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A CVCV Account of the Russian ɔ/a Alternation[1]

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In this paper, I propose an analysis of the Russian ɔ/a alternation in the CVCV framework introduced by Lowenstamm (1996)[2]. My aim is to give a phonological account of the correlation between ɔ/a alternation and stress. I first present the data and introduce the issue. Second, I give a brief overview of basic facts concerning the framework. Finally, I show how CVCV can account for the alternation at issue.

1 The Russian ɔ/a alternation

In this section, I introduce some properties of the ɔ/a alternation: **i.** the morphological context in which it occurs; **ii.** its correlation with stress; and **iii.** the exceptions and their evolution.

1 Examples are in IPA, but stressed nuclei are underlined. Square brackets represent phonetic forms and slashes represent underlying forms. Intermediary forms are represented without slashes. All examples were checked with a native speaker of Russian.
2 Because of the restricted page number, I will not discuss the analysis explored in Pesetsky (1979), Rubach (1986) and Matushansky (2009) (among others), which considers the ɔ/a and Ø/ɨ alternations as two manifestations of an ATR feature. First, this analysis does not: **i.** account for the correlation between ɔ/a alternation and stress, which is the main topic of the present paper; and **ii.** it does not motivate the insertion of an ATR feature. Second, unlike the ɔ/a alternation, the Ø/ɨ alternation is not related to stress. I propose an account of the latter in Anonymous (XXXX).

1.1 Data

1.1.1 Morphological context. The Russian ɔ/a alternation[3] is involved in verbs ending with the secondary imperfective suffix -ɨva. It concerns exclusively the last (non-yer) root vowel. When the last root vowel is an underlying /ɔ/ in the perfective form, it is most often replaced by /a/ in the secondary imperfective form ending with -ɨva (Mazon, 1908:62, 1943:§133; Chernyshev, 1911:§324-326; Garde, 1980:§584) (1).

(1) Examples of ɔ/a alternation

Perfective	**Imperfective**	**Gloss**
na-brɔs-a-tʲ	na-bra-s-ɨva-tʲ	*sketch sth*
za-kɔnʧʲ-i-tʲ	za-kanʧʲ-iva-tʲ	*finish*
za-rabɔt-a-tʲ	za-rabat-ɨva-tʲ	*earn*

1.1.2 Correlation with stress. Along with this ɔ/a alternation, the suffix -ɨva involves a pre-suffixal stress: stress falls on the last (non-yer) vowel before the suffix -ɨva (Mazon, 1908:61; Garde, 1980:§582) (2).

(2) Examples of stress shift to the pre-suffixal vowel

Perfective	**Imperfective**	**Gloss**
s-prɔsʲ-i-tʲ	s-praʃ-ɨva-tʲ	*ask*
na-brɔs-a-tʲ	na-bra-s-ɨva-tʲ	*sketch sth*
raz-pʲis-a-tʲ-sʲa	raz-pʲis-ɨva-tʲ-sʲa	*sign*

As a consequence, -ɨva involves two phonological properties: **i.** an a-mutation of the last root vowel /ɔ/; and **ii.** a pre-suffixal stress.

1.1.3 Exceptions. Today, less than 20% of the verbs in -ɨva (with an underlying root vowel /ɔ/) are exceptions to the ɔ/a alternation (Sagitova, 2012). These exceptions changed during the history of Russian. Before the 19th century, exceptions were conditioned by phonology. Verbs with

3 Historically, the ɔ/a alternation stems from a quantitative alternation o/ō in Proto-Slavic. In Russian, o became ɔ, and ō became a (Vaillant, 1948).

a stressed root vowel /ɔ/ in the perfective did not undergo a-mutation (Mazon, 1908:63, 1943:§133; Chernyshev, 1911:§325-326) (3).

