Grammatical Profiles and Aspect

Laura A. Janda
Collaborators and Publications

PART ONE: Aspect in Russian

PART TWO: Aspect in Old Church Slavonic
PART ONE
Grammatical Profiles: Aspect in Russian

• Introduction
  • Tense, Aspect and Mood (TAM) in Russian
  • What is a Grammatical Profile?
• 2 Studies of TAM (Tense, Aspect, Mood) in Russian
  • Study 1: prefixes and suffixes
    • Are pairs formed via both prefixes and suffixes?
  • Study 2: TAM and outlier verbs
    • What verbs are most attracted to TAM combinations?
• Conclusion
  • Perfective vs. imperfective pairs formed with both prefixes and suffixes
  • Grammatical “idioms” in interaction of aspect and inflection
Introduction

- Why use grammatical profiles?
  - Subset of behavioral profiles (Divjak & Gries 2006, Gries & Divjak 2009)
  - Some verbs used in some forms more frequently than others (Šteinfeldt 1970)
  - Differences are relevant to TAM
Tense in Russian

• Past
• Non-Past
  • Imperfective = Present tense
  • Perfective = Future tense
Mood in Russian

- Russian lacks modal verbs
- Infinitives used in modal constructions
- Imperative mood
Aspect in Russian

• All forms of all verbs express aspect
  • (residue of biaspectual verbs are syncretic)
• Perfective (marked): views an event as a bounded whole
• Imperfective (unmarked): views an event as unbounded
Major Patterns of Russian aspectual morphology

- Simplex verbs
  - nearly all imperfective (delat’ ‘do’)
- Prefixed verbs (prefix + simplex
  - nearly all perfective (sdelat’ ‘do’, peredelat’ ‘redo’)
- Prefixed and suffixed verbs (prefix + simplex + suffix)
  - secondary imperfectives (peredelyvat’ ‘redo’)

Aspect Study 1: prefixes & suffixes

- Study 1 involves only aspectual “partners”
  - **p-partners** (Natural Perfectives formed by **prefixation**):
    - *delat’‘do.IMPV’ & s-delat’‘do.PF’
  - **s-partners** (Specialized Perfectives formed by **suffixation**):
    - *peredelat’‘redo.PF’ & peredel-yvat’‘redo.IMPV’

- Study 1 excludes
  - habituals (*govarivat’‘talk, say habitually’*)
  - semelfactives (*čixnut’‘sneeze once’*)
  - stacked prefixes (*poperepisyvat’‘spend some time rewriting’*)
  - suppletive pairs (*govorit’‘skazat’‘say’*)
Aspect Study 1: prefixes & suffixes

- **Traditional hypothesis**
  - both p-partners and s-partners form aspectual pairs

- **Corollary**
  - p-partners and s-partners should behave the same

- **Isačenko hypothesis**
  - only s-partners form aspectual pairs

- **Corollary**
  - p-partners and s-partners should behave differently

The corollaries can be tested empirically
Aspect Study 1: prefixes & suffixes

• Databases of p-partners and s-partners
  • Based on Modern subcorpus (1950-2007; 92M words) of Russian National Corpus
  • Excludes all verbs with <100 attestations
• p-partners: 264 pairs, over 1.6M forms
  • Based on Exploring Emptiness database
  • Excludes verbs with multiple prefixes, biaspectual verbs, homonymy
• s-partners: 1,311 pairs, over 4.3M forms
  • Based on Zaliznjak 1980
Aspect in Russian Research Questions

1) Do perfective verbs behave differently than imperfective verbs?
2) Do verbs behave differently depending upon whether they mark aspect with prefixes or suffixes?
3) How does aspect interact with tense and mood?
4) What verbs are most attracted to certain TAM combinations?
2 Studies of TAM in Russian

• Insights into Russian aspect
  • Are aspectual pairs formed only by suffixation (Isačenko) or by both suffixation and prefixation (traditional view)?

• Which verbs characterize various TAM intersections?
  • For example, which verbs are used most in a given TAM combination, such as perfective imperative or imperfective non-past?

Study 1

Study 2
What is a grammatical profile?

