

# Prefixation of Russian verbs of motion: a frame-based account

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CTF'14

Concept Types and Frames in Language, Cognition, and Science

25–27 August, 2014, Düsseldorf

# Introduction

Russian verbs of motion consist of a limited set of basic imperfective verbs which exist in two forms:

- ▶ determinate (or called directional or unidirectional)
- ▶ indeterminate (or multi-directional or non-directional).

- (1) a.  $idti_{det}$  –  $xodit'_{indet}$   
go (one direction) – go (non-directional)
- b.  $letet'_{det}$  –  $letat'_{indet}$   
fly (one direction) – fly (non-directional)

# Introduction

Overview of Russian verbs of motion:

determinate	indeterminate	
<i>idtí</i>	<i>xodít'</i>	'walk, go'
<i>bežát'</i>	<i>bégat'</i>	'run'
<i>letét'</i>	<i>letát'</i>	'fly'
<i>plyt'</i>	<i>plávat'</i>	'swim, sail'
<i>brestí</i>	<i>brodít'</i>	'stroll, trudge'
<i>polztí</i>	<i>pólzat'</i>	'crawl'
<i>katít'sja</i>	<i>katát'sja</i>	'roll'
<i>lezt'</i>	<i>lázit'</i>	'climb, clamber'
<i>éxat'</i>	<i>ézdít'</i>	'ride'
<i>gnát'sja</i>	<i>gonját'sja</i>	'chase'
<i>nestís'</i>	<i>nosít'sja</i>	'rush'
<i>nestí</i>	<i>nosít'</i>	'carry'
<i>taščít'</i>	<i>taskát'</i>	'drag'
<i>katít'</i>	<i>katát'</i>	'roll, convey in a wheeled vehicle'
<i>gnat'</i>	<i>gonját'</i>	'drive'
<i>vestí</i>	<i>vodít'</i>	'lead'
<i>veztí</i>	<i>vozít'</i>	'haul, carry by conveyance'

# Indeterminate vs. determinate verbs

## Determinate

- (2) a. On letel<sub>det</sub> v Berlin.  
he fly.PST.SG.M in Berlin  
'He was flying to Berlin.'
- b. Ptica letela<sub>det</sub> vdol' reki.  
bird fly.PST.SG.F along the river.  
'A bird flew along the river (following the river).'

## Indeterminate

- (3) Ptica letala<sub>indet</sub> vdol' reki.  
bird fly.PST.SG.F along the river.  
'A bird flew along the river (up and down the river).'

## Indeterminate vs. determinate verbs

### Indeterminate

- (4) a. On letal<sub>indet</sub> (krugami).  
he fly.PST.SG.M (circle.INS.PL)  
'He was flying around (in circles).'
- b. Samolët letal<sub>indet</sub> nad gorodom dva časa.  
plane fly.PST.SG.M above city.INS.SG two hours  
'The plane was flying over the city for two hours.'
- c. Etot samolët letaet<sub>indet</sub> v Berlin dva raza v den'.  
this plane fly.PRES.3SG in Berlin two time in day  
'This plane flies to Berlin two times a day.'

## Indeterminate vs. determinate verbs

Informal semantic characterization (Stilman, 1951, pp. 3f):

- ▶ Determinate verbs describe “motion in a definite direction, actually taking place at a given time.”
- ▶ Indeterminate verbs are “used to describe
  - a given type of locomotion in general, without reference to progress in any particular direction;
  - motion in a definite direction when it is repeated or habitual;
  - a completed round trip (in past tense).”

## Prefixation of verbs in Russian

Prefixation (according to Shvedova (1982)):  
28 different prefixes (23 productive),  
up to 10 different meanings per prefix.

Examples of **pri-** meanings:

'approaching something' (*prijti* 'to come'),

'adding something to something' (*pribit* 'to hammer smth'),

'limited action' (*pripodnjat* 'to lift a bit').

