide an answer, so under this approach some additional syntactic machinery would be necessary to explain this restriction.

Similar judgments obtain for axial expressions that take PP complements. Consider the syntactic properties of the axial expression *s-leva-a* ‘(to/from) the left’, which is ambiguous between a locative and a source interpretation. When used locatively, it can take a complement introduced by the preposition *ot* ‘from’, cf. example (7), repeated below:

- (17) S-lev-a        \*(ot)            dom-a        roslo        derevo  
       s-left-GEN    from            house-GEN    grew        tree  
       ‘A tree grew to the left of the house.’

On the other hand, when used directionally as a Source expression, it can take neither DP nor PP complements:

- (18) \*Ja    otošol/podošol            s-lev-a            dom-a  
       I        walked.away/walked.to    from-left-GEN    house-GEN
- (19) \*Ja    otošol/podošol            s-lev-a            ot    dom-a  
       I        walked.away/walked.to    from-front-GEN    from    house-GEN

The following example shows that in the absence of overt complement, *sleva* can indeed be used directionally:

- (20) Ja    podošol            s-lev-a<sup>4</sup>  
       I        walked.to            from-front-GEN  
       ‘I approached (something) from the left’.

Again, the contrast between (17) and (18)-(19) is unexpected if the Directional expression is obtained by adding the Path<sub>SOURCE</sub> head, discussed above, on top of the Locative.

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4 Cf. the next section for a discussion of the compatibility of Russian directional adverbs with different types of motion verbs.

2.2. *The Semantics of Directional Expressions*

In this section we examine the semantics of Russian Directional axial expressions, and demonstrate that it doesn't fit with the semantics of  $\text{Path}_{\text{GOAL}}$  and  $\text{Path}_{\text{SOURCE}}$ , discussed above. Specifically, it turns out that the interpretations of  $\text{Path}_{\text{GOAL}}$  and  $\text{Path}_{\text{SOURCE}}$ , i.e. (9) and (10), repeated here as (21) and (22), are not sufficiently restrictive:

(21)  $\text{Path}_{\text{GOAL}}$ :  $\lambda R. \{p: p(1) \text{ is at } R \text{ and } p(0) \text{ is not at } R\}$

(22)  $\text{Path}_{\text{SOURCE}}$ :  $\lambda R. \{p: p(0) \text{ is at } R \text{ and } p(1) \text{ is not at } R\}$

Consider the following sentence:

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

The denotation of  $\text{Path}_{\text{GOAL}}$  in (21), and the structures in (5) and (8), predict the following structure and semantics for (23):

(24)  $[\text{PathP to } [_pP \text{ in } [\text{Deg}[\text{Loc}[\text{AxPartP front } [\text{KP of X}]]]]]]$ , where X represents the silent ground

(25) 'the ball flew along a path p such that p(1) is in front of the Ground, and p(0) is not in front of the Ground'

In this case only end point of the ball's trajectory is restricted to the space in front of the implicit Ground, and the initial point is taken to lie outside of that space. This is illustrated in Figure 1<sup>5</sup>:

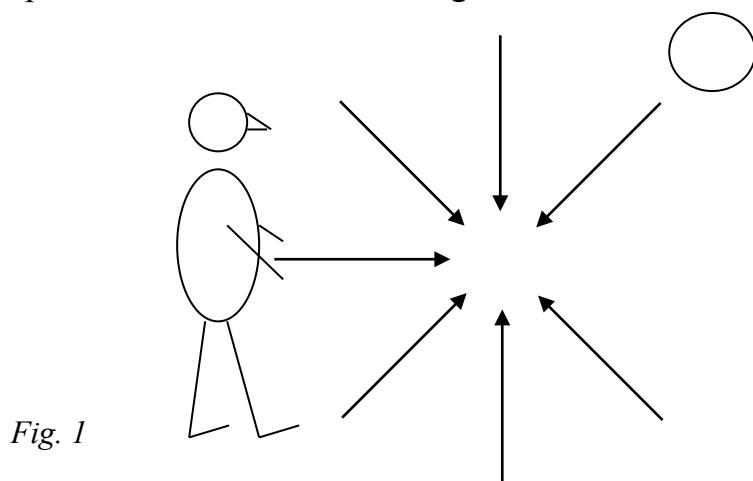


Fig. 1

5 The horizontal arrow pointing right in this picture is supposed to represent a path that starts *at* the Ground object itself, not in front of it.

