Perfectivity in Russian: A modal analysis
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**Problem:** aspectual composition. In languages like English, cumulativity/quantization status of incremental arguments determines that of verbal predicates (Krifka 1989, 1992, 1998), cf. *eat an apple/the apple/three apples/the soup* and *eat apples/eat soup*. In languages like Russian, the other way round, perfectivity restricts interpretation of the argument (e.g., Filip 1993 and much further work, Piñon 2001). In (1), the perfective verb *napisat’* can only yield a telic predicate, and undetermined plural incremental argument has the definite interpretation: it refers to the maximal individual consisting of all the apples available at the universe of discourse. Maximality is an entailment of (1): explicit indication that there are individuals not involved in the event yields a contradiction, (2). If the perfective is not there, the interpretation of the incremental argument is no longer restricted. (3). Krifka 1992:50 and Pinon 2001 analyze the perfective as an operator guaranteeing that things go wrong if it combines with a cumulative nominal predicate. For Krifka, the perfective is a modifier in (4). Assume that the verb ‘*eat*’ in (1) is a three-place relation \( \lambda e \lambda y \lambda x \exists s[\text{agent}(x)(e) \land \text{eat}(e) \land \text{theme}(y)(e)] \), and the undetermined internal argument is ambiguous between definite and indefinite interpretations ( \( \text{eat appls}(x) \) vs. \( \lambda x \exists s[\text{eat}(x) \land \text{appls}(x)] \)). This yields two aspectless event predicates in (5a-b) that serve as an input to the aspectual operator. The result of the application of PVF to the non-quantized (5b) is an empty set of events, and this is the way the definiteness effect observed in (1) can be derived, see Pinon 2001 and Filip 1996, 2005 for analyses in the same spirit. An obvious problem for this type of approach is that it looks like a re-description of facts rather than an explanation. A major alternative, Klein’s (1994, 1995) analysis of the perfective, does not suffice to account for Slavic perfectivity. There is nothing in the semantics of the perfective in (6) that prevents its successful application to both (5a) and (5b). Aspectual compositional effects of the Slavic perfective cannot be derived.

**Proposal.** An alternative I propose is based in the following informal idea. The Slavic perfective consists of two components: Klein’s component, (7a), it shares with perfectives in languages like English, and a modal component, (7b), framed within Kratzer’s (1977, 1981 and elsewhere) double relative theory of modality. Due to (7b), the perfective asserts that an event \( e \) of event-type \( P \) occurs in the evaluation world and that no continuation of \( e \) occurs in any accessible world provided that the continuation falls under \( P \) as well; the evaluation world is one of those worlds where \( e \) is maximally realized with respect to \( P \). This is captured by means of the *BEST relation* determining the set of best worlds for \( P \)-type events, those worlds where events are maximally realized. The *BEST relation*, (8), picks out the set of worlds from the modal base (more precisely: from the intersection of all propositions in the modal base \( \langle \mathcal{CIRC}(w) \rangle \)) that come closest to the ideal established by the ordering source \( \text{Cont}(e, P) \). The *modal base* \( \mathcal{CIRC} \) (of type \( <s, <t, h> \)), (9), is a circumstantial conversational background that assigns to each \( w \) a set of propositions. One of these propositions is a set of worlds \( w’ \) such that our event occurs in \( w’ \) (assuming cross-world identity) while still falling under the event description \( P \) in \( w’ \). The conversational background is realistic. The *ordering source* \( \text{Cont} \) of type \( <v_t, <v, <s, t, h>> \), (10)-(11), imposes a strict partial order on the set defined by \( \mathcal{CIRC} \). \( \text{Cont} \) takes an event description \( P \) and an event \( e \) and returns a set of propositions that express continuations of \( e \). We keep track of any continuation of \( e \) in any world \( w \) from the modal base provided that \( e \) falls under the extension of \( P \) in \( w \). Intuitively, the more our \( P \)-event extends in a world, the better this world is. If we reach a world \( w \) where our \( P \)-event still occurs, but cannot find a world \( w’ \) where it extends yet a bit more, then \( w \) is (one of) the best worlds. This ordering source makes the perfective dependent on the quantization status of the event predicate \( P \).

**Case 1:** \( P \) is quantized (e.g., (5a)). If \( P \) is quantized and \( e \) falls under \( P \), then \( e \oplus e_i \) does not fall under \( P \) for any \( e_i \) distinct from \( e \) itself. (For if \( P(e) \) and \( P(e \oplus e_i) \) both hold, and \( e \neq e_i \), \( P \) applies to \( e \oplus e_i \) and to its proper part \( e \), that is, is not quantized, contrary to the assumption.) Therefore, sets of worlds in the ordering source \( \{w | P(e \oplus e_i) \text{ in } w\}, \{w | P(e \oplus e_i \oplus e_2) \text{ in } w\} \), and so on are all empty: in any world, our event cannot continue as a \( P \)-type event. The ordering source reduces to a singleton set of propositions in (12). The *BEST* function thus picks out \( \{w | P(e) \text{ in } w\} \) as the set of best worlds. According to (7b), our world is one of those.