Distribution of verb forms:

- **eat**: 749 M
- **eats**: 121 M
- **eating**: 514 M
- **eaten**: 88.8 M
- **ate**: 258 M

The grammatical profile of *eat*
# Grammatical Profiles of Russian Verbs

<table>
<thead>
<tr>
<th></th>
<th>Nonpast</th>
<th>Past</th>
<th>Infinitive</th>
<th>Imperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperfective</td>
<td>1,330,016</td>
<td>915,374</td>
<td>482,860</td>
<td>75,717</td>
</tr>
<tr>
<td>Perfective</td>
<td>375,170</td>
<td>1,972,287</td>
<td>688,317</td>
<td>111,509</td>
</tr>
</tbody>
</table>

- chi-squared = 947756
- df = 3
- p-value < 2.2e-16
- effect size (Cramer’s V) = 0.399 (medium-large)
Summary thus far…

Now we know that perfective verbs behave differently from imperfective verbs

BUT: does it make a difference whether aspect is marked by

- **prefixes** (p-partners like *delat*‘do.IMPV’ & *s-delat*‘do.PF’)
  or by
- **suffixes** (s-partners like *peredelat*‘redo.PF’ & *peredel-yvat* ‘redo.IMPV’) ?

In order to find out, we need to disaggregate the data
Disaggregated data for Russian verbs

<table>
<thead>
<tr>
<th></th>
<th>Ipfv NonPast</th>
<th>Ipfv Past</th>
<th>Ipfv Inf</th>
<th>Ipfv Imper</th>
<th>Pfv NonPast</th>
<th>Pfv Past</th>
<th>Pfv Inf</th>
<th>Pfv Imper</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-partners</td>
<td>475,893</td>
<td>397,409</td>
<td>195,926</td>
<td>36,427</td>
<td>72,439</td>
<td>317,570</td>
<td>114,460</td>
<td>24,280</td>
</tr>
<tr>
<td></td>
<td>43%</td>
<td>35.9%</td>
<td>17.7%</td>
<td>3.3%</td>
<td>13.7%</td>
<td>60.1%</td>
<td>21.6%</td>
<td>4.6%</td>
</tr>
<tr>
<td>s-partners</td>
<td>854,123</td>
<td>517,965</td>
<td>286,934</td>
<td>39,290</td>
<td>302,731</td>
<td>1,654,717</td>
<td>573,857</td>
<td>87,229</td>
</tr>
<tr>
<td></td>
<td>50.3%</td>
<td>30.5%</td>
<td>16.9%</td>
<td>2.3%</td>
<td>11.6%</td>
<td>63.2%</td>
<td>21.9%</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

• **p-partners** (formed by **prefixation**), like:
  • *delat*‘do.IMPV’ & *s-delat*‘do.PF’

• **s-partners** (formed by **suffixation**), like:
  • *peredelat*‘redo.PF’ & *peredel-yvat*‘redo.IMPV’
Prefixation (dark) vs. suffixation (light): Statistically significant, BUT effect sizes too small (0.076 & 0.037)
Aspect Study 1: prefixes & suffixes

• No real difference between p-partners and s-partners
• No support for Isačenko hypothesis
• Since p-partners and s-partners behave the same, we merge data from both types in Study 2.
Aspect Study 2: TAM & outlier verbs

• Hypothesis for each TAM combination based on previous scholarship

• We look at outlier verbs for each combination of imperfective vs. perfective with imperative, non-past, infinitive, and past

• Outlier verbs are statistically deviant, strongly attracted to (or repulsed by) a given TAM combination

• We also sampled verbs from mid- and bottom-range
median

+ 1.5 times interquartile range

- 1.5 times interquartile range

outliers

outlier

Proportion of Imperfective NonPast
Imperfective imperative “be doing X!”

- Hypothesis:
  - categorical negation
  - politeness
  - insistence (rudeness)
- Šatunovskij (2002, 2009): if hearer understands action is to take place, imperfective is used

✔ Hypothesis confirmed, but other findings too
Imperfective imperative

- Over 200 outliers
- Polite: guest knows what to expect: *razdevajtes* ‘take off your coat’, *sadites* ‘sit down’, *prisoedinjajtes* ‘join in’, *zakusyvajte* ‘eat a chaser’, *zakurivajte* ‘have a smoke’, *zaezžajte* ‘stop by’, *zalezajte* ‘get into the car’
- Insistence: hearer is hesitant: *stupajte* ‘get going’, *gljadite* ‘look’, *zabirajte* ‘take’
- Insistence: hearer has not behaved properly (connection with negation): *provalivaj* ‘get out of here’, *končaj* ‘stop’, *ne perebivaj* ‘don’t interrupt’, *ne prikidyvajsja* ‘don’t pretend to be something you aren’t’, *ne peredergivaj* ‘don’t distort the facts’, *otvalivaj* ‘get out of here’
Imperfective imperative

