Inversion and remorphologization in the Šatrovački language game

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Šatrovački

- Inversion ludling in many urban varieties of BCMS; popular in rap songs
- word-initial C_0V sequence gets shifted to the end of the word (1)
- ə-insertion to comply with the disyllabic minimum in monosyllables (1b)

(1)

	BCMS	Šatrovački	
a.	[zatvɔr]	[tvɔrza]	‘prison.NOM.SG’
b.	[kraj]	[jəkra]	‘neighborhood.NOM.SG’
c.	[vampir]	[mpirva]	‘vampire.NOM.SG’
d.	[dɔrʨɔl]	[rʨɔldɔ]	‘Dorćol’ (neighborhood in Belgrade)

today's talk

- extensive work on the phonology of Šatrovački and its theoretical import (Rizzolo 2006, 2007; Stojković 2017)
- today: remorphologization in Šatrovački
- central question (c.f. Bagemihl 1988): timing of ludling w.r.t. morphological operations (case/agreement marking)
- implications for the ludling-grammar interface
- brief remarks on the role of phonotactics in assessing morphological well-formedness in language games

remorphologization in language games

Remorphologization: reinterpretation of a form's morphological structure

- Twofold manifestation in language games:
  1. opacification of an ending
  2. reanalysis of a simple form as containing multiple morphemes

remorphologization in TTK

- In TTK (a Verlan-like inversion ludling of Brazilian Portuguese):
- *fumar* ‘smoke.INF’ > *marfu*,
  optionally /marfu-**ar**/ > *marfu-zar* (z-insertion)
- because the INF marker is rendered opaque

Šatrovački and inflection #1

- when an inflected form undergoes inversion, its inflectional ending ends up being "trapped" word-internally

(2)	BCMS		Šatrovački
a.	[nɔʒ-ɛm]	'knife-INS.SG'	[ʒ ɛm nɔ]
b.	[ʒɛn-ɔm]	'woman-INS.SG'	[n ɔm ʒɛ]
c.	[puʃ-i-m]	'smoke-TV.PRS-1SG'	[ʃ im pu]

(data from Rizzolo 2007)

Late inversion in Šatrovački

- LATE INVERSION: case/agreement inflection *before* inversion:

0. /puʃi-/ (present stem)
1. puʃi-**m** **(Inflection)**
2. [ʃi**m**pu] **(Inversion)**

‘smoke.PRS-1SG’ *[ʃipu-**m**]

Šatrovački and inflection #2

- In some verbs, input to inversion = **present stem**, inconsistent with data such as (2c).
- **Remorphologization**: final vowel of the output of inversion reinterpreted as a theme vowel, to which agreement endings can then be added.

(3)

	BCMS (PRS stem)	BCMS (PRS.1SG)	early inversion	late inversion	
a.	[krad-ɛ-]	[krad-ɛ-m]	[dɛkra-m]	?[dɛmkra]	'steal'
b.	[ʋid-i-]	[ʋid-i-m]	[diʋi-m]	?[dimʋi]	'see'

Early inversion in Šatrovački

- EARLY INVERSION: inversion **before** agreement morphology:

0. /ʊidi-/ (present stem)
1. diʊi- **(Inversion & Remorphologization)**
2. [diʊi-**m**] **(Inflection)**

‘see.PRS.1SG’; ?[di**m**ʊi] (late inversion)

Late inversion (?[di**mʊ**i]) dispreferred although phonotactically okay; cf. BCMS [ʊɔlim] > Šatrovački [li**mʊ**ɔ] ‘love.PRS.1SG’

Early vs. late inversion in nouns

- The same dual patterning observed in nouns.
- LATE INVERSION: **case inflection** takes precedence over **inversion**:

0. /ʒɛn-/ (base form)
1. ʒɛn-ɔm **(Inflection)**
2. [n**ɔm**ʒɛ] **(Inversion)**

‘woman-INS.SG’

Early vs. late inversion in nouns

- EARLY INVERSION: **inversion** ordered before **case inflection**:

0.	/kafu/	(base form)
1.	fuka > fuk-a	**(Inversion & Remorphologization)**
2.	[fuk-**ɔm**][1]	**(Inflection)**
	‘coffee.INS.SG’;	*[fɔmka] (late inversion)

[1] Bad Copy, *Vodio sam devojku na soju*

hypothesis

Question: What factor determines which inversion strategy (late or early inversion) is preferred?

