Result states and their descriptive properties: on the meaning of some prefixes in Russian

Sergei Tatevosov

Lomonosov Moscow State University

tatevosov@gmail.com

Overview

Russian verbal morphology:

“Imperfective”	**“Perfective”**	**“Imperfective”**
	da-t’ ‘give’	da-va-t’
pisa-t’ ‘write’	na-pisa-t’	
	za-pisa-t’ ‘record’	za-pis-yva-t’
čita-t’ ‘read’	pro-čita-t’	pro-čit-yva-t’

Overview

“Imperfective”	**“Perfective”**	**“Imperfective”**
	da-t’ ‘give’	da-va-t’
pisa-t’ ‘write’	na-pisa-t’	
	za-pisa-t’ ‘record’	za-pis-yva-t’
čita-t’ ‘read’	pro-čita-t’	pro-čit-yva-t’

Overview

“Imperfective”	**“Perfective”**
pisa-t’ ‘write’	**na-**pisa-t’
čita-t’ ‘read’	**pro-**čita-t’
dela-t’ ‘do, make’	**s-**dela-t’
pi-t’ ‘drink’	**vy-**pit’

- In these examples, the only superficially visible contribution of the prefixes is the perfective aspect
- In traditional Russian aspectology, *na-* in *napisat’*, *pro-* in *pročitat’* and others are sometimes called **pure aspectual** prefixes

Overview

- Goals
  - To show that “pure aspectual prefixes” introduce a result state into a complex even description
  - To argue that this is all they do
  - To account for the descriptive properties of result states contributed by prefixes

Overview

- 1. Prefixes and result states
- 2. Prefixes and perfectivity
- 3. Result states and their descriptive properties

1. Prefixes and result states

(1) **Simplex unprefixed stem: activity event structure, a property of events**

a. Vasja **pisa-l** pis'm-o.
V. write-PST.M letter-ACC
'Vasja was writing a letter.'

b. || [$_{vP}$ Vasja *pisa*- pismo] || = λe [write(e) $\wedge$ agent(Vasja)(e) $\wedge$ theme(letter)(e)]

1. Prefixes and result states

(2) **Prefixed stem: accomplishment event structure, a relation between events and states**

a. Vasja **na-pisa-l** pis'm-o.
V. PRF-write-PST.M letter-ACC
'Vasja wrote a letter.'

b. || [$_{vP}$ *Vasja na-pisa- pismo* || = λsλe [write(e) ∧ agent(Vasja)(e) ∧ theme(letter)(e) ∧ cause(s)(e) ∧ written(s) ∧ arg(letter)(s)].

- *Napisa-* involves a complex event structure consisting of two causally related subevents, the activity subevent, and the result state subevent. Subevents share a theme participant.
- The contribution of the prefix is a result state

1. Prefixes and result states

- Evidence for event-structural complexity
  - Argument realization (Rappaport Hovav and Levin 1998)
  - Restitutive ‘again’ (Dowty 1979, von Stechow 1996, Rapp, von Stechow 1999)
  - Scope of negation
  - Scope of ‘almost’ (Dowty 1979 and much subsequent work)

1. Prefixes and result states

- Rappaport Hovav, Levin 1998:
- Object alternation with activity event structures
- No object alternation with accomplishment event structures

(3) Leslie swept

(4) *Kelly broke

- For RH&L, (4) is bad because *break*'s event template contains a result state description, and its argument must be projected in the syntax
- (3) is ok because *sweep* does not have a result component, and nothing forces syntactic realization of the internal argument

1. Prefixes and result states

- If LR&H's generalization is correct, we can use it as a diagnostic no matter if we accept their assumptions about lexicon-syntax interface

(5) a. Kogda ja pri-še-l, Vasja **pisa-l**.
when 1SG PRF-come-PST Vasja write-PST
When I came, Vasja was writing.

b. *Kogda ja pri-še-l, Vasja ***na*-pisa-l.**
when 1SG PRF-come-PST Vasja *PRF*-write-PST
When I came, Vasja wrote.

1. Prefixes and result states

- Syntactic realization of the internal argument
  - Obligatory with prefixed stems
  - Optional with non-prefixed stems
- To the extent that this pattern reflects subevental complexity, we have the first piece of evidence that prefixed stems are associated with accomplishment even structure

1. Prefixes and result states

- Scope of negation, ‘almost’ and ‘again’
- Accomplishments give rise to ambiguity, since all these elements can scope either above or below the activity subevent
- [α [Activity [Result state]]]
- [Activity [α [Result state]]]

1. Prefixes and result states

(6) Ali Baba opened Sesame again.

