Towards a rule-guided derivation of aspectual readings in Russian

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Résumé – Abstract

Les significations des expressions dans les langues naturelles sont souvent indéterminées (sous-spécifiées) et nécessitent d'être enrichies avant de devenir des propositions complètes. La sémantique générale des expressions linguistiques doit être complétée par les inférences pragmatiques, identifiées et captées d'une manière régulière et permettant ainsi un traitement opérationnel et même informatique. Cet article étudie l'indétermination de l'aspect imperfectif en russe et propose un cadre sémantique et pragmatique pour l'identification de ses différentes valeurs sémantiques à la base de règles.

Natural language expressions are underspecified and require enrichment to develop into full fledged propositions. Their sense-general semantics must be complemented with pragmatic inferences that have to be systematically figured out and pinned down in a principled way, so as to make them suitable inputs for NLP algorithms. This paper deals with the underspecified ipf[1] aspect in Russian and introduces a semantic and pragmatic framework that might serve as the basis for a rule-guided derivation of its different readings.

Keywords – Mots Clés

Indétermination, aspect, interprétation, sémantique, pragmatique
Underspecification, aspect, interpretation, semantics, pragmatics

1 Underspecification of Russian ipf Aspect

One instance of underspecification is aspect in Russian, especially the ipf, which gives rise to a considerable variety of readings. These temporal and further, rather specific readings arise due to an interplay of information provided by different linguistic and non-linguistic sources. Some examples are illustrated in (1a-d) below (cf. Padučeva 1996). The defeasibility of these

[1] 'ipf' = (Russian) imperfective aspect; 'pf' = (Russian) perfective aspect

readings indicates their at least partial pragmatic character. A further difficulty for NLP applications is that – presuming cooperativity – any utterance can receive an interpretation by appropriately accommodating the context.

(1) a. *actual-processual reading*

Kogda	ja	vošel,	moj brat	čital	knigu.
when	I	enter:PAST:**pf**,	my brother	read:PAST:**ipf**	a book:ACC.

'When I entered, my brother was reading a book.'

This reading is assumed to be the default reading, requiring no additional context to arise.

b. *general-factual reading*

Ty	čital	ėtot roman?
you	read:PAST:**ipf**	this novel

'Have you read this novel?'

This reading poses difficulties for accounts of the ipf in terms of 'incompletedness', as the event in question is completed. Here, English does not allow the progressive aspect which is marked for φ_{dyn}-selection (*section 2*) and therefore is incompatible with completedness.

c. *potential reading*

On	chorošo	igral	v	šachmaty.
he	well	play:Past:**ipf**		chess.

'He could play chess very well.' = 'He was a good chess-player'.

This reading arises mainly with a specific group of verbs, combined with manner adverbials.

d. *habitual reading*

deduška	obyčno	guljal	so vnukami,	s nimi	igral	v	futbol,
grandpa	usually	take a walk:PAST:**ipf**	with grandschildren,	with them	play:PAST:**ipf**		football,
kuril	trubku, ...						
smoke:PAST:**ipf**	pipe, ...						

'Grandpa used to go for a walk with the grandchildren, he used to play football with them, he used to smoke a pipe, …

This reading arises with any aspectual form in the presence of adverbials of habituality.

2 Basic semantics

Semantically, a 'selectional theory' of aspect is assumed (Bickel 1996), where aspect selects phases (φ) or boundaries (τ). Presuming a tripartite event structure (Moens/Steedman 1988) consisting of preparation phase (dynamic phase φ_{dyn}), culmination point (boundary τ) and consequent state (static phase φ_{stat}) there are three possibilities for that selection, i.e., for making the selected part of the event visible and accessible for truth-conditional evaluation at a validation interval *VI*. The non-selected parts of the event are presupposed or left to implicatures. Note, that aspect requires a certain input, and if this input is not given by the verbal basis, it has to be adjusted accordingly[2]. The marked members of the respective aspectual oppositions explicitly select a certain part; the unmarked forms are sense-general, their meaning has to be specified semantically or pragmatically. The readings of ipf can be grouped according to the character of their *VI*, which may be retrospective or synchronous (bounded or unbounded, cf. Padučeva 1996) with respect to the selected part. The relation

[2] Contrary to what an anonymous reviewer pointend out, this analysis does make the correct predictions about 'He is being silly' meaning 'He is acting silly': the progressive requires a dynamic phase to be present, and this phase is pragmatically induced resulting in the respective interpretation (M-inference, cf. section 4).