(3) Examples of exceptions to the ɔ/a alternation (19th Russian)

Perfective	**Imperfective**	**Gloss**
za-rɔb**ɔ**t-a-tʲ	za-rɔb**ɔ**t-ɨva-tʲ	*earn*
na-str**ɔ**j-i-tʲ	na-str**ɔ**j-iva-tʲ	*tune*
za-mɔr**ɔ**zʲ-i-tʲ	za-mɔr**ɔ**ʒ-ɨva-tʲ	*freeze*

After the 19th century, a lot of former exceptions came to show an ɔ/a alternation (e.g. u-sv**ɔ**j-iva-tʲ > u-sv**a**j-iva-tʲ 'to assimilate') (Mazon, 1908:63; Chernyshev, 1911:§326; Garde, 1980:§595; Sagitova, 2012:100-101) (4), sometimes resulting in competitive forms (e.g. ɔ-bʲɛz-b**ɔ**lʲ-iva-tʲ / ɔ-bʲɛz-b**a**lʲ-iva-tʲ 'to anesthetize'). This spreading is still applying in Modern Russian (Sagitova, 2012:112). Thus the a-mutation of the root vowel /ɔ/ is not only regular, but it also became a productive process (Sagitova, 2012:101-114).

(4) Spreading of the ɔ/a alternation after the 19th century

19th century	**20th century**	**Gloss**
za-rɔb**ɔ**t-ɨva-tʲ	za-rɔb**a**t-ɨva-tʲ	*earn*
na-str**ɔ**j-iva-tʲ	na-str**a**j-iva-tʲ	*tune*
za-mɔr**ɔ**ʒ-ɨva-tʲ	za-mɔr**a**ʒ-ɨva-tʲ	*freeze*

Today, exceptions are rare (Chernyshev, 1911:§325; Garde, 1980:§584, §595), and are no longer conditioned by phonology. Following Mazon (1908:63, 1943:§133), Garde (1980:§595) and Sagitova (2012:113), the remaining exceptions are essentially denominal verbs (5).

(5) Examples of denominal verbs with no ɔ/a alternation (20th Russian)

Imperfective	**Gloss**	**Noun**	**Gloss**
ɔ-zabɔ̲ʧʲ-iva-tʲ	*disquiet*	zabɔ̲t-a	*care*
ɔ-pɔzɔ̲rʲ-iva-tʲ	*disgrace*	pɔzɔ̲r	*shame*
ɔ-bʲɛz-pɔkɔ̲j-iva-tʲ	*perturb*	pɔkɔ̲j	*peace*
u-pɔlnɔmɔ̲ʧʲ-iva-tʲ	*empower*	pɔlnɔmɔ̲ʧʲijɛ	*power*
za-ʃtɔ̲p-ɨva-tʲ	*darn*	ʃtɔ̲p-ka	*darn*
za-pɔ-dɔ̲zrʲ-iva-tʲ	*suspect*	ɖɔzɔ̲r	*watch*
za-xlɔ̲p-ɨva-tʲ	*slam*	xlɔ̲p-ɔk	*clap*
u-zakɔ̲nʲ-iva-tʲ	*legalize*	zakɔ̲n	*law*
pɔd-zadɔ̲rʲ-iva-tʲ	*defy*	zadɔ̲r	*ardor*
ɔt-ʃlʲɔ̲p-ɨva-tʲ	*spank*	ʃlʲɛp-ɔ̲k	*spank*
prɔ-srɔ̲ʧʲ-iva-tʲ	*let expire*	srɔ̲k	*term*
prʲɛ-ɔbraz-ɔ̲v-ɨva-tʲ	*transform*	ɔ̲braz	*form*

Verbs with a suffix -ɔv count as *one* exception: the absence of ɔ/a alternation is conditioned by -ɔv. This suffix is defined as denominal in Mazon (1908:63; 1943:§133), Meillet (1924:§234, §321) and Garde (1980:§553). It derives: **i.** adjectives from nouns (e.g. dʲɛ̲d-ɔv ‘of grandfather’); **ii.** verbs from nouns (6); and also **iii.** some verbs from foreign roots (e.g. tramb-ɔv-a̲-tʲ < germ. *trampeln* ‘to trample’, etc.).