# Prefixation of verbs in Russian

Main issue:

intricate interplay of lexical meaning and grammatical aspect.

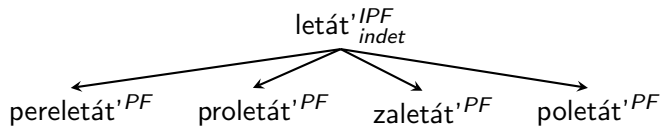
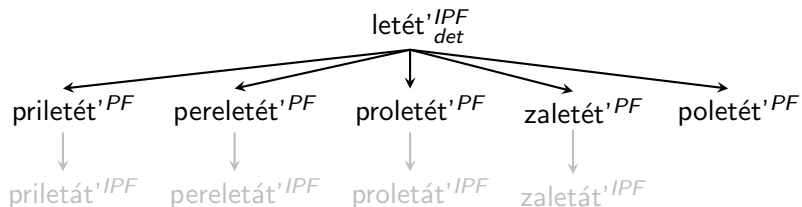
The traditional view of Russian verbal morphology:

- ▶  $V \rightarrow \textit{imperfective}$
- ▶  $\text{Prefix} + V \rightarrow \textit{perfective}$
- ▶  $\text{Prefix} + V + \text{S-imperfective/Hab} \rightarrow \textit{imperfective}$



## Prefixed verbs of motion

Prefixes of interest: *pere-*, *po-*, *pri-*, *pro-*, *za-*.





## Prefixed verbs of motion

- (7)    letét'<sup>IPF</sup><sub>det</sub>                      letát'<sup>IPF</sup><sub>indet</sub>  
         ↓    ↓  
         poletét'<sup>PF</sup>                      poletát'<sup>PF</sup>  
         'to start flying'                      'to spend a short time flying'

- (8) a. Ptenec poletel.  
      Nestling PO.fly.PST.SG.M  
      'The nestling started to fly.'
- b. Ja poletaju            i    vernus'.  
      I PO.fly.PRES.1SG and come.back  
      'I will fly a bit and come back.'

# Frames for verbs

## Frame-semantic representations in general

- ▶ Conceptual-semantic entities (events, objects) can be characterized by types and attributes (and relations between attribute values)  $\rightsquigarrow$  frame representations
- ▶ Frame representations are well-suited for semantic composition at the syntax-semantics interface.
- ▶ Frame representations for verbs can be seen as closely related to logical representations along the lines of Neo-Davidsonian event semantics (for details, see Kallmeyer and Osswald, 2013).

# Examples of verb entries

Frame for *letát'*<sub>indet</sub>

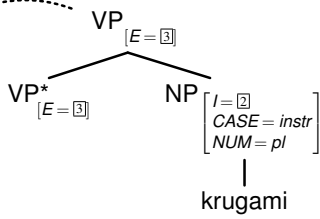
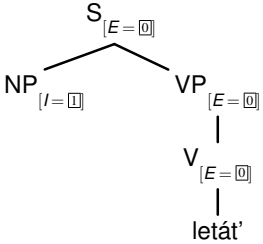
□ <sub>0</sub>	[	<i>transloc</i>	]	V	[E=□ <sub>0</sub> ]		letát'
		MANNER <i>fly</i>					
		ACTOR <i>entity</i>					
		TRACE <i>trace</i>					

Frame for *letét'*<sub>det</sub>

□ <sub>0</sub>	[	<i>directed-transloc</i>	]	V	[E=□ <sub>0</sub> ]		letét'
		MANNER <i>fly</i>					
		ACTOR <i>entity</i>					
		PATH <i>path</i>					

Note: The value of the attribute TRACE is just the set of points traversed without any event-related ordering imposed.