characterizes the values ipf may acquire in interpretation.[3] In most cases, *VI* is lexically specified and serves as a hint as to which group of readings (I-III) applies. The respective reading then is derived by means of context and world-knowledge, cf. *figure 1*:

		VI	**Relation**	**Reading of the ipf Aspect**
IPF	I.	synchronous, bounded	TT included in φ_{dyn}	actual-processual
	II.	synchronous, non-bounded	TT simultaneous with (φ_{dyn} τ φ_{stat})	habitual, inactual/continuous, potential, permanent, atemporal
	III.	retrospective	TT includes (φ_{dyn} τ φ_{stat})	general-factual, durative

Figure 1: Classification of the readings of Russian ipf aspect

3 Basic pragmatics

The pragmatic principles are Levinson's (2000) default heuristics for interpretation based on the Gricean Maxims of Conversation (Grice 1989): Q-inferences are based on the first quantity maxim ('make your statement as informative as possible') and license inference to the negation or invalidity of a stronger expression, M-inferences stem from violations of the manner maxim ('avoid prolixity'), and lincense the inference from marked expressions to marked interpretations. I-inferences are based on the second quantity maxim ('do not say more than necessary') and allow for inference to a stereotype. Contrary to the Gricean view, however, these are assumed to work also on the subpropositional level giving rise to 'explicatures' (Carston 2002), which enrich underspecified lexical representation.

Q-inferences derive the meaning of unmarked forms by giving rise to scalar implicatures (scale <pf, ipf>), meaning that the use or the weaker element (ipf) entitles the hearer to infer the non-validity of the stronger expression (pf), thereby giving rise to the three possible values stated above (*figure 1*). M-inferences occur here with mismatches between aspectual selector and verbal basis, i.e. with the application of a φ- or τ-selector on a basis that does not provide the respective feature, which hast to be induced semantically or pragmatically, thereby enriching the logical structure. This can be systematically captured and formalized by 'coercion operators' (Thomas/Pulman 1999; Pulman 1997). I-inferences refer back to world-knowledge, thereby enriching the lexical meaning of the aspecto-temporal forms. As frequently encountered concepts are more likely to get activated, they constitute the stereotypes to which the I-inferences are drawn.

4 Towards a rule-guided derivation

A list of readings has to be established (see *figure 1*), the factors involved their derivation have to be fixed and rules of interaction have to be stated that can be expressed in the propositional logic form $A \rightarrow B$ (cf. Vazov/Lapalme 2000). Interpretation of aspectual forms processes incrementally, i.e. information once provided and processed can't be undone. Input factors for algorithms are the following: Verbs indexed for φ and τ they contain; lexical items

[3] That we have indeed to distinguish between those three possibilities is indicated by a look at Turkish, which has morphological means to express the respective relation (cf. Sonnenhauser 2003).

indexed for whether they add φ or τ and aspectual selectors indexed for what they select and for their status within the language specific markedness relation. That is how Q-inferences are drawn. *VI* constrains the interpretations of the unmarked aspectual partner. The default combinations of base and selector have to be stated, as well as rules for resolving the mismatches. M-inferences then can be pinned down by coercion operators (Pulman 1997; Thomas/Pulman 1999). More difficult is the problem of how to specify verbs for the commonsens knowledge they provide access to, which is indespensable for I-inference to be drawn. One means would be corpus analysis in order to detect regularities and coocurrences of lexical items that might hint to a conceptual connection. As the factor 'probability' can't be eliminated, there is to be implemented a condition preferring the shortest line of reasoning (Thomas/Pulman 1999).

The default case is a fit of basis and marker, where the verbal basis provides the necessary input for the marker to apply. For ipf, the conditions have to be stated under which the three possibilites (*figure 1*) get activated. Here, *VI* – primarily temporal or manner adverbials (e.g. *vse bol'še* 'more and more', *chorošo* 'well') – is decisive. Adverbials of cardinality and duration fix *VI* as retrospective and the reading as out of group III. The rule for this line of interpretation can be stated as follows (adopted from Vazov/Lapalme 2000):

(4) IF ipf is applied to a verb providing a phase
AND if there is an adverbial fixing VI as retrospective
THEN the aspectual form gets a reading out of group III.

(5) *durative reading*

Ja guljala		ot	trech to pjati.
I go-for-a-walk:PAST:**ipf**		from	three:Gen to five:Gen
'From three to five, I went for a walk.'			

This interpretation can be overridden if *VI* is turned into a synchronous one by adverbials of the type *vsegda* ('always') or *obyčno* ('usually').