• Other findings
  • Polite requests: *vyručajte* ‘help’
  • Kind wishes: *vyzdoravljajte* ‘get well’
  • Idiomatic: *davajte* ‘let’s/let me’ (*posmotrim* ‘take a look’, *pomogu* ‘help’, *rasskažu* ‘tell’, *pokažu* ‘show’, *sdelaju* ‘do’)
  • Idiomatic/culturally anchored: *proščaj(te)* ‘farewell’, *obogoščajsja* ‘be prosperous’ (NEP), *soedinjajtes* ‘unite’ (slogan), *zapevaj* ‘sing’ (army), *ne pominaj lixom/kak zvali* ‘bear no ill will/they just vanished’, *spasajsja, kto možet* ‘every man for himself’, *na čužoj karavaj rot ne razevaj* ‘don’t take others’ belongings’
Perfective imperative “make X happen!”

- Hypothesis
  - Rude
  - Instructions
  - Warnings

✔ Hypothesis confirmed for rude and instructions, but not for warnings, and there are other findings too
Proportion of Perfective Imper
Perfective imperative

- Over 300 outliers
- Rude: *otstan*'leave me alone', *otpustis*'let me go', *perestan*'stop it'
- Instructions: (cooking) *vskipjatite* 'boil', (exercising) *sognite* 'bend', (official transactions) *raspišites* 'sign for', (text instructions) *rassmotrite* [grafik x] 'see [figure x]'

**Additional findings**

- Polite expressions: *izvinite* 'excuse me', *poterpite* 'please be patient', *predstav*’te ‘imagine’
- Attention-directing: *posmotrite* 'look at', *vslušajtes* 'listen to', *ponjuxajte* ‘sniff’, *ugadajte* ‘guess’
Perfective imperative

• Additional findings, cont’d.
• Discourse markers: požaluj ‘perhaps’, razrešite ‘allow’, podskažite ‘prompt, tell’, uvol’tе ‘spare’
• Religious: Gospodi pomiluj ‘Lord have mercy’, blagoslovi otče ‘Father bless’
• Idiomatic dajte ‘let me’ (poceluju ‘kiss’, posmotrju ‘take a look’, vzgljanu ‘take a peek’
• Idioms: xot’ zalejsja/zavalis’ ‘a very large amount’, ne razlej voda ‘really close friends’, čert razderi ‘to hell with it’
Imperfective non-past “is doing X”

- Hypothesis
  - On-going processes
  - Concrete processes with a duration
  - Simultaneous processes
  - Repeated actions

✘ Hypothesis NOT confirmed – gnomic situations instead
Proportion of Imperfective NonPast
Imperfective non-past

• 10+1 outlier verbs (slyxat’’‘hear’ lacks non-past)
• 10 used in gnomic constructions:
  • diskussija vsegda javljaetsja naibolee produktivnoj formoj naučnogo obsuždenija problemy ‘a discussion is always the most productive form for scholarly debate on an issue’
  • dannoe obstojatel’stvo vlečet za soboj negativnye posledstvija ‘this situation entails negative consequences for the clients’
  • okazyvaetsja ‘turns out to be’; vyjasnjaetsja, čto ‘it turns out that’; čto kasaetsja ‘as far as X is concerned’; storony objazujutsja ‘the parties are obliged to’; zatrudnjajus’ otvetit’ ‘not sure’
Perfective non-past “will get X done”

- Hypothesis
  - Predicted actions
  - Promised actions

✔ Hypothesis is confirmed, but there are other findings too
Proportion of Perfective NonPast
Perfective non-past

• 84 outlier verbs
• Predictions: prevysit ‘will exceed’, umen’šitsja ‘will decrease’, prodlitsja ‘will last’, naladitsja ‘will work out well’, vyzdoroveet ‘will get well’, zatrudnit ‘will make things difficult’, razoritsja ‘will go broke’, potrebuetsja ‘will be necessary’, podoxnet ‘will die’, pridetsja ‘will be necessary’, (ne) obojdetsja (bez) ‘will (not) manage (without)’
• Promises: upravitsja ‘will take care of something’, postaraetsja ‘will try’, rasterzaet ‘will tear to pieces’, prokljanet ‘will curse’
• Performatives: osmeljus ‘I will take the liberty of’, procitiruju ‘I quote’
• Additional findings:
• Idioms: ne pridereš’sja ‘don’t find fault with’, ostal’noe priložitsja ‘the rest will come’, ot tebja ne ubudet ‘nothing is going to happen to you’, vragu ne poželaeš ‘I wouldn’t wish it on my worst enemy’
• Residue: vysoxnet ‘will dry out’, poletit ‘will fly’
Imperfective infinitive “to be Xing”

