DOI: 10.26346/1120-2726-147

Vowel reduction in a North Russian dialect: A case study

Alexander Krasovitsky

University of Oxford, Great Britain <alexander.krasovitsky@mod-langs.ox.ac.uk>

The paper investigates the rise of phonological vowel reduction of low and mid back phonemes, /a/ and /o/, in North Russian, one of the two major Russian regional varieties. The study is based on an analysis of synchronic variation across different generations of speakers in one rural community. Stress-independent discrimination of low and mid vowel phonemes /a/ and /o/ found within the older generation of speakers is compared to the stress-dependent neutralisation of these phonemes characteristic of middle and younger generation speakers of this variety. The analysis allowed me to link the emergence of this new pattern of allophonic variation to significant overlapping in the acoustic space of low and mid back vowels. It is hypothesised that this phenomenon is facilitated by stronger coarticulation effects found in less conservative individual sound systems of the dialect. This accounts for a larger spread of /o/ and /a/ allophones within the F1xF2 acoustic space and presumably leads to the neutralisation of these phonemes in unstressed syllables.

KEYWORDS: vowel reduction, synchronic variation, sound change, coarticulation, Russian dialects.

1. Background

Until recently, consistent stress-independent discrimination of the low and mid vowel phonemes /a/ and /o/ has been a salient feature of North Russian, one of the two major Russian regional varieties.[1] In the Russian dialectological tradition this phenomenon is referred to as *okan´je*. Research conducted in the last 10-15 years (e.g. Vaahtera 2009, Krasovitsky 2014) has revealed that middle-aged and particularly younger speakers have deviated from the stress-independent discrimination of low and mid vowels and developed a new model of allophonic variation based on the neutralisation of the phonemes /o/ and /a/ in unstressed syllables. As exemplified in (1) and (2), the two phonemes, distinguished in unstressed positions in conservative idiolects, are neutralised in these positions in innovative idiolects due to the loss of unstressed [o]. Rounded mid vowels are ousted by the unrounded low-mid or mid vowels [ɐ] or [ə]. Thus, different diachronic stages are

presented as synchronic variation across speakers: conservative idiolects with consistent discrimination of low and mid vowels, as in (1), co-exist with innovative idiolects where neutralisation is obligatory in unstressed positions, as in (2). A number of transitional idiolects found in such local communities present a competition between these two models. Typically, the conservative and the transitional type of idiolects are characteristic of older-generation speakers, while the innovative type is found in middle and younger-generation speakers.

	Stressed syllables	Unstressed syllables
(1) Conservative	*s*[a]*m* 'myself' M *s*[o]*m* 'cat-fish' SG.NOM	*s*[ɐ]*má* or *s*[ə]*má* 'myself' F *s*[o]*má* 'cat-fish' SG.ACC/GEN
(2) Innovative	*s*[a]*m* 'myself' M *s*[o]*m* 'cat-fish' SG.NOM	*s*[ɐ]*má* or *s*[ə]*má* 'myself' F *s*[ɐ]*má* or *s*[ə]*má* 'cat-fish' SG.ACC/GEN

This situation enables us to investigate sound change resulting in the transition from consistent discrimination of low and mid vowels to their consistent neutralisation in unstressed syllables using present-day dialectal data.

2. Data and methodology

The data for this case study were obtained through fieldwork conducted in 2006 in a North Russian dialect spoken in the district of Mezen´ (Arkhangelsk Region), in two neighbouring villages, Safonovo and Yolkino (henceforth 'Safonovo dialect'), along the Pyoza river.[2] The data collected consist of sociolinguistic interviews and elicitation work based on a word list in carrier phrases. The list contains instances of vowel phonemes in stressed and unstressed positions and is based on the programme for data collection developed for the Dialectological Atlas of the Russian Language (Avanesov 1947; Avanesov & Bromlej 1986). Phrases from the list were pronounced by eight speakers of the Safonovo dialect (one realisation per phrase per speaker). The subjects fall into three age groups: (i) five participants born between 1934 and 1941, (ii) one born in 1968 and (iii) two born in 1992 and 1995 respectively. The analysis reported in this paper rests on this elicitation work. For further details see Table 1 in the Appendix.[3]

The data were recorded at 44 kHz with 16-bit resolution and downsampled to 22 kHz. The target words were manually segmented and labelled using Praat (Boersma & Weenink 2018). The acoustic

properties of vowels and their distribution within the vowel space (section 4) were investigated using F1 and F2 values for unstressed vowels of the 1st and 2nd pretonic syllables.[4] Measurements for these analyses were taken as an average for the central part of each vowel (the window includes one third of the duration of the vowel, i.e. 1/6 to the right and 1/6 to the left of the central point). The F1 and F2 values for the onset of the vowel used for the analysis of coarticulation effects (section 5) were taken as an average of the first third of the duration of the vowel respectively. Means and standard deviations of the allophones of low and mid back phonemes were visualised using the VOWELS R package (online interface: <lingtools.uoregon.edu>). All recordings resulting from this fieldwork are available in RuReg (Sappok *et al.* 2016).

3. Preliminary auditory analysis

A preliminary auditory analysis of the Safonovo data revealed striking differences across speakers with respect to the quality of allophones representing phonemes /o/ and /a/. While these pre-instrumental observations are obviously impressionistic in nature, I find it useful to report them here since they adequately reflect the situation in the Safonovo dialect, as shown by the results of the acoustic analysis discussed later in this article. The differences in question, very salient to a trained ear, may be summarised as follows.