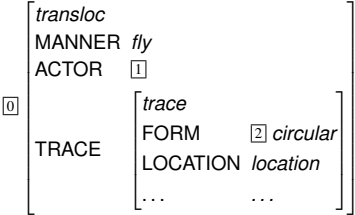
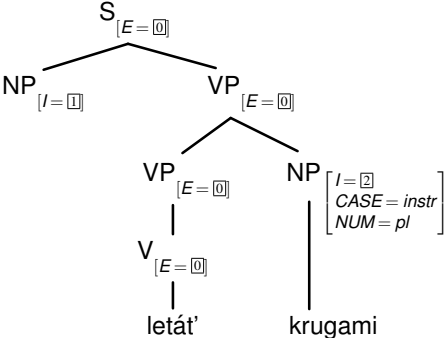
# Examples of motion expressions



[0]	<i>transloc</i>								
	MANNER	<i>fly</i>							
	ACTOR	[1]							
	TRACE	<table border="1"> <tr> <td><i>trace</i></td> <td></td> </tr> <tr> <td>FORM</td> <td><i>form</i></td> </tr> <tr> <td>LOCATION</td> <td><i>location</i></td> </tr> <tr> <td>...</td> <td>...</td> </tr> </table>	<i>trace</i>		FORM	<i>form</i>	LOCATION	<i>location</i>	...
<i>trace</i>									
FORM	<i>form</i>								
LOCATION	<i>location</i>								
...	...								

[3]	TRACE	<table border="1"> <tr> <td><i>trace</i></td> <td></td> </tr> <tr> <td>FORM</td> <td>[2] <i>circular</i></td> </tr> </table>	<i>trace</i>		FORM	[2] <i>circular</i>
<i>trace</i>						
FORM	[2] <i>circular</i>					

# Examples of motion expressions



## The prefix *pro-*: Examples to model

A couple of illustrative examples with distance and time:

- (9) a. Vasja begal<sub>indet</sub>/bežal<sub>det</sub> 20 km 3 časa.  
Vasja run.PST.SG.M 20 km 3 hours  
'Vasja ran 20 km and it took him 3 hours.'
- b. Vasja begal<sub>indet</sub>/bežal<sub>det</sub> 20 km za 2 časa.  
Vasja run.PST.SG.M 20 km in 2 hours  
'Vasja used to run 20 km in two hours.'
- (10) a. Vasja probégal/\*probežál 2 časa.  
Vasja PRO.run.PST.SG.M 2 hours  
'Vasja ran for two hours (without stopping).'
- b. Vasja probégal/probežál 20 km \*(za) 2 časa.  
Vasja PRO.run.PST.SG.M 20 km in 2 hours  
'Vasja ran 20 km in two hours.'



# The prefix *pro-*: Examples to model

## Observations:

- ▶ almost everything is allowed with non-prefixed verbs;
- ▶ prefixed verbs do not allow simultaneous distance specification and time specification with an NP<sub>acc</sub>;
- ▶ prefixed determinate verbs require an NP<sub>acc</sub> that contains path or distance specification.

Assumptions about the syntactic status of measure NP<sub>acc</sub>  
(cf. Fowler and Yadroff, 1993):