1. Ali Baba had opened Sesame before, and now he did that again (repetitive reading)

[again [Activity [Result state]]]

2. Sesame had been open before, and now Ali Baba opened it again (restitutive reading)

[Activity [again [Result state]]]

Prefixes and result states

- **Evidence for higher subevental complexity of prefixed verbs**

- ‘Again’ and others can take scope over one of the components of a complex event structure not affecting another component.
- Combined with prefixed predicates, these operators are scopally ambiguous.
- Non-prefixed predicates, which lack a result state are unable to give rise to scope ambiguities.

1. Prefixes and result states

- When the tests are applied to prefixed and non-prefixed verbs, care should be taken, since the former project perfective and the latter imperfective clauses

- We have to make sure that (im)perfectivity does not influence our diagnostics

1. Prefixes and result states

- ‘Again’
- Prefixed verbs show the expected repetitive restitutive ambiguity with ‘again’:

(7) Volodja opjat’ na-pisal
V. again PRF-write-PST:M
Feliksu oskorbitel’noe pis’mo
F-DAT insulting letter-ACC

a. Repetitive reading: *‘V. had written an insulting letter to Felix before, and now he did that again.’*

b. Restitutive reading: *‘Lev had written an insulting letter to Felix before, and now Volodija did that again.’*

1. Prefixes and result states

- The restitutive reading of ‘again’ survives under the progressive:

(8) Sesame had been open before. When I saw Ali Baba, he was opening it again.

- This gives promise that if non-prefixed verbs allow for the restitutive reading, we will see it even though the clause is imperfective.

1. Prefixes and result states

- For non-prefixed verbs, the restitutive reading of ‘again’ is not available:

(9)	Volodja	opjat’	pisal	Feliksu
	V.	again	PRF-write-PST:M	F-DAT
	oskorbitel’noe		pis’mo	
	insulting		letter-ACC	

a. Repetitive reading: *‘V. had written an insulting letter to Felix before, and when I saw him this morning, he was doing that again.’*

b. ??/*Restitutive reading: *‘Lev had written an insulting letter to Felix before, and when I saw Volodja this morning, he was doing that again.’*

1. Prefixes and result states

In that respect, non-prefixed verbs pattern together with paradigmatic activities like ‘run’:

(10) Volodja *opjat’* **bega-l** po sad-u.
V. Again run-PST:M around garden-ACC
??Restitutive reading: *‘Lev had run in the garden before. When I saw Volodja, he was running there again’*.

- The range of interpretations with ‘again’ suggests that prefixed verbs are event-structurally complex, but non prefixed ones are not.

1. Prefixes and result states

- Negation

(11) Ali did not open Sesame
1. He did not even try. (Neg > Activity > RS)
2. even though he tried hard. (Activity > Neg > RS)

- Negated accomplishments, under the narrow scope of negation, convey that the result state does not occur but the activity does.
- Russian prefixed verbs show this ambiguity, too.

1. Prefixes and result states

(12) Vasja ne **na-pisa-l** kursov-uju
V. not PRF-write-PST.M term.paper-ACC
‘Vasja did not write his term paper.’
1. He has not even started.
2. By the deadline, he only had 15 pages written

Prefixes and result states

- For *napisa-*, the standard ambiguity whereby the negation can scope either above or below the eventive component of event structure.
  - On the wide scope reading, the sentence indicates that neither component has occurred.
  - On the narrow scope reading, the result state only falls under the scope of negation.

1. Prefixes and result states

- The Activity > NEG > RS reading is not detectable in the progressive

(13) Ali was not opening Sesame

- The progresstive ‘extracts’ a proper part of an eventuality from the original extension of the predicate; the result state is not part of it.

- This means that the progressive does not serve the right environment where the difference between simplex and complex event structures can be seen.

1. Prefixes and result states

- To get around this problem, one needs to find a configuration where imperfective Russian verbs entail that the result state has been reached.
- It is in this context where non-prefixed imperfective verbs can be meaningfully compared with their prefixed counterparts
- Fortunately for our purposes, the Russian imperfective allows for the so called ‘general factual’ interpretation (Gronn 2003), roughly corresponding to the existential perfect in languages like English

1. Prefixes and result states

(14)	Volodja	(odnaždy)	/	(nikogna	ne)
	V.	once		never	NEG
	čital	“Devida		Kopperfil’da”	
	read-PST.M	D.		C.	

‘Volodja has once/never read David Copperfield’

- If, on this interpretation, non-prefixed verbs show different range of interpretations than prefixed ones, this would reflect their event-structural difference

1. Prefixes and result states

(15) Vasja ni razu ne **pisa-l**
V. not.a.single.time not write-PST.M
kursov-uju.
term.paper-ACC
'Vasja has never written his term paper.'
1. No writing activity has ever been performed.
2. *No wiring activity has ever been completed.

(16) … #xotja mnogo raz načinal
'even though he started many times'.

1. Prefixes and result states

- Non-prefixed stem under negation are unambiguous, unlike prefixed stems
- If *pisa-* is a predicate of events, but *napisa-* is a relation between events and states, we have a principled account for the observed pattern.
- The relation between events and states, but not the property of events provides the negation with a subevental content that introduces different scope possibilities.