(6) Examples of denominal suffix -ɔv (20th Russian)

Imperfective	**Gloss**	**Noun**	**Gloss**
prʲɛ-ɔbraz-**ɔ̲v**-ɨva-tʲ	*transform*	ɔ̲braz	*form*
raz-tɔlk-**ɔ̲v**-ɨva-tʲ	*explain*	tɔ̲lk	*sense*
za-vɔj-**ɔ̲v**-ɨva-tʲ	*conquer*	vɔj-na̲	*war*
vɨ-tɔrg-**ɔ̲v**-ɨva-tʲ	*bargain*	tɔ̲rg	*bargain*
za-intrʲig-**ɔ̲v**-ɨva-tʲ	*intrigue*	intrʲi̲g-a	*intrigue*
pʲɛrʲɛ-arʲɛnd-**ɔ̲v**-ɨva-tʲ	*sublet*	arʲɛ̲nd-a	*lease*
za-brak-**ɔ̲v**-ɨva-tʲ	*reject*	bra̲k	*flaw*
pʲɛrʲɛ-gaz-**ɔ̲v**-ɨva-tʲ	*give a boost (car)*	ga̲z	*gas*
prʲi-park-**ɔ̲v**-ɨva-tʲ	*park*	pa̲rk	*(car) park*
ɔb-vɔr-**ɔ̲v**-ɨva-tʲ	*deprive*	vɔ̲r	*thief*
za-strax-**ɔ̲v**-ɨva-tʲ	*insure*	stra̲x	*anxiety*
ɔ-ʃtraf-**ɔ̲v**-ɨva-tʲ	*fine*	ʃtra̲f	*fine*
raz-ɔ-ʧʲar-**ɔ̲v**-ɨva-tʲ	*disappoint*	ʧʲa̲r-ɨ	*charms*
raz-krʲitʲik-**ɔv**-ɨva-tʲ	*criticize*	krʲi̲tʲik-a	*critism*

Hence the following generalization: *exceptions to the ɔ/a alternation are denominal verbs*. However, it does not mean that all denominal verbs are exceptions (i.e. za-rɔba̲t-ɨva-tʲ ‘to earn’, derived from rɔbɔ̲t-a ‘to work’).

1.2 Issue

In sum, I showed in the preceding sub-section that there is a correlation between ɔ/a alternation and stress in Russian. First, the ɔ/a alternation is correlated to a pre-suffixal stress. Second, exceptions to the ɔ/a alternation were correlated, before the 19th century, to the occurrence of a stressed root vowel /ɔ/ in the perfective form. Thus I formulate the questions in (7).

(7)

a. How to account for the fact that -ɨva involves both an ɔ/a alternation and a pre-suffixal stress?

b. How to account for the fact that a stressed root vowel /ɔ/ in the perfective form of verbs conditions (before the 19th century) the absence of ɔ/a alternation in the imperfective form ending with -ɨva?

I address these two questions in the following sections. I show that these questions are closely related to the issue in (8).

(8) How to account for the fact that only /ɔ/ alternates with /a/?

2 Framework and Representation

In this section, I introduce: **i.** the representation of the -ɨva suffix that I proposed in Anonymous (XXXX); and **ii.** some basic facts about the CVCV framework (Lowenstamm, 1996; Scheer, 2004; among others).

2.1 The Representation of -ɨva

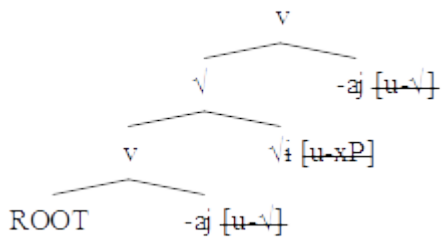
In Anonymous (XXXX), I proposed a representation of the -ɨva suffix based on Coats (1974) and Feinberg (1980). I give a brief overview of this representation in this sub-section. Coats (1974) and Feinberg (1980) agree that -ɨva is the realization of two suffixes -aj (i.e. underlyingly /-aj-aj/). Following Coats (1974), the first suffix -aj is an unstressed thematic vowel. For Feinberg (1980), it is the stressed imperfectivizing suffix -áj (see Garde, 1980:§582 and Melvold, 1989:295 about the stress property of this suffix). In the last section, I will propose that both representations occurred during the history of Russian: **i.** -ɨva with an unstressed suffix -aj could sometimes occur in the 19th century; but then **ii.** -ɨva with a stressed suffix -áj spread to all forms during the 20th century.