- With respect to the discrimination or neutralisation of low and mid back vowels in unstressed syllables, the investigated idiolects fall into three types: conservative (consistent discrimination of /a/ and /o/ with occasional instances of unrounded vowels representing /o/), innovative (consistent neutralisation of /a/ and /o/ as [ɐ] or [ə]) and transitional, in which the discrimination and neutralisation models are applied inconsistently and the phoneme /o/ may be realised both by rounded and unrounded allophones.[5] The realisational variation of /o/ and /a/ for the three speaker types is illustrated in Table 2 and Table 3 of the Appendix.
- Many stressed allophones of /o/ in the pronunciation of speakers of transitional and innovative idiolects are more centralised and less rounded than those of conservative speakers.
- Unstressed rounded allophones of /o/ in transitional idiolects (i.e. in those where both discrimination and neutralisation of

low and mid back vowels are found) are more centralised than those in the conservative idiolects.
- Preceding consonants have a clear and perceptible effect on the quality of vowels, in particularly on allophones of /o/. The difference is particularly striking if we compare rounded mid back vowels after alveolar and after labial consonants: the former are perceived as much more centralised and less rounded.
- In many instances, stressed allophones of /a/ in the data representing transitional and innovative idiolects are perceived as raised in comparison with those pronounced by conservative speakers.

These preliminary observations on the data from Safonovo raise the following two questions:

(i) Does the rise of neutralisation of /o/ and /a/ in the transitional and innovative idiolects result from decreased distances between these vowels within the vowel space, as compared to the conservative idiolects?
(ii) Do contextual conditions have an effect on weakening labialisation of mid back vowels and on further neutralisation of /o/ and /a/?

I address the first question in section 4, where I present the correlation between spatial reduction (i.e. diminished vowel space) and the rise of the stress-dependent pattern of vowel neutralisation. Section 5 is dedicated to a possible impact of coarticulation on the spread of the new neutralisation model.

4. Acoustic space

The acoustic analysis of the Safonovo data shows that the presence of one of the two models of allophonic variation for phonemes /o/ and /a/, i.e. the stress-independent discrimination or neutralisation in unstressed syllables, correlates with the location of the vowels within the F1xF2 acoustic space. Figure 1 shows the location of means for the allophones of the five vowel phonemes, /a, o, u, e, i/ in strong prosodic positions, i.e. in stressed syllables. As these data demonstrate, in the conservative type the greatest distances are found between the means for individual phonemes, while in the transitional and the innovative types the raised floor of the vowel space and the horizontal shift towards the centre of the quadrilateral account for smaller distances between the vowels.

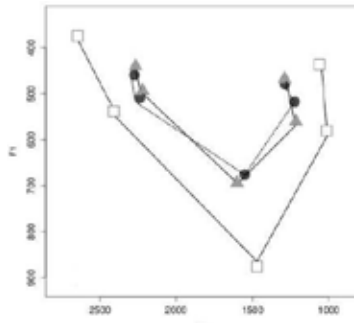

Figure 1. Vowel space measured for conservative (□), transitional (△) and innovative (·) idiolects. Phonemes /a, o, u, e, i/ (means for stressed syllables). Number of tokens for individual phonemes in the list (stressed syllables): /i/ 44, /e/ 64, /u/ 19, /o/ 66, /a/ 60.

While the individual vowel phonemes, and in particular low and mid back vowels, draw closer to each other in the transitional and in the innovative type, these two types are characterised by the larger acoustic regions of /o/ and /a/, as compared to the conservative type. Figures 2, 3 and 4 show the means and standard deviation for low and mid back vowels within the three dialectal types under study. As the charts reveal, the stretch is particularly noticeable for the /o/ region in the transitional and in the innovative types, which spreads along the F2 axis to a much greater extent than in the conservative type. For a number of rounded vowels (in particular for most advanced outliers) this shift to the centre presumably implies impaired labialisation (Kodzasov & Krivnova 2001: 160; Ladefoged & Maddieson 2002: 358; Grawunder, Simpson & Khalilov 2010: 234).

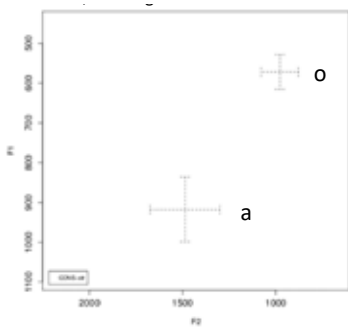

Figure 2. Means and standard deviations for stressed allophones of /o/ and /a/. Conservative type. Realisations per phoneme: /o/ (vowel [o]) 128; /a/ (vowel [a]) 117.

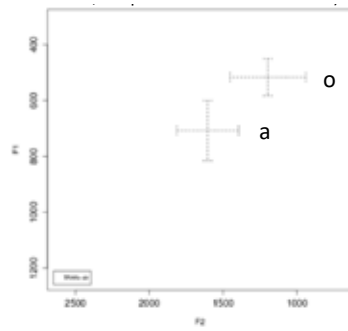

Figure 3. Means and standard deviations for stressed allophones of /o/ and /a/. Transitional type. Realisations per phoneme: /o/ (vowel [o]) 104; /a/ (vowel [a]) 113.

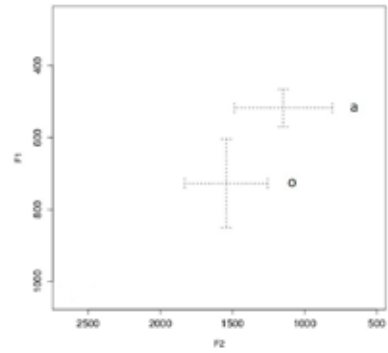

Figure 4. Means and standard deviations for stressed allophones of /o/ and /a/. Innovative type. Realisations per phoneme: /o/ (vowel [o] 139; /a/ (vowel [a]) 141.

