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## The prepositional aspect of Slavic prefixes and the goal-source asymmetry

### 1 INTRODUCTION

Matushansky (2002):

#### Russian prefixes and prepositions constitute a single category P

- ⇒ same morpho-phonological status
- ⇒ semantic differences are consequences of the immediate syntactic context – attachment to VP or DP/CP
- ⇒ nearly all Slavic prefixes can be used as or are homophonous to prepositions

#### the semantics of prefixes and prepositions can be treated alike

**proposal:** vector space semantics (Zwarts & Winter 2000)  
prepositional aspect (Zwarts 2005)

### 2 INNER AND OUTER ASPECT

- **inner aspect:** predicates at VP level that are atelic or telic (lexical aspect)
- **outer aspect:** temporal boundedness at sentence level (e.g. grammatical aspect)

#### 2.1 grammatical aspect

Slavic: obligatory grammatical verbal category of aspect

- ⇒ each Slavic verb form is either perfective or imperfective

#### criteria to set perfective and imperfective verbs apart:

- ⇒ **only imperfective but not perfective verbs can combine with phase verbs:**

- (1) *On načal pisat' / \*na-pisat' / \*po-pisat' pis'mo.* Russian  
he began.PF write.IPF / \*ON-write.PF / \*PO-write.PF letter.ACC  
'He began writing a / the letter.'

- ⇒ **only imperfective but not perfective verbs derive periphrastic future forms:**

- (2) *On budet pisat' / \*na-pisat' / \*po-pisat' pis'mo.* Russian  
he will write.IPF / \*ON-write.PF / \*PO-write.PF letter.ACC  
'He will write a / the letter.'

#### aspectual information on the verb:

- ⇒ perfectivizing prefixes
- ⇒ imperfectivizing suffixes (vowel alternation)
- ⇒ most morphologically simple verbs are imperfective

- (3) a. ipf. *spat'* > pf. *po-spat'* – 'to sleep' Russian  
ipf. *pisat'* > pf. *po-pisat'* – 'to write'  
ipf. *pisat' pis'mo* > pf. *na-pisat' pis'mo* – 'to write a / the letter'
- b. pf. *dat'* > ipf. *da-va-t'* – 'to give'  
pf. *pod-pisat'* > ipf. *pod-pis-yva-t'* – 'to sign (lit. under-write)'  
pf. *iz-dat'* > ipf. *iz-da-va-t'* – 'to edit (lit. out-give)'
- c. ipf. *vy-da-va-t' knigi* > pf. *po-vy-da-va-t' knigi* – 'to give out / distribute (the) books'

#### no uniform marking of the perfective or the imperfective aspect

- ⇒ not every perfective verb form contains a prefix
- ⇒ not every imperfective verb form contains a suffix
- ⇒ prefixes do not exclusively mark perfectivity (see below)

#### 2.2 telicity

- ⇒ property of the VP, which constitutes an event
- ⇒ one instantiation of telicity: resultativity

**resultativity** is syntactically represented in terms of a result state sub-event in a tripartite event structure, following Ramchand (2005):

- (4) (initial state  $e_1$ ) → [process event  $e_2$  → (final state  $e_3$ )]  
init(iator)P                      proc(ess)P                      res(ult)P

### 3 TESTING TELICITY IN SLAVIC

#### 3.1 (in)compatibility with temporal adverbials for an hour and in an hour

- (5) *On ot-kryl okno \*(za) čas.* **telic**  
 he opened.PF window.ACC \*(in) hour.ACC  
 ‘He opened a / the window in / \*for an hour.’
- (6) *On po-spal (\*za) čas.* **atelic**  
 he PO-slept.PF (\*in) hour.ACC  
 ‘He slept \*in / for an hour.’

#### 3.2 entailment test: $x$ Ved ( $y$ ) as (not) entailing $x$ no longer Vs ( $y$ ) (Borik 2002)

- (7) a. *Ja na-pisal<sup>p</sup> pis'mo. entails Ja (uže) ne pišu<sup>i</sup> pis'mo.* **telic**  
 I ON-write.PAST letter.ACC I (anymore) not write.PRES letter.ACC  
 ‘I wrote a / the letter.’ ‘I don’t write the letter anymore.’
- b. *Ja po-pisal<sup>p</sup> pis'mo. doesn't entail Ja (uže) ne pišu<sup>i</sup> pis'mo.* **atelic**  
 I PO-write.PAST letter.ACC I (anymore) not write.PRES letter.ACC  
 ‘I wrote (at) a / the letter.’ ‘I don’t write (at) the letter anymore.’