Figure 2 illustrates the actual interpretation of the sentence in (23). In this case the initial point of the ball's trajectory coincides with the Ground, and the end point is located in the space in front of the Ground.

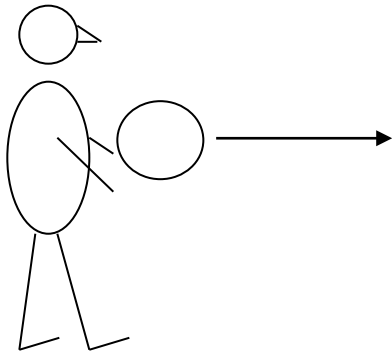


Fig. 2

The paths that the ball can take under the actual interpretation of this expression (illustrated in Figure 2) are a subset of the paths illustrated in Figure 1 for the predicted interpretation. Thus, the actual semantics of *v-perēd* turns out to be more restrictive than that provided by the interpretation of  $\text{Path}_{\text{GOAL}}$  given in (21).

This conclusion extends to Source axial expressions:

- (26) Mjač            letel s-zad-i  
 ball              flew from-back-GEN  
 ‘The ball flew from behind’.

The standard analysis involving  $\text{Path}_{\text{SOURCE}}$  predicts the following structure and semantics for (26):

- (27)  $[\text{PathP from } [_p\text{P in } [\text{Deg}[\text{Loc}[\text{AxPartP back } [\text{KP of X}]]]]]]]$ , where X represents the silent ground
- (28) ‘the ball flew along a path p such that p(0) is behind the Ground, and p(1) is not behind the Ground’

Under this interpretation, the starting point of the ball's trajectory is restricted to the space behind the implicit Ground, while the final point must be located outside of that space. This is illustrated in Figure 3:

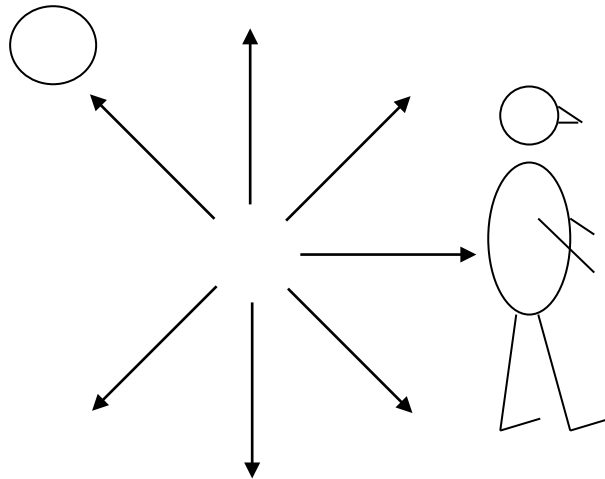


Fig. 3<sup>6</sup>

The actual interpretation of (26) once again turns out to be more restrictive, cf. Figure 4:

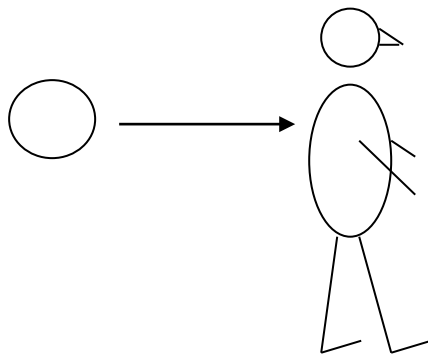


Fig. 4

In this case the final point of the ball's trajectory coincides with the Ground, and the initial point is located in the space behind the Ground<sup>7</sup>.

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- 6 The horizontal arrow pointing right in this picture is supposed to represent a path that end *at* the Ground object itself, not behind it.
- 7 An anonymous reviewer suggests that the semantic description that we provide for Russian Source expressions may be too strong, and that it may not be necessarily the end point of the Path that has to be located at the Ground object. In this connection the reviewer asks whether it is possible to use a sentence like (i) in a situation where the ball flew past the Ground object and ended up (potentially far) in front of it:

(i) Mjač proletel s-zad-i  
 ball flew.past from-back-GEN  
 Intended: 'The ball flew (past something) from behind'

Note, that under the actual interpretation of Goal axial expressions illustrated in Figure 2, the Figure necessarily undergoes movement *away* from the Ground. This accounts for the fact that these Goal expressions most naturally occur with verbs denoting movement away from the Ground, but not towards it:

- (29) Mjač            uletel / ??priletel            v-perēd  
       ball            flew.away / flew.here        in-front.ACC  
       ‘The ball flew forward.’

