Thoughts and Notes Concerning a Stress Placement Experiment in Russian

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Nikolaeva 1971[1] presents the results of an experiment seeking to elucidate stress placement in Russian using native speaker judgments about stress in unfamiliar foreign words. Many different patterns were identified in the responses. The main finding is that words ending in a closed syllable tend to have final stress, and words ending in an open syllable tend to have penultimate stress.

Given the data presented, the main finding concerning structure of the final syllable seems very strong. However, many of the other patterns discussed seem open to challenge. Futhermore, the article does not include discussion what might be at the root of the intriguing syllable-structure effect. Since stress judgments from the experiment are included at the end of the article, many of these questions can be taken up and pondered by the reader. In what follows, I present some of my ponderings on these topics.

Diphthongs as Stress Attractors

One of the many patterns discussed is a tendency for the sequences *ej* and *aj* to attract stress. I want to note simply note that usage of the term "diphthong" in connection with these sequences may be misleading for some since these sequences are not diphthongs in Russian. There is clear evidence that glides are considered consonantal in Russian; this is not something that is disagreed upon to my knowledge. For example, verbal forms ending in –j take the reflexive allomorph –s^{j}a, which subcategorizes for consonant-final stems; the allomorph –s^{j} is used with vowel-final forms (cf. moet-s^{j}a 'he/she/it washes self', moj-s^{j}a 'wash yourself! (familiar)' vs. mojte-s^{j} 'wash yourself! (formal)'). Similarly, although it is not considered normative, final /j/ often devoices, especially in careful citation-style speech; the same is not true for final vowels. In fact, if you read the section in the article closely, you will see that Nikolaeva herself refers to the sequences as "diphthongs in the source language".

Effect of Vowel Palatality

Another pattern discussed in the article is that non-front vowels attract stress more strongly than front vowels. Two potential problems exist here. One is the fact that no statistical tests are used to determine whether differences in raw response rates are in fact significant. The second is that /a/ is grouped as a non-front vowel. This introduces a possible confound because Russian does not have any front low vowel to balance the sonority of the two groups.

[1] Nikolaeva, T.M. 1971. "Mesto udareniia i foneticheskii sostav slova (rasstanovka udareniia v neizvestnykh slovakh inostrannogo proiskhozhdeniia)," in F.P. Filin et al. (Eds.), *Fonetika. Fonologiia. Grammatika. K semidesatiletiiu A.A. Reformatskogo.*. Nauka: Moscow.

With respect to the first point, the chi-squared test shows that differences in the distribution of responses shown in Table 4 of the article are probably not significant. Although the response pattern for the "NF" and "FN" groups are obviously different from each other, it is questionable whether either is different from the 'default' "NN" and "FF" cases, where palatality of the final two vowels is equal.[2] For example, the response pattern for the "NN" group (where the last two vowels are both non-front) is not significantly different from that of the "NF" group (χ^2=1.08 $p < 1$), and the response pattern for the "FF" group is not significantly different from that of the "FN" group (χ^2=2.57 $p < 0.2$). If the "FF" and "NN" groups are merged, since there can be no effect of vowel palatality in either case, the "FN" group is seen to have a significantly lower rate of final stress than the joint NN/FF group, but there remains to significant difference between NN/FF and NF.

To further investigate the second point, i.e. the problem of including /a/ in the non-front group with no corresponding low front vowel, I grouped the data according to the palatality of the vowels of the final two syllables, excluding forms with /a/ in either position. This investigation was limited to closed-syllable forms. A similar analysis for open-syllable forms is not presented since comparatively few items fall into the pertinent categories, making it difficult to form stable generalizations (out of 63 vowel-final forms, 36 end in /a/, and another 10 have /a/ as the penultimate vowel).

Palatality for V's of last two syllables	# of words in the dataset	# of stress judgments falling within last two syllables	# of penultimate stresses	# of final stresses
back-front	25	229	95 (41%)	138 (59%)
front-back	18	168	53 (32%)	115 (68%)
front-front	30	298	128 (43%)	170 (57%)
back-back	18	180	73 (41%)	167 (59%)

For this group, the expected trend is for stress on the final (closed) syllable. As shown, the majority of responses for the words in each of the categories was final stress. Here, stresses falling outside the final two syllables are not considered; percentages in the last two columns indicate what percentage of the stresses falling within the last two syllables are final vs. penultimate. The final two rows present numbers for forms in which the last two vowels do not differ in palatality. If vowel palatality has an effect, we would expect to see an increase in the number of penultimate stresses in the first row where a front vowel in the ultima might induce rightward stress shift onto a back vowel, and we might expect to see an exaggerated tendency for final stress in the second row, where the ultima has a back vowel. Although the latter of these predictions seems to be confirmed, the first one does not. The rate of penultimate stress in the back-front condition is in fact

[2] Recall that in the article, abbreviations and numbers are given in a form where the leftmost abbreviation or number refers to the final syllable. Hence, the "NF" group refers to words with a Nonfront vowel in the final syllable and a Front vowel in the penult. Except where explicitly citing a section of the article using these abbreviations, as in the current discussion, I have not continued this practice.

identical to that in the back-back condition, and is slightly lower than in the front-front condition.