Prefixes and result states

- ‘Almost’
- As before, prefixed stems are ambiguous.

(17) Volodja počti
V. almost
na-pisa-l kursov-uju.
PRF-write-PST.M term.paper-ACC
‘Vasja almost wrote his term paper.’
1. Volodja came close to starting the term paper, but then changed his mind.
2. Volodja was writing the concluding section when he found a critical mistake and decided to start all over again.

Prefixes and result states

- Similarly to what happens with the negation, accomplishments in the progressive can hardly yield the reading where ‘almost’ only scopes over the result state

(18a) John was almost opening the door

‘#John was in the midst of bringing about a state of the door having been almost open’

Prefixes and result states

- As with the negation, one could have tried to look at the range of interpretations of ‘almost’ on the general factual reading of the Russian imperfective.

- But for some unclear reason sentences with ‘almost’ are at best marginal on this reading.

Prefixes and result states

(18b) ?/??Volodja odnaždy počti čital
V. once almost read-PST.M
“Devida Kopperfil’da”
D. C.
‘Volodja has once read David Copperfield’

- Fortunately, there is another type of environment where imperfective sentences describe culminating eventualities: narrative present.

Prefixes and result states

(19) Volodja saditsja v kreslo,
V. sit.down-PRS.3SG in chair,
zakurivaet, čitaet
light.up-PRS.3SG, read-PRS.3SG
Nadinu zapisku,…
Nadya's note
'Volodja sits down, lights up a cigarette, reads Nady's note,…'

Prefixes and result states

- Plugging in ‘almost’ creates an unambiguous sentence:

(20)Volodja saditsja v kreslo, zakurivaet,
V. sit.down-PRS.3SG in chair, light.up-PRS.3SG,
i uže počti čitaet Nadinu zapisku, no tut…
and already ALMOST read-PRS.3SG Nadya’s note but there
‘Volodja sits down, lights up a cigarette. He almost reads Nadja’s note, but…’

1. V. came close to starting reading when something happened.

2. *Volodja was about to finish reading when something happened.

Prefixes and result states

- Evidence from argument realization and the scope of adverbials and negation converges: all the diagnostics suggest that prefixed stems are more subeventally complex than non-prefixed stems.

- If prefixed stems are accomplishments, but non-prefixed stems are activities, these facts can be accounted for in a principled way.

1. Prefixes and result states

(1) **Simplex unprefixed stem: activity event structure, a property of events**

a. Vasja **pisa-l** pis'm-o.
V. write-PST.M letter-ACC
'Vasja was writing a letter.'

b. || [*v*P Vasja *pisa*- pismo] || = λe [write(e) ∧ agent(Vasja)(e) ∧ theme(letter)(e)]

Prefixes and result states

(2) **Prefixed stem: accomplishment even structure, a relation between events and states**

a. Vasja **na-pisa-l** pis'm-o.
V. PRF-write-PST.M letter-ACC
'Vasja wrote a letter.'

b. || [$_{vP}$ *Vasja na-pisa- pismo* || = λsλe [write(e) ∧ agent(Vasja)(e) ∧ theme(letter)(e) ∧ cause(s)(e) ∧ written(s) ∧ arg(letter)(s)].

2. Prefixes and perfectivity

- **Prefixes do not contribute perfective aspect. Prefixed verbs enter the derivation aspectless (Tatevosov 2011)**
- **Argument in a nutshell:**
  - If semantic aspect is no part of the meaning of a verb, there is a stage of syntactic derivation, call it α, where the stem *napisa-* is already there, but perfectivity is not.

(21) **The "perfective stem" is part of α, but perfectivity is not**

[… [… [… **PFV** [… **[α … [V *napisa-*]]**]]]]

  - If perfectivity appears with the prefix, there is no such a stage.

2. Prefixes and perfectivity

- Find a configuration that shares α with a fully inflected clause, but lacks some of the clausal functional projections.

$[_{CP} \cdots [_{F_{i+1}P} \cdots [_{F_iP} \cdots \quad [_{\alpha} \cdots [_{VP} \cdots [_{V}$ PFV-napisa]]]]]]

$[_{CP} \cdots [_{F_{i+1}P} \cdots [_{F_iP} \cdots$ PFV $[_{\alpha} \cdots [_{VP} \cdots [_{V}$ napisa]]]]]]

- If we do not find perfectivity effects in such **a structurally deficient configuration**, this can only happen because PFV is not there
- Strong evidence for prefixed stems being aspectless

2. Prefixes and perfectivity

3. A relevant configuration is provided by **argument supporting deverbal nominals (ASNs)**.

- ASNs give us an opportunity to see properties of vPs/VPs/verbs at early stages of syntactic derivation, when (at least some of) **the clausal structure is not yet there**. In ASNs characteristics of uninflected vPs/VPs/verbs are more transparently visible.