- ▶ adjunct for non-prefixed verbs
- ▶ argument for *pro*-prefixed verbs

# Frame semantics: Components

*bégať*'*indet*

<i>transloc</i>	
MANNER	<i>run</i>
ACTOR	<i>entity</i>
TRACE	<i>trace</i>

*bežáť*'*det*

<i>directed-transloc</i>	
MANNER	<i>run</i>
ACTOR	<i>entity</i>
PATH	<i>path</i>

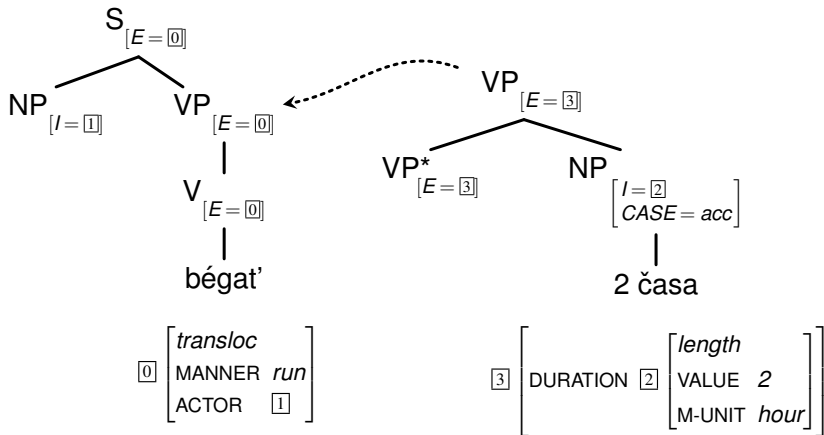
*20 km*

<i>length</i>	
VALUE	<i>20</i>
M-UNIT	<i>km</i>

*2 časa*

<i>length</i>	
VALUE	<i>2</i>
M-UNIT	<i>hour</i>

# Composition: Non-prefixed verbs



# Composition: Non-prefixed verbs

*bégať*'<sub>indet</sub> 30 km 2 časa

<i>transloc</i>	
MANNER	<i>run</i>
ACTOR	<i>entity</i>
PATH   LENGTH	<i>length</i>
	VALUE 30
	M-UNIT <i>km</i>
DURATION	<i>length</i>
	VALUE 2
	M-UNIT <i>hour</i>

*bežáť*'<sub>det</sub> 30 km 2 časa

<i>directed-transloc</i>	
MANNER	<i>run</i>
ACTOR	<i>entity</i>
PATH   LENGTH	<i>length</i>
	VALUE 30
	M-UNIT <i>km</i>
DURATION	<i>length</i>
	VALUE 2
	M-UNIT <i>hour</i>

## Frame semantics: Prefixed verbs

Most prefixes impose the following bounded event structure on the verb they attach to:

$$\left[ \begin{array}{ll} \textit{bounded-event} & \\ \text{START} & \textit{time-pt} \\ \text{END} & \textit{time-pt} \\ \text{DURATION} & \textit{duration} \end{array} \right]$$

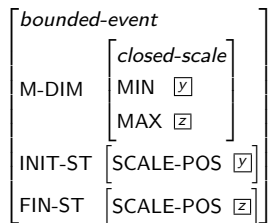
Moreover, if an event is characterized with respect to an *initial stage*, then the time point of this stage is the start point of the event, and the same holds for the *final stage* and the end point, respectively:

$$\text{INIT-ST} : \top \preceq \text{INIT-ST TIME-PT} \doteq \text{START}$$

$$\text{FIN-ST} : \top \preceq \text{FIN-ST TIME-PT} \doteq \text{END}$$

# Frame semantics: Prefixed verbs

*pro-*



Constraints:

$\text{M-DIM} : \top \preceq \text{M-DIM} \doteq \text{ID} \vee \text{M-DIM} \doteq \text{PATH} \vee \dots$

$\text{M-DIM} : \top \wedge \text{PATH} : \top \preceq \text{M-DIM} \doteq \text{PATH}$

...

$\textit{closed-scale} \wedge \textit{path} \preceq \text{MIN} \doteq \text{START} \wedge \text{MAX} \doteq \text{END}$

$\text{M-DIM} \doteq \text{PATH} \preceq \text{INIT-ST} : (\text{SCALE-POS} \doteq \text{LOC})$

$\textit{closed-scale} \wedge \textit{event} \preceq \text{MIN} \doteq \text{START} \wedge \text{MAX} \doteq \text{END}$

$\text{M-DIM} \doteq \text{ID} \preceq \text{INIT-ST} : (\text{SCALE-POS} \doteq \text{TIME-PT})$

...