(6) a. *habitual reading*

Ja	obyčno	guljala	ot trech to pjati.
I	usually	go-for-walk:PAST:**ipf**	from three:GEN to five:GEN
'I usually went for a walk from three to five.'			

This shows the incremental way of interpretation, whereby the inner parts are left intact:

b. [$_{\text{syn.unbounded}}$ obyčno [$_{\text{retro}}$ ot...do [$_{\text{syn.bounded}}$ guljal]]]

A synchronous *VI* may be bounded or unbounded (group I and II, *table 1*), cf. (7) and (8):

(7) IF ipf is applied to a verb providing a phase
AND if there is an adverbial fixing VI as synchronous bounded/unbounded
THEN the aspectual form gets a reading out of group I/II

(8) a. *actual-processual reading*

V vosem´ časov, ja		čitala	knigu.
at eight o´clock,	I	read:Past:**ipf**	book:Acc
'At eight o´clock, I was reading a book.'			

b. *inactual reading*

Ran´še, on rabotal		v universitete.
before	he work:PAST:**ipf**	at university
'He used to work at university.' (= 'He was working as a teacher.')		

Depending on the semantic representation of the verb, implicatures or presuppositions may arise. Ipf with the structure [φ τ] leaves the reaching of the boundary as an implicature, ipf with [τ φ] leaves the initial boundary as presupposition.

Whenever an aspectual marker is applied on a basis not providing the relevant feature (φ or τ) for it to apply, that feature is semantically or pragmatically induced in order to eliminate that mismatch. Coercion operators capture this recategorization process (Pulman 1997):

(9) a. Ivan vyigral gonku.
Ivan win:PAST:**pf** race:ACC
'Ivan won the race.'

Here, pf is applied to a verb that provides a τ, no coercion is necessary.

b. Ivan vyigryval gonku (četyre raza).
Ivan win: PAST:**ipf** race:ACC (four times).
'Ivan won the race four times / was winning the race.'

The application of ipf in (9b) requires a φ, which the verb *vyigrat´* ('win') does not provide. So it has to be induced by iteration or by zooming in on φ_{dyn}. Two coercion operators may be applied: "iterate / stretch: point → process" (Pulman 1997). In most cases, context provides the necessary cues for disambiguation, if not, one has to rely on the 'probability-condition'.

c. V vosem časov ona uže vyšla.
at eight o´clock she already leave:PAST:**pf**
'At eight o´clock, she had already left.' (= she was gone)

For the consequent-state reading in (9c), the prefix *vy-* induces the boundary required for pf to apply. The reading arises due to the particle *uže* ('already'); the coercion operator is "add-cstate: X → <X, state>, where X is point or process" (Pulman 1997). The rules for (9b) are:

(10) a. IF ipf is applied to a verb providing no phase,
AND a lexical item indicating iteration is present
THEN induce the phase by application of '*iterate'*

b. IF ipf is applied to a verb providing no phase
AND and adverbial/clause indicating incidence is present
THEN induce the phase by application of '*stretch'*

The application of ipf onto a verbal basis providing merely a τ (prior to coercion) is both pragmatically and morphologically marked, but ipf does not lose its semantic unmarkedness. Though interpretation in terms of coercion is compositional, the specific reading this coercion gives rise to dependens on linguistic context and world-knowledge (de Swart 1998); cf. (11)[4]:

(11) On rešal zadaču.
he solve:PAST:**ipf** exercise:ACC

a. *actual-processual reading*
'He was solving the exercise.'

b. *conative reading*
'He tried to solve the exercise.'

c. *general-factual reading*
'He solved the exercise.'

Whereas (c) can be disambiguated by fixing *VI* as retrospective, (a) and (b) cannot be distinguished by *VI* alone as both require it to be synchronous. The distinction between the possible readings is left to contextual disambiguation and world-knowledge. Gaining probability values and for interpretations by a statistical approach taking into account judgements of native speakers helps (Glovinskaja 1982), but the probability rankings can be overriden by the lexical content of verbal phrases.

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[4] The readings listed here involve different degrees of context-dependency.

5 Concluding remarks

The framework presented here allows for taking also pragmatic reasoning processes into account in computing interpretations. Without a principled account of inferential principles NLP applications have to fail. This rather sketchy picture presented here is to serve as a starting point for identifying semantic and pragmatic factors in the aspecto-temporal system of Russian. A lot of problems remain to be solved. Corpus analyses and the appropriate annotation of verbs, aspect markers and adverbials are the prerequisite for formulating rules that enable the systematic derivation and computation of the readings. Furthermore, the interaction of the different factors has to be studied in a wider domain, i.e. on the paragraph level.

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