- ASNs do not exhibit perfectivity effects, hence aspect is not part of the structure they share with fully inflected clauses.

- Aspectual operators come into play at later stages of derivation, when the functional structure is built that nominals **do not share** with clauses

2. Prefixes and perfectivity

Perfectivity effects

- Morphosyntactic distribution
- Reference time
- Culmination/telicity
- Aspectual composition

2. Prefixes and perfectivity

- **Morphosyntactic distribution**

(22) Periphrastic Future

*Vasja	bud-et	**na-pisa-t'**	pis'm-o
V.	AUX-3SG	PRF-write-INF	letter-ACC

'Vasja will write a letter.'

(23) Complement of phasal verbs

*Vasja	nača-l	**na-pisa-t'**	pis'm-o
V.	start-PST.M	PRF-write-INF	letter-ACC

'Vasja started writing a letter.'

2. Prefixes and perfectivity

- **Reference time**

(24) Kogda ja priše-l, Vasja **na-pisa-l** pis'm-o.
when I come-PST V. PRF-write-PST letter-ACC

1. 'When I came, Vasja wrote a letter'
2. *'When I came, Vasja was writing a letter'

(25) e_1 = V. wrote a letter
e_2 = I came

(26) a. $\tau(e_2) \ll \tau(e_1)$
b. $*\tau(e_2) \subset \tau(e_1)$

2. Prefixes and perfectivity

- **Telicity: time-span adverbials**

(27) a. Vasja **na-pisa-l** pis'm-o
V. PRF-write-PST.M letter-ACC
za dva čas-a.
in two.ACC hour-GEN
'Vasja wrote a letter in two hours.'

b. *Vasja **na-pisa-l** pis'm-o
V. PRF-write-PST.M letter-ACC
dva čas-a.
two.ACC hour-GEN
'Vasja wrote a letter for two hours.'

2. Prefixes and perfectivity

- **Telicity: conjunction criterion** (Verkuyl 1972)

(28)

Vasja	**na-pisa-l**		pis'm-o		v
V.	PRF-write-PST:M		letter-ACC		in
dva	čas-a	i	v	tri	čas-a.
two	hour-GEN	and	in	two	hour-GEN

'Vasja wrote a letter at 2 p.m. and at 3 p.m.'

OK: two distinct events
NOT OK: a single continuous event

2. Prefixes and perfectivity

- **Aspectual composition**

(29) Vasja **na-pisa-l** pis'm-a…
V. PRF-write-PST.M letter-ACC.PL
1. 'Vasja wrote (all) the letters.'
2. *'Vasja wrote letters.'

(30) ...*no osta-l-o-s' ešče mnogo.
but remain-PST-N-REFL more a.lot
'… but there are a lot more (letters to write).'

2. Prefixes and perfectivity

- **Argument-supporting** nominals
- Abney 1987, Alexiadou 2001, 2007, 2009, 2010, Alexiadou *et al.* 2010, Fu et al. 2001, Harley 2009, van Hout, Roeper 1998, Roeper 1987, 2004, a.m.o.

- Deverbal nouns in -*nie*-/-*tie*- in Russian

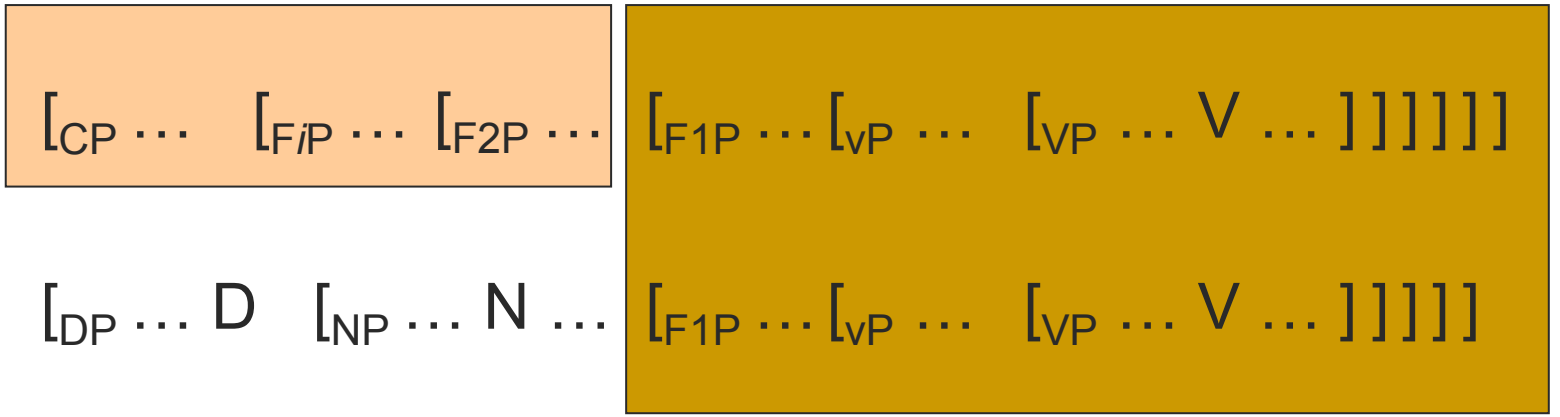
(31) na-pisa-n-ij-e pis'm-a

PRF-write-N/T-NOUN-NOM letter-GEN

'writing (of) a/the letter'

