The composition of aspect and path in Russian motion expressions

In the context of verbal affixes and aspect in Russian, verbs of motion provide a particularly interesting domain of investigation. They consist of a limited set of basic imperfective verbs which exist in two forms: determinate (or (uni)directional) and indeterminate (or multi-/non-directional). Taking into the account numerous existing approaches (Isačenko, 1960; Forsyth, 1970; Padučeva, 1996; Romanova, 2006; Dickey, 2010; Kagan, 2010, 2012, among others), we propose an analysis based on frame-semantic decomposition (Fillmore, 1982; Kallmeyer and Osswald, 2012) for modeling the difference between indeterminate vs. determinate motion verbs and the effect of their prefixation.

To keep things simple, we consider an indeterminate-determinate verb pair where the former bears stress on the root[1]: *bégat'*^{IPF}/*bežát'*^{IPF} ('to run'). The prefix *pro-* can be added to both verbs of the pair, which gives rise to the two verbs in (1-a) and (1-b) that are not paired any longer. Moreover, *probežát'*^{PF} has the (irregular) secondary imperfective shown in (1-c). Now, (1-a) and (1-c) phonologically differ only in stress, but have different aspect and semantics.

(1) a. *probégat'*^{PF} 'to run during a certain amount of time'
     b. *probežát'*^{PF} 'to run a certain distance or past something'
     c. *probegát'*^{IPF} 'to be running/run a certain distance or past something'

Our modeling framework leans on the approach proposed by Kallmeyer and Osswald (2012, 2013), where operations on the morphological and syntactic levels trigger the unification of frames on the semantic level. As suggested by Kagan (2012), indeterminate and determinate motion verbs differ in that the latter but not the former lexicalize a *path scale*. In a frame-based analysis, this difference can be represented as follows. Indeterminate motion verbs are mainly characterized by the manner of motion they encode, which is represented by the value of a MANNER attribute. Since motion events come by default with a change of location, they can be said to have an attribute TRACE, whose value is the set of points in space traversed.[2]

We assume a hierarchy of scale types with *time* and *path* as subtypes of *scale*, and *distance* as subtype of *path*. As verbs of motion describe non-static events, there is a measuring function of a certain type represented by a MEASURE attribute that can be further specified. Events of indeterminate motion may only be measured with respect to the *time* scale, whereas determinate motion events lexicalize a *path* scale, which is assumed to provide a richer conceptualization of the trace elements in terms of temporal ordering and directedness. This analysis allows us to predict the ability of the verbs in question to be combined with measure phrases of *time* and *path* types and the semantics of the resulting verb phrases,[3] as sketched by the frames in Fig. 1. In the full paper, we show how the approach extends to other Russian prefixes and motion verbs, with an emphasis on those pairs where the indeterminate verb bears stress on the suffix and gives rise to ambiguous forms similar to (1-a) and (1-c).

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[1] Vowel stress is marked by acute accents.

[2] Note that the FORM of the trace can be accessed in expressions like 'run in circles', which in Russian, requires the indeterminate verb plus an plural NP in instrumental case.