- **Hypothesis**: correlation between **timing of inversion** (early vs. late) and **remorphologization** (whether the output of early inversion can be reinterpreted as a stem/NOM.SG form)
  - If so, early inversion is **preferred**;
    cf. /fuka/ > [fuk-ɔm]; *[fɔmka]
  - If remorphologization is *not possible*, late inversion is the only option:
    /nuʒɛ/ > [nɔmʒɛ]; **[nuʒɛ-m]

hypothesis

Hypothesis: correlation between **timing of inversion** and **remorphologization**

- How to determine whether remorphologization is possible?
- Final vowel of the output of early inversion:
  - only -a, -ɛ and -i are permissible PRS theme vowels in BCMS (Milosavljević & Arsenijević 2022)
  - -a is the only vowel feminine NOM.SG can end in

experiment: case marking in Šatrovački

- **goal**: is there a correlation between **timing of inversion** and **remorphologization** in nouns?
- **rating study** conducted online via Qualtrics XM
- **task**: rate Šatrovački oblique case forms on a five-point Likert scale
- two phases: **elimination phase** (text entry) and **rating survey**

participants

- participants (*N* = 56) recruited via social media and snowball sampling
- demographics: **age** and **residence/birthplace** (to determine whether there is variation based on age and/or dialect)
- median age: 27, age range: 19 to 63 (q1 = 23, q3 = 32)
- participants' fluency in Šatrovački determined by asking them to "translate" 5 BCMS words into Šatrovački

experimental design

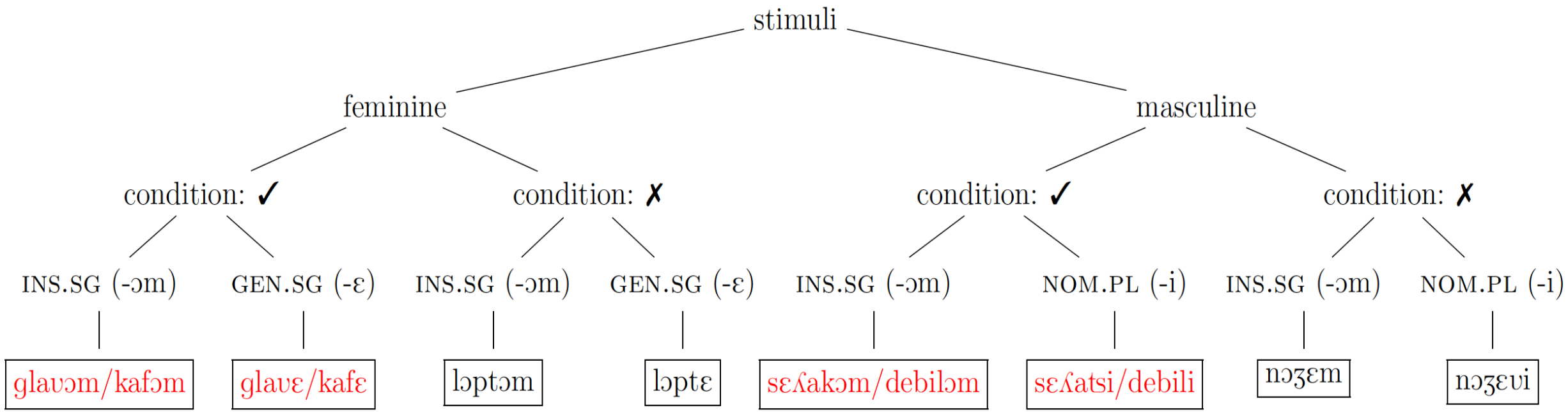
- **carrier sentence**: for all stimuli, there was a carrier sentence with a missing word.
- **evaluation task**: Participants evaluated three corresponding forms of Šatrovački for each missing word on a five-point scale.

experimental design: variables

- **Gender:**
  1. feminine
  2. masculine
- **Conditions** per Gender:
  1. allows remorphologization (✓)
  2. disallows remorphologization (✗)
- **Case forms** per Condition:
  1. ins.sg (-ɔm)
  2. gen.sg/nom.pl (-ɛ/-i)

design structure

- **blocks**:
  2 Genders × 2 Conditions × 2 Case Forms = **8 blocks per participant**
- Each block contained 3 stimuli
- Total stimuli per participant:
  8 blocks × 3 stimuli = **24 stimuli**
- **Latin Square design**: for Condition: ✓, two alternative nouns were included for each condition; each participant saw only one noun per condition.