2. Prefixes and perfectivity

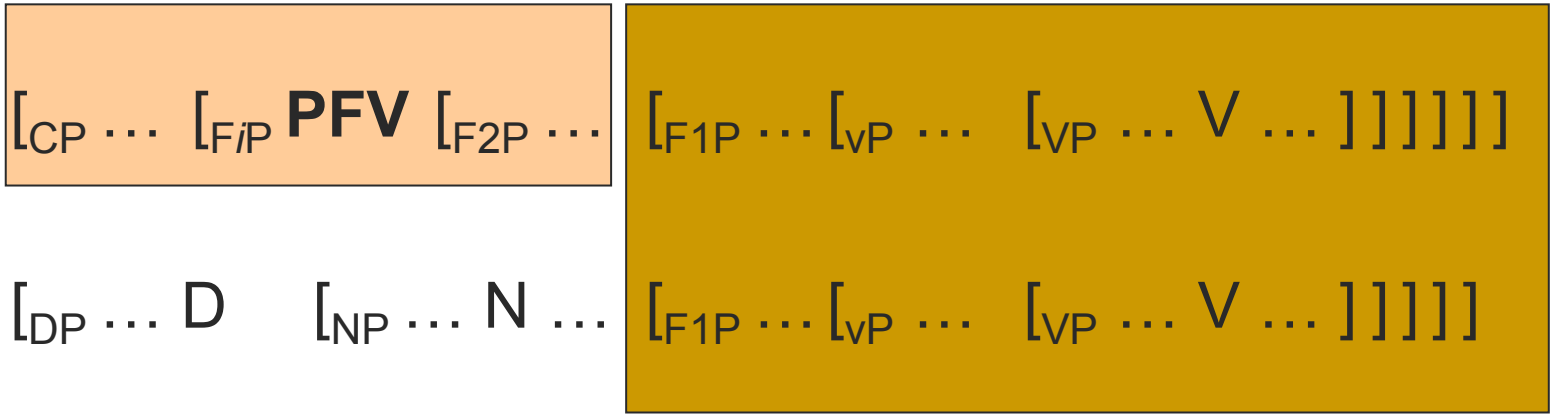
- ASNs are structurall deficient
- Fully-inflected clauses



- ASNs

2. Prefixes and perfectivity

- If PFV is a component of functional structure not present in deverbal nominals, deverbal nominals will never show perfectivity effects



- The crucial argument for the generalization that prefixed stems are aspectless

2. Prefixes and perfectivity

Perfectivity effects in ASNs

- Morphosyntactic distribution
- Reference time
- Culmination/telicity
- Aspectual composition

(32)

na-pisa-n-ij-e	pis'm-a
PRF-write-N/T-NOUN-NOM	letter-GEN
'writing (of) a letter'	

2. Prefixes and perfectivity

- **Morphosyntactic distribution**

- Complement of aspectual verbs

(18) *Vasja nača-l **na-pisa-t'** pis'm-o
V. start-PST.3SG PRF-write-INF letter-ACC
'Vasja started writing a letter.'

(19) Vasja nača-l **na-pisa-n-ij-e** pis'm-a
V. start-PST.3SG PRF-write-N/T-NOUN-ACC letter-GEN
'Vasja started writing a letter.'

2. Prefixes and perfectivity

- **Reference time**

(33) Ja priše-l vo vremja
I come.PFV-PST in time
na-pisa-n-ij-a pis'm-a
PRF-write-N/T-NOUN-GEN letter-GEN
'I came at the time of writing a letter.'

(34) **na-pisa-n-ij-e** pis'm-a v
PRF-write-N/T-NOUN-GEN letter-GEN in
moment moego prixoda
moment.ACC my-GEN coming-GEN
'writing of a/the letter at the moment of my coming.'

(35) OK: τ(coming) $\subset$ τ(writing)

2. Prefixes and perfectivity

- **Telicity: conjunction criterion** (Verkuyl 1972)

(36) **na-pisa-n-ij-e** pisem v dva
PRF-write-N/T-NOUN-NOM letter-GEN:PL in two
čas-a i v tri čas-a.
hour-GEN and in three hour-GEN
'writing (the) letters at 2 p.m. and at 3 p.m.'