The shift of stressed vowels attested in the transitional and the innovative types translates into more drastic changes in unstressed syllables, leading to further weakening of labialisation of /o/ allophones and finally to their unrounding and neutralisation with /a/, as sketched out in examples (1) and (2). It is noteworthy that the auditory analysis of transitional idiolects, as mentioned above, points to a horizontal shift of unstressed [o] towards the centre, and this shift is more salient than in the conservative type. Figure 5 and Figure 6 depict the acoustic regions of unstressed vowels [a] ([ɐ]) and [o] in the conservative and in the transitional type respectively. (Note that I do not include here data from the innovative type since this type lacks unstressed [o].) We have seen already that in the conservative dialectal type acoustic regions occupied by the stressed allophones of /o/ and /a/ do not overlap (Figure 2) and acoustic regions occupied by the unstressed allophones of these phonemes overlap only marginally (Figure 5). This ensures that an acoustic and perceptual distinction between these phonemes is preserved irrespective of stress.

By contrast, the transitional type is characterised by converging and overlapping of the acoustic regions of unstressed allophones. As shown in Figure 6, which depicts means and standard deviation of unstressed [a] and [o] in transitional idiolects, a key factor accounting for this overlap in unstressed positions (along with the raising of unstressed allophones of /a/) is the centralisation of mid back vowels, which implies that a significant number of /o/ allophones in transitional idiolects are characterised by a weaker labial gesture. This, presumably, may be con-

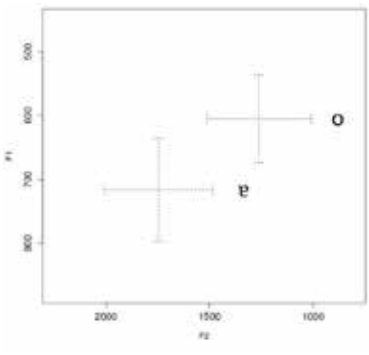

Figure 5. Means and standard deviations for unstressed vowels [o] and [ɐ]. Conservative type. Realisations per vowel: [o] 94; [ɐ] 39.

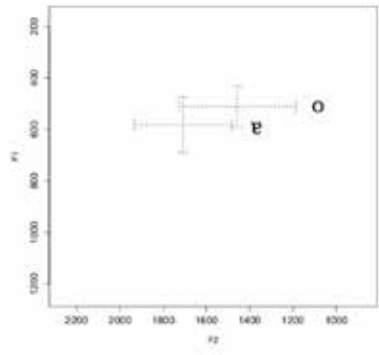

Figure 6. Means and standard deviations for unstressed vowels [o] and [ɐ]. Transitional type. Realisations per vowel: [o] 71; [ɐ] 102.

sidered as a diachronic stage immediately preceding the unrounding of /o/ allophones in unstressed syllables and leading to the decline of the phonological contrast between phonemes /o/ and /a/ (as Table 2 and Table 3 in the Appendix demonstrate).

5. Coarticulation effects

As shown above, rounded vowels are obligatory as unstressed allophones of /o/ in the conservative type and are optional in the transitional type (where they are in variation with unrounded vowels [ə] and [ɐ]). In both types significant fluctuations are found in the quality of rounded vowels representing /o/ in unstressed position. As the analysis of acoustic regions for these vowels has revealed, this difference in quality may be to a large extent attributed to fluctuations in the horizontal (front-back) dimension, on the F2 axis from an acoustic perspective. It is likely that these differences in F2 values may be related to fluctuations in the strength of the labial gesture (cf. Kodzasov & Krivnova 2001; Ladefoged & Maddieson 2002; Grawunder, Simpson & Khalilov 2010).

The purpose of the analysis reported in this section was to establish whether coarticulation effects may be considered as a conditioning factor on the stretching of the /o/ acoustic region in the unstressed position, in particular the shift of some of the /o/ allophones towards the centre and their unrounding. As mentioned above, differences between individual instances of [o] with respect to the consonantal environ-

ment became obvious during the initial auditory analysis of the data: [o] after alveolar consonants made an impression of being more centralised and less rounded than in other consonantal contexts. These preliminary observations align with previous research on the subject, e.g. Mooshamer & Fuchs (2002) who observed a significant increase in F2 values and the horizontal shift of vowels towards the centre of the quadrilateral in the alveolar context.

While there is a general consensus that the quality of unstressed vowels may be to a large extent affected by the consonantal context (cf. Savinov 2013: 195 for Russian), coarticulation effects have not so far been investigated as a possible condition on the unrounding of unstressed allophones of /o/ and the rise of neutralisation of /o/ and /a/ in North Russian. Avanesov & Bromlej (1986), for example, note that there are high frequencies of unstressed [o] preceded by a rounded vowel, however, they rule out the value of these data since such examples are, in general, more numerous than those in a different consonantal context (Avanesov & Bromlej 1986: 83). The analysis of the coarticulation effects in the Safonovo dialect and their possible impact on the diachronic process leading to the loss of opposition between low and mid back vowels in unstressed syllables is probably the first attempt to address this issue in North Russian using acoustic data.

It should be noted that the data recorded in Safonovo were not originally intended for the study of coarticulation effects: the need to apply such analysis to the Safonovo dialect, as mentioned above, became obvious at a later stage. One shortcoming of these data, therefore, is that it is not possible to control for the effect of both left and right contexts simultaneously. Another shortcoming is that the dataset does not contain sufficient data to check the effect of all consonantal contexts. Given these issues, it was decided to select contexts in which different effects on F2 could be assumed, and those where the number of realisations would be greatest. The scope of the analysis is limited to F2, since according to previous studies variation in F2 values can be taken as the most significant indication of coarticulation effects, while variation in F1 values of vowels with respect to place of articulation of adjacent consonants is quite small (Stevens & House 1963; Mooshamer & Geng 2008; Birkholz 2013). The contexts under consideration are labial [p, b, v] and alveolar [t, d, s, z].[6] These contexts are known to differ radically in terms of their coarticulation effects on adjacent vowels. Thus, alveolar consonants condition significant fronting of back vowels and higher F2 frequencies due to a higher F2 loci of these consonants in comparison with the F2 loci of mid back vowels. As opposed to alveolar consonants, the F2 loci of labial consonants are close to those of mid