### 4 VECTOR SPACE SEMANTICS AND PREPOSITIONAL ASPECT

- Zwarts (2005): locative (stative) vs. directional (dynamic) prepositions
- Zwarts & Winter (2000): semantics of locative prepositions

#### example: locative PP behind the house

set of vectors that go from the house to points behind it  
 location function derives sets of located vectors, mapping an e-type denotation of the reference object to a vector that describes its location or dimension

⇒ **non-projective locative Ps:** *in, on, at*

require only spatial knowledge about the location of figure and ground with respect to one another; defined as boundary vectors on sets of points:

- (8) a.  $\mathbf{in}' = \lambda A. \lambda v. \text{int}(v, A)$  (Zwarts & Winter 2000, p. 4)  
 b.  $\mathbf{at}' = \mathbf{on}' = \lambda A. \lambda v. \text{ext}(v, A) \wedge |v| < r_o$   
 (with  $r_o \approx 0$ ,  $A$  as a set of points,  $v$  as a boundary vector of  $A$ )

⇒ **projective locative Ps:** *over, under, behind*

involve a certain axis modelled along the lines of three orthogonal unit vectors in the vector space  $V$  for *up, right* and *front*:

- (9) a.  $\mathbf{under}' = \lambda A. \lambda v. \text{ext}(v, A) \wedge c(-up, v) > |v_{\perp up}|$   
 b.  $\mathbf{behind}' = \lambda A. \lambda v. \text{ext}(v, A) \wedge c(-front, v) > |v_{\perp front}|$

⇒ **directional Ps**

map the reference object to a set of sequences of vectors (paths), each of these sequences determines a potential change in position of the figure.

- (10) *A path is a function of type iv from the real interval  $[0,1] \subset \mathbf{R}$  (type i) to vectors (type v).*
- (11) A PP is **bounded (telic)** iff it does not have cumulative reference
- (12) *A set of paths  $X$  is cumulative iff*  
 (i) *there are  $p$  and  $q \in X$  such that  $p+q$  exists and*  
 (ii) *for all  $p, q \in X$ , if  $p+q$  exists, then  $p+q \in X$ .*

**concatenation:** partial operation subject to the condition that the second path has to start where the first path ends

**atelic PPs are closed under sums, telic PPs are not**

- (13) a. *bounded, telic:* to, into, onto, from, out of, off, away from, past, via  
 b. *unbounded, atelic:* towards, along  
 c. *(un)bounded, (a)telic:* across, around, down, over, through, up

**goal and source prepositions:** transitions from one phase to another (Zwarts 2005):

- (14)  $\{ p:$  there is an interval  $I \subset [0,1]$  including...  
 ... 0 and consisting of all the  $i \in [0,1]$  for which  $p(i)$  is at  $x \} = [[ \text{from } x ]]$   
 ... 0 and consisting of all the  $i \in [0,1]$  for which  $p(i)$  is on  $x \} = [[ \text{off } x ]]$   
 ... 0 and consisting of all the  $i \in [0,1]$  for which  $p(i)$  is in  $x \} = [[ \text{out of } x ]]$   
 ... 1 and consisting of all the  $i \in [0,1]$  for which  $p(i)$  is at  $x \} = [[ \text{to } x ]]$   
 ... 1 and consisting of all the  $i \in [0,1]$  for which  $p(i)$  is on  $x \} = [[ \text{onto } x ]]$   
 ... 1 and consisting of all the  $i \in [0,1]$  for which  $p(i)$  is in  $x \} = [[ \text{into } x ]]$

## 5 SLAVIC PREFIXES AS PS

### (15) Russian and Czech goal and source prepositions:

Russian	Czech	
<i>do</i> (+ GEN), <i>k</i> (+ DAT)	<i>do</i> (+ GEN), <i>k</i> (+ DAT)	to
<i>k</i> (+ DAT)	<i>k</i> (+ DAT), <i>vůči</i> (+ DAT)	towards
<i>v</i> (+ ACC)	<i>do</i> (+ GEN)	into
<i>na</i> (+ ACC)	<i>na</i> (+ ACC)	onto
<i>ot</i> (+ GEN)	<i>od</i> (+ GEN)	(away) from
<i>iz</i> (+ GEN)	<i>z</i> (+ GEN)	out of

#### exclusively directional:

- ⇒ Russian and Czech *k* (+ DAT) ‘to(wards)’ and *na* (+ ACC) ‘onto’
- ⇒ Czech *vůči* (+ DAT) ‘towards’
- ⇒ Russian *v* (+ ACC) ‘into’

#### exclusively locative:

- ⇒ Russian and Czech *na* (+ PREP) ‘on’
- ⇒ Russian and Czech *v* (+ PREP) ‘in’