**Case 2:** \( P \) is cumulative (e.g., (5b)). If \( P \) is cumulative and \( e \) falls under \( P \), then \( e \oplus e_i \) does falls under \( P \) as well (as long as \( e_i \) falls under \( P \)); similarly for any other continuations of \( e \). The ordering source, then, looks like (13). Due to (10)-(11), the bigger continuation we take the better the world in which this continuation occurs is, (14). Therefore, for our world, where, by initial assumption, \( e \) stops,
there is no way of being among the best ones, contrary to what (7b) requires. (Moreover, since \( \text{Cont}(e, P) \) does not take care about the degree of similarity of a world where a continuation of \( e \) occurs to the evaluation world, the continuation of our event will never stop. The \text{BEST} function will then return an empty set of worlds.)

**Conclusion.** The modal analysis I attempted to develop seems to derive aspectual compositional effects of the Slavic perfective without stipulating quantization / non-cumulativity conditions and to capture significant intuitions about maximality entailments associated with perfective sentences.

(1) **Perfective sentence; undetermined plural DP**

Vasja \( s^{'}-e-l \) jablok-i (za dva čas-a / * dva čas-a).
Vasja PRF-eat-PST.M apple-ACC.PL in two-ACC hour-GEN two-ACC hour-GEN
1. ‘Vasja ate all the apples (in two hours).’
2. * ‘Vasja ate apples (for two hours).’

(2) #Vasja \( s^{'}-e-l \) jablok-i, no osta-l-o-s’ es’c’e neskol’ko.
Vasja PRF-eat-PST.M apple-ACC.PL but remain-PST-N-REFL more a few
‘Vasja ate (all) the apples, but there are a few more (apples to eat).’

(3) ** Imperfective sentence; undetermined plural DP**

Vasja e-l jablok-i.
Vasja eat-PST.M apple-ACC.PL
1. ‘Vasja was eating the apples.’
2. ‘Vasja was eating apples.’

(4) **Krifka 1992 on Slavic perfectivity:** \( \lambda P \lambda e [ P(e) \land \text{QUA}(P) ] \)

(5) \( \forall P \) denotations

a. \( \lambda e [ \text{agent}(\text{vasja})(e) \land \text{eat}(e) \land \text{theme}(\text{vy apples}(y))(e)] \) (quantized)
b. \( \lambda e \exists y [ \text{apples}(y) \land \text{agent}(\text{Vasja})(e) \land \text{eat}(e) \land \text{theme}(y)(e)] \) (cumulative)

(6) **Klein 1994 and elsewhere: reference time includes event time**

\[ \text{PFV} = \lambda P \lambda e [ P(e) \land \tau(e) \subset t ] \]

(7) **Semantics of PFV:**

a. PFV(P)(t) is true of a world \( w \) iff there is an event \( e \) in \( w \) such that \( P(e) \) and \( t \) includes \( \tau(e) \) and
b. \( w \) is a member of the set \( p \) of best worlds for \( e \) relative to \( P \), \( p = \text{BEST}(\text{Circ}, \text{Cont}, P, e, w) \), where \( \text{Circ} \) is a contextual mod. base and \( \text{Cont} \) is an event-maximizing ordering source

(8) **The best relation:** \( \text{BEST}(\text{Circ}, \text{Cont}, P, e, w) = \text{the set of worlds } w' \text{ in } \cap \text{Circ}(w) \) such that there is no \( w'' \) in \( \cap \text{Circ}(w) \) where \( w'' < \text{Cont}(e, P) \) \( w' \)

(9) **Modal base (for a world \( w \)):** \( \text{Circ}(w) = \{ \ldots , \{ w' \mid P(e) \text{ in } w' \} , \ldots \} \)

(10) **Ordering relation:** For any \( w, w' < \text{Cont}(e, P) \) \( w' \) iff \( \{ p \in \text{Cont}(e, P) \mid w \in p \} \subset \{ p \in \text{Cont}(e, P) \mid w' \in p \} \)

(11) **Ordering source:**

\( \text{Cont}(e, P) = \{ \{ w \mid P(e) \text{ in } w \} , \{ w \mid P(e \otimes e_1) \text{ in } w \} , \{ w \mid P(e_1 \otimes e_2 \otimes e_3) \text{ in } w \} , \ldots \} \)

(12) **Degenerate ordering source for quantified Ps**

\( \text{Cont}(e, P) = \{ \{ w \mid P(e) \text{ in } w \} , \{ w \mid P(e \otimes e_1) \text{ in } w \} , \{ w \mid P(e_1 \otimes e_2 \otimes e_3) \text{ in } w \} , \ldots \} \)

(13) **Ordering source for non-quantified Ps**

\( \text{Cont}(e, P) = \{ \{ w \mid P(e) \text{ in } w \} , \{ w \mid P(e \otimes e_1) \text{ in } w \} , \{ w \mid P(e_1 \otimes e_2 \otimes e_3) \text{ in } w \} , \ldots \} \)

(14) **If \( P(e \otimes e') \text{ holds in } w, \text{P(e) holds in } w, \text{too for any } P, e, e' \text{ (down to atomic parts of } P \text{ if } P \text{ is atomic). Hence if } w \in \{ w \mid P(e) \} \text{ and } w' \in \{ w \mid P(e \otimes e) \} \text{, } w' < \text{Cont}(e, P) \text{ w} \)