- 2 hypotheses
  - Šmelev & Zaliznjak (2006): Imperfective used when action is controllable
  - Divjak (2009): Imperfective has generic interpretation

✔ Divjak’s hypothesis is confirmed
Imperfective infinitive

• 12 outlier verbs
• 1 is idiomatic: *mne plevat* ‘I don’t give a damn’
• Others used in modal constructions
• Our data supports Divjak
  • outlier verbs include uncontrollable actions: *vyvjaszyvat’sja* ‘get mixed up in’, *raspoznavat* ‘recognize, identify’, *soglayvat* ‘conform to, agree with’
  • outlier verbs target conformist behavior: *sobljudat* ‘conform to’, *peredelyvat* ‘redo’, *ispravljet* ‘repair’, *učityvat* ‘take into account’
Perfective infinitive “to get X done”

- 2 hypotheses
  - Šmelev & Zaliznjak (2006): Perfective used when action is uncontrollable
  - Divjak (2009): Perfective has specific interpretation; also used with “tentative verbs”, čtoby ‘in order to’ and adverbs describing difficulty/importance of achieving X

✔ Divjak’s hypothesis is confirmed
Perfective infinitive

- 12 outlier verbs (*mne naplevat* ‘I don’t give a damn’)
- Modal uses for specific situations
- Tentative verbs:
  - *Poètomu my popytaemsja vospolnit’ ètot probel, opirajas’ na fakty i cifry.* ‘That is why we are trying to fill in that gap, relying on facts and figures.’
- Čtoby ‘in order to’:
  - *Posle zanjatija možno vypit’ vody, čtoby vospolnit’ ee poterju.* ‘After working one can drink some water in order to make up for its loss.’
- Adverbs describing difficulty/importance
  - *Fruktami istinnyj deficit kalija vospolnit’ očen’ tjaželo, praktičeski nevozmožno.* ‘It is very difficult, practically impossible, to make up for a real calcium deficit by [eating] fruit.’
Imperfective past “was X-ing”

• Hypothesis
  • Durative past actions
  • Repeated past actions

✔ Hypothesis is confirmed, but there are other findings too
Proportion of Imperfective Past
Imperfective past

• 13 outlier verbs
• Evidentials: slyxal, syl ‘heard’
• Defective paradigms: 10 of these verbs have no imperative
• Narration of observations: belel ‘showed white’, černel ‘showed black’, mračnel ‘showed dark’, svešivalsja ‘hung, dangled’
• Negation for categorical statements: ne pomyšljal ‘not thought about, dreamt of’, ne unimalsja ‘there was no stopping X’
• Behaviors accompanying dialog: ščurilsja ‘squinted’, otšučivalsja ‘made joking replies’, mračnel ‘glowered’
Perfective past “Xed, got X done”

• no outlier verbs
PART ONE: Aspect in Russian
Conclusions

• Aspectual pairs behave similarly, regardless of whether they are formed via suffixation or prefixation
  • It may be that meanings of prefixes and verbs overlap
• Outlier verbs support some previous scholarship, but also present new insights and challenges
PART ONE: Aspect in Russian
Conclusions, continued

- Imperfective imperative
  - extend list of typical polite and rude expressions; added familiar uses

- Perfective imperative
  - new details on rude and neutral uses; added polite uses and use for attention-directing

- Imperfective non-past
  - gnomic reference (instead of ongoing-durative)

- Perfective non-past
  - predictions of improvements/problems, threats, promises, performatives
PART ONE: Aspect in Russian
Conclusions, continued

• Imperfective & Perfective infinitive
  • Mainly modal uses
  • Imperfective infinitives express generic circumstances
  • Perfective infinitives express specific situations (both circumstances and physical necessity/capacity); constructions with tentative verbs, adverbs, čtoby ‘in order to’

• Imperfective past
  • evidentials, habituals, narration of observations
PART TWO:
Aspect in Old Church Slavonic

1. Aspect in Old Church Slavonic (OCS)
2. Grammatical profiles and aspect in Russian
3. OCS data
4. Sorting of OCS verbs according to grammatical profiles
5. Distribution of forms in sub-paradigms
6. Why was Dostál right?
7. Conclusions
8. Future research: aspect in Russian and Czech
1. Antonín Dostál and Aspect in OCS

