

23rd INTERNATIONAL CONFERENCE  
on Computational Linguistics and Intellectual Technologies

# ANNOTATION OF RUSSIAN MANUAL GESTURES: THEORETICAL AND PRACTICAL ISSUES

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Russian Science Foundation,  
project #14-18-03819

Dialogue 2017  
Moscow  
June 2

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Linguistics, RAS  
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# TALK OUTLINE

- “Russian Pears Chats and Stories” project
- Manual gestures vs. kinetic background
  - Gesture as a figure
  - Kinetic background: neutral positions, manual postures, posture changes and self-adaptors
- Gesticulation units
  - Gesture (manual) chains, gestures, gesture phases
- Annotating procedure & scheme for ELAN
  - ELAN tiers system
  - Main gesture characteristics and difficult cases
- Individual variation: handedness

# RUSSIAN PEAR CHATS AND STORIES

## RuPeCS (under construction):

- 24 conversations about 'The Pear Film' (W. Chafe 1980)
- 96 native speakers
- $\approx$  9 hours
- 100 000 words
- 24 written retellings

## Current subcorpus:

- 3 annotated conversations
- $\approx$  1 hour

Project web-site: [www.multidiscourse.ru](http://www.multidiscourse.ru)

# MANUAL GESTURES

- **Communicatively significant spontaneous hand/arm movements, accompanying speech**
- **Standing out as a figure against kinetic background (other movements and stillness periods)**

# KINETIC BACKGROUND & GESTICULATION PORTRAIT

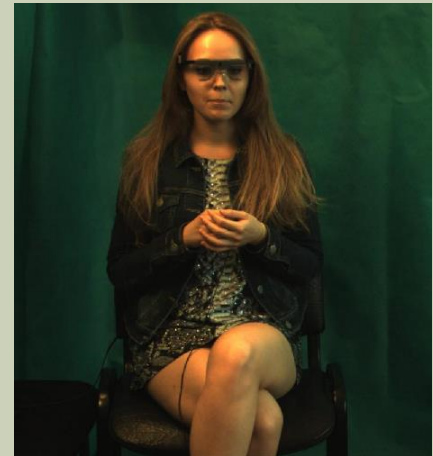
- Neutral (resting) positions
  - Set of preferred hand/arm positions a speaker regularly returns to
- (Dis)inclination to stillness
  - Hand/arm resting habits (preference for (not) being still for a long/short periods of time)
- Hand/arm posture changes
  - Hand/arm resting position changing movements
- Self-adaptors (adaptors, manipulators)
  - Physiologically motivated movements, movements with other practical purposes

Typical kinetic patterns of a speaker form a ***gesticulation portrait*** (cf. 'prosodic portraits' in *Kibrik 2009*)

# NEUTRAL POSITIONS

Neutral positions:

- absolute,
- medium level,
- local



# POSTURES & POSTURE CHANGES

Isolated posture change



Posture changes in a gesture chain



# ADAPTORS

Adaptors: not connected to speech

- Type 1: obvious practical purpose: stretching, scratching, removing hair from face, etc.; usually structured;
- Type 2: no practical purpose: playing with things, 'nervous' finger movements, fidgeting; usually not-structured;
- Type 3: rhythmical (tapping, etc.); usually structured

Type 2



Type 1



Type 3





# GESTURES

- Kinetic structure
  - Distinct articulatory effort, velocity, trajectory, movement direction, hand shape and orientation, gesture range, location in gesture space
- Discourse functions
  - Adding to speech contents, facilitating verbalization, appealing to an interlocutor, regulating turn-taking, supporting rhythmical structure

# GESTURE UNITS

- Adam Kendon 1980, 2004:

- gesture units (G-units)
- gesture phrases (G-phrases)
- gesture phases

- RuPeCS:

- manual chains
- gestures
- gesture phases

# GESTURES

## GESTURE

- main/nuclear gesticulation unit

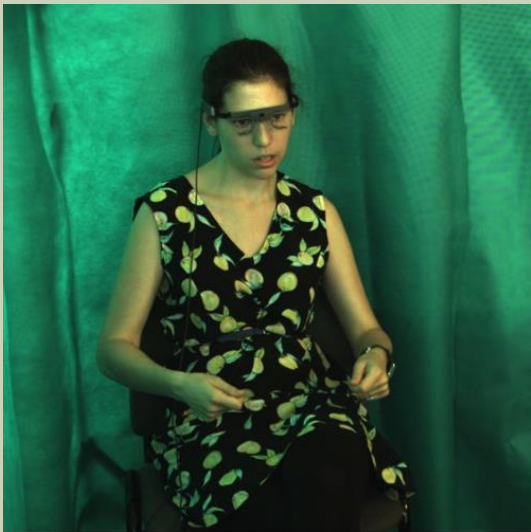
‘Well, the close-up [mg348] shot. With the pears, as he picked them off... [mg349] The face of this man...’



# GESTURE PHASES

- **STROKE** (main/obligatory phase)
  - a nucleus of a gesture that relates most of its meaning
- **Preparation**
  - transition to the stroke starting point from the previous gesture or a neutral position
- **Hold**
  - motionless phase, staying in a marked position
- **Retraction**
  - transition from the stroke ending point to the next gesture or a neutral position