According to these analyses, the vowel of the first suffix needs to be reduced to [ɨ] (for obscure reasons)[4], and an intervocalic j/v alternation occurs. We get -ɨva(j). To explain the reduction of /a/, I proposed in Anonymous (XXXX) that: **i.** both -aj suffixes are phonological

4 [ɨ] is not the regular reduced form of the vowel /a/.

exponents of a head v; and **ii.** the vowel [ɨ] is an expletive root (see Faust, 2011:223 for Modern Hebrew) inserted in order to avoid a succession of two identical heads. See the corresponding complex head in (9).

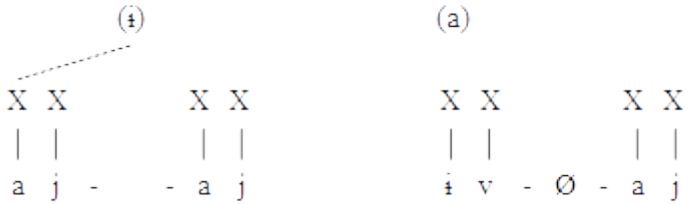
(9) /aj-ɨ-aj/



I assumed in Anonymous (XXXX) that the vowel /ɨ/ of the expletive root is floating (represented between round brackets in 10a). In order to be realized, it associates to the nearest vocalic position on the left[5] (i.e. the vocalic position of the first suffix -aj) (10a). Accordingly, /a/ is delinked (it becomes floating) and we get -ɨva(j) (after intervocalic v/j alternation) (10b).

(10)

a. underlying: /-aj-ɨ-aj/ b. surface: -ɨva

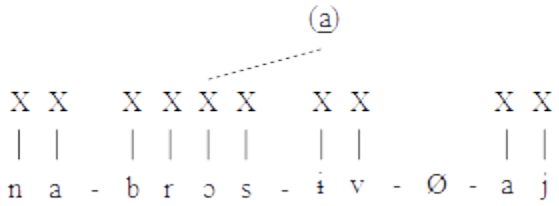


The advantage of this representation – except the fact that the change from /a/ to [ɨ] on the surface is now motivated – is that we do not get the suffix -ɨva only, but also a floating vowel /a/ (10b). If we assume that this floating vowel originally belongs to the stressed imperfectivizing suffix -

5 Segmental assimilation is most often supposed to occur leftward (Javkin, 1979).

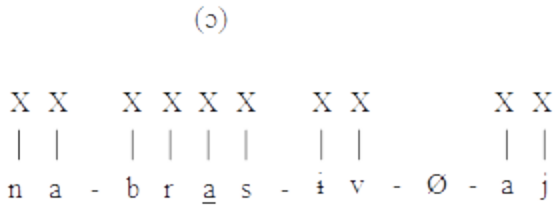
aj (see Feinberg, 1980), then it should also be stressed. In Anonymous (XXXX), I argued that this floating stressed vowel /a/ is responsible for the ɔ/a alternation and for the stress shift to the pre-suffixal syllable: after it was delinked, /a/ aims to be realized. For this purpose, it moves to the nearest vocalic position on the left (11).

(11)



If this vowel is an underlying /ɔ/, it is delinked and replaced by the stressed /a/: both ɔ/a alternation and pre-suffixal stress are obtained (12).

(12) na-bras-ɨva-tʲ



Thus this representation accounts for: **i.** the fact that -ɨva involves an a-mutation, and not an i- or u-mutation (or whatever); and **ii.** the fact that -ɨva involves a pre-suffixal stress. In this paper, I aim to show more precisely what happens phonologically. That is: **i.** why only /ɔ/ undergoes an a-mutation; and **ii.** how is stress always shifted to the pre-suffixal vowel?

2.2 The CVCV Framework

2.3.1 Basic Facts. The CVCV framework is an autosegmental approach to phonology that supposes that the skeleton is made of a sequence of consonant and vowel positions (i.e. C and V respectively). The melodic

content is associated to these positions via association lines: **i.** long segments are associated to two C- or V-positions (13a); **ii.** a melodic material that is not associated to the skeleton is floating (13b); and **iii.** a skeletal position that is not associated to melody is unexpressed.

(13)

a. b.

CVCV follows the universal association convention in (14) (Lowenstamm, 2003).