OCS potentially had aspect on **two levels**

- **in inflection**: aorist (perfective) vs. imperfect (imperfective)
  - *pisa* (3sg aorist) vs. *pisaaše* (3sg imperfect) from *pěsati* ‘write’
    No controversy here

- **at the level of verbs**:
    This is controversial:
      - OCS inherited a system of perfective vs. imperfective verbs:
        - Dostál 1954, Kuryłowicz 1929; Kuznecov 1953; Kölln 1957; Nemec 1956; 1958; Maslov 1961; Andersen 2009; Meillet 1934; Vaillant 1966; Schenker 1993; Vaillant 1948; Lunt 2001; Borkovskij & Kuznecov 1965; Gorškova & Xaburgaev 1981
      - OCS did not inherit a system of perfective vs. imperfective verbs, but began to develop such a system:
        - Amse-De Jong 1974; Forsyth 1972
      - A system of perfective vs. imperfective verbs developed later:
        - Borodič 1953; Růžička 1957; Budich 1969; Bermel 1997; Nørgård- Sørensen 1997

Our approach is agnostic
2. Gramatical Profiles and Aspect in Russian

Janda & Lyashevksaya 2011: What did we learn?
• There is a relationship between grammatical profiles and aspect in Russian

BUT:
– In Russian there is no controversy, we know from the start which verbs are perfective and which ones are imperfective
– Our approach for Russian was **top-down**
• Would it be possible to turn the approach upside down for OCS, to take it **bottom-up**?
  – Use grammatical profiles to determine whether or not aspect exists on the level of the verb in OCS
  – Was Dostál right?
### 3. OCS Data

- **PROIEL** ([http://foni.uio.no:3000/](http://foni.uio.no:3000/)): parallel corpus of ancient languages: Ancient Greek, Old Armenian, Gothic, Latin, and **Old Church Slavonic**
- 62000 words in OCS
  - 15720 verb forms
  - 2117 forms of the verb *byti/ byvati* ‘be’ were excluded (but see Eckhoff, Janda & Nesset 2014a-b)
- We looked at the grammatical profiles of verbs for which there were ≥20 attested forms in our database:
  - **9694 forms of 129 verbs**

<table>
<thead>
<tr>
<th>Verb</th>
<th>aorist</th>
<th>imperative</th>
<th>imperfect</th>
<th>infinitive/supine</th>
<th>present</th>
<th>past participle</th>
<th>present participle</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>tvoriti</em></td>
<td>0</td>
<td>14</td>
<td>12</td>
<td>23</td>
<td>99</td>
<td>0</td>
<td>26</td>
<td>174</td>
</tr>
<tr>
<td>‘make’</td>
<td>0%</td>
<td>8%</td>
<td>7%</td>
<td>13%</td>
<td>57%</td>
<td>0%</td>
<td>15%</td>
<td>100%</td>
</tr>
<tr>
<td><em>jęti</em></td>
<td>25</td>
<td>7</td>
<td>0</td>
<td>10</td>
<td>28</td>
<td>20</td>
<td>0</td>
<td>90</td>
</tr>
<tr>
<td>‘take’</td>
<td>28%</td>
<td>8%</td>
<td>0%</td>
<td>11%</td>
<td>31%</td>
<td>22%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td><em>prijęti</em></td>
<td>30</td>
<td>6</td>
<td>0</td>
<td>10</td>
<td>24</td>
<td>41</td>
<td>0</td>
<td>111</td>
</tr>
<tr>
<td>‘receive’</td>
<td>27%</td>
<td>5%</td>
<td>0%</td>
<td>9%</td>
<td>22%</td>
<td>37%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td><em>priimati</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>32</td>
<td>1</td>
<td>8</td>
<td>43</td>
</tr>
<tr>
<td>‘receive’</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5%</td>
<td>74%</td>
<td>2%</td>
<td>19%</td>
<td>100%</td>
</tr>
</tbody>
</table>
4. Sorting of OCS Verbs According to Grammatical Profiles

- Multiple correspondence analysis:
  - measures the distance between arrays of numbers, in this case between grammatical profiles of verbs
  - creates a multidimensional space where these arrays are arranged according to their distances from each other
  - the dimensions, called factors, are mathematical constructs
  - a 2-D diagram is constructed using the two most important factors
Factor 1 looks like aspect: verbs on the left are imperfective, verbs on the right are perfective
“Lefties” = verbs on the left = imperfective verbs