OK: two distinct events

OK: a single continuous event

2. Prefixes and perfectivity

- **Aspectual composition**

(37) **na-pisa-n-ij-e** pisem
PRF-write-N/T-NOUN-NOM letter-GEN:PL
1. ‘writing (all) the letters’
2. ‘writing letters’

- The definite (unique maximal) interpretation is not obligatory

2. Prefixes and perfectivity

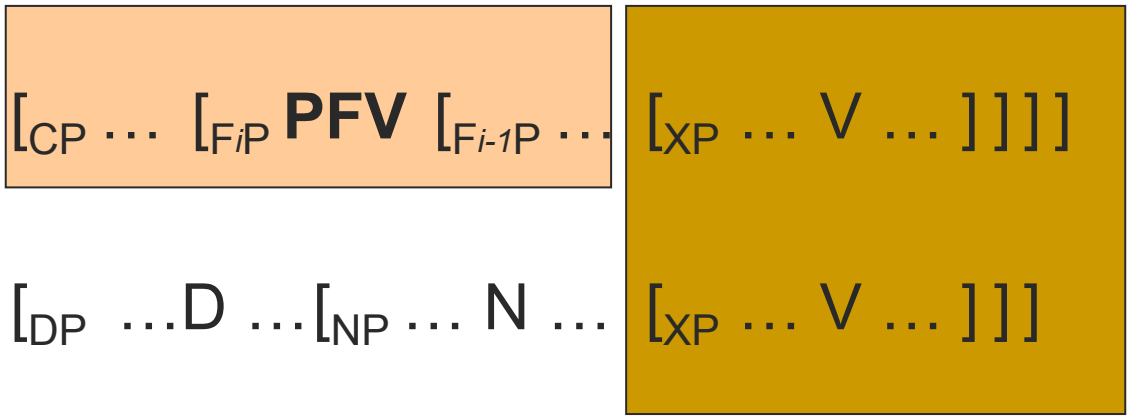
- Aspectual composition

(38) N**a-pisa-n-ij-e** pisem
PRF-write-N/T-NOUN-NOM letter.GEN.PL
prodolža-l-o-s' ves' den' …
last-PST-N-REFL whole day
'Writing letters lasted for the whole day long...'

(39) ... ^{OK}no osta-l-o-s' ešče mnogo.
but remain-PST-N-REFL more a.lot
'but there are a lot more (letters to write).'

2. Prefixes and perfectivity

- No perfectivity effects in ASNs
- Whatever part of the clausal structure, XP, is embedded within nominalizations, PFV merges outside that XP



2. Prefixes and perfectivity

- Argument supporting nominalizations

(40) na-pisa-n-ij-e (pis'm-a)
PRF-write-N/T-NOUN-NOM letter-GEN
'writing (of) a//the letter'

$[_{NP}$ -ij- $[_{n/tP}$ -n- $[_{XP}$ … napisa …]]]

- No PFV in ASNs
- Prefixes do not contribute perfectivity

3. Result states and their descriptive properties

- Prefixes arguably introduce result states into the semantic representation of a complex verbal predicate (cf. also Žaucer 2009 for a recent discussion and references therein).
- However, descriptive properties of a result state vary along with the event type introduced by the stem.
- I propose that prefixes have parameterized choice functions of type <<<v,t>,t>,<v,t>> as part of their denotation that apply to a set of properties of states and choose a state predicate according to the event type denoted by the verb stem.

3. Result states and their descriptive properties

- So far, non-prefixed transitive stems like *pisa*- have been treated as three-place relations between two individuals and events.
- Prefixed stems denote a four-place relation between two individuals, events and states.

(41) $\| \text{pisa} \| = \lambda y \lambda y \lambda e$ [write(e) $\wedge$ agent(x)(e) $\wedge$ theme (y)(e)]

(42) $\| \text{napisa} \| = \lambda y \lambda x \lambda e \lambda s$ [write(e) $\wedge$ agent(x)(e) $\wedge$ theme (y)(e) $\wedge$ CAUSE(s)(e) $\wedge$ written(s) $\wedge$ arg(y)(s)]

3. Result states and their descriptive properties

- To derive compositionally (42) from (41), the prefix is to be analyzed as in (43).

(41) $\| \text{pisa} \| = \lambda y \lambda y \lambda e$ [write(e) $\wedge$ agent(x)(e) $\wedge$ theme (y)(e)]

(42) $\| \text{napisa} \| = \lambda y \lambda x \lambda e \lambda s$ [write(e) $\wedge$ agent(x)(e) $\wedge$ theme (y)(e) $\wedge$ CAUSE(s)(e) $\wedge$ written(s) $\wedge$ arg(y)(s)]

(43) $\| \text{na-} \| = \lambda S_{<e, <e, <y,t>>>} \lambda y \lambda x \lambda e \lambda s$[S(y)(x)(e) $\wedge$ CAUSE(s)(e) $\wedge$ written(s) $\wedge$ arg(y)(s)]

3. Result states and their descriptive properties

(43) $\| \text{na-} \| = \lambda S_{<e, <e, <y,t>>>} \lambda y \lambda x \lambda e \lambda s[\, S(y)(x)(e) \wedge \text{CAUSE}(s)(e) \wedge \text{written}(s) \wedge \text{arg}(y)(s)]$

- (43) cannot be correct, however, since for any stem except *pisa'* (e.g., for *risova-* 'paint' in (44)) it yields a relation involving a wrong property of states.