Figure 4 shows that Source axial expressions, conversely, denote paths oriented *towards* the Ground, and hence they are predicted to co-occur with verbs that denote movement towards the Ground, but not away from it. This is indeed the case:

- (30) Mjač            priletel / ??uletel            s-zad-i  
       ball            flew.here / flew.away        from-back-GEN  
       ‘The ball flew from behind’.

### 3. A Proposal: Path<sub>Dir</sub>

We propose that the structure of Russian Directional axial expressions doesn’t involve the Path heads, with the semantics given in (21) and (22), but rather, a different head which we call Path<sub>Dir</sub>. Path<sub>Dir</sub> is similar to Path in that it returns a set of paths, but is different in other semantic and syntactic respects.

Semantically, Path<sub>Dir</sub> has a more restrictive interpretation than Path. Informally, Goal Path<sub>Dir</sub> specifies that the trajectory of the Figure object must start at the (contextually given) Ground object, and end in the region defined by the head’s complement with respect to that same Ground. Conversely, Source

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According to our intuitions sentence (i) is indeed bad in the described context, which suggests that restricting the end point of the Path specified by this kind of Source expressions to the Ground object may be on the right track.

Another example that the reviewer gives is “the bullet came flying ‘szadi’ and then hit the wall in front of me”. In this case *szadi* would indeed be fine in Russian. But we would argue that here the axial expression describes only the path of the bullet from its initial location up to the Ground object, but not the path of its further movement specified by the verb *hit*. One argument for the plausibility of this analysis is that in this context in Russian it would be most natural to use the verb *priletet* ‘fly here/towards a reference point’ which suggests that the verb *fly* in this case can indeed denote the bullet’s movement up to the Ground object and not further (see also below for a brief discussion of the co-occurrence of Russian axial expressions with different kinds of prefixed verbs).

$\text{Path}_{\text{Dir}}$  specifies that the trajectory must end at the Ground object, and start in the region specified by the head's complement, again, with respect to the same Ground object. This is stated more formally in (31) and (32):

(31) Goal  $\text{Path}_{\text{Dir}}$ :  $\lambda Q. \{p: \exists x[p(1) \text{ is at } Q(x), \text{ and } p(0) \text{ is at } x]\}$ ,

(32) Source  $\text{Path}_{\text{Dir}}$ :  $\lambda Q. \{p: \exists x[p(0) \text{ is at } Q(x), \text{ and } p(1) \text{ is at } x]\}$ ,

where  $Q$  is a variable over functions of type  $\langle e,r \rangle$ , from individuals to regions.

Note, that since  $\text{Path}_{\text{Dir}}$  heads restrict one of the points of the trajectory with respect to the Ground object itself, they cannot, like  $\text{Path}_{\text{GOAL}}$  and  $\text{Path}_{\text{SOURCE}}$  in (21) and (22), combine with complements which denote regions defined relative to that Ground. If the complement phrase denotes a region defined with respect to a particular Ground, then under standard assumptions regarding compositionality the Ground object itself cannot be accessed in the semantics of a higher head.

Rather,  $\text{Path}_{\text{Dir}}$  must combine with a complement which denotes a function from individuals to regions, represented as  $Q$  in (31) and (32), such that the bound variable in the description of that function corresponds to the Ground object. In this way the Ground object can be accessed in the semantics of  $\text{Path}_{\text{Dir}}$ .<sup>8</sup>

Compare the interpretation of the English Source  $\text{PathP}$  *from behind the house* in (33) with the interpretation of the Russian  $\text{Path}_{\text{Dir}}\text{P}$  *s-zad-i* 'from behind' which we propose in (34):

(33)  $\text{PathP}$ : *from behind the house*:  $\{p: p(0) \text{ is in the space projected from the back of the house, and } p(1) \text{ is not in the space projected from the back of the house}\}$

(34)  $\text{Path}_{\text{Dir}}\text{P}$ : *s-zad-i* 'from behind':  $\{p: \exists x[p(0) \text{ is in the space projected from the back of } x, \text{ and } p(1) \text{ is at } x]\}$

The  $\text{Path}$  head *from* in (33) combines with the complement locative phrase *behind the house*, which denotes a region, and restricts the position of the initial

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8 A reviewer points out that the Ground object is also, in a sense, referenced twice in the denotations of classical  $\text{Path}$  heads: the denotations in (21) and (22) each mention the region  $R$  twice, and that region is defined relative to the Ground object. What is crucial, is that the denotations in (21) and (22) do not make reference to the Ground object *itself*, but only to the region  $R$ , which corresponds to the denotation of the whole  $pP$ . The semantics of  $\text{Path}_{\text{Dir}}$  heads, on the other hand, must involve direct access to the Ground object.

and the final points of the trajectory with respect to that region. The Source  $\text{Path}_{\text{Dir}}$  head *s-* in (34) must combine with a complement which denotes the function  $\lambda x.[\text{space projected from the back of } x]$ , and following the semantics in (32), this yields the given interpretation. This captures the restrictions on the semantics of these kinds of expressions discussed in the previous section, and illustrated for *s-zad-i* ‘from behind’ in Figure 4.