“Righties” = verbs on the right = perfective verbs
aggregated grammatical profiles

“Lefties” = verbs on the left = imperfective verbs

“Righties” = verbs on the right = perfective verbs
### Some Verbs According to Factor 1 and Dostál

<table>
<thead>
<tr>
<th>“Lefties”</th>
<th>“Righties”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb</td>
<td>Factor 1</td>
</tr>
<tr>
<td>vězležati ‘lie (at table)’</td>
<td>-1.81</td>
</tr>
<tr>
<td>séděti ‘sit’</td>
<td>-1.70</td>
</tr>
<tr>
<td>věpiti ‘cry’</td>
<td>-1.62</td>
</tr>
<tr>
<td>ležati ‘lie’</td>
<td>-1.59</td>
</tr>
<tr>
<td>stojati ‘stand’</td>
<td>-1.56</td>
</tr>
<tr>
<td>bolěti ‘be ill’</td>
<td>-1.54</td>
</tr>
<tr>
<td>naricati (se) ‘name, call, be called’</td>
<td>-1.42</td>
</tr>
<tr>
<td>věxoditi ‘enter’</td>
<td>-1.32</td>
</tr>
</tbody>
</table>
## Potential aspectual pairs

<table>
<thead>
<tr>
<th>Imperfective Verbs: Factor 1</th>
<th>Perfective Verbs: Factor 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>въпiti ‘cry’</td>
<td>възъpiti ‘cry out’</td>
</tr>
<tr>
<td>naricati (сe) ‘name, call, be called’</td>
<td>nareсти ‘name, claim’</td>
</tr>
<tr>
<td>въпрашати ‘question’</td>
<td>въпросити ‘question’</td>
</tr>
<tr>
<td>datati ‘give’</td>
<td>dati ‘give’</td>
</tr>
<tr>
<td>ljubiti ‘love’</td>
<td>въzljubити ‘come to love’</td>
</tr>
<tr>
<td>znати ‘know’</td>
<td>poznати ‘recognize’</td>
</tr>
<tr>
<td>bojати сe ‘fear’</td>
<td>ouбojати сe ‘become afraid’</td>
</tr>
<tr>
<td>tvорити (сe) ‘make, pretend’</td>
<td>съtvорити ‘make, accomplish’</td>
</tr>
<tr>
<td>priимати ‘receive’</td>
<td>prijeти ‘accept, receive’</td>
</tr>
<tr>
<td>bitи ‘strike’</td>
<td>ouбити ‘kill’</td>
</tr>
<tr>
<td>отъpouшатi ‘release, forgive’</td>
<td>отъpouстити ‘release, let go’</td>
</tr>
</tbody>
</table>
Factor 1 agrees with Dostál 96%

<table>
<thead>
<tr>
<th>Aspectual designation according to Dostál</th>
<th>Number of lefties with that designation</th>
<th>Number of righties with that designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iterative</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Imperfective</td>
<td>32</td>
<td>2</td>
</tr>
<tr>
<td>Biaspectual mostly</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Imperfective</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Biaspectual</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Biaspectual mostly</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Perfective</td>
<td>2</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>76</td>
</tr>
</tbody>
</table>

These designations agree with Dostál
Factor 1 agrees with Dostál 96%

<table>
<thead>
<tr>
<th>Aspectual designation according to Dostál</th>
<th>Number of lefties with that designation</th>
<th>Number of righties with that designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iterative</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Imperfective</td>
<td>32</td>
<td>2</td>
</tr>
<tr>
<td>Biaspectual mostly</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Biaspectual</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Biaspectual mostly</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Perfective</td>
<td>2</td>
<td>69</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>53</strong></td>
<td><strong>76</strong></td>
</tr>
</tbody>
</table>

These designations disagree with Dostál
The nine verbs for which Factor 1 does not agree with Dostál

<table>
<thead>
<tr>
<th>Verb</th>
<th>aorist</th>
<th>imperative</th>
<th>imperfect</th>
<th>infinitive/supine</th>
<th>present</th>
<th>past participle</th>
<th>present participle</th>
</tr>
</thead>
<tbody>
<tr>
<td>sъbyti sę 'happen'</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>krъstiti (sę) 'baptize'</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>klęti (sę) 'curse, swear'</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>9</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>zъvati 'call'</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>iti 'go'</td>
<td>79</td>
<td>65</td>
<td>25</td>
<td>25</td>
<td>63</td>
<td>56</td>
<td>13</td>
</tr>
<tr>
<td>vesti 'lead'</td>
<td>14</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>viděti 'see'</td>
<td>82</td>
<td>22</td>
<td>4</td>
<td>32</td>
<td>59</td>
<td>92</td>
<td>26</td>
</tr>
<tr>
<td>slyšati 'hear'</td>
<td>39</td>
<td>5</td>
<td>5</td>
<td>19</td>
<td>34</td>
<td>63</td>
<td>17</td>
</tr>
<tr>
<td>pъsatи 'write'</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>28</td>
<td>0</td>
</tr>
</tbody>
</table>