This does not rule out the possibility that some palatality effect is present, since each of the categories discussed above contains vowels of two different heights, mid and high. If vowel height has an effect on stress, this could be obscuring a smaller effect of palatality. To address this possibility, I separated out all those closed-syllable forms for which the vowels of the last two syllables were equal in height, to which the following numbers pertain. Note that there were no items falling into the high-high/back-front category, and only three items falling into the mid-mid/front-back category. These categories are therefore not included in the table. The first row indicates the response pattern for items in which neither palatality nor height should influence stress placement (i.e., it includes high-high/back-back, high-high/front-front, mid-mid/back-back, and mid-mid/front-front).

Height (last two syllables)	Palatality (last two syllables)	# of words in the dataset	# of stress judgments falling within last two syllables	# of penultimate stresses	# of final stresses
high-high or mid-mid	back-back or front-front	23	229	94 (41%)	135 (59%)
high-high	front-back	6	50	12 (24%)	38 (76%)
mid-mid	back-front	12	120	51 (43%)	69 (58%)

Here, the majority of stress responses are again on the ultima, which is expected for closed-syllable items. The first row provides the data for those items in which neither height nor palatality should influence the preference for final stress. The last two columns represent those cases where an effect of vowel palatality, if present in the language, has the strongest chance of making itself known. In the high-high/front-back condition, a dispreference for stressing front vowels should strengthen the final stress preference. Indeed, we do see a higher rate of final stress in this category than in any of the other three. However, it is also predicted that the mid-mid/back-front condition should have an attenuated tendency for final stress. Although the rate is minimally lower than expected in comparison with line 1 of the table, this effect is not significant (χ^2=0.0684, p<1).

Summarizing the above, what we are left with is the observation that the preference for final stress among closed-item forms is stronger for items having a final back vowel but penultimate front vowel than for other closed-syllable forms. Although this is consistent with a palatality effect on stress placement, this hypothesis is weakened by lack of any evidence showing an attenuation in the final stress pattern for items with a final front vowel but penultimate back vowel. Instead, it may be more likely that certain of the items falling into the front-back category have a higher rate of final stress for independent reasons. For example, many of the front-back items had identifiable Greek or Latinate endings, such as –on (*cotyledon*) or –um (*addendum*), which may be associated with

specific stress patterns in the minds of native speakers. I conclude that if vowel palatality does affect stress placement in Russian, this remains unproven.

Effect of Vowel Height

The article did not specifically look at possible effects of vowel height or sonority or stress placement. However, since I have raised this in the previous section as a possible confound in the discussion of palatality, it seems important to test whether there is in fact a sonority effect.

Again, only stress responses falling on the final two syllables were considered. Items were categorized with respect to the sonority of the final two vowels – either they were equal in sonority, the penult vowel was higher in sonority than the final, or vice versa. Because different stress patterns are expected for open-syllable and closed-syllable forms, figures were calculated separately for each group.

	Height for V's of last two syllables	# of words in the dataset	# of stress judgments falling within last two syllables	# of penultimate stresses	# of final stresses
closed syllable forms	equal sonority	54	529	182 (34%)	347 (66%)
	more son. – less son.	56	558	220 (39%)	338 (61%)
	less son. – more son.	45	428	136 (32%)	292 (68%)
open syllable forms	equal sonority	15	150	123 (82%)	27 (18%)
	more son. – less son.	13	130	97 (75%)	33 (25%)
	less son. – more son.	35	293	268 (92%)	25 (8%)

For the closed syllable forms, there does not seem to be any effect of vowel sonority; all three groups show about the same distribution of response types; neither of the categories with unequal sonority differs significantly from that with equal sonority (more son. – less son. vs. equal: $\chi^2 = 0.7369$; less son. – more son. vs. equal: $\chi^2 = 2.939$; critical value at .05 = 3.84). For the open syllable forms, the different sonority categories do seem to have distinctly different response patterns, however, these go exactly contrary to the predictions of a sonority effect. The highest rate of penultimate stress, 92%, is found in forms where the penultimate vowel is less sonorous than the ultima. Likewise, the lowest rate of penultimate stress, 75%, is found in forms where the vowel of the ultima is less sonorous than that of the penult. The former effect (last row of the table) is also extremely significant when compared with the response pattern for forms with equal sonority ($\chi^2 = 8.5834$, $p<.01$). A possible explanation for this pattern is presented in the next section.