[3] As imperfectivization is not the central topic of this abstract, we provide only one possible solution and just for the progressive meaning. Adopting other analysis of imperfective paradox does not influence the rest of the approach.
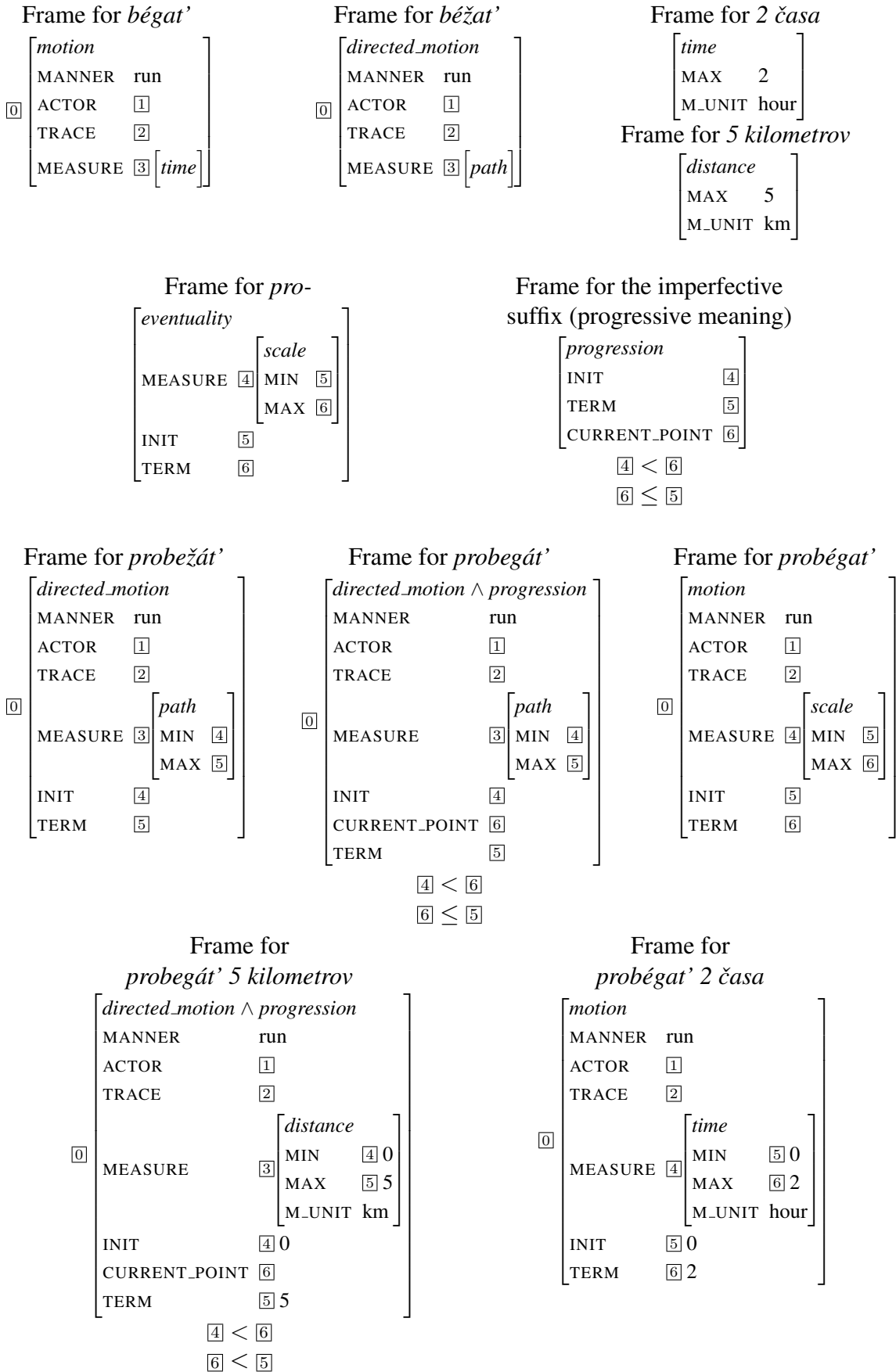
Frame for _bégat'_

$$
\boxed{0}\begin{bmatrix} \textit{motion} \\ \text{MANNER} \quad \text{run} \\ \text{ACTOR} \quad \boxed{1} \\ \text{TRACE} \quad \boxed{2} \\ \text{MEASURE} \quad \boxed{3}\begin{bmatrix}\textit{time}\end{bmatrix} \end{bmatrix}
$$

Frame for _béžat'_

$$
\boxed{0}\begin{bmatrix} \textit{directed\_motion} \\ \text{MANNER} \quad \text{run} \\ \text{ACTOR} \quad \boxed{1} \\ \text{TRACE} \quad \boxed{2} \\ \text{MEASURE} \quad \boxed{3}\begin{bmatrix}\textit{path}\end{bmatrix} \end{bmatrix}
$$

Frame for _2 časa_

$$
\begin{bmatrix} \textit{time} \\ \text{MAX} \quad 2 \\ \text{M\_UNIT} \quad \text{hour} \end{bmatrix}
$$

Frame for _5 kilometrov_

$$
\begin{bmatrix} \textit{distance} \\ \text{MAX} \quad 5 \\ \text{M\_UNIT} \quad \text{km} \end{bmatrix}
$$

Frame for _pro-_

$$
\begin{bmatrix} \textit{eventuality} \\ \text{MEASURE} \quad \boxed{4}\begin{bmatrix}\textit{scale} \\ \text{MIN} \quad \boxed{5} \\ \text{MAX} \quad \boxed{6}\end{bmatrix} \\ \text{INIT} \quad \boxed{5} \\ \text{TERM} \quad \boxed{6} \end{bmatrix}
$$