Aside from *sъbyti sę* 'become’, these are all verbs **without** aspectual prefixes and suffixes.

Aside from *pъsatи* 'write’ all these verbs have Factor 1 -0.5≥+0.5.
5. Distribution in sub-paradigms

- Here we will look at the “outliers” – verbs that are strongly attracted to certain inflectional forms:
  - aorist, imperfect, past participle, present participle

- Among the outliers we find:
  - the verbs for which Factor 1 does not agree with Dostál
  - verbs without aspectual prefixes and suffixes
  - determinate motion verbs
Aorist

<table>
<thead>
<tr>
<th>Category</th>
<th>% aorist</th>
</tr>
</thead>
<tbody>
<tr>
<td>svađeteljstvovati ‘bear witness’</td>
<td>28% (11)</td>
</tr>
<tr>
<td>věrovatı ‘believe’</td>
<td>26% (22)</td>
</tr>
<tr>
<td>glagolati ‘speak’</td>
<td>26% (289)</td>
</tr>
<tr>
<td>diviti sę ‘be surprised’</td>
<td>26% (9)</td>
</tr>
<tr>
<td>plakati (sę) ‘weep’</td>
<td>19% (5)</td>
</tr>
<tr>
<td>sbyti sę ‘happen’</td>
<td>15% (3)</td>
</tr>
</tbody>
</table>
# Imperfect

**Lefties:**

<table>
<thead>
<tr>
<th>Russian</th>
<th>% imperfect</th>
</tr>
</thead>
<tbody>
<tr>
<td>въпрошати ‘question’</td>
<td>72% (23)</td>
</tr>
<tr>
<td>въпяти ‘cry’</td>
<td>50% (12)</td>
</tr>
<tr>
<td>дивитись ‘be surprised’</td>
<td>50% (17)</td>
</tr>
</tbody>
</table>

**Righties:**

<table>
<thead>
<tr>
<th>Russian</th>
<th>% imperfect</th>
</tr>
</thead>
<tbody>
<tr>
<td>зъвати ‘call’</td>
<td>13% (4)</td>
</tr>
<tr>
<td>вести ‘lead’</td>
<td>9% (2)</td>
</tr>
<tr>
<td>ити ‘go’</td>
<td>8% (25)</td>
</tr>
<tr>
<td>пишати ‘write’</td>
<td>3% (1)</td>
</tr>
<tr>
<td>слышати ‘hear’</td>
<td>3% (5)</td>
</tr>
<tr>
<td>видеть ‘see’</td>
<td>1% (4)</td>
</tr>
<tr>
<td>знаете to know’</td>
<td>1% (1)</td>
</tr>
<tr>
<td>дати ‘give’</td>
<td>0.5% (1)</td>
</tr>
<tr>
<td>отъвешати ‘answer, pronounce judgement’</td>
<td>0.4% (1)</td>
</tr>
</tbody>
</table>
## Past participle

### Lefties:

<table>
<thead>
<tr>
<th>verb</th>
<th>% past participle</th>
</tr>
</thead>
<tbody>
<tr>
<td>sěti ‘sow’</td>
<td>33% (11)</td>
</tr>
<tr>
<td>biti ‘strike’</td>
<td>31% (9)</td>
</tr>
<tr>
<td>kr̥stiti (se) ‘baptize’</td>
<td>12% (4)</td>
</tr>
<tr>
<td>žiti ‘live’</td>
<td>9% (2)</td>
</tr>
</tbody>
</table>

### Righties:

<table>
<thead>
<tr>
<th>verb</th>
<th>% past participle</th>
</tr>
</thead>
<tbody>
<tr>
<td>vřzřěti ‘look up at’</td>
<td>79% (22)</td>
</tr>
<tr>
<td>pěsati ‘write’</td>
<td>70% (28)</td>
</tr>
</tbody>
</table>
## Present participle