(14) Universal Association Convention
- a. consonants associate to C-positions, and vowels to V-positions
- b. the melody is associated to the skeleton from left to right
- c. association lines cannot cross (LCC)
- d. adjacency of two identical melodic materials is forbidden (OCP)
- e. the remaining skeleton units (i.e. CV) are identified by spreading

2.2.1 Element Theory. CVCV (which is a theory of the skeleton) is inextricably linked to the element theory (which is a theory of the melodic content) introduced in Kaye, Lowenstamm and Vergnaud (1985) and later developed in Backley (2011), among others. Following this theory, vowels are made of some sets of features called *elements* (and represented with capital symbols). Each element (e.g. A, I, U, and the zero element @) can be a head (underlined) or an operator[6].

Russian vowels (both plain and reduced forms[7]) are represented in (15). The vowels /i/, /u/ and /ɨ/ are never reduced (Garde, 1980:§102). I

6 A head shares all its features, and an operator shares only its *marked* feature (see Kaye, Lowenstamm and Vergnaud, 1985 for details).

7 The reduction in palatalized context is not relevant for the present study. Just note that the palatalized context shares an I element with the reduced vowel.

deduce that, in unstressed context: **i.** only the operators I and U are lost; and **ii.** the head element A loses its head function (it is also lost after *always hard* consonants /ʃ, ʒ, ʦ/). The most important fact to retain is that /ɔ/ is reduced to a single element A in unstressed (non palatalized) context.

(15) Representation of Russian vowels (element theory)

Plain vowels				**Reduced vowels (non palatalized context)**			
|I|	/i/	|U|	/u/		-		-
|AI|	/ɛ/	|AU|	/ɔ/	|@|	[ɨ]	|A|	[ə, ʌ][8, 8]
|A|	/a/	|@|	/ɨ/	|A|	[ə, ʌ][9]		-

The specificity of CVCV with regard to element theory is that the phonetic realization of elements can be conditioned (in some languages) by their length. Lowenstamm (1991) argues that: **i.** a non branching element is likely not to be realized (16a); when **ii.** a branching element is phonetically expressed, but it can be realized as a short segment (16b).

(16)

a. /a/ → [ɨ]

b. /aa/ → [a]

This abstractness of CVCV representations is particularly relevant for the present study.

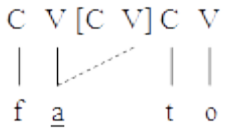
2.2.2 Representation of Russian stress. In the frame of CVCV, Larsen (1998) (and then Lowenstamm, 1996; Scheer, 2000; Anonymous, XXXX; among others) proposed that stress is represented by length: a CV unit is inserted on the right of the *stressed* nucleus, thus accounting

8 After the consonants ʒ, ʃ and ʦ, /ɔ/ is reduced to @ (i.e. [ɨ]), when it directly precedes the stress.

9 [ʌ] is found in pre-tonic position. The reason why /ɔ/ and /a/ reduce to [ʌ] in pre-tonic context is not relevant here: only the neutralization of these two vowels is phonologically relevant. Thus, I here assume that the contrast between [ʌ] and schwa is phonetic.

for Tonic Vowel Lengthening in languages like Italian. After the *stress CV* (represented with square brackets) was inserted, the tonic vowel spreads (17) in order to satisfy the association convention in (14e).

(17) Italian /fa̲to/ → [fa̲a̲to]



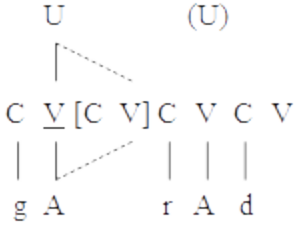
I assume that this representation accounts for Russian stress, and especially for the reduction of unstressed vowels (e.g. compare stressed vowels in 18a with their unstressed counterparts in 18b).