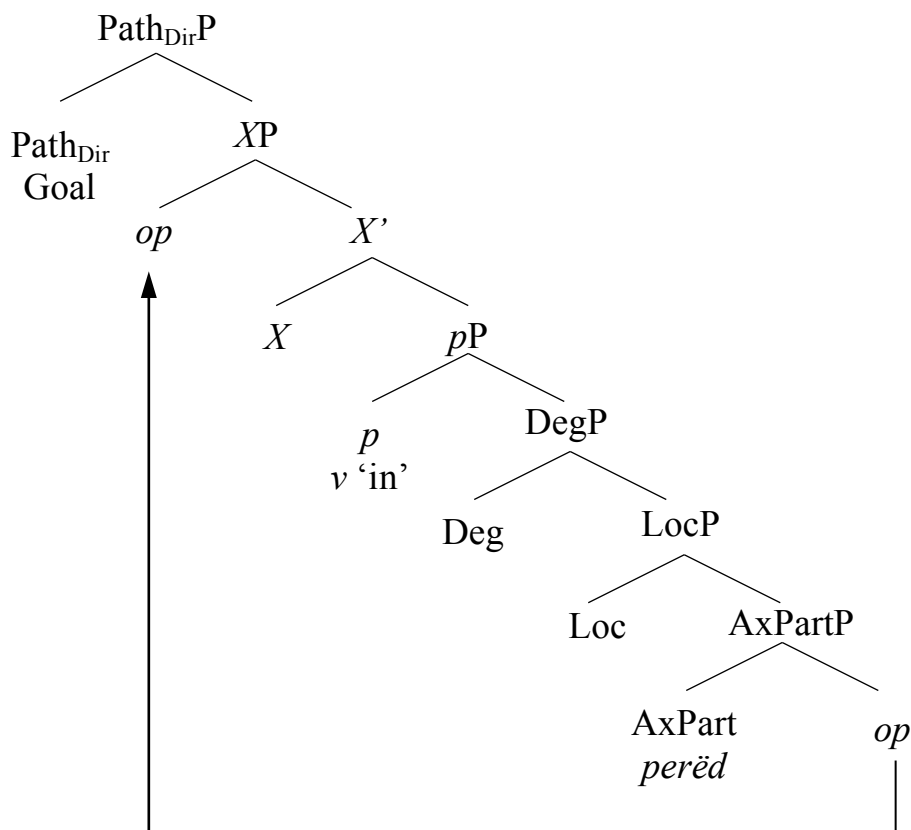
The semantics of *v-perĕd* ‘lit. to front’ under our account is given in (35):

- (35)  $\text{Path}_{\text{Dir}}\text{P}$ : *v-perĕd* ‘to front’:  $\{p: \exists x[p(1) \text{ is in the space projected from the front of } x, \text{ and } p(0) \text{ is at } x]\}$

This interpretation correctly represents the restrictive semantics of *v-perĕd*, illustrated in Figure 2 above.

The question is how to derive the necessary semantics for the complement of  $\text{Path}_{\text{Dir}}$  compositionally; specifically, we need a way to achieve  $\lambda$ -abstraction over the Ground argument. A natural way to do this is through movement. The proposed configuration is illustrated in (36):

- (36)



The analysis we propose is conceptually similar to Chomsky’s (1977) analysis of *tough*-constructions. We assume that, the complement of  $\text{Path}_{\text{Dir}}$  involves

an additional layer above  $pP$ , which we have labeled  $XP$ . The  $X$  head carries a feature which triggers the syntactic movement of a phonologically null (*wh*-like) operator  $op$  from the complement of  $AxPart$  into the specifier of  $XP$ . This movement gives rise to the necessary interpretation: the null operator in the higher position is interpreted as a  $\lambda$ -operator binding a variable in the base position<sup>9</sup>. All the other heads within the  $pP$  are interpreted in the usual way. Hence, the  $XP$  in (36) is interpreted as a function  $\lambda x.[\text{the space projected from the front of } x]$  of type  $\langle e,r \rangle$ , which when combined with the denotation of  $Goal\ Path_{Dir}$  in (31) yields the required semantics of the whole  $Path_{Dir}P$ , given in (35).

