TOROT: The Tromsø Old Russian and OCS Treebank

Hanne Eckhoff

UiT Arctic University of Norway

April 21, 2015
Birds and Beasts and the TOROT

- Birds and Beasts: Shaping Events in Old Russian (2013–2016)
Birds and Beasts and the TOROT

- **Birds and Beasts: Shaping Events in Old Russian (2013–2016)**
- **Two main purposes**
  - Study Russian verbal prefixation patterns diachronically and contrastively
  - Build a treebank of OCS, Old and Middle Russian (goal: 220 000 (new) word tokens)
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- TOROT: Tromsø Old Russian and OCS Treebank at nestor.uit.no
- No treebank is perfect, but ours should now be ready to use
Point of departure: the OCS part of the PROIEL corpus
PROIEL

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- PROIEL: Pragmatic Resources in Old Indo-European Languages
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- Centrepiece: A parallel corpus of old Indo-European New Testament texts (Greek, Latin, Gothic, Classical Armenian and OCS)
- Focus on making the most of a limited dataset by in-depth manual annotation on many levels
A family of treebanks for ancient languages

- Classical Latin and Ancient Greek: expansions of the PROIEL corpus
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Both annotation tool and guidelines were developed through practical annotation and custom-made for the old Indo-European languages (rich morphology, free word order)

Corpus builders are also corpus users; linguist's needs in focus

Advantages to TOROT: established annotation practice for early Slavic; lemma/form base

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Advantages to text contributors: Indexing of your choice for easy transfer of annotation.
Text collaborations

- The Suprasliensis project (BAS; Anisava Miltenova and David Birnbaum): TOROT lemmatisation, morphology (and syntax?) can be integrated into the electronic edition
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TOROT digitisations

- Project members have (reluctantly) digitised several manuscripts that were unavailable or unavailable in sufficient detail
- *Russkaja pravda*, *Life of Avvakum*, *Life of Feodosij Pečerskij*, some letters and legal acts
- Principle: always stick to a single good manuscript
- Retain original orthography as far as possible
- Consult manuscript facsimile when possible
- Base tokenisation on existing editions
- Release digitised text freely
Goals and results

<table>
<thead>
<tr>
<th>text</th>
<th>morph</th>
<th>syntax</th>
<th>reviewed</th>
<th>goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCS</td>
<td>207 893</td>
<td>157 726</td>
<td>121 577</td>
<td>150 000</td>
</tr>
<tr>
<td>Old Russian</td>
<td>–</td>
<td>74 156</td>
<td>69 489</td>
<td>100 000</td>
</tr>
<tr>
<td>Middle Russian</td>
<td>–</td>
<td>48 097</td>
<td>47 403</td>
<td>50 000</td>
</tr>
</tbody>
</table>
# Text inventory

<table>
<thead>
<tr>
<th>text</th>
<th>morph</th>
<th>syntax</th>
<th>reviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codex Marianus</td>
<td>–</td>
<td>57577</td>
<td>57554</td>
</tr>
<tr>
<td>Codex Suprasliensis</td>
<td>–</td>
<td>98077</td>
<td>63042</td>
</tr>
<tr>
<td>Codex Zographensis</td>
<td>52181</td>
<td>2072</td>
<td>981</td>
</tr>
<tr>
<td>Codex Laurentianus</td>
<td>–</td>
<td>55368</td>
<td>55013</td>
</tr>
<tr>
<td>Mstislav’s letter</td>
<td>–</td>
<td>159</td>
<td>0</td>
</tr>
<tr>
<td>Russkaja pravda</td>
<td>–</td>
<td>4021</td>
<td>3928</td>
</tr>
<tr>
<td>Statute of Prince Vladimir</td>
<td>–</td>
<td>650</td>
<td>0</td>
</tr>
<tr>
<td>Uspenskij sbornik</td>
<td>–</td>
<td>13818</td>
<td>10548</td>
</tr>
<tr>
<td>Varlaam’s donation charter</td>
<td>–</td>
<td>140</td>
<td>0</td>
</tr>
<tr>
<td>Domostroj</td>
<td>–</td>
<td>22662</td>
<td>22640</td>
</tr>
<tr>
<td>The Life of Avvakum</td>
<td>–</td>
<td>22210</td>
<td>22205</td>
</tr>
<tr>
<td>The Tale of Luka Koločskij</td>
<td>–</td>
<td>897</td>
<td>281</td>
</tr>
<tr>
<td>The taking of Pskov</td>
<td>–</td>
<td>2328</td>
<td>2277</td>
</tr>
</tbody>
</table>
Preprocessing: statistical morphological tagging

- One of TOROT’s major assets is the large database of form, lemma and tag correspondences
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Auto-tag other PVL manuscripts and align?
## Auto-tagged Suprasliensis

### Morphology

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<thead>
<tr>
<th>Word</th>
<th>Part of Speech</th>
<th>Tagging</th>
</tr>
</thead>
<tbody>
<tr>
<td>не</td>
<td>adv.</td>
<td>non-infl.</td>
</tr>
<tr>
<td>же</td>
<td>adv.</td>
<td>non-infl.</td>
</tr>
<tr>
<td>яйко</td>
<td>subj.</td>
<td>non-infl.</td>
</tr>
<tr>
<td>мовежь</td>
<td>common noun</td>
<td>ins., sg., f.</td>
</tr>
<tr>
<td>съмрътьнъ</td>
<td>adj.</td>
<td>pos., nom., sg., m., strong</td>
</tr>
</tbody>
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<tr>
<td>разоумъти</td>
<td>verb</td>
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<tr>
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<td>adj.</td>
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<tr>
<td>быти</td>
<td>verb</td>
</tr>
</tbody>
</table>
# Auto-tagged Feodosij Pečerskij