stimuli
feminine
masculine
condition: ✓
condition: ✗
condition: ✓
condition: ✗
INS.SG (-ɔm)
GEN.SG (-ɛ)
INS.SG (-ɔm)
GEN.SG (-ɛ)
INS.SG (-ɔm)
NOM.PL (-i)
INS.SG (-ɔm)
NOM.PL (-i)
glavɔm/kafɔm
glavɛ/kafɛ
lɔptɔm
lɔptɛ
sɛʎakɔm/debilɔm
sɛʎatsi/debili
nɔʒɛm
nɔʒɛvi

stimuli

- Target Word: [kafɛ] ‘coffee.gen.sg’; **stimuli**:
  1. **Late Inversion**: [f**ɛ**ka]
  2. **Early Inversion**: [fuk**ɛ**]
  3. **Filler (Double Marking)**: [f**ɛ**k**ɛ**]
- **Presentation mode**: joint mode of presentation (Marty et al. 2020) to increase sensitivity to distinctions between stimuli

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Milan je jutros popio dosta _____ [kafe].

a. feka

neprihvatljivo	skoro neprihvatljivo	neutralno	skoro prihvatljivo	prihvatljivo

b. fuke

neprihvatljivo	skoro neprihvatljivo	neutralno	skoro prihvatljivo	prihvatljivo

c. feke

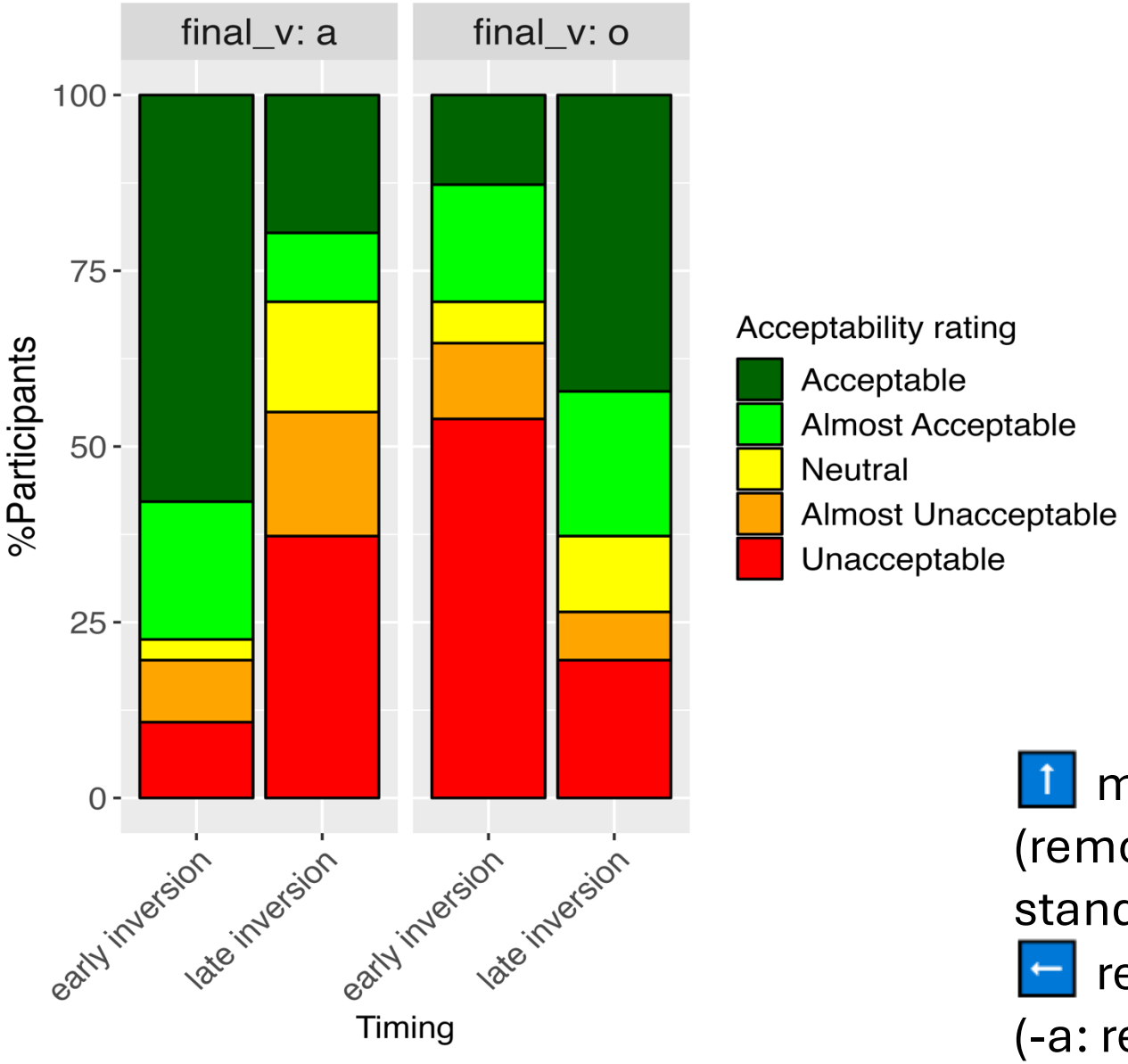
neprihvatljivo	skoro neprihvatljivo	neutralno	skoro prihvatljivo	prihvatljivo

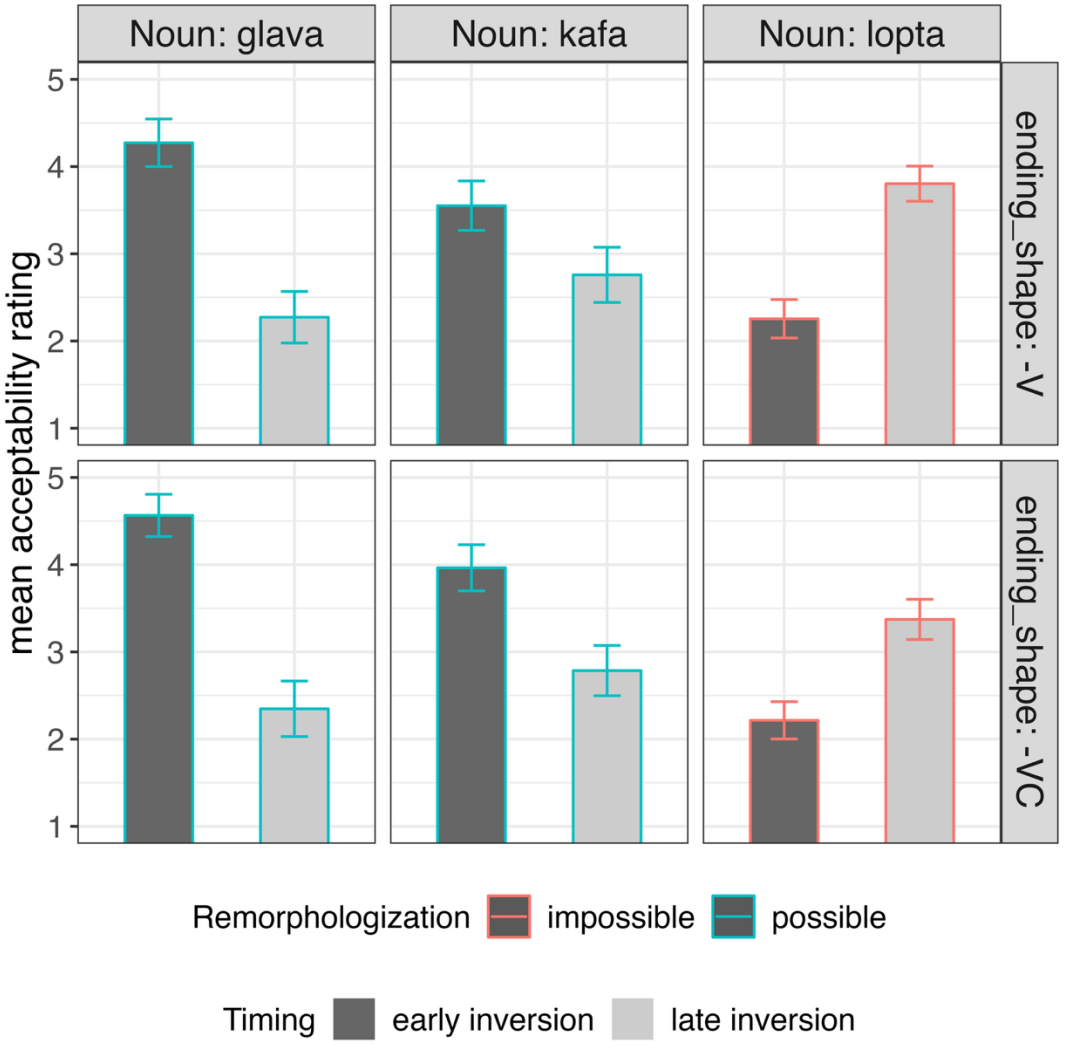
→

experimental interface:

i. carrier sentence with a missing form (BCMS form in square brackets)
ii. three options for inversion to be evaluated (a. late inv.; b. early inv.; c. double marking)

results: feminine nouns

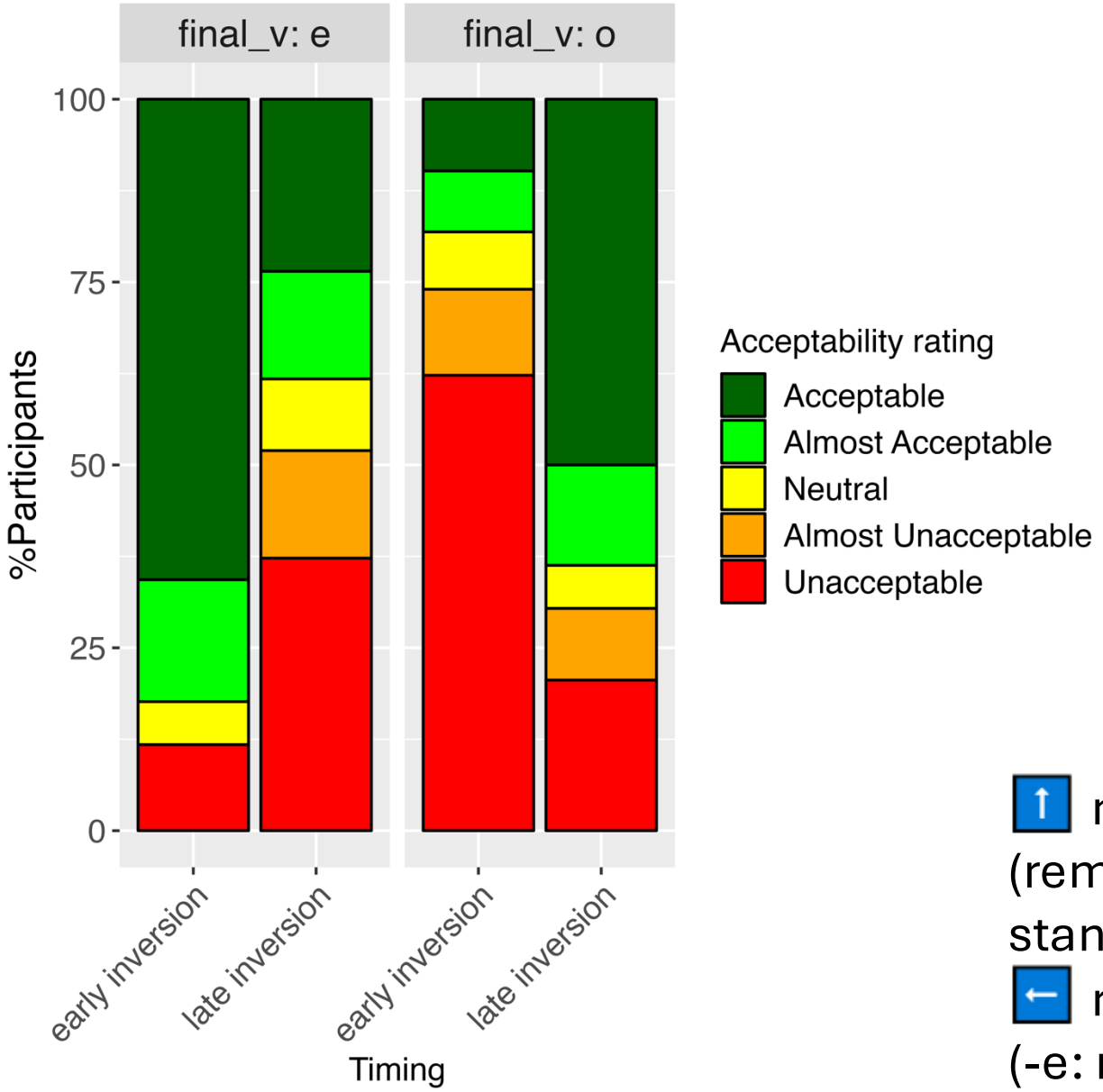


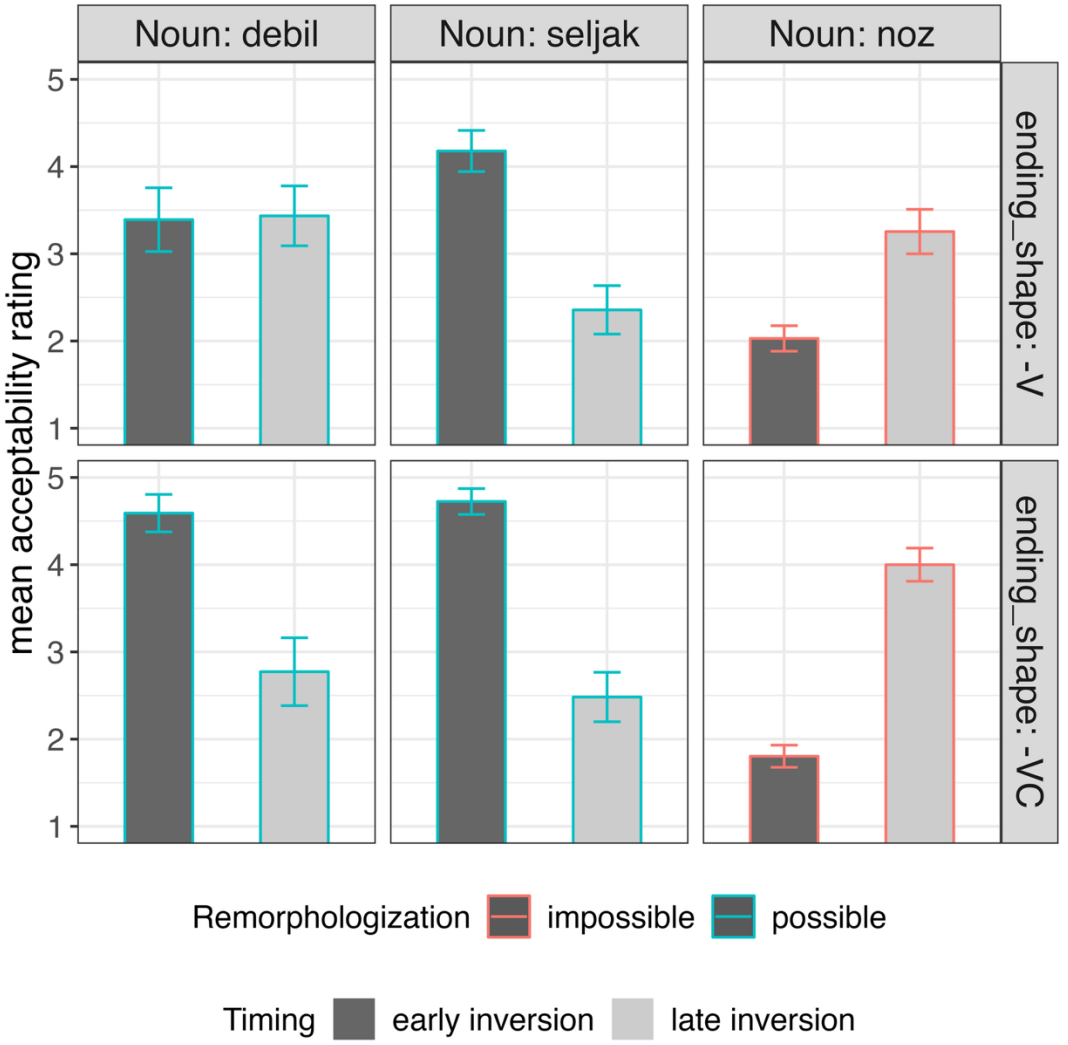


↑ mean rating by Noun and Ending Shape (remorph color-coded); whiskers indicate standard error of the mean

← responses by Condition and Final Vowel (-a: remorph possible; -o: remorph impossible)

results: masculine nouns





⬆ mean rating by Noun and Ending Shape (remorph color-coded); whiskers indicate standard error of the mean

⬅ responses by Condition and Final Vowel (-e: remorph possible; -o: remorph impossible)

ordinal regression analysis

- mixed effects ordinal regression model was fitted using the ordinal R package (Christensen 2023)
- **Rating** (dependent variable; multinomial; ordered) modeled as a function of two fixed effects and their interaction:
  1. **Timing** (levels: Early Inversion [baseline], Late Inversion)
  2. **Remorphologization** (possible, impossible [baseline])
- Random intercept by **Participant**

results (fixed effects)

```
Coefficients:

                                                    Estimate Std. Error z value Pr(>|z|)
Conditionlate inversion                               1.9686     0.1806   10.90   <2e-16 ***
Remorphologizationremorph_possible                    2.5258     0.1868   13.53   <2e-16 ***
Conditionlate inversion:Remorphologizationremorph_possible  -3.6455     0.2734  -13.33   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

The model found:

- a significant **positive** main effect of Late Inversion on Rating (β = 1.97, *p* = .000)
- a significant **positive** main effect of Remorphologization on Rating (β = 2.53, *p* = .000)
- a significant **negative (!)** interaction effect of Late Inversion and Remorphologization on Rating (β = −3.65, *p* = .000)

➢Late Inversion associated with a decline in acceptability when Remorphologization is possible

post hoc pairwise test

contrast	estimate	SE	df	z.ratio	p.value
early inversion remorph_impossible - late inversion remorph_impossible	-1.969	0.181	Inf	-10.899	<.0001
early inversion remorph_impossible - early inversion remorph_possible	-2.526	0.187	Inf	-13.525	<.0001
early inversion remorph_impossible - late inversion remorph_possible	-0.849	0.176	Inf	-4.813	<.0001
late inversion remorph_impossible - early inversion remorph_possible	-0.557	0.188	Inf	-2.968	0.0159
late inversion remorph_impossible - late inversion remorph_possible	1.120	0.189	Inf	5.914	<.0001
early inversion remorph_possible - late inversion remorph_possible	1.677	0.194	Inf	8.631	<.0001

Note: contrasts are still on the as.factor scale
P value adjustment: tukey method for comparing a family of 4 estimates

post hoc pairwise tests, Tukey-adjusted for multiple comparisons:

- Remorphologization Impossible: Early Inversion vs. **Late Inversion**: −1.969 ($p < .0001$)
- Remorphologization Possible (reverse): **Early Inversion** vs. Late Inversion: 1.677 ($p < .0001$).

Hypothesis: Early Inversion preferred if Remorphologization is possible; otherwise, Late inversion is preferred ✓

discussion

- Our experiment confirmed that inversion can apply at different derivational stages in Šatrovački
- This is consistent with Bagemihl (1988), Vaux (2011), and Vital & Nevins (2023) for TTK

Proposal: the morphological component of BCMS grammar and the ludling component interact *serially*, feeding and blocking operations in the other component

serial analysis:

1. the ludling component takes the base form of a word and subjects it to inversion
2. output of early inversion loops back to the morphological component of BCMS, which assesses its well-formedness
    1. **remorphologization possible**: the morphological component of BCMS applies inflectional morphology
    2. **remorphologization impossible** : BCMS grammar rejects the ludling form and applies inflectional morphology to the original, unaltered stem
3. fully inflected form fed into the ludling component, where it undergoes late inversion

conclusion

- inversion in Šatrovački can take place at different points in the morphophonological derivation in BCMS
- correlation between timing of inversion and availability of remorphologization
- complex interaction between the ludling component and morphological component of BCMS grammar
- future work:
  1. verbs
  2. productivity: nonce words
  3. more data on the role of phonotactics (see Appendix)

Thank you for your attention!
Merci pour votre attention!

appendix: the place of phonology (provisional)

- we assume that phonology likewise has access to the output of the ludling component (specifically, early inversion)
- however, unlike the morphological component, phonology cannot categorically rule out the product of early inversion
- BCMS verbs [dɛbili] → Šatrovački [bilidɛ] (late) or [bildɛi] (early); equally desirable

appendix: the place of phonology (provisional)

- BCMS verbs [dɛbili] → Šatrovački [bilidɛ] (late) or [bildɛi] (early); equally desirable
- exception: remorph possible, but no preference for early inversion!
- marked phonotactics: [ɛ.i]-hiatus with two unstressed vowels
- the phonotactic component penalizes this marked setting, but is ultimately unable to categorically rule it out