A few comments on the proposed analysis are in order. First, all the examples which we have discussed so far involve projective uses of axial expressions, i.e. the end points (for Goal expressions) and initial points (for Source expressions) are confined to spaces projected from particular sides of a Ground object. Yet some of the expressions involved allow for non-projective uses as well. For instance, imagine that a girl named Masha was sitting on a back row in a classroom and then moved to the front row. We can then describe her movement as in (37):

- (37) Maša            peresela        v-perëd  
       Masha        sit                in-front.ACC  
       ‘Masha sat forward.’

In this case the room serves as the Ground object, but final point of the girl’s path is not located in the space *projected* from the front part of the room, but rather is confined to the front space *within* the room. We assume that in such cases the structure of the axial expression does not involve the Deg and Loc heads, and hence the  $pP$  is interpreted non-projectively, as denoting the front part of the room. Otherwise, such expressions can be analyzed in exactly the same way as projective ones, with a null operator moving from the complement of  $AxPart$  to the specifier of  $XP$ , which then combines with a  $Path_{Dir}$  head.<sup>10</sup>

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9 Our use of the term *operator* here follows the established tradition in the syntactic literature, e.g. with regards to the analysis of *tough*-constructions. Semantically, the null operator might best be viewed as a vacuous pronominal element carrying an index. When it moves to the specifier of  $XP$  a  $\lambda$ -operator is added below its landing site in the usual way, binding the trace or copy in its original position (cf. Heim and Kratzer’s (1998) discussion of relative pronouns and PRO). We thank an anonymous reviewer for drawing our attention to this issue.

10 As noted by a reviewer, for the proposed analysis to work in cases like (37) the *at* relation involved in the interpretation of  $Path_{Dir}$  heads must be understood in such a way as to



Second, it is important to note that the interpretations in (31) and (32) do not place any restrictions on how the Ground object (i.e.  $x$ ) is to be identified in any particular context. The rules governing this choice are taken to lie outside the semantics of the axial expression itself. One particular case worth mentioning here is the situation when the Figure object itself is identified as the value of  $x$ , i.e. the same object serves as both the Figure and the Ground. Consider the following example:

- (38) Pojezd          projexal          v-perëd  
       train            moved            in-front.ACC  
       ‘The train moved forward.’

On its most salient reading, this sentence does not seem to require for any additional Ground object to be identified in the context. Rather, in this case the front direction can be defined relative to the Figure object itself, i.e. relative to the train’s front part. This intuition can be captured under our analysis if the train itself in its initial position is taken to be the Ground object, i.e. identified as in (31). In this case, sentence (38) would mean that the train moved along a path which started at the train’s initial position (this is trivially true), and ended at some point in the space projected from the train’s front. This appears to be basically correct<sup>11</sup>.

To conclude this section, we have proposed an analysis of Russian directional axial expressions which accounts for both their semantic and syntactic properties. Specifically, we proposed that semantically  $\text{Path}_{\text{Dir}}$  heads combine with functions of type  $\langle e,r \rangle$ , where the argument slot corresponds to the Ground object. Syntactically this is achieved via movement of a null operator from the position of the Ground object into the specifier of  $\text{Path}_{\text{Dir}}$ ’s complement. Since

allow for the Figure to be located inside the Ground. We assume that this is indeed the case.

11 A similar analysis would apply to the following example involving the axial expression *vverx* ‘up’, brought up by a reviewer:

- (i) v golubom čistom vozduxe trepeščet i unositsja s pesnej vverx malen’kaja ptička.  
       ‘In the clear blue air a small bird is quivering and flying upwards with a song.’

Here the bird in its initial position is understood as the Ground object with respect to which the Goal directional path is defined.

the position of the Ground object under this analysis is occupied by a null operator, overt Ground complements are correctly ruled out.

If this analysis is on the right track we expect the following correlation to hold generally: if a directional axial expression restricts some points of a trajectory with respect to the Ground object itself rather than to the region denoted by *pP*, then that expression should not combine with overt Ground complements. And conversely, if a directional axial expression combines with overt Ground complements it should define a trajectory only with respect to the region denoted by *pP*, but not with respect to the Ground object itself.