# GESTURE HANDEDNESS



Two-handed gesture



Right-handed gesture

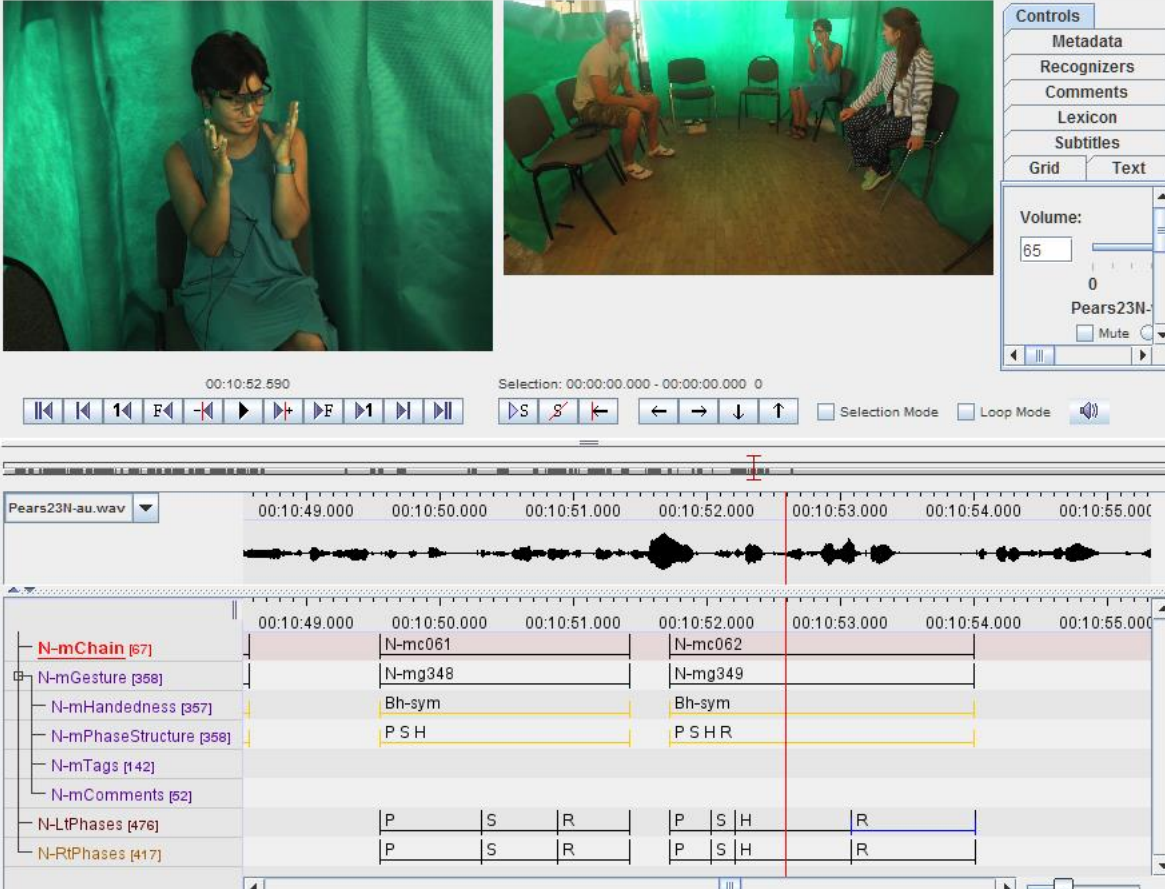


Left-handed gesture

# ANNOTATING GESTURES IN ELAN

ELAN 4.9.4 - pears23N-manu\_2017-05-19\_for\_Dialogue.eaf

File Edit Annotation Tier Type Search View Options Window Help



The screenshot displays the ELAN 4.9.4 software interface. At the top, the title bar reads "ELAN 4.9.4 - pears23N-manu\_2017-05-19\_for\_Dialogue.eaf". Below the title bar is a menu bar with options: File, Edit, Annotation, Tier, Type, Search, View, Options, Window, and Help. The main window is divided into several sections. On the left, there is a large video window showing a person in a blue dress gesturing with their hands. To the right of the video window is a smaller inset window showing a wider view of the scene with three people sitting in a room. Below the video windows is a control panel with a "Controls" tab selected, showing options for Metadata, Recognizers, Comments, Lexicon, Subtitles, Grid, and Text. A volume slider is set to 65, and there is a "Pears23N-" label with a "Mute" checkbox. Below the control panel is a timeline with a selection bar indicating "Selection: 00:00:00.000 - 00:00:00.000 0". The timeline itself shows a waveform for "Pears23N-au.wav" and a series of annotations. The annotations are organized into tiers, with the following labels visible on the left: N-mChain [57], N-mGesture [358], N-mHandedness [357], N-mPhaseStructure [358], N-mTags [142], N-mComments [52], N-LtPhases [476], and N-RtPhases [417]. The annotations are represented by colored bars (pink, yellow, blue) with labels like N-mc061, N-mc062, N-mg348, N-mg349, Bh-sym, P S H, and P S H R. The timeline has a time scale from 00:10:49.000 to 00:10:56.000.

# ANNOTATION PROCEDURE

At least 3 successive passes

- 1<sup>st</sup> pass: gesticulation portrait & rough posture / manual chains annotation

- 2<sup>nd</sup> pass (or series of passes): detailed annotation on all tiers

- \* Both the 1<sup>st</sup> and the 2<sup>nd</sup> passes are done *without relying on speech context (with sound muted)*, thus minimizing the influence of speech units' boundaries on the kinetic units' boundaries.

- \*\* A simultaneous change of two or more kinetic parameters (effort, velocity, trajectory, etc.) marks a phase boundary; a change of several features points to a gesture boundary.

- 3<sup>rd</sup> pass: annotation verification, using speech context and other kinetic channels

# ANNOTATION SCHEME

## ■ Independent tiers

- mChain — gesture chains (united for both hands)
- mGesture — gestures (united for both hands)
- mLtPhases — left hand gesture phases (separately)
- mRtPhases — right hand gesture phases (separately)

## ■ Gesture: dependent tiers

- mHandedness — gesture handedness and trajectory type (symmetrical, identical, different moving for two-handed gestures)
- mPhaseStructure — gesture phase structure formula (e.g. P S R)
- mTags — standardized tags for important gesture characteristics and adjoining gestures' relations
- mComments



# GESTURE ANNOTATION EXAMPLES

## 2 gestures

‘Well, the close-up [mg348]  
shot. With the pears, as he  
picked them off... [mg349]  
The face of this man...’