Effect of Morphological Status

One thing that is not discussed in the article is why the overall pattern of final stress for closed-syllable forms and penultimate stress for open-syllable forms would in fact be the case. One possibility for making sense of this pattern is to assume that speakers are building a moraic trochee aligned with the right edge of the word, and that coda consonants are moraic. However, I can hardly believe that this is a stress system that native speakers of Russian have in their heads. An alternative explanation based on increasing familiarity with the words in the appendix to the article is that stress placement is affected by the assumed morphological status of a given item. Consider, first of all, that when someone given a novel word in isolation, as was the case in this experiment, people are probably most likely to assume that it is a noun. This means that the closed-syllable and open-syllable forms used in this study would have quite different morphological interpretations: with one exception, any of the vowel graphemes of Russian is also a possible nominal case ending. For example, -u is the marker for dative singular case for most masculine and neuter nouns, -e is the locative singular marker for most nouns, -a is the nominative singular ending for most feminine nouns and the genitive/accusative for most masculine and neuter nouns, -o is the nominative singular ending for most neuter nouns, etc. Hence, practically all of the vowel-final items in the study had a possible interpretation as a case-marked noun. In comparison, the number of case endings that are consonant-final is incredibly small (-om, -am, -ov, -oj). It is therefore quite unlikely that any of the consonant-final items could have been interpreted as case-marked. Given this state of affairs, it is possible that both the open-syllable and closed-syllable groups obey exactly the same pattern: place the stress on the rightmost syllable of the stem.

As a test of this hypothesis, I looked at all the vowel-final items, and classified them according to their 'declinability'. When a word is borrowed into Russian, it almost always declines if it ends in a consonant (the only exception being feminine proper names, where declining them would lead to a gender mismatch). If it ends in a vowel, it is declined if it 'lends itself to declination'. Practically speaking, this means that a form that looks like a good nominative singular declines, but other things don't. Hence, borrowed words in –i and –u do not decline: *kenguru*, *kolibri*, etc. Words ending in –a look like feminine nouns and almost always decline, using the typical feminine nominal case endings; the only /a/-final borrowed word I know of that does not decline is *boa*. Interestingly, even though words ending in –o and –e could in principle be interpreted as nominative singular neuter nouns, they do not typically receive this interpretation, and are instead usually treated as indeclinable: *tire* 'hyphen', *metro*. If these ideas about declinability hold for the experimental items, the morphology-based hypothesis concerning stress placement makes a prediction about stress placement in the vowel-final forms. If we assume that people are most likely to think that a word presented to them in isolation will be provided in citation form, which would be nominative singular for Russian, this means that the penultimate stress tendency seen with open-syllable forms should be strongest for words ending in /a/. This prediction is strongly confirmed ($\chi^2 = 26.07$, $p<.001$).

Final Vowel (open-syllable forms only)	# of words in the dataset	# of stress judgments falling within last two syllables	# of penultimate stresses	# of final stresses
/a/	36	311	284 (91%)	27 (9%)
some other vowel	27	262	177 (75%)	58 (25%)

This result also explains the enigmatic pattern observed in the section on possible sonority effects: penultimate stress is strongest precisely when the ultima contains a very sonorous vowel simply because the highly sonorous vowel /a/ just also happens to lend itself to being interpreted as a case ending for nouns in citation form. Note, however, that the rate of penultimate stress is still quite high for items ending in some other vowel. I suppose there could be many different ways to explain this, but what seems most likely to me is simply that, not having received any explicit information about the morphological status of the items, participants were free to assume any morphological interpretation they wanted to. Hence, some words in –u or –i or some other vowel might have been interpreted as a non-citation case-marked form. Anecdotally, when attempting to replicate some of the judgments in the article, native speakers would sometimes ask me whether they were "allowed" to assume the presence of case endings, since they thought that this would in fact change their answers on certain items.

Conclusion

In conclusion, I would say that the main finding of this very interesting article on Russian stress, namely that open-syllable forms receive penultimate stress while closed-syllable forms receive final stress, is clearly correct. Subsidiary patterns, such as an effect of vowel palatality, seem less well founded and may have been artifactual. Furthermore, closer examination of the open-syllable forms suggests a possible explanation for the main pattern. Further investigation of stress placement in novel Russian words is required to determine whether morphological status does in fact play a role in the mental grammar of native speakers.