<table>
<thead>
<tr>
<th>Verb</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>vesti ‘lead’</td>
<td>9%</td>
<td>(2)</td>
</tr>
<tr>
<td>slyšati ‘hear’</td>
<td>9%</td>
<td>(17)</td>
</tr>
<tr>
<td>viděti ‘see’</td>
<td>8%</td>
<td>(26)</td>
</tr>
<tr>
<td>zvati ‘call’</td>
<td>6%</td>
<td>(2)</td>
</tr>
<tr>
<td>iti ‘go’</td>
<td>4%</td>
<td>(13)</td>
</tr>
<tr>
<td>tranziti ‘come to know’</td>
<td>1%</td>
<td>(1)</td>
</tr>
<tr>
<td>rešti ‘say’</td>
<td>0.2%</td>
<td>(2)</td>
</tr>
</tbody>
</table>

### vůzležati ‘lie (at table)’

![Box plot](image)

- **Left**
- **Right**
6. Why was Dostál right?

• Dostál was Czech
• According to Dickey, aspect has been preserved most/evolved least in Czech, in contrast to other Slavic languages, in particular Russian, where aspect has undergone many changes
• So if Dostál used his native Czech intuitions about aspect, they would be mostly correct for OCS
7. PART TWO: Conclusions

• OCS verbs can be mathematically sorted into two groups according to their grammatical profiles
• The two groups agree with Dostál’s aspectual classification of verbs
• The aspectual system in OCS was probably nascent, less grammaticalized than in modern Russian
• The “righties” (perfective verbs) are more compact, more homogeneous than “lefties” (imperfective verbs)
• It is possible that aspect was not yet stabilized for some verbs in OCS
8. Future research: aspect in Russian and Czech

- Bottom-up research: can the aspect of verbs be determined by their grammatical profiles?
  - Journalism in Russian and Czech (threshold = 50)
  - “i” in Russian / “I” in Czech = imperfective aspect
  - “p” in Russian / “P” in Czech = perfective aspect
  - “B” in Czech = biaspectual verbs
Russian

Factor 1 (39.1 %)

Factor 2 (19.7 %)

partcpnonpast

partcppast

gerpast

imperf

indicpast

indicfut

gernonpast

indicnonpast

Russian
Take your linguistic data to the bank!

TROLLing

- is an international archive of linguistic data and statistical code
- is built on the Dataverse platform from Harvard University and complies with DataCite, the international standard for storing and citing research data
- is compliant with CLARIN (Common Language Resources and Technology Infrastructure in the EU), the EU research infrastructure for language-based resources
- assigns a permanent URL to each post
- uses metadata that ensures visability and retrieval through international services
- is professionally managed by the University Library of Tromsø and an international steering committee.

Authors of scholarly works around the world are welcome to deposit their data in TROLLing, along with citations of their publications. Conversely, authors can reference their data by citing their TROLLing posts in their articles.

Visit us at
http://opendata.uit.no/
http://site.uit.no/trolling/

“In the age of Big Data, the creation of a general repository of datasets and statistical models for linguistic research is a welcome development. It will stimulate more research and new analyses.” -- Maria Polinsky, Director of the Polinsky Language Sciences Lab at Harvard University

“TROLLing will revolutionize research in linguistics and drive the discipline forward: making data publicly available significantly reduces the risk of bogus results, avoids duplication of efforts and facilitates large-scale analysis of meticulously annotated datasets.” -- Dagmar Divjak, Reader, Russian and Slavonic Studies, University of Sheffield

“TROLLing is crucial for the field of linguistics as it takes the next steps towards becoming more empirical. For the first time, it will be possible for researchers to deposit their primary linguistic data (the foundation for all research) in a central freely accessible on-line repository so that colleagues around the world have access to the same data. This invaluable resource will promote on-going academic exchange on an empirical basis.” -- Hans Boas, Professor, Department Germanic Studies and the Department of Linguistics, University of Texas at Austin

“TROLLing is exactly what our field needs - with the potential to become the most useful data resource in linguistics.” -- Marit Westergaard, Professor, Center for Advanced Study of Theoretical Linguistics, UiT The Arctic University of Norway

“I would like to recommend that scholars deposit their data at TROLLing. I strongly believe that sharing of data and methods for analysis can play a key role in the growth of cognitive linguistics. It will be beneficial for the community of linguists to have a single searchable repository rather than having data scattered about in many places.” -- Laura Janda, Professor, Center for Advanced Study of Theoretical Linguistics, UiT The Arctic University of Norway