(44) $\| \text{risova-} \| = \lambda y \lambda x \lambda e\, [\, \text{paint}(e) \wedge \text{agent}\,(x)(e) \wedge \text{theme}\,(y)(e)]$

(45) $\| \text{na-risova-} \| = \lambda y \lambda x \lambda e \lambda s[\text{paint}(e) \wedge \text{agent}(x)(e) \wedge \text{theme}\,(y)(e) \wedge \text{CAUSE}(s)(e) \wedge \text{written}(s) \wedge \text{arg}(y)(s)]$

3. Result states and their descriptive properties

(45) || na-risova- || = λyλxλeλs[paint(e) ∧ agent(x)(e) ∧ theme(y)(e) ∧ CAUSE(s)(e) ∧ written(s) ∧ arg(y)(s)]

- Painting events lead the theme argument to the state of being written, which does not make much sense.
- While the very presence of a result state in the semantic representation has to do with the prefix, the descriptive content of that state is determined by the stem, hence cannon be part of the meaning of the prefix.

3. Result states and their descriptive properties

- We can try to find a fix by assigning the prefix denotations in (46) or (47):

(46) $\| \text{na-} \| = \lambda S_{<e, <e, <v,t>>>} \lambda y \lambda x \lambda e \lambda s \exists P[S(y)(x)(e) \wedge \text{CAUSE}(s)(e) \wedge P(s) \wedge \text{arg}(y)(s)]$

(47) $\| \text{na-} \| = \lambda S_{<e, <e, <v,t>>>} \lambda y \lambda x \lambda e \lambda s[S(y)(x)(e) \wedge \text{CAUSE}(s)(e) \wedge P(s) \wedge \text{arg}(y)(s)]$

- In (46), the variable over properties of states gets existentially bound,
- In (47), the variable is left free and interpreted by the assignment function

3. Result states and their descriptive properties

(46) $\| \text{na-} \| = \lambda S_{<e, <e, <v,t>>>} \lambda y \lambda x \lambda e \lambda s \exists P[S(y)(x)(e) \wedge CAUSE(s)(e) \wedge P(s) \wedge arg(y)(s)]$

(47) $\| \text{na-} \| = \lambda S_{<e, <e, <v,t>>>} \lambda y \lambda x \lambda e \lambda s [S(y)(x)(e) \wedge CAUSE(s)(e) \wedge P(s) \wedge arg(y)(s)]$

- This does not seem to yield the desired result either.
- (46)-(47) do not guarantee that a property of events is coupled with a right of property of states, ‘write’ with ‘be written’, ‘paint’ with ‘be painted’, etc.

3. Result states and their descriptive properties

- While (43) is too specific, as to the descriptive properties of a result state, (46) and (47) are too underspecified.

(43) $\| \text{na-} \| = \lambda S_{<e, <e, <v,t>>>} \lambda y \lambda x \lambda e \lambda s[\, S(y)(x)(e) \wedge \text{CAUSE}(s)(e) \wedge \text{written}(s) \wedge \text{arg}(y)(s)]$

(46) $\| \text{na-} \| = \lambda S_{<e, <e, <v,t>>>} \lambda y \lambda x \lambda e \lambda s \exists P[S(y)(x)(e) \wedge \text{CAUSE}(s)(e) \wedge P(s) \wedge \text{arg}(y)(s)]$

(47) $\| \text{na-} \| = \lambda S_{<e, <e, <v,t>>>} \lambda y \lambda x \lambda e \lambda s[S(y)(x)(e) \wedge \text{CAUSE}(s)(e) \wedge P(s) \wedge \text{arg}(y)(s)]$

3. Result states and their descriptive properties

- One can argue that it is the causal relation that ensures that the properties of a result state come out right on the ‘underspecified’ version of the analysis
- States of having been written are not caused by drawing events
- However, it is by far not obvious if the causal relation can and should be defined in such a way

3. Result states and their descriptive properties

- Resultatives

(48) He drank the teapot empty (Kratzer 2005)

- Drinking events bring about a state of being empty
- If only states of having been drunk are allowed to be causally related to drinking events, resultatives like (48) will be difficult to derive.