Frame for the imperfective suffix (progressive meaning)

$$
\begin{bmatrix} \textit{progression} \\ \text{INIT} \quad \boxed{4} \\ \text{TERM} \quad \boxed{5} \\ \text{CURRENT\_POINT} \quad \boxed{6} \end{bmatrix}
$$
$$\boxed{4} < \boxed{6}$$
$$\boxed{6} \leq \boxed{5}$$

Frame for _probežát'_

$$
\boxed{0}\begin{bmatrix} \textit{directed\_motion} \\ \text{MANNER} \quad \text{run} \\ \text{ACTOR} \quad \boxed{1} \\ \text{TRACE} \quad \boxed{2} \\ \text{MEASURE} \quad \boxed{3}\begin{bmatrix}\textit{path} \\ \text{MIN} \quad \boxed{4} \\ \text{MAX} \quad \boxed{5}\end{bmatrix} \\ \text{INIT} \quad \boxed{4} \\ \text{TERM} \quad \boxed{5} \end{bmatrix}
$$

Frame for _probegát'_

$$
\boxed{0}\begin{bmatrix} \textit{directed\_motion} \wedge \textit{progression} \\ \text{MANNER} \quad \text{run} \\ \text{ACTOR} \quad \boxed{1} \\ \text{TRACE} \quad \boxed{2} \\ \text{MEASURE} \quad \boxed{3}\begin{bmatrix}\textit{path} \\ \text{MIN} \quad \boxed{4} \\ \text{MAX} \quad \boxed{5}\end{bmatrix} \\ \text{INIT} \quad \boxed{4} \\ \text{CURRENT\_POINT} \quad \boxed{6} \\ \text{TERM} \quad \boxed{5} \end{bmatrix}
$$
$$\boxed{4} < \boxed{6}$$
$$\boxed{6} \leq \boxed{5}$$

Frame for _probégat'_

$$
\boxed{0}\begin{bmatrix} \textit{motion} \\ \text{MANNER} \quad \text{run} \\ \text{ACTOR} \quad \boxed{1} \\ \text{TRACE} \quad \boxed{2} \\ \text{MEASURE} \quad \boxed{4}\begin{bmatrix}\textit{scale} \\ \text{MIN} \quad \boxed{5} \\ \text{MAX} \quad \boxed{6}\end{bmatrix} \\ \text{INIT} \quad \boxed{5} \\ \text{TERM} \quad \boxed{6} \end{bmatrix}
$$

Frame for _probegát' 5 kilometrov_

$$
\boxed{0}\begin{bmatrix} \textit{directed\_motion} \wedge \textit{progression} \\ \text{MANNER} \quad \text{run} \\ \text{ACTOR} \quad \boxed{1} \\ \text{TRACE} \quad \boxed{2} \\ \text{MEASURE} \quad \boxed{3}\begin{bmatrix}\textit{distance} \\ \text{MIN} \quad \boxed{4}\,0 \\ \text{MAX} \quad \boxed{5}\,5 \\ \text{M\_UNIT} \quad \text{km}\end{bmatrix} \\ \text{INIT} \quad \boxed{4}\,0 \\ \text{CURRENT\_POINT} \quad \boxed{6} \\ \text{TERM} \quad \boxed{5}\,5 \end{bmatrix}
$$
$$\boxed{4} < \boxed{6}$$
$$\boxed{6} \leq \boxed{5}$$

Frame for _probégat' 2 časa_

$$
\boxed{0}\begin{bmatrix} \textit{motion} \\ \text{MANNER} \quad \text{run} \\ \text{ACTOR} \quad \boxed{1} \\ \text{TRACE} \quad \boxed{2} \\ \text{MEASURE} \quad \boxed{4}\begin{bmatrix}\textit{time} \\ \text{MIN} \quad \boxed{5}\,0 \\ \text{MAX} \quad \boxed{6}\,2 \\ \text{M\_UNIT} \quad \text{hour}\end{bmatrix} \\ \text{INIT} \quad \boxed{5}\,0 \\ \text{TERM} \quad \boxed{6}\,2 \end{bmatrix}
$$

Figure 1: Examples of frame representations

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