# Frame semantics: Prefixed verbs

*pro-begat'*

<i>transloc</i> $\wedge$ <i>bounded-event</i>							
MANNER	<i>run</i>						
ACTOR	<i>entity</i>						
M-DIM	<table style="border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 2px 5px;"><i>closed-scale</i></td> </tr> <tr> <td style="padding: 2px 5px;">MIN</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>y</i></td> </tr> <tr> <td style="padding: 2px 5px;">MAX</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>z</i></td> </tr> </table>	<i>closed-scale</i>		MIN	<i>y</i>	MAX	<i>z</i>
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INIT-ST	<table style="border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;"><i>stage</i></td> <td style="border: 1px solid black; padding: 2px 5px;"></td> </tr> <tr> <td style="padding: 2px 5px;">SCALE-POS</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>y</i></td> </tr> </table>	<i>stage</i>		SCALE-POS	<i>y</i>		
<i>stage</i>							
SCALE-POS	<i>y</i>						
FIN-ST	<table style="border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;"><i>stage</i></td> <td style="border: 1px solid black; padding: 2px 5px;"></td> </tr> <tr> <td style="padding: 2px 5px;">SCALE-POS</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>z</i></td> </tr> </table>	<i>stage</i>		SCALE-POS	<i>z</i>		
<i>stage</i>							
SCALE-POS	<i>z</i>						

Measure dimension not specified

*pro-bežat'*

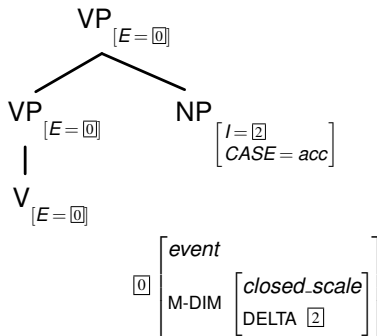
<i>dir-transloc</i> $\wedge$ <i>bounded-event</i>									
MANNER	<i>run</i>								
ACTOR	<i>entity</i>								
PATH	<table style="border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 5px;"><i>x</i></td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;"> <table style="border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">START</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>y</i></td> <td style="padding: 2px 5px;"><i>loc</i></td> </tr> <tr> <td style="padding: 2px 5px;">END</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>z</i></td> <td style="padding: 2px 5px;"><i>loc</i></td> </tr> </table> </td> </tr> </table>	<i>x</i>	<table style="border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">START</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>y</i></td> <td style="padding: 2px 5px;"><i>loc</i></td> </tr> <tr> <td style="padding: 2px 5px;">END</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>z</i></td> <td style="padding: 2px 5px;"><i>loc</i></td> </tr> </table>	START	<i>y</i>	<i>loc</i>	END	<i>z</i>	<i>loc</i>
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M-DIM	<table style="border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 5px;"><i>x</i></td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;"> <table style="border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 2px 5px;"><i>closed-scale</i></td> </tr> <tr> <td style="padding: 2px 5px;">MIN</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>y</i></td> </tr> <tr> <td style="padding: 2px 5px;">MAX</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>z</i></td> </tr> </table> </td> </tr> </table>	<i>x</i>	<table style="border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 2px 5px;"><i>closed-scale</i></td> </tr> <tr> <td style="padding: 2px 5px;">MIN</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>y</i></td> </tr> <tr> <td style="padding: 2px 5px;">MAX</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>z</i></td> </tr> </table>	<i>closed-scale</i>		MIN	<i>y</i>	MAX	<i>z</i>
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<i>closed-scale</i>									
MIN	<i>y</i>								
MAX	<i>z</i>								
INIT-ST	<table style="border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 2px 5px;"><i>loc-stage</i></td> </tr> <tr> <td style="padding: 2px 5px;">LOC</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>y</i></td> </tr> </table>	<i>loc-stage</i>		LOC	<i>y</i>				
<i>loc-stage</i>									
LOC	<i>y</i>								
FIN-ST	<table style="border-collapse: collapse;"> <tr> <td colspan="2" style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 2px 5px;"><i>loc-stage</i></td> </tr> <tr> <td style="padding: 2px 5px;">LOC</td> <td style="border: 1px solid black; padding: 2px 5px;"><i>z</i></td> </tr> </table>	<i>loc-stage</i>		LOC	<i>z</i>				
<i>loc-stage</i>									
LOC	<i>z</i>								