(18) Examples of Russian vowel reduction

a.	[g**ɔ̲**rət]	*city*	b.	[gərʌda̲]	*cities*
	[n**a̲**ʧʲɪl]	*he began*		[nəʧʲila̲]	*she began*
	[ʒː**e̲**ʧʲ]	*burn sth* (PF)		[ʒː**i**ga̲tʲ]	*burn sth* (IPF)

Following Zlatoustova (1953), Fedorova (1971), Chistovich *et al.* (1976), Al'muhamedova and Kul'sharipova (1980:47), Svetozarova (1982:155-158), Kasatkina (1996), Crosswhite (2000:5-7), Krivnova (2004), Knjazev (2006:43), Shastina (2011) and Apushkina (2013) (among others), one of stress correlates in Russian is vowel length: stressed vowels are longer than unstressed vowels. Thus I propose the representation of the word /gɔ̲rəd/ in (19). Stress is represented by an *extra* CV unit (in brackets) on the right of the phonetically stressed nucleus. This CV unit is identified by spread of the vowel on the left (see 14e). As a consequence, all the elements of this vowel are branching and thus phonetically expressed (see Section 2.2.2). We get [ɔ] (see 15). On the contrary, the unstressed vowel cannot branch. Thus all the operators I and U are delinked (i.e. they are floating). We get [ə].

(19) Russian /gɔ̲rəd/ → [gɔ̲rət]



After having introduced these basic facts, I now propose a CVCV account of the issues in (7) and (8), repeated in (20).

(20)

a. How to account for the fact that -ɨva involves both an ɔ/a alternation and a pre-suffixal stress?

b. How to account for the fact that a stressed root vowel /ɔ/ in the perfective form of verbs conditions (before the 19th century) the absence of ɔ/a alternation in the imperfective form ending with -ɨva?

c. How to account for the fact that only /ɔ/ alternates with /a/?

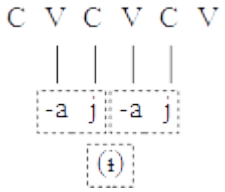
3 The Proposed Account

In this section, I propose an account of: **i.** the fact that -ɨva involves a pre-suffixal stress; **ii.** the fact that only /ɔ/ can undergo an a-mutation; **iii.** the fact that a stressed root vowel /ɔ/ (in the perfective) did no't undergo any a-mutation during the 19th century; and **iv.** the fact that the exceptions to the ɔ/a alternation today are restricted to denominal verbs.

3.1 The Pre-Suffixal Stress

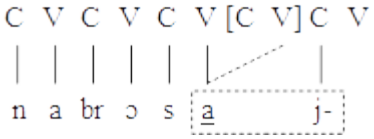
In Section 2.1, I briefly presented a representation of the -ɨva suffix that makes it possible to motivate the a-mutation involved by -ɨva. Following this representation, -ɨva is the realization of two suffixes -aj with an intervening floating vowel /ɨ/ (boxed) (see Section 2.1) (21).

(21) /aj-ɨ-aj/ (underlying form)



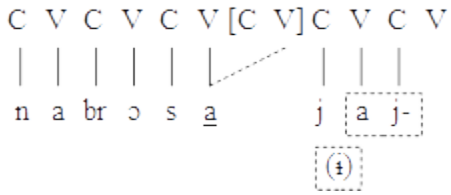
Note that this set of suffixes is not necessarily added to a stem as a monolithic bloc. See for example the representation of the perfective verb na-brɔs-a̲-tʲ 'to sketch sth' in (22): it already contains a stressed suffix -a̲j (boxed). (Remember that stress is now represented with vowel length.)

(22) /na-brɔs-a̲j-/ (underlying form)



The derivation of the imperfective form ending with -ɨva results from the suffixation of a *new* imperfectivizing suffix -aj and an intervening floating vowel /ɨ/ (boxed) (23). However, note that in perfective stems ending with another suffix than -aj (e.g. s-prɔsʲ-i̲-tʲ 'to ask'), the derivation of the imperfective form ending with -ɨva (e.g. s-pra̲ʃ-ɨva-tʲ) implies a suffixation of the two suffixes -aj simultaneously (see Coats, 1974; Feinberg, 1980; and Anonymous, XXXX for argumentation).

(23) /na-brɔs-a̲j-ɨ-aj-/ (underlying form)

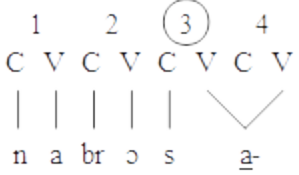


Now, the question is: how is the surface form (e.g. na-bra̲s-ɨva-tʲ) derived? In Anonymous (XXXX) (see Section 2.1), I argued that the floating vowel /ɨ/ *forces* the vowel of the first suffix -aj to shift to the root and replace the vowel /ɔ/ (see 10, 11, 12). Thus, the suffix vowel /a/ in na-brɔs-a̲-tʲ and the a-mutated root vowel in na-bra̲s-ɨva-tʲ are analyzed as the same item. There is no need for a readjustment rule or a set of features arbitrary involved by -ɨva in the morpho-syntactic tree (*contra* Gribanova, 2015).

