The Paradigm as a Radial Category

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Overview

• Russian suffix shift
• The status of the paradigm
• The structure of the paradigm
• What structure do we expect for Russian verbal paradigms?
• Does Russian suffix shift conform to the expected structure?
• What about frequency?
Suffix shift in Russian verbs

- An ongoing language change:
- Unproductive suffix –а is replaced by productive –аж
  - kapljut (with –а) → kapajut ‘(they) drip’
  - Slezy kapljut odna za drugoj na klaviši. ‘The tears drip one after another onto the keyboard.’
  - Slezy в šči kapajut. ‘The tears drip into the cabbage soup.’
- Well–known, described in the scholarly literature
- We examine a database of ca. 20,000 examples from the Russian National Corpus
- Suffix shift progresses unevenly through the paradigm
More about Russian suffix shift: 
–a suffixed vs. –aj suffixed forms

• –aj is the productive pattern
• –aj eliminates a consonant alternation (p ~ pl’ in kapat’)
• –a vs. –aj forms differ (see handout):
  • all Non–Past tense forms
  • Present Active Participle
  • Gerund

- a and –aj forms are the same:
  • Infinitive
  • all Past tense forms

These will be ignored
The status of the paradigm

- Paradigms are a legacy from classical grammarians of Greece and Rome
- Some contemporary linguistic theories reject the paradigm altogether:
  - Item & Arrangement/Item & Process (Hockett 1958)
  - Distributed Morphology (Halle & Marantz 1993)
  - in such theories, the lexicon contains morphemes, the grammar specifies rules for combining them
Evidence for paradigms

• McCreight & Chvany (1991) show that paradigms facilitate better descriptions of syncretism than syntactic features.

• Milin et al. (2008) report that increased complexity of paradigms yields longer response times in psycholinguistic experiments.
The structure of the paradigm

- Aristotelian category
  - An unordered list of inflected forms
  - All forms have the same status
  - Paradigms lack internal structure
  - Word & Paradigm (Matthews 1972)

- Radial category (Lakoff 1987)
  - Paradigms have internal structure
  - Prototypical vs. peripheral forms

Can the question of paradigm structure be investigated empirically?
Our approach

• Language change: empirical predictions
  • Paradigm = aristotelian category
    • All forms affected to same degree
  • Paradigm = radial category
    • Peripheral forms affected most

• Statistical analysis
  • Logistic Mixed Effects Modeling
  • Systematic analysis of various factors
  • Thanks to R. Harald Baayen

Our analysis indicates that paradigms have structure.
What structure do we expect for Russian verbal paradigms?

• What parts of the paradigm should be prototypical vs. peripheral?

• What categories are expressed in the Russian verbal paradigm?
  • finite vs. non–finite
  • indicative vs. imperative
  • person
  • number
finite vs. non–finite

• In Russian, gerunds and participles are non–finite because they cannot express mood
• Finite forms are more prototypical than non–finite forms (Bybee 1985, Joseph 1983)
**indicative vs. imperative**

- Indicative is more prototypical since it represents the simplest relationship of a situation to reality.
- Typologically verbs rarely lack indicative forms, but there are often verbs that lack imperative forms (modals, perception verbs).
- Imperatives have reduced person opposition and clitic placement (Joseph 1983).

- **all indicative forms**  
  - more prototypical

- **imperative**  
  - more peripheral
# Relationship between person and number

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<td>2nd</td>
<td>tv</td>
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<tr>
<td>3rd</td>
<td>on, ona, ono</td>
<td>on’i</td>
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<td>jevo, jejo, jevo</td>
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<td>-V₁$§$</td>
<td>-V₁t$e$</td>
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<tr>
<td>-V₁t</td>
<td>-V₂t</td>
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The major distinction is: 3rd person vs. 1st/2nd person. This indicates that person ranks above number.
3rd person vs. 1st & 2nd person

- Typologically zero expression is more common for 3rd person than for 1st & 2nd person (Bybee 1985)
- 3rd person is unmarked (Lyons 1977)
singular vs. plural

- Cross-linguistically, singular is unmarked (Janda 1995, Corbett 2000, Lyashevskaya 2004)
Prototypical vs. peripheral forms

Categories

Finite

Indicative

Imperative

3. person

1./2. person

Singular

Plural

Non-finite

Participle/gerund

3sg > 3pl > 1&2 > imperative > participle/gerund

Prediction:
Most conservative (−a)

Prediction:
Most innovative (−aj)
Results

Other differences are statistically significant

NOT statistically significant

Bar chart showing:
- 3 sg: 10.1%
- 3 pl: 16.5%
- Pres act part: 21%
- 1 & 2: 21.3%
- Imperative: 43.8%
- Gerund: 50.5%
Predictions vs. results

• Predictions:
  • 3 sg
  • 3 pl
  • 1. & 2. person
  • imperative
  • gerund/
  • participle

• Results:
  • 3 sg
  • 3 pl
  • 1. & 2. person/
  • participle
  • imperative
  • gerund

The results indicate that the predictions are correct. Problem: The participle behaves like a finite form.
Why does the participle behave like a finite form?

- Hypothesis:
  - Form overrides prototypicality
- 3 pl has suffixes: \(-ut \sim -at\)
- Part. has suffixes: \(-ušč \sim -ašč\)
- “Parasitic formation”:
  - The participle “borrows” the vowel from the 3pl form
  - This formal resemblance relates the participle to the finite forms
  - This formal resemblance influences the participle, causing it to behave like a finite form in relation to suffix shift
What about frequency?

Alternative hypothesis:
The least frequent forms are most prone to undergo suffix shift

- Prototypicality ranking:
  - 3 sg
  - 3 pl
  - 1. & 2. person
  - imperative
  - gerund

- Frequency ranking:
  - 3 sg
  - 3 pl
  - GERUND
  - 1. & 2. person
  - imperative

Frequency yields incorrect predictions for the GERUND.
Frequency: Written vs. Spoken

- Perhaps the gerund has high frequency because **spoken Russian** is underrepresented in the corpus?

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<th># lemmas</th>
<th># gerunds</th>
<th>% gerunds</th>
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<tr>
<td>Whole corpus</td>
<td>13,581,979</td>
<td>501,036</td>
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<tr>
<td>Spoken corpus</td>
<td>135,326</td>
<td>1,522</td>
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- Difference is statistically significant (p<2.2e-16)
- Effect size is less than “small” (Cramers V=0.01)
- Indicates that frequency difference between spoken and written language has minimal impact
- Cannot exclude the possibility that frequency is relevant
Summary

1. Suffix shift
   • is sensitive to morphosyntactic features:
     • 3sg is most conservative form (–a)
     • Gerund is most innovative (–aj)

   • Pardigm structure:
     • Results are compatible with the hypothesis that paradigms are radial categories with internal structure

   • Frequency:
     • It is possible, but not likely, that frequency is of decisive importance