### (16) Russian and Czech goal and source prefixes:

Russian	Czech	
<i>do-</i> , <i>pri-</i> , * <i>k-</i>	<i>do-</i> , <i>při-</i> , * <i>k-</i> , * <i>vůči-</i>	to
<i>v-</i> , <i>za-</i>	<i>do-</i>	in(to)
( <i>na-</i> ) <sup>1</sup>	( <i>na-</i> )	(on(to)) <sup>1</sup>
<i>ot-</i> , <i>u-</i>	<i>od-</i> , <i>u-</i>	(away) from
<i>iz-</i> , <i>vy-</i>	<i>vy-</i>	out of

#### prepositional counterparts of additional prefixes:

- ⇒ *za* (+ ACC) ‘within’ (never directional)
- ⇒ *u* (+ GEN) ‘at’
- ⇒ *pri* (*při*) (+ PREP) ‘by’

<sup>1</sup> The prefix *na-* is only found on the motion verb Russian *idti* / Czech *jít* ‘go’. *Najti* and *najít*, however, do not convey the meaning of a motion on foot onto something but have the different lexical meaning of ‘find’. To describe a motion onto something, other prefixes are used depending on the particular perspective such as Russian *so-jti* ‘descend’ (lit. down-go) or Czech *vze-stoupit* ‘ascend’ (lit. up-step).

contra Filip (2003), among others, with Žaucer (2004):

#### Slavic prefixes are locative Ps, identifying a result state subevent

- ⇒ no prefixal counterparts to exclusively directional prepositions
- ⇒ prefixal counterparts to purely locative prepositions
- ⇒ the prefixes are stative and license / identify a result state subevent
- ⇒ such prefixed predicates are always telic

## 6 AN APPARENT PROBLEM: THE GOAL-SOURCE ASYMMETRY

syntactic and semantic asymmetries between goal and source Ps

#### • Nam (2004)

- ⇒ goal PPs are generated under the lower VP of the extended VP-structure and compose a result state sub-event
- ⇒ source PPs are generated under the higher VP, modifying a process sub-event
- ⇒ goal-oriented PPs induce telicity whereas source-oriented ones do not

#### • Filip (2003)

- ⇒ Czech source prefixes grammatical with measure expressions
- ⇒ Czech goal prefixes ungrammatical with measure expressions

- (17) a. *Po-vy-táhl káru z příkopu.* (= (49) b. in Filip 2003, p. 94)  
 PO-OUT-dragged.PF cart.ACC from ditch.GEN  
 ‘He dragged the cart out of the ditch a bit.’  
 b. \**Po-do-táhl káru do příkopu.* (= (50) b. in Filip 2003, p. 94)  
 PO-(IN)TO-dragged.PF cart.ACC (in)to ditch.GEN  
 ‘He dragged the cart (in)to the ditch a bit.’

#### (18) Goal-Source Telicity Asymmetry (Filip 2003, p. 79)

The spatial orientation of directional modifiers determines the telicity status of a derived predicate. Source-modifiers form atelic (homogeneous) predicates. Goal-modifiers form telic predicates.

- (19) Filip (2003), p. 61: *A verbal predicate is telic if it denotes either*  
 (i) *a set P<sub>C</sub>, i.e., a set of single atomic events contextually restricted by t*  
*(a time index) and M (a measure statement for P), or*  
 (ii) *a plural set of atomic events of a definite cardinality.*  
*Otherwise the predicate is atelic.*

M:  $\forall e [ P(e) \wedge Q(e) \rightarrow |e| = 1 ]$ , where Q is a context-dependent variable.

## 6.1 Russian and Czech goal and source prefixed predicates are telic

### Russian:

- (20) a. *On pri-lete<sup>P</sup> v Moskvu \*den' / za den' (do prazdnika).*  
 he TO-flew in Moscow.ACC \*day.ACC / in day.ACC to holiday.GEN  
 'He arrived in Moscow (by plane) \*for a day / a day before the holiday.'  
 b. *On u-lete<sup>P</sup> iz Moskvyy \*den' / za den' (do prazdnika).*  
 he AWAY-flew out-of Moscow.GEN \*day.ACC / in day.ACC to holiday.GEN  
 'He left Moscow (by plane) \*for a day / a day before the holiday.'
- (21) a. *On pri-lete<sup>P</sup> v Moskvu. entails On uže ne pri-letaet<sup>i</sup> v Moskvu.*  
 he more not TO-fly.PRES in Moscow  
 b. *On u-lete<sup>P</sup> iz Moskvyy. entails On uže ne u-letaet<sup>i</sup> iz Moskvyy.*  
 he more not AWAY-fly.PRES out of Moscow