back vowels. As a result of this similarity, the effect of labial consonants on these vowels is generally small (Stevens & House 1963: 119; Birkholz 2013: Figure 5). Syllables with palatalised and palatal consonants were excluded in order to avoid F2 raising, typically caused by these contexts (Ladefoged & Maddieson 2002: 363-365). Two subsets representing the same speakers and the same data as those of the analysis reported in section 4 were extracted: a subset containing instances with unstressed [o] and a left alveolar context and another subset with unstressed [o] and a left labial context. The analysis is based on the F2 measurements averaged for the first 1/3 of the vowel. Innovative idiolects are not presented in this analysis since, as mentioned above, they miss rounded allophones of /o/ in unstressed positions. The results obtained through this analysis and depicted in Figure 7 have revealed the following:

Conservative labial	Transitional labial	Conservative alveolar	Transitional alveolar
mean: 1109 Hz	mean: 1232 Hz	mean: 1318 Hz	mean: 1567 Hz
53 realisations	52 realisations	23 realisations	29 realisations

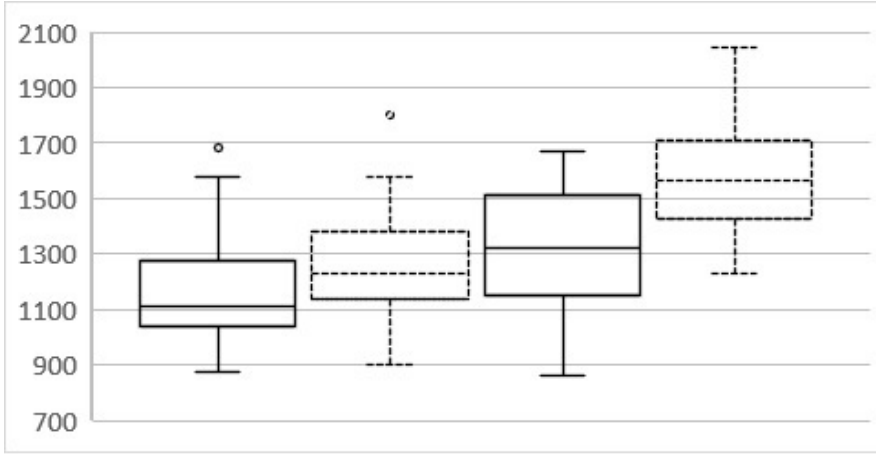

Figure 7. The spread of F2 values of unstressed [o] in the conservative and transitional type with respect to context. The left two columns depict the labial context; the right two columns show the alveolar context.

Both types of idiolects, conservative and transitional, demonstrate sensitivity to consonantal context in unstressed syllables. As F2 mean values and the location of quantiles for unstressed [o] show, the alveolar

context triggers higher F2 values than the labial context, which may be taken as an indication that unstressed rounded vowels in the alveolar context shift more significantly towards the centre and are more prone to unrounding or to the weakening of the labial gesture.

At the same time, the analysis has revealed significant differences between the conservative type, which consistently distinguishes between the phonemes /o/ and /a/ in unstressed syllables, and the transitional type where this pattern is in decline. The difference is in the extent to which unstressed allophones of /o/ shift towards the centre. As Figure 7 demonstrates, in the transitional idiolects a more significant horizontal shift is found after alveolar consonants than in the conservative type. This surfaces in higher F2 mean values and in the greater stretch of values along the F2 axis. In the transitional dialectal type, therefore, the alveolar context triggers stronger centralisation of the allophones of /o/. This ultimately leads to the weakening of the acoustic and perceptual contrast between unstressed allophones of /o/ and allophones of /a/, which contributes to the neutralisation of these phonemes.

Previous studies on Russian dialects have posited that the phonological contrast between /o/ and /a/ in unstressed syllables is lost in the first instance in the vowel systems where vowels [o] and [a] are only minimally different in stressed and unstressed contexts. Kasatkin (2010) observes this in South Russian and in Belarussian, where the phonemes /o/ and /a/ neutralise in unstressed syllables. Under his analysis, the neutralisation could emerge due to changes in the quality of unstressed vowels and is not immediately related to vowel duration. Thus, weak rounding of open-mid [ɔ], which historically represented the phoneme /o/ in all prosodic conditions in these varieties, was lost in unstressed syllables. This diachronic process, in turn, could have been triggered primarily by the loss of tense articulation previously characteristic of all vowels, rather than by quantitative reduction alone (Kasatkin 1999: 131-133).

It is noteworthy that the data from Safonovo do not reveal an immediate cause-and-effect relationship between vowel shortening in unstressed syllables, on the one hand, and unrounding of [o] resulting in the neutralisation of phonemes /o/ and /a/, on the other. The duration of unstressed vowels in the Safonovo dialect is approximately 50-60% of that of their stressed counterparts, and this holds for all three dialectal types, i.e. conservative, transitional and innovative. This also holds for the ratio between stressed and unstressed [o] both in the conservative and transitional type, which shows that even relatively short vowels can preserve the labial gesture and preclude neutralisation of /o/ and /a/ (Krasovitsky 2014). Mooshammer & Geng (2008) point out that the

cause-and-effect relationship between spatial reduction (resulting in horizontal shifts and diminished vowel space) and vowel shortening could not be confirmed on the basis of their data from German. In the case of the Safonovo dialect, it may be suggested that shortening on its own is not a sufficient condition for the rise of categorical reduction of low and mid back vowels. For example, the conservative type, which does not differ from the other two types with respect to the extent of quantitative reduction, demonstrates consistent stress-independent discrimination of low and mid vowels.