# GESTURE 348



	00:10:50.000	00:10:51.000	00:10:52.000	00:10:53.000	00:10:54.000
N-mChain [67]	N-mc061		N-mc062		
N-mGesture [358]	N-mg348		N-mg349		
N-mHandedness [357]	Bh-sym		Bh-sym		
N-mPhaseStructure [358]	P S H		P S H R		
N-mTags [142]					
N-mComments [52]					
N-LtPhases [476]	P	S	R		
N-RtPhases [417]	P	S	R		

Preparation start



Stroke start



Retraction start



Retraction end



# GESTURE 349



	00:10:50.000	00:10:51.000	00:10:52.000	00:10:53.000	00:10:54.000
N-mChain [67]	N-mc061		N-mc062		
N-mGesture [358]	N-mg348		N-mg349		
N-mHandedness [357]	Bh-sym		Bh-sym		
N-mPhaseStructure [358]	P S H		P S H R		
N-mTags [142]					
N-mComments [52]					
N-LtPhases [476]	P	S	R		
N-RtPhases [417]	P	S	R		

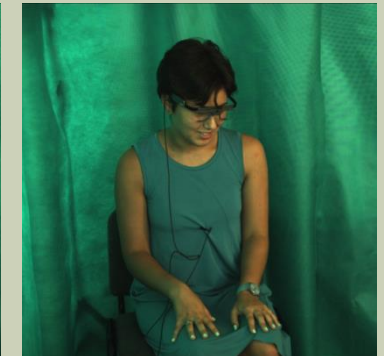
Preparation start

Stroke start

Hold start

Retraction start

Retraction end



# MULTI-STROKE GESTURES

## 3 multi-stroke gestures

[mg032] 'He had 3 baskets in the first place. One full [mg033], one... [mg034] he just added [pears] to it.'

[mg032] — 5 strokes

[mg033] — 2 strokes

[mg033] — 2 strokes



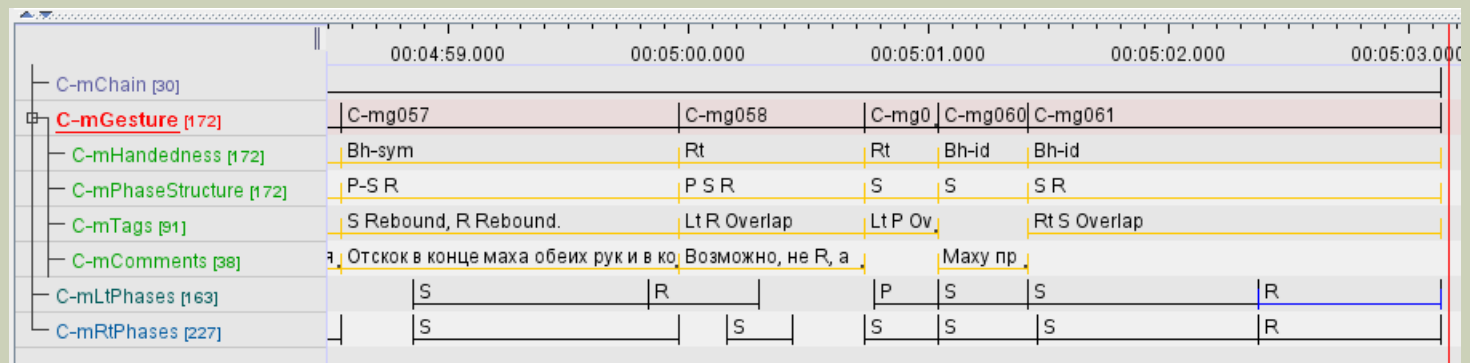
	04:17.000	00:04:18.000	00:04:19.000	00:04:20.000	00:04:21.000	00:04:22.000
C-mChain [30]	C-mc003					
C-mGesture [172]	C-mg032	C-mg033	C-mg034	C-mg035	C-mg036	C-mg037
C-mHandedness [172]	Lt	Lt	Lt	Rt	Rt	
C-mPhaseStructure [172]	P S	P S	P S H	P-S	S	
C-mTags [91]	Multi-S	Multi-S	Multi-S	Lt S H Ov		
C-mComments [38]	Аналогічно тому,					
C-mLtPhases [163]	S	S	S	H		
C-mRtPhases [227]				S	S	



# GESTURE OVERLAPS

## 3 gesture overlaps in 5-gesture series

[mg057] 'And he takes the whole basket. That is, he [mg058] sees that the other won't [mg059] notice, [mg060] takes and [mg061] puts the whole basket on his bicycle...'