Measure dimension = path

(M-DIM : T  $\wedge$  PATH : T  $\preceq$  M-DIM  $\doteq$  PATH)

# Frame semantics: Prefixed verbs

Partial elementary tree for *pro-V*:



M-DIM  $\dot{=} ID \preceq$  M-DIM DELTA  $\dot{=} DURATION$

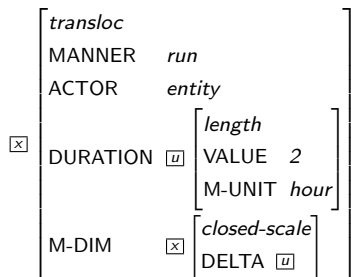
M-DIM  $\dot{=} PATH \preceq$  M-DIM DELTA  $\dot{=} PATH LENGTH$

...



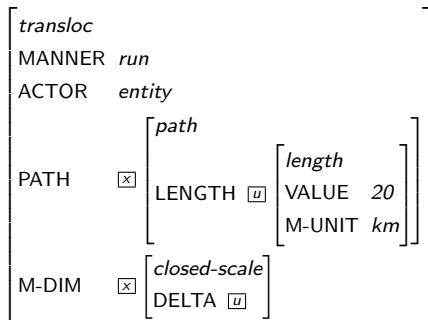
# Composition: Appropriate dimensions

*probégat' 2 časa*



Measure dimension = event  
(M-DIM  $\doteq$  ID)

*probégat' / probežát' 20 km*



Measure dimension = path  
(M-DIM  $\doteq$  PATH)

Since M-DIM cannot refer to both, the event and the path:  
*\*probégat' 20 km 2 časa* and *\*probežát' 2 časa*

## Summary

- ▶ Frame representations allow us to add a scalar perspective on the existing event structures.
- ▶ Our analysis captures the fact that two accusative NPs are possible with non-prefixed motion verbs (and not with the corresponding prefixed verbs).
- ▶ We offer regular compositional semantics for “lexical” prefixes (considered idiosyncratic and not analyzed in most approaches).
- ▶ Scalar frame analysis allows to provide single semantics for what is traditionally considered to be different prefix meanings.
- ▶ The analysis is suitable for all motion verbs and extendable to other prefixes.

## Further work: preliminary analysis of *po-*

Semantics for *po-*:

<i>event</i>	
M-DIM	$\left[ \begin{array}{l} \textit{scale} \\ \text{MIN } \boxed{y} \end{array} \right]$
INIT-ST	$\left[ \text{SCALE-POS } \boxed{y} \right]$

*po-begat'*

<i>transloc</i>	
MANNER	<i>run</i>
ACTOR	<i>entity</i>
M-DIM	$\boxed{x} \left[ \begin{array}{l} \textit{scale} \\ \text{MIN } \boxed{y} \end{array} \right]$
INIT-ST	$\left[ \begin{array}{l} \textit{loc-stage} \\ \text{TIME-PT } \boxed{y} \end{array} \right]$
FIN-ST	$\left[ \begin{array}{l} \textit{loc-stage} \\ \text{TIME-PT } \boxed{z} \end{array} \right]$

*po-bežat'*

<i>directed-transloc</i>	
MANNER	<i>run</i>
ACTOR	<i>entity</i>
PATH	$\boxed{x} \left[ \textit{path} \right]$
M-DIM	$\boxed{x} \left[ \begin{array}{l} \textit{scale} \\ \text{MIN } \boxed{y} \end{array} \right]$
INIT-ST	$\left[ \begin{array}{l} \textit{loc-stage} \\ \text{LOC } \boxed{y} \end{array} \right]$

Thanks for your attention!

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