3. Result states and their descriptive properties

- One can try to save the underspecified semantics for a prefix by suggesting that descriptive properties of the result state are inferred from ***both*** the causal relation and **the fact that the subevental components share a participant (**cf. Rothstein's (2004) theory of resultatives)

(42) || napisa- || = λyλxλeλs [write(e) ∧ agent(x)(e) ∧ theme (y)(e) ∧ CAUSE(s)(e) ∧ written(s) ∧ arg(y)(s)]

- Events in which X undergoes writing/eating/drinking can only bring about X's states of being written/eaten/drunk

3. Result states and their descriptive properties

- This may work for cases like *napisa-*.
- However, there are other cases, where a holder of the result state associated with the prefix is not identical to a (subcategorized) argument of the activity

(49) Volodja nael puzo
V. PRF-eat-PST.M belly.ACC
'Volodja acquired a belly by eating'

3. Result states and their descriptive properties

- Examples like (49) suggest that, as a general case, verbs and prefixes do not have to share arguments.

- If an analysis of *na-* in *napisa-* is crucially based on the assumption that the theme of the activity is identical to the holder of result state, it will not be extendable to verb where non-subcategorized arguments are projected as a sentential object.

3. Result states and their descriptive properties

- A possible solution
- Part of the denotation of prefixes like *na-* in *napisat'* are parameterized choice function of type <<<v,t>,t><v,t>>.
- Overall, choice functions, functions of logical type <<σ, t>, σ>, where σ is a type, apply to a non-empty set and yield a member of this set as a value.

3. Result states and their descriptive properties

- Parameterized choice functions (PCFs; e.g., Kratzer (1998): choice functions with an implicit argument position.
- In Kratzer's system, a variable occurring in this position can be bound by a quantifier, hence the choice function is made dependent on that quantifier.
- It is this latter aspect of PCFs, namely, that their interpretation varies according to how the implicit argument is construed, plays a crucial role in the semantics of prefixes.

3. Result states and their descriptive properties

(50) || na- || =

$\lambda S_{<e,<e,<v,t>>>} \lambda y \lambda x \lambda e \lambda s \exists \underline{P}_{<<v,t>,t>} [S(y)(x)(e) \wedge CAUSE(s)(e) \wedge (f^{NA}_{\lambda e'.S(y)(x)(e')}(\underline{P}))(s) \wedge arg(y)(s)]$

- In (50), f^{NA} is a function that takes an event description $\lambda e.S(y)(x)(e)$ based on the relation *S* provided by the verb stem and maps it to a choice function $f^{NA}_{\lambda e.S(y)(x)(e)}$.
- $f^{NA}_{\lambda e.S(y)(x)(e)}$, then, is only defined for one argument, the set of properties of all states $\underline{P}$, and picks out a particular property of states, the one containing states brought about by events from the extension of $\lambda e.S(y)(x)(e)$.

3. Result states and their descriptive properties

(51) || na-pisa || = $\lambda y \lambda x \lambda e \lambda s \exists \underline{P}$ [write(e) $\wedge$ agent (x)(e) $\wedge$ theme (y)(e) $\wedge$ CAUSE(s)(e) $\wedge$ ($f^{NA}_{\lambda e'.\text{write}(e') \wedge \text{agent}(x)(e') \wedge \text{theme}(y)(e')}(\underline{P})$)(s) $\wedge$ arg(y)(s)]

- Having combined the prefix with the verb stems *pisa*-, we get a four-place relations in (51).

- The choice function $f^{NA}_{\lambda e'.\text{write}(e') \wedge \text{agent}(x)(e') \wedge \text{theme}(y)(e')}$ yields a property of states of being written

3. Result states and their descriptive properties

(52) || na-risova- || =

$\lambda y \lambda x \lambda e \lambda s \exists \underline{P}$ [paint(e) $\wedge$ agent (x)(e) $\wedge$ theme (y)(e) $\wedge$ CAUSE(s)(e) $\wedge$ ($f^{NA}_{\lambda e'.paint(e') \wedge agent(x)(e') \wedge theme(y)(e')}(\underline{P}$))(s) $\wedge$ arg(y)(s)]

- The choice function $f^{NA}_{\lambda e'.paint(e') \wedge agent(x)(e') \wedge theme(y)(e')}$ picks out a property of states of being painted

3. Result states and their descriptive properties

- Approaching non-subcategorized arguments

(53) || Volodja nael puzo || =
$\lambda y \lambda x \lambda e \lambda s \exists \underline{P} \exists z [eat(e) \wedge agent(x)(e) \wedge theme\ (z)(e) \wedge CAUSE(s)(e) \wedge (f^{NA}_{\lambda e'.\exists z\ '[eat(e') \wedge agent(x)(e') \wedge theme(z')(e')]}(\underline{P}))(s) \wedge arg(y)(s)]$

Summary

- Prefixes introduce result states
- Prefixes only introduce result states
- Descriptive properties of result states are determined by an event description provided by the verb base
- Choice functions open a way of providing a general account for the relationship between prefixes and verb bases

Thank you!