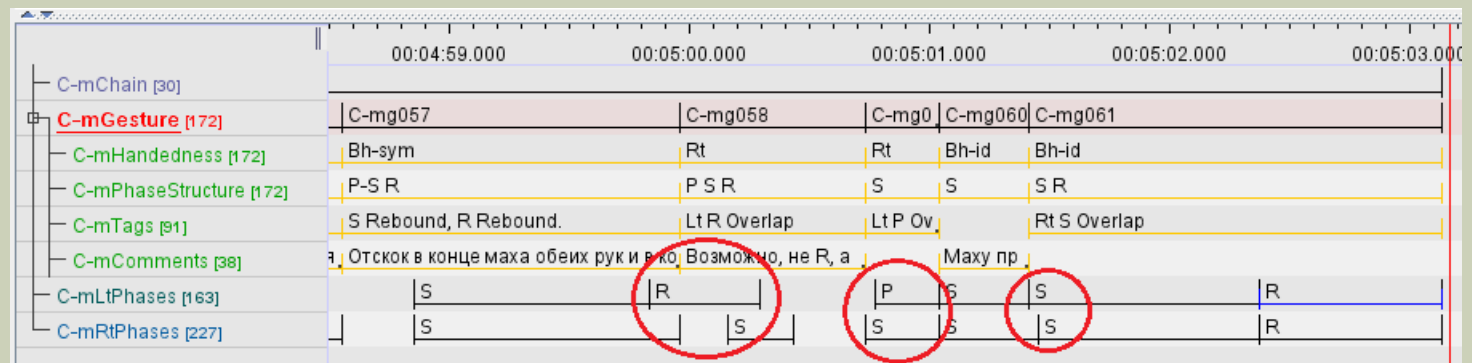
# GESTURE OVERLAPS

## Structural overlaps:

- mg057 retraction overlaps preparation and stroke of mg058
- mg060 preparation overlaps mg059



Asynchronous hands movements: left hand starts mg061 40 ms earlier



# ANNOTATION: TAGS SYSTEM

- **Multi-S** — multi-stroke gestures
- **Shuttle** — two-part gesture ('there-and-back', P-S-R)
- **Long R** — two-part retraction phase
- **S/R Rebound** — rebound in the end of a stroke/retraction
- **Rt/Lt P/S/H/R Overlap** — gesture overlaps (e.g. *Rt S Overlap*)
- **Repeat** — previous gesture repeat
- **Rt/Lt Adaptor (former Unspec tag)** — overlapping/adjoining adaptor

# INDIVIDUAL VARIATION: HANDEDNESS

## *Two-handed and one-handed gestures preference*

Participant	Two-handed		One-handed		Total
23C	66	67%	32	33%	98
23N	229	66%	120	34%	349
04C	71	60%	47	40%	118
22R	66	44%	83	56%	149
23R	93	42%	126	58%	219
22C	69	40%	102	60%	171
04R	158	32%	329	68%	487
22N	110	32%	239	68%	349
04N	162	27%	441	73%	603

## *One-handed gestures handedness*

Participant	Right-handed		Left-handed		Total
22N	231	97%	8	3%	239
22R	72	87%	11	13%	83
22C	79	77%	23	23%	102
04R	225	68%	104	32%	329
04C	32	68%	15	32%	47
23C	20	63%	12	38%	32
23R	47	37%	79	63%	126
04N	144	33%	297	67%	441
23N	40	33%	80	67%	120



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# CONCLUSION & PERSPECTIVES

## ■ Current annotation scheme

- ... provides detailed annotation of manual gesticulation units, concentrating on characteristics relevant for the whole gesture;
- ...takes into account most frequent complications (multi-stroke gestures, asynchronous manual movements, gesture overlaps, etc.);
- ...makes a part of a consistent annotation system for several kinetic channels, based on the idea of concurrence in multichannel communication where several channels are used simultaneously to pass along one message;
- ...allows comparing manual gestures to vocal channel units and other kinetic channels' units.

## ■ Further research

- Extending annotated subcorpus
- Annotating adaptors and posture change movements
- Adding 'dominant hand' parameter for the two-handed gestures
- Measuring gesticulation portrait features

# THANK YOU!