## Morphology (Edit)

<table>
<thead>
<tr>
<th>oномоу</th>
<th>же</th>
<th>тълькоувъшю</th>
<th>и</th>
<th>рекъшю</th>
<th>блгословести</th>
<th>очё</th>
</tr>
</thead>
<tbody>
<tr>
<td>dem. pron.</td>
<td>adv.</td>
<td>verb</td>
<td>conj.</td>
<td>verb</td>
<td>verb</td>
<td>common noun</td>
</tr>
<tr>
<td>dat., sg., m.</td>
<td>non-infl.</td>
<td>part., past, act., dat., sg., m., strong</td>
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<td>part., past, act., dat., sg., m., strong</td>
<td>inf., pres., act.</td>
<td>voc., sg., m.</td>
</tr>
<tr>
<td>онь</td>
<td>же</td>
<td>‘but, also’</td>
<td>и</td>
<td>‘and’</td>
<td>‘say’</td>
<td>‘отцъ’</td>
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</table>

*FIXME*
Auto-tagged Zographensis with some corrections

**Morphology (Edit)**

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<th>мытарь</th>
<th>и</th>
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<th>въсть</th>
<th>и</th>
<th>пьеть</th>
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<tr>
<td>prep.</td>
<td>interrog. pron.</td>
<td>prep.</td>
<td>common noun</td>
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- Give syntactic analysis (enriched dependency grammar) guided by rule-based guesses
- Future: Experiment with syntactic parsing and pre-tagging?
Syntactic analysis
Extra layers

- Separate layer for annotating information status and anaphoric relations
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- All NT texts are aligned with the Greek text at token level
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- OCS: nouns are annotated for animacy, verbs are annotated for prefixation, suffixation and stem
Availability

- All sentences are (to be) checked by a reviewer
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- We do consistency checks continually
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- For demonstrations of the query options: demo session!
A user-built corpus

- A full-coverage corpus will have less bias than a database collected and annotated for a specific study
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- Several phenomena may be given elegant analyses by exploiting the interplay between the syntactic and morphological layers.
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The syntactic analysis enhances the morphological analysis; it is an advantage to make the syntactic interpretation explicit.

Several phenomena may be given elegant analyses by exploiting the interplay between the syntactic and morphological layers.

Animacy: the genitive-accusative is always taken as genitive in the morphology, its status is determined by the syntax (OBJ? OBL? negated?)
Squeezing the empirical lemon

- The depressing life of the historical linguist
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- How far can statistics take us?
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- Every study improves the corpus: targeted corrections
The status of OCS *byti*

- Eckhoff, Janda and Nesset 2014: Grammatical profiling and constructional profiling to assess whether *byti* was one or two verbs
- Data layers: morphology, syntax, token alignments (Greek used as rough semantic tags)
- Radial category structure of the verb’s semantics emerged from argument structure data
- *Byti* should most reasonably be seen as a single polysemous verb
Inflectional and derivational aspect in OCS

- Eckhoff and Haug to appear (soon!)
- Data layers: Morphology, syntax, prefix/stem/suffix tags, token alignments
- Conclusions:
  - Verb pairs and imperfect/aorist both express viewpoint aspect
  - The aorist is independent of telicity and has retained meanings that the new perfective doesn't have
  - These meanings can only be seen with atelic simplex verbs (delimitative, ingressive)
  - Evidence that aspect mismatches were a later development: imperfective aorist and perfective imperfect were not found in Marianus/Zographensis
Animacy and definiteness in OCS

- Eckhoff to appear (soon!)
- Data layers: Morphology, syntax, semantic tags (animacy), information status, anaphoric links, token alignments
- The gen-acc predominates with old and accessible objects
- Variation between gen-acc and nom-acc with new and anchored objects
- The nom-acc marks referential persistence
- The gen-acc may be preferred if the subject has low discourse prominence
More than a millennium on the same format

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- Adding information: secondary dependencies (Berdičevskis and Eckhoff to appear (soon!))
Using the SynTagRus data

- Do perfective and imperfective verbs have different constructional profiles? Do they have different distributions across argument frames?
- It appears that they do
- We can track the development of simplex verbs: from aspectually neutral to imperfective
The future

The history of simplex verbs: prediction

• **Fact:** the average imperfective and perfective profiles are different
The future

The history of simplex verbs: prediction

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- **Hypothesis:** for simplex verbs, the aspectual opposition is most relevant in Modern Russian, less so in Old Russian, even less in Old Church Slavonic
The future

The history of simplex verbs: prediction

- **Fact:** the average imperfective and perfective profiles are different

- **Hypothesis:** for simplex verbs, the aspectual opposition is most relevant in Modern Russian, less so in Old Russian, even less in Old Church Slavonic

- **Prediction:** the intersection rate (measure of similarity) between the ‘simplex perfective’ and ‘simplex imperfective’ profiles will be highest for Old Church Slavonic and lowest for Modern Russian
The history of simplex verbs: results

Similarity of perfective and imperfective profiles for simplex verbs

- Simple profiles
- Enriched profiles

Language stage

Intersection rate
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- Dictionary resource exploiting the TOROT lemma and form inventory
- Expand the Old/Middle Russian part of TOROT with 100 000 more tokens
Lemmas with attested paradigms: *darъ*

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Summary

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Comprehensive annotation improves overall quality of data

This kind of data yields interesting results in long-disputed questions for OCS and Old Russian

A strong, quality-controlled basis for further computational approaches to OCS, Old and Middle Russian

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