### Czech:

- (22) a. *Vy-táh<sup>P</sup> káru z příkopu \*(za) hodinu.*  
 OUT-dragged cart.ACC from ditch.GEN \*(in) hour.ACC  
 'He dragged the cart out of the ditch (in / \*for) an hour.'  
 b. *Do-táh<sup>P</sup> káru do příkopu \*(za) hodinu.*  
 (IN)TO-dragged cart.ACC (in)to ditch.GEN \*(in) hour.ACC  
 'He dragged the cart (in)to the ditch (in / \*for) an hour.'
- (23) a. *Vy-táh<sup>P</sup> káru z příkopu. entails Už ne-vy-tahuje<sup>i</sup> káru z příkopu.*  
 anymore not-OUT-drag.PRES cart out of ditch  
 b. *Do-táh<sup>P</sup> káru do příkopu. entails Už ne-do-tahuje<sup>i</sup> káru do příkopu.*  
 anymore not-(IN)TO-drag.PRES cart into ditch

## 7 THE NATURE OF THE GOAL-SOURCE ASYMMETRY

Zwarts & Winter (2000): not all locative PPs can be modified by measure phrases

- (24) **Modification Condition:** *A set of located vectors  $W \subseteq V \times V$  satisfies the modification condition iff  $W$  is  $VMON\uparrow$ ,  $VMON\downarrow$  and non-empty.*
- (25) **vector monotonicity:** *Let  $P$  be a prepositional function and  $X \subseteq D_{pt}$ .*  
 a.  *$P$  is upward vector-monotone over  $x$  ( $VMON\uparrow$ ) iff*  
 $\forall A \in X \forall \mathbf{u}, \mathbf{v} \in D_v [\mathbf{u} \leq \mathbf{v} \rightarrow (P(A)(\mathbf{u}) \rightarrow P(A)(\mathbf{v}))]$ .  
 b.  *$P$  is downward vector-monotone over  $x$  ( $VMON\downarrow$ ) iff*  
 $\forall A \in X \forall \mathbf{u}, \mathbf{v} \in D_v [\mathbf{u} \leq \mathbf{v} \rightarrow (P(A)(\mathbf{v}) \rightarrow P(A)(\mathbf{u}))]$ .

- (26) **Universal:** *All simple locative prepositions in natural language are downward monotone.*
- (27)  $VMON\uparrow$ : in front of, behind; above, over, below, under; beside; outside  
 not  $VMON\uparrow$ : near, on, at; inside, in; between

**basic assumption: Slavic prefixes as locative Ps identify the result state subevent which is predicated over an event participant:**

- *he dragged the cart into the ditch  $\approx$  dragging, he caused the cart to be **inside** the ditch*
- *he dragged the cart out of the ditch  $\approx$  dragging, he caused the cart to be **outside** the ditch*

**PO- MODIFIES THE RESULT STATE DENOTED BY THE SOURCE PREFIX, A LOCATIVE PP**

- $\Rightarrow$  only the result state of the source-oriented VP (*outside the ditch*) is upward monotone, hence only this VP can be modified by *po-*  
 $\Rightarrow$  goal-oriented VPs cannot combine with *po-*, since their result states (e.g. *inside the ditch*) are not upward monotone  
 $\Rightarrow$  both events are telic and contain a result state subevent

**alternative (as proposed in the proceedings paper): Slavic prefixes as directional Ps**

- $\Rightarrow$  Zwarts & Winter (2000): dir operator for the mapping between a locative preposition and the corresponding directional preposition  
 $\Rightarrow$  Cresswell's (1978) path-to-place function (e.g. *Across a meadow a band is playing* paraphrased as *at the end of a journey across the meadow*)  
 $\Rightarrow$  Jackendoff's (1983) ON-operator (e.g. *the train is through the tunnel*)  
 $[PLACE] \rightarrow [Place ON ([Path X])]$

**further support for po- as modifier of the result state:**

neither imperfective source-prefixed nor imperfective goal-prefixed verbs can combine with *po-*:

- (28) *\*po-vy-tahovat<sup>P</sup>, \*po-do-tahovat<sup>P</sup>* – pull + out / in (imperfective) with *po-*  
*\*po-od-skákat<sup>P</sup>, \*po-při-skákat<sup>P</sup>* – jump + away / to (imperfective) with *po-*  
*\*po-od-sedět<sup>P</sup>, \*po-při-sedět<sup>P</sup>* – sit down + away / to (imperfective) with *po-*

explanation: if the imperfective operator brings about that the result state subevent cannot be accessed anymore (Arsenijević 2004), the result state subevent is not accessible anymore and cannot be modified by *po-*

## 8 CONCLUSIONS

- ⇒ Slavic prefixes and prepositions constitute a single category P (Matushansky 2002)
- ⇒ Slavic predicates containing either goal or source prefixes are telic since the particular prefixes contribute the result state subevent
- ⇒ asymmetries between sources and goals are not aspectual in nature
- ⇒ the particular asymmetry between Czech source and goal prefixes (i.e. only source- but not goal-prefixed predicates can combine with measure phrase modifiers) is due to different topological properties of the particular result states

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