#### 4. The Special Case of *vnutr'*

It appears that at least one series of axial expressions in Russian can form PathPs as opposed to Path<sub>Dir</sub>Ps: expressions with the axial root *nutr'* 'inner part', cf. Table 2.

Table 2.

|          | Locative<br>prepositions/adverbs                                      | Directional adverbs             |                                     |
|----------|-----------------------------------------------------------------------|---------------------------------|-------------------------------------|
|          |                                                                       | Goal                            | Source                              |
| 'inside' | <i>v-nutr-i</i><br>IN-INSIDE-LOC<br><i>iz-nutr-i</i><br>IZ-INSIDE-GEN | <i>v-nutr'</i><br>IN-INSIDE.ACC | <i>iz-nutr-i</i><br>FROM-INSIDE-GEN |

The Goal and Source expressions in Table 2 both combine with overt DP complements, and yield the semantics compatible with the semantics of Path<sub>GOAL</sub> and Path<sub>SOURCE</sub> given above in (21) and (22):

(39) Mjač            zaletel            v-nutr'            tank-a  
 ball                flew.in            in-inside.ACC    tank-GEN  
 'The ball flew inside the tank'

(40) Golos            donosilsja            iz-nutr-i            tank-a  
 voice                was.heard            from-inside-GEN    tank-GEN  
 'The voice was heard from inside the tank'

In (39), the final point of the path is restricted to the region inside the tank, while the initial point is located somewhere outside the tank. This is consistent with the semantics of Path<sub>GOAL</sub>, but not with the semantics of Goal Path<sub>Dir</sub> given in (31) since the initial point in this case is not necessarily at the Ground object. Similarly, in (40) the initial point of the sound's trajectory is located inside the

tank, while the end point is placed somewhere outside. This interpretation follows from the semantics of  $\text{Path}_{\text{SOURCE}}$ , but not from the semantics of  $\text{Source Path}_{\text{Dir}}$  given in (32), since the end point of the path in this case does not need to be at the Ground object.

Note, that these semantic properties are preserved even in the absence of overt complements:

- (41) Mjač            zaletel            v-nutr'  
 ball               flew.in            in-inside.ACC  
 ‘The ball flew inside (something)’
- (42) Golos           donosilsja            iz-nutr-i  
 voice               was.heard            from-inside-GEN  
 ‘The voice was heard from inside (of something)’

Sentences (41) and (42) have exactly the same interpretation as (39) and (40) except that the Ground object is left unspecified and must be provided by the context. In (41) the Figure moves from outside of a contextually defined Ground object to a position inside that Ground. Hence, the initial point of the path does not have to lie at the Ground, as required by the semantics of  $\text{Goal Path}_{\text{Dir}}$ . Likewise, in (42) the Figure’s path starts inside a contextually defined Ground object, and ends somewhere outside, not necessarily at it as required by the interpretation of  $\text{Source Path}_{\text{Dir}}$ . The standard  $\text{Path}_{\text{GOAL}}$  and  $\text{Path}_{\text{SOURCE}}$  heads, on the other hand, provide the correct interpretations, assuming that a silent referential pronoun (*pro*) functions as the complement of  $\text{AxPart}$  in these cases.

Hence, the properties of directional expressions with the axial root *nutr* ‘inner part’ provide further support for the claim that the availability of overt complements is linked to the semantics of the  $\text{Path}/\text{Path}_{\text{Dir}}$  head. If the semantics of a directional expression corresponds to the semantics of  $\text{Path}_{\text{Dir}}$  heads, overt complements are banned. If, on the other hand, overt complements are allowed, as in the case of *v-nutr* ‘to inside’ and *iz-nutr-i* ‘from inside’, the semantics corresponds to that of  $\text{Path}$ , rather than  $\text{Path}_{\text{Dir}}$  heads.

## 5. Conclusion

We have argued that syntactic and semantic properties of Russian Directional axial expressions differ from those predicted by existing analyses of  $\text{PathPs}$ . We proposed that the structure of these expressions in Russian involves distinct  $\text{Path}_{\text{Dir}}$  heads that take phrases denoting functions from individuals to regions as complements, and have more restrictive interpretations than the standard  $\text{Path}$

heads. We proposed to derive the necessary semantics of the complement phrase by means of null operator movement from the position of the Ground complement. In this way we were able to derive the ban on overt complements with these expressions from the semantics of Path<sub>Dir</sub>. We showed that the link between the semantics of Path/Path<sub>Dir</sub> and the availability of overt complements is further supported by the properties of axial expressions with the root *nutr* ‘inner part’.

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