The complexity of duration as a factor shaping the word structure has been demonstrated by a number of recent studies addressing the situation in Standard Russian. Thus, Krivnova (2004) has shown that the expected quantitative relationship between stressed and unstressed vowels within a phonetic word (i.e. where a stressed vowel noticeably exceeds unstressed ones in duration) may be frequently violated in consecutive speech. On the other hand, it may be sufficient for a vowel to have duration above or beyond a specific threshold (different for different vowel) to be perceived as stressed or unstressed respectively. Knjazev *et al.* (2007) have identified instances where vowel duration and vowel quality are orthogonal to each other: word-initial vowels in the 2nd pretonic may be as short as vowels preceded by a consonant in this prosodic position, but in terms of quality (formant structure) they are very close to vowels of the 1st pretonic syllable, which are expected to be longer. Crosswhite (2001: 59) argues that the difference between the two degrees of reduction in Standard Russian, and in some of the Russian dialects (i.e. 'moderate' reduction in the 1st pretonic syllable and 'radical' reduction elsewhere), rests on different abstract representations of phonetic properties, such as vocalic duration and sonority: more sonorous vowels appear in immediately pretonic syllables and less sonorous vowels in other pre-tonic positions. This, in particular, accounts for two phonological models of /o/-/a/ neutralisation: [a] in immediately pretonic syllables and the lower sonority [ə] in other pretonic syllables. The view that such phonetic factors as duration may be embedded into a phonological model of reduction in Russian has been confronted by Iosad (2012), who claims that qualitative reduction in unstressed syllables is a symbolic (phonological) operation which blocks particular features (such as rounding) in unstressed syllables. Under this view, the distinction between the two degrees of reduction, 'moderate' and 'radical', is non-phonological and is conditioned by phonetic environment: shorter syllables (such as 2nd pretonic) trigger greater undershoot. Hence, for example, /o/ and /a/ in these syllables are neutralised in [ə] rather than in [ɐ], as it would be in the 1st pretonic. It should be pointed

out that the pattern of vowel reduction arising in the Safonovo dialect does not seem to fit to any of the above theories. As mentioned in note 5, a striking feature of the Safonovo dialect (also found in other North Russian dialects, cf. Avanesov & Bromlej 1986: Maps 1, 2, 9, 11) is the [ə/ɐ] variation representing phonemes /o/ and /a/ in all unstressed syllables. This variation cannot be attributed to differences in duration only. In line with this, Kasatkin (2008), in his analysis of another North Russian dialect, demonstrates that significant fluctuations in the quality of /o/ allophones in unstressed positions, both in the height and in the front-back dimension, may result from vowel-to-vowel coarticulation.

Currently, the interaction between duration and coarticulation as factors conditioning the rise of categorical vowel reduction in North Russian is not fully understood. However, in view of the acoustic analysis outlined above and of previous findings, it may be hypothesised that stronger coarticulation effects which are established for the transitional type are a likely conditioning factor in the phonological reduction of mid back vowels and in spread of neutralisation of /o/ and /a/.[7]

6. Conclusion

The analysis of vowel reduction and neutralisation in the Safonovo dialect has revealed consecutive stages in the rise of this phenomenon. A comparison across individual speakers representing different age groups and different types of idiolects suggests a hypothesis that consonant-to-vowel coarticulation effects may be considered as a factor conditioning the spread of neutralisation of low and mid back vowels in contemporary North Russian dialects. Thus, the alveolar environment triggers stronger centralisation of mid back vowels. The degree to which the alveolar environment affects the quality of these vowels varies with respect to the dialectal type (conservative or transitional, as discussed above). In conservative idiolects, in which the phoneme /o/ is not subjected to categorical reduction in unstressed syllables, the effect of context-induced mutations is manifested less than in transitional dialects characterised by inconsistent discrimination or neutralisation of /o/ and /a/. Stronger coarticulation with alveolar consonants triggers greater shift of unstressed allophones towards the centre of the vowel space. This makes the loss of the labial gesture in unstressed allophones of /o/ likely, leading to the neutralisation of /o/ and /a/ in unstressed positions.

The acoustic analysis presented here is based on a small sample and is not free from a number of shortcomings, as discussed above. More data showing the effect of various consonantal contexts on low and mid

back vowel neutralisation will be required to arrive at firm conclusions regarding the role of coarticulation in this process. However, the results of this case study in the context of existing literature on vowel reduction and coarticulation in a variety of languages provide strong grounds for the suggested hypothesis.

Acknowledgements

Part of this research was carried out during a research stay at the Institute of Phonetics and Speech Processing of the Ludwig Maximillian University (Munich) in July and August 2018. I am grateful to the members of the IPS Sound Change Group for their constructive feedback. The research stay was funded by the Alexander von Humboldt Foundation whose support is gratefully acknowledged. I am grateful to Sven Grawunder (Max Planck Institute for Evolutionary Anthropology) for his help with Praat scripts.

Notes

[1] According to the classification of Russian dialects accepted in Russian dialectology, Russian has two major regional varieties, North Russian and South Russian, while Central dialects in between the two combine North Russian and South Russian features in a variety of ways (Zaxarova & Orlova 1970: 71-81).

[2] The fieldwork was conducted by the author together with Professor Christian Sappok of the Ruhr University, Bochum (Germany). The recordings are hosted by the Russian Regional Corpus (Sappok *et al.* 2016). The corpus is available online at <www.rureg.de>.

[3] Sociolinguistic interviews were recorded from 25 residents of Safonovo and Yolkino. Only eight speakers, however, agreed to participate in the elicitation task. This is why the data are not balanced with respect to speakers' age or dialectal type (i.e. conservative, transitional, or innovative).

[4] The stress-dependent reduction pattern for low and mid back vowels attested in the Safonovo dialect differs from that of Standard Russian where the choice between [ə] or [ɐ] as allophones of /o/ and /a/ is conditioned by prosodic position: 1st pretonic syllables, any vowel-initial pretonic syllables and open final syllables followed by a pause take [ɐ], other unstressed syllables take [ə]. This distribution is not found in the Safonovo dialect (as well as in a number of other North Russian dialects, Avanesov & Bromlej 1986), where any unstressed syllable may take any of the two vowels, [ə] or [ɐ], both representing phonemes /o/ and /a/ (see Table 2 and Table 3 for examples). There are certain preferences for [ə] or [ɐ], but hardly any strict rules. Thus, a salient property of North Russian is the wave-like rhythmic structure of the word with a strong stressed and (relatively) strong 2nd pretonic syllable, and a weak 1st pretonic (Kasatkina 1996: 219-220). This accounts for the fact that in a three-syllable word with a final stressed syllable [ə] is probably more likely to appear in the

1st pretonic and [ɐ] in the 2nd pretonic. However, choices may depend on sentence prosody or general speech rate and are not categorical. For discussion of the Standard Russian model (also found in a variety of Russian dialects) see Šaxmatov (1896-97); Avanesov (1972); Švedova *et al.* (1980); Crosswhite (2001); Kasatkin (2010); Iosad (2012), Kapatsinski *et al.* (*this issue*).

[5] The IJL anonymous reviewer queried if the discrimination and neutralisation patterns may be distributed unevenly across the lexicon, with some lexical items being more prone, for example, to neutralisation than others. The analysis reported here did not reveal such preferences. It should be taken into account, however, that the questionnaire was not designed to test this, since no previous research, to the best of my knowledge, has addressed this issue in North Russian dialects. Consequently, it would be hard, without any previous background, to incorporate this research question into elicitation work based on a small sample. The question, however, is highly relevant and will be addressed during the analysis of informal sociolinguistic interviews recorded in Safonovo and Yolkino.

[6] In Standard Russian and in the majority of Russian regional varieties, [t, d, s, z] are classified as dental consonants (Panov 1979: 25; Švedova *et al.* 1980: 19; Kasatkin 2005: 66). In some of the North Russian dialects, these consonants are described as alveolar (Vysotsky 1967: 47). The acoustic properties of these consonants suggest the alveolar constriction (Kuznecova 1969: 44, 1977: 64-70; Kasatkin 2008: 6-7). On the basis of this analysis, the consonants [t, d, s, z] found in of the Safonovo dialect (particularly in idiolects of older generation) may be classified as alveolar. However, no articulatory analysis has ever been carried out to confirm this. It is also likely that dental and alveolar realisations coexist in the dialect in question. In the remainder of the article these consonants will be conventionally referred to as alveolar.

[7] Cf. Kapatsinski *et al.* (*this issue*): according to their data comprising samples from 81 languages, most quality reduction patterns include changes in the horizontal dimension.

Bibliographical References

Antonova Ol´ga V. 2007. Proiznošenie soglasnyx na meste bukvosočetanija *čn* v sovremennom russkom literaturnom jazyke. *Issues in Phonetics V*. Moscow: Nauka. 337-343.

Avanesov, Ruben I. & Bromlej, Svetlana V. (eds.) 1986. *Dialektologičeskij atlas russkogo jazyka: Centr Evropejskoj časti SSSR. Vol. 1: Fonetika*. Moscow: Nauka.

Birkholz, Peter 2013. Modeling Consonant-Vowel Coarticulation for Articulatory Speech Synthesis. PLOS ONE, <doi.org/10.1371/journal.pone.0060603>.

Boersma, Paul & David Weenink 2018. *Praat: doing phonetics by computer* [Computer program]. Version 6.0.37, retrieved from <www.praat.org>.

Crosswhite, Katherine 2001. *Vowel reduction in Optimality Theory*. New York / London: Routledge.

Grawunder, Sven; Simpson, Adrian & Khalilov, Madzhid 2010. Phonetic characteristics of ejectives – samples from Caucasian languages. In Fuchs, Susanne; Tode, Martine & Żygis, Marzena (eds.), *Turbulent sounds. An interdisciplinary guide*. Berlin: Mouton de Gruyter. 209-244.

Iosad, Pavel 2012. Vowel reduction in Russian: No phonetics in phonology. *Journal of Linguistics* 48,3. 521-571.

Kapatsinski, Vsevolod; Easterday, Shelece & Bybee, Joan *this issue*. Vowel reduction: A usage-based perspective. *Italian Journal of Linguistics* 32.
Kasatkin, Leonid L. 1999. *Sovremennaja russkaja dialeknaja i literaturnaja fonetika kak istočnik dlja istorii russkogo jazyka*. Moscow: Nauka.
Kasatkin, Leonid L. (ed.) 2005. *Russkaja dialektologija*. Moscow: Academia.
Kasatkin, Leonid L. 2008. Konsonantizm slobodskix govorov. *Materialy i issledovanija po russkoj dialektologii* 3,9. Moscow: Nauka. 5-49.
Kasatkin, Leonid L. 2010. Iz istorii akan'ja – jakan'ja v russkom jazyke. *Russkij jazyk v naučnom osveščenii* 2. 77-102.
Kasatkina, Rosalia F. 1996. Prosodija russkix govorov. In Kalenčuk, Maria. L.; Kasatkina, Rosalia F.; Kodzasov, Sandro V.; Kuznecov Vladimir B.; Ščigel, Elena V. & Sappok, Christian, *Prosodičeskij stroj russkoj reči*. Moscow: Nauka. 207-255.
Knjazev, Sergej V.; Ključinskaja, O. G. & Jakunina, N. V. 2007. Nekotorye problemy struktury sloga v russkoj reči. In *Lingvističeskaja polifonija: Sbornik statej v čest´ jubileja professora R. K. Potapovoj*. Moscow: Jazyki slavjanskix kul´tur. 376-393.
Kodzasov, Sandro V. & Krivnova, Ol´ga F. 2001. *Obščaja fonetika*. Moscow: RGGU.
Krasovitsky, Alexander 2014. Articulatory shift and the rise of neutralization of vowels. In *Issues in Phonetics VI*. Moscow: Nauka. 280-296.
Krivnova, Ol´ga F. 2004. Dlitel´nost´ kak sredstvo realizacii slovesnogo udarenija v tekste (sopostavitel´nyj analiz raznyx sposobov ocenki vyrazhennosti udarenija v slove). In *Jazyk i reč´: problemy i rešenija. Sbornik naučnyx trudov k jubileju professora L. V. Zlatoustovoj*. Moscow: Maks Press. 77-99.
Kuznecova, Adol´fina M. 1969. Nekotorye voprosy fonetičeskoj xarakteristiki javlenija tverdosti-mjagkosti soglasnyx v russkix govorax. In Vysotskij, Sergej S. (ed.), *Èksperimental´no-fonetičeskoe izučenie russkix govorov*. Moscow: Nauka. 35-137.
Kuznecova, Adol´fina M. 1977. Raznovidnosti sposoba obrazovanija soglasnyx v russkix govorax. In Vysotskij, Sergej S. (ed.), *Èksperimental´no-fonetičeskie issledovanija v oblasti russkoj dialektologii.* Moscow: Nauka. 60-184.
Ladefoged, Peter & Maddieson, Ian 2002. *The Sounds of World's Languages*. Blackwell.
Mooshamer, Christine & Fuchs, Susanne 2002. Stress distinction in German: Simulating kinematic parameters of tongue-tip gestures. *Journal of Phonetics* 30. 337-355.
Mooshamer, Christine 2008. Acoustic and articulatory manifestations of vowel reduction in German. *Journal of the International Phonetic Association* 38,2.
Panov, Mixail V. 1979. *Sovremennyj russkij jazyk. Fonetika*. Moscow: Vyssaja škola.
Sappok, Christian; Krasovitskij, Alexander; Paschen, Ludger; Brabender, Katrin; Koch, Andreas; Kühl, Nadja 2016. *RuReg: Russische Regionen. Akustische Datenbank*. Available online at <www.rureg.de>.
Savinov, Dmitrij M. 2013. *Èvol'ucija sistem vokalizma v južnorusskix govorax*. Moscow
Šaxmatov, Aleksandr A. 1896-1897. Zvukovye osobennosti el´ninskix i mosal´skix govorov. *Russkij filologičeskij vestnik*. Vol. 36 (1896), number

3-4, 60-99; vol. 38 (1897), number 3-4, 172-209.
Stevens, Kenneth N. & House, Arthur S. 1963. Perturbation of vowel articulation by consonantal context: an acoustical study. *Journal of Speech and Hearing Research* 6. 111-128.
Švedova, Natal´ja J.; Arutjunova, Nina D.; Bondarko, Aleksandr V.; Ivanov, Valerij V.; Lopatin, Vladimir V.; Uluxanov, Igor S.; Filin, Fedot P.; Maslov Jurij S. & šmelev Dmitrij N. 1980. *Russkaja grammatika*. Vol. 1. Moscow: Nauka.
Vaahtera, Jouni Mikael 2009. Èvol'ucija sistemy glasnyx fonem v nekotoryx govorax Vologodskoj oblasti. *Slavica Helsingiensia* 37. Helsinki. 1-323.
Vysotskij, Sergej S. 1967. Opredelenie sostava glasnyx fonem v sv'azi s kačestvom zvukov v severnorusskix govorax. In *Očerki po fonetike severnorusskix govorov*. Moscow. 5-82.
Zaxarova, Kapitolina F. & Orlova, Varvara G. 1970. *Dialektnoe členenie russkogo jazyka*. Moscow.

Appendix

Table 1 includes a list of dialectal speakers who participated in the elicitation work. Table 2 and Table 3 illustrate allophonic variation of the phonemes /o/ and /a/ in the Safonovo dialect (unstressed syllables). It is worth mentioning that the data in Table 1 does not reveal obligatory correlation between the age group and dialectal type: of five older generation speakers one represents the archaic type and four belong to the transitional one, while middle and younger generation speakers represent the innovative type. While it may be expected that each generation would be one step ahead of the previous one, in reality this does not necessarily occur. First, a particular stage of a historical process may be spread across several generations; second, speakers of the same age group may be prone to innovation to a different extent. Thus, dialectological data for mid-20th century reveal that the archaic pattern discussed in this article was characteristic of speakers born in the late 19th and early 20th century (e.g. Avanesov & Bromlej 1986). This pattern had significantly deteriorated in the speech of people born in 1930s and 1940s (the transitional type reported here), however, this sound change affected some individuals but not all. A similar situation is reported for the distribution of pronunciation norms in Standard Russian: the so-called 'older norm' of pronunciation (*staršaja norma*), generally characteristic of older generation speakers, may remain in individual phonetic systems of some of the younger speakers (Antonova 2007). The disproportionate sample, with only one speaker (LE) representing the archaic type (with other speakers of the same age group representing the transitional type), may be taken as an indication that the consistent discrimination of low and mid back phonemes in unstressed syllables has become very infrequent in this dialect. At the same time, the validity of the claim that the data recorded from the only conservative speaker (LE) represent a certain dialectal type corresponding to a particular historical stage is reinforced by previously published dialectal data. These data show that this type was widely spread in North Russian in the middle of the 20th century (Avanesov & Bromlej 1986: Maps 1, 9, 10, 11).

Recording in RuReg (Sappok *et al.* 2016)	Initials	Year of birth	Place of birth	Gender	Education	Type of idiolect
MEZ1-23	LE	1934	Yolkino	F	more than 4 classes	conservative
MEZ1-12	DO	1931	Bereznik (Mezen′ District)	F	more than 4 classes	transitional
MEZ1-15	AE	1941	Safonovo	F	more than 4 classes	transitional
MEZ1-16	EE	1937	Yolkino	F	more than 4 classes	transitional
MEZ1-21	AA	1939	Yolkino	F	more than 4 classes	transitional
MEZ1-21	MA	1968	Safonovo	F	polytechnic	innovative
MEZ1-13	EO	1995	Safonovo	F	secondary school student	innovative
MEZ1-13	AL	1992	Safonovo	F	secondary school student	innovative

Table 1. Elicitation work: participants.

CONSERVATIVE TYPE	TRANSITIONAL TYPE	INNOVATIVE TYPE	TRANSLATION
[do]*mój*	[do]*mój* / [də]*mój* / [dɐ]*mój*	[də]*mój* / [dɐ]*mój*	'(to) home'
[do]*róga*	[də]*róga* / [dɐ]*róga*	[də]*róga* / [dɐ]*róga*	'road'
[go]*lová*	[go]*lová* / [gə]*lová* / [gɐ]*lová*	[gə]*lová* / [gɐ]*lová*	'head'
[go]*rá*	[go]*rá* / [gə]*rá*	[gə]*rá* / [gɐ]*rá*	'mountain, hill'
[go]*rodá*	[go]*rodá* / [gə]*rodá* / [gɐ]*rodá*	[gə]*rodá* / [gɐ]*rodá*	'towns'
[ko]*gdá*	[ko]*gdá* / [kə]*gdá*	[kə]*gdá*	'when'
[molo]*kó*	[molo]*kó* / [molə]*kó*	[mɐlə]*kó*	'milk'
[no]*gá*	[no]*gá* / [nə]*gá*	[nə]*gá* / [nɐ]*gá*	'leg, foot'
[po]*žár*	[po]*žar* /[pə]*žar*	[pə]*žár* / [pɐ]*žár*	'fire'
po[do]*šël*	*po*[do]*šël* / *po*[də]*šël*	*po*[də]*šël*	'approached'
pri[xo]*dí*	*pri*[xo]*dí* / *pri*[xə]*dí*	*pri*[xə]*dí* / *pri*[xɐ]*dí*	'come'
[ro]*díteli*	[ro]*díteli* / [rə]*díteli*	[rə]*díteli* / [rɐ]*díteli*	'parents'
[so]*bák*	[so]*bák* / [sə]*bák*	[sə]*bák* / [sɐ]*bák*	'dogs' PL.GEN
[smo]*lá*	[smo]*lá* / [smə]*lá*	[smə]*lá* / [smɐ]*lá*	'tar'
[xo]*róšee*	[xo]*róšee* / [xɐ]*róšee*	[xə]*róšee* / [xɐ]*róšee*	'good'
[də]*má*	[do]*má* / [də]*má* / [dɐ]*má*	[də]*má* / [dɐ]*má*	'houses'
k [stə]*lú*	*k* [sto]*lú* / *k* [stə]*lú*	*k* [stə]*lú* / *k* [stɐ]*lú*	'to the table'

Table 2. Allophonic variation of the phoneme /o/ in the Safonovo dialect in three dialectal types. Unstressed syllables. Partial phonetic transcription (in square brackets). Alternative realisations found within a type are listed in one cell and divided by '/'. The transliteration of Russian orthography follows the scholarly conventions.

CONSERVATIVE TYPE	TRANSITIONAL TYPE	INNOVATIVE TYPE	TRANSLATION
[zɐ]*bór*	[zɐ]*bór* / [zə]*bór*	[zɐ]*bór*	‘fence’
[sɐ]*pók*	[sɐ]*pók*	[sɐ]*pók*	‘boot’
[skɐ]*ží*	[skɐ]*ží* / [skə]*ží*	[skɐ]*ží* / [skə]*ží*	‘tell’
po[sə]*dít´*	*po*[sə]*dít´* / *po*[sɐ]*dít´*	*po*[sə]*dít´* / *po*[sɐ]*dít´*	‘to plant’
ry[bɐ]*kí*	*ry*[bɐ]*kí*	*ry*[bɐ]*kí*	‘fishermen’
[nɐ]*vérx*	[nɐ]*vérx*	[nɐ]*vérx*	‘up, upwards’
[nɐ]*šël*	[nɐ]*šël*	[nɐ]*šël*	‘find’ SG.PST
u [stɐ]*rúxi*	*u* [stɐ]*rúxi* / [stə]*rúxi*	*u* [stɐ]*rúxi* / [stə]*rúxi*	‘at an old woman’
[stɐ]*rík*	[stɐ]*rík* / [stə]*rík*	[stɐ]*rík* / [stə]*rík*	‘old man’
[stə]*kán*	[stə]*kán*	[stɐ]*kán* / [stə]*kán*	‘glass’
[trə]*wá*	[trɐ]*vá* / [trə]*wá*	[trɐ]*vá* / [trə]*wá*	‘grass’
[zə]*bóta*	[zɐ]*bóta* / [zə]*bóta*	[zɐ]*bóta*	‘anxiety’
za[kə]*zát´*	*za*[kɐ]*zát´* / *za*[kə]*zát´*	*za*[kɐ]*zát´* / *za*[kə]*zát´*	‘to order’

Table 3. Allophonic variation of unstressed /a/ in three varieties of the Safonovo dialect. Partial phonetic transcription (within brackets). Alternative realisations found within a type are listed in one cell and divided by ‘/’. The transliteration of Russian orthography follows the scholarly conventions.