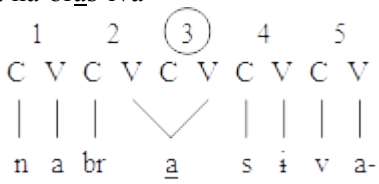
But it is still unclear how stress phonologically moves from one skeletal position to another. In fact, I now aim to argue that neither the suffix vowel nor the stress really move. Compare the surface representations of the perfective na-brɔs-a̲-tʲ 'to sketch sth' (24a) and its secondary imperfective form na-bra̲s-ɨva-tʲ in (24b)[10]. We can observe that the suffix vowel in (24a) and the a-mutated vowel in (24b) are associated to the same (third) position of the skeleton in both cases. There is no vowel shift.

(24)

a. na-brɔs-a̲j-



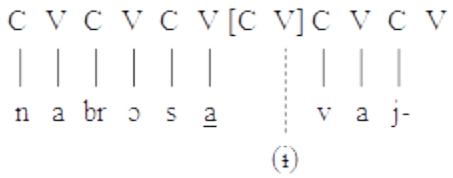
b. na-bra̲s-ɨva-



Thus I propose the following phonological derivation of secondary imperfectives ending with -ɨva. After /-aj-ɨ-aj/ was suffixed (see 23): **i.** /j/ alternates with /v/ (see Coats, 1974); and **ii.** the floating vowel /ɨ/ associates to the nearest vocalic position on the left (25).

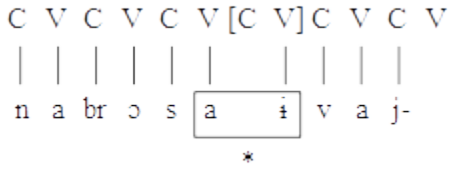
10For convenience, the consonants b and r are represented on the same C-position, and the infinitive suffix -tʲ is not represented.

(25)



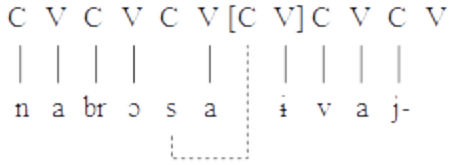
It results a hiatus (26), which is, in Russian, prohibited between a root vowel and a suffix vowel, or between two suffix vowels (i.e. at the right edge of the word; see Jakobson, 1948:159; Garde, 1972:372).

(26)



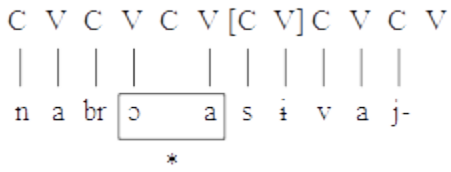
Consequently, I assume that the apparent *moving* of the vowel /a/ is the effect of a metathesis: the consonant /s/ associates to the C-position that follows /a/ (see 27) in order to repair the hiatus in (26).

(27)



Metathesis is the optimal solution in (27) to repair a hiatus without losing any material. However, it creates a new hiatus in the following stage of the derivation, represented in (28).

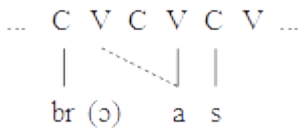
(28)



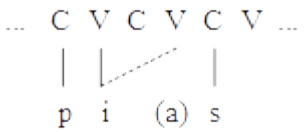
In order to account for the pre-suffixal stress, I assume that this new hiatus is repaired by assimilation (29). If the first component of the hiatus is an /ɔ/, /a/ spreads (29a). But if the first component is another vowel that /ɔ/, then it spreads (29b).

(29)

a. na-bra̲s-ɨva-tʲ ‘to sketch sth’



b. za-pʲi̲s-ɨva-tʲ ‘to record’



In both cases, it results a long vowel surfacing as stressed (given that the underlying representation of stress is vowel length, see Section 2.2.3).

3.2 The Specificity of the Vowel /ɔ/

