Consonant Length in Russian: Factors Affecting Variability in Production

Olga Dmitrieva, Department of Linguistics, Stanford University

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Introduction

Geminates in Russian can be freely degeminated in speech ⇨ **Variation**:

/ssuda/ 'loan'

[ssuda] [suda]

Previous literature (Avanesov, 1984; Panov, 1967; Kasatkin & Choj, 1999; and others) suggests that certain factors can affect the **frequency of degemination**:

- Morphological boundary (concatenated vs. tautomorphemic)
- Stress location (preceding, following, elsewhere in the word)
- Position in the word (word-initial, word-final)
- Phonetic environment (intervocalic, preconsonantal)
- Manner of articulation (stops, fricatives, nasals, liquids)
- Speech style (formal/informal, read/spontaneous)

Typology and distribution of geminates cross-linguistically:

- Most common - *intervocalic* and after a short *stressed* vowel (Thurgood, 1993)
- Voiced and *high sonority* geminates are avoided (Podesva, 2000, 2002)

Present Study

⇨ Do these factors affect the frequency of degemination?
⇨ If so, what is the direction of their effect?
⇨ Is there any evidence for a perceptual or an articulatory explanation for their effect?
⇨ Is there a connection between the gradient factors affecting variation in Russian and the categorical constrains on geminate typology?

Methods

Participants
Eight native speakers recorded in Russia
Three males and five females
5 (2 M, 3 F) older age group: 50-60 y. o.
3 (1 M, 2 F) younger age group: 20-30 y. o.

Procedure
Participants were recorded in four conditions designed to elicit words with geminates
- Interview
- Picture task
- Text reading
- Word-list reading

Example of an image used in the picture task. Target word: [allergija] 'allergy'.

Data processing
- Each occurrence of underlying geminate was *perceptually* labeled as a **geminate** or a **singleton** (*categorical* variable)
- Duration of the consonant was then *measured* instrumentally (*continuous* variable)

Results

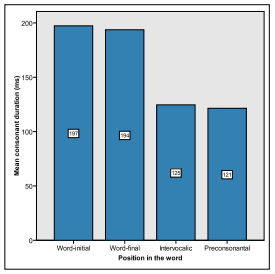
Categorical variable

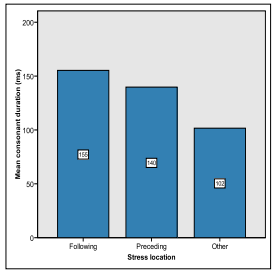
Logistic regression in VARBRUL
dependent variable: number of geminates
The best model
Input = 0.341
Log likelihood = -834.537
Significance = 0.004
included all of the following factors:

Continuous variable

ANOVA
dependent variable: consonant duration
Significant main effect of: Position in the word
Stress location
Manner of Articulation
Morphological boundary
Experimental task

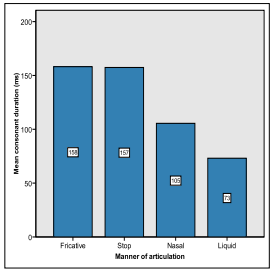
• Position in the word
Significant effect of Position on frequency of degemination: **less frequent** in *word-initial* (factor weight 0.882) than in *word-final* position (0.161); and in *intervocalic* (0.524) than in *preconsonantal* (0.236) position.
Significant effect of Position on consonant duration (F(3, 1261) = 4.333, p < 0.01): **longer** in *word-initial* and *word-final* position, than in *preconsonantal* and *intervocalic* position.

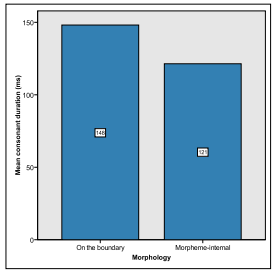




• Stress location
Significant effect of Stress location on frequency of degemination: **less frequent** in *post-stress* condition (factor weight 0.791) than in *pre-stress* conditions (0.453) and than in *non-stress adjacent* position (0.299). Significant effect of Stress location on consonant duration (F(2, 1261) = 12.897, p < 0.001): significantly **longer** in *pre-stress* condition than in *post-stress* condition and than in *non-stress adjacent* condition.

• Manner of articulation
Significant effect of Manner on frequency of degemination: **less frequent** for *stops* (0.714) and *fricatives* (0.577) than for *nasals* (0.430) and *liquids* (0.275).
Significant effect of Manner on consonant duration (F(3, 1261) = 43.871, p < 0.001): *stops and fricatives* **longer** than *nasals* and nasals **longer** than *liquids*.

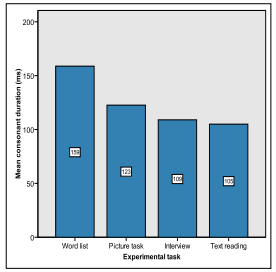




• Morphological boundary
Significant effect of Morphological boundary on frequency of degemination: **less frequency** on the *morpheme boundary* (0.754) than within a morpheme (0.407).
Near-significant effect of Morphological boundary on consonant duration (F(1, 1261) = 2.834, p = 0.093): **longer** consonants *on the morpheme boundary* than *within a morpheme*.

Results

• Experimental task
Significant effect of Task on frequency of degemination: **less frequent** in *Word-list task* (0.644) than in *Picture-task* (0.565) than in *Interview* (0.413), than in *Text reading task* (0.366).
Significant effect of Task on consonant duration (F(3, 1261) = 47.117, p < 0.001): **longer** in *Word-list* than in Picture task, **longer** in Picture task than in Interview and Text reading task.



Conclusion

⇨ Examined factors had a significant effect on the frequency of degemination in Russian and the duration of underlying geminates.
⇨ More frequent degemination during the most natural verbal interaction (Interview). No effect of orthography.
⇨ Frequency of degemination in Russian ⟺ geminate typology:

- less frequent degemination occurs in the environments where geminates are preferred cross-linguistically (prevocalic, post-stress, low-sonority geminates)
- more frequent degemination occurs in the environments where geminates are avoided cross-linguistically (consonant-adjacent, not near stress, high-sonority geminates)

⇨ Mismatch between perceived frequency of degemination and actual consonant duration: different perceptual boundary between a geminate and a singleton? One of the factors shaping geminate typology?

- Word-initial: less degemination, but duration = word-final
- Intervocalic: less degemination, but duration = preconsonantal
- Post-stress: less degemination, but duration < pre-stress

Future Directions

A perception experiment with non-words to determine perceptual boundaries for geminate identification in different positions and phonetic environments.

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