Gradient Representations in Russian Noun Declension: A Phonological Approach to Stress Alternations

Ekaterina Medvedeva, University of Leipzig

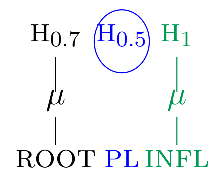
Main claim: In this talk, I will argue that the stress alternations between the singular and the plural paradigms in the Russian noun declension can be explained purely in terms of phonology. This pattern follows from the assumption of a single fully general primitive of the plural exponence, added in an additional step before inflection, and presupposes that the contrast between the underlying accentual properties of morphemes is gradient. The proposal elaborates on hypotheses originally made by Privoznov (2020) and translates them into the Harmonic Grammar with Gradient Symbolic Representations framework (Smolensky and Goldrick, 2016) (Hsu, 2022). **Data and previous approaches:** Every noun root in Russian inherits lexical information about phonologically unpredictable lexical stress patterns. These are responsible for the different accentual behavior of roots and, indirectly, inflectional suffixes through the paradigms. As illustrated in Table 1, if a root is of the (c) stress pattern, stress surfaces on the root in the singular and on the inflectional suffix in the plural. In the case of roots marked with the (d) stress pattern, the surface stress would be *mirrored* compared to roots marked with the (c) stress pattern. This results in stress surfacing on the inflection in the singular and on the root in the plural. In previous approaches, the data in question was derived under the assumption of the binary [+stress]/[-stress] opposition between underlying accentual properties of morphemes. Additionally, either rules whose application is triggered by lexical features stored on roots and suffixes (Halle and Kiparsky, 1977), or anti-faithfulness constraints indexed with allomorphs of a plural dominant morpheme (Alderete, 1999) were assumed. Both do not consider the observed *dichotomy* between two inherent features - one responsible for the choice of an inflectional suffix (gender/declension) and the other responsible for the stress pattern. The relationship between stress pattern and paradigm was largely overlooked, as stated in (Brown, 1996)[54]. **Theoretical proposal:** In the proposed analysis, it is assumed that the underlying stress of roots and inflectional suffixes has numerical levels of activity corresponding to a morpheme's ability to retain stress. The underlying stress is represented as H-tone following Halle (1997)[277] "head elements of a metrical constituent/foot are usually marked phonetically by a (high) tone which is referred to as stress". The CULM(inativity) constraint gives rise to competition between H-tones of morphemes that are concatenated into the same word. In the weighted constraint model where a constraint violation score is proportional to activities of the phonological elements that incur it, the faithfulness constraint MAX-H predicts that the most active morphemes retain their stress, winning the competition. When two morphemes of the same activity are combined, competition is resolved by an ALIGN (μ,L) constraint which determines the language-specific preference for stress to be

	a	b	c	d
	$\sqrt{swamp}$	$\sqrt{substance}$	$\sqrt{see}$	$\sqrt{village}$
singular				
NOM	bolót -o	vešestv- ó	mór -e	sel- ó
GEN	bolót -a	vešestv- á	mór -a	sel- á
DAT	bolót -u	vešestv- ú	mór -u	sel- ú
ACC	bolót -o	vešestv- ó	mór -e	sel- ó
INST	bolót -om	vešestv- óm	mór -em	sel- óm
LOC	bolót -e	vešestv- é	mór -e	sel- é
plural				
NOM	bolót -a	vešestv- á	mor- á	sól -a
GEN	bolót -∅	vešestv-∅	mor- éj	sól -∅
DAT	bolót -am	vešestv- ám	mor- ám	sól -am
INST	bolót -ami	vešestv- ámi	mor- ámi	sól -ami
LOC	bolót -ax	vešestv- áx	mor- áx	sól -ax

Table (1): Noun inflection paradigm (fragment) realized on the edge of a prosodic word. The results of the evaluation are summarized in (2), where the contrast between the underlying accentual properties of morphemes is preserved by MAX-H, resulting in surface stress on morphemes with greater activity. The surface stress is aligned to the left edge due to the ALIGN (μ,L) constraint when the morphemes have the same activity. To derive the stress alternations between the singular and the plural paradigms, plural derivation before inflection in the plural paradigm is assumed. The single fully general plural exponence is a floating tone, which has a numerical activity of 0.5 and attaches to all roots, as shown in Figure (3). It can dock to TBU-s (= moras) and undergo fusion with elements of the same autosegmental level. For example, it can merge with the underlying tone of a (d) root as in (5-a.). Conseguently, the activities of both input tones are added up for the new output tone. However, the $^*H_{>1}$ constraint sets a threshold. Candidate (4-a.) for a (c) root with fused tones is ruled out because its resulting activity is greater than 1. The phonological mechanism of tone fusion hence predicts the mirrow pattern in the plural. **Discussion:** As I will show in the talk, the proposed analysis is superior to previous approaches because it derives the data by enriching underlying representations with numerical activities that translate morphological and lexical information into phonological representations. This does not only neutralizes the dichotomy between inherent features but also allows to account for the stress patterns in the Russian noun inflection paradigm from purely phonological constraints.

roots		(a)	(b)	(c)	(d)
	activities	1	0	0.7	0.5
SG.INFLECTION	0.7	MAX	MAX	ALIGN L	MAX
PL.DERIVATION	(0.5)	1+(0.5)	0+(0.5)	0.7+(0.5)	0.5+(0.5)
PL.INFLECTION	1	ALIGN L	MAX	MAX	ALIGN L

Table (2): Summary of analysis



(3): Plural derivation

$H \to \mu$: assign a violation 1 for every H-tone that is not associated to a μ

$^*\mu \to 2 \text{ x } \tau$: count 1 violation for every μ that is directly associated to more than one tone

$^*H_{>1}$: assign a violation 1 for every H-tone that has activity greater than 1 in the output

(4)

(R_c): $H_{0.7}$ $H_{0.5}$ H_1 / μ μ / mór ám	CULM ∞	$^*H_{>1}$ ∞	$^*\mu \to 2$ x τ ∞	MAX(H) 100	$H \to \mu$ 100	ALIGN (μ,L) 10	HS
a. mór ám		-1		-1			∞
b. mór am				-1	-1		-200
☞ c. mor ám				-0.7	-1	-1	-180
d. O = I	-1				-1		∞

(5)

(R_d): $H_{0.5}$ $H_{0.5}$ H_1 / μ μ / sól ám	CULM ∞	$^*H_{>1}$ ∞	$^*\mu \to 2$ x τ ∞	MAX(H) 100	$H \to \mu$ 100	ALIGN (μ,L) 10	HS
☞ a. sól am				-1			-100
b. sól am				-1	-1		-200
c. sel ám				-0.5	-1	-1	-160
d. O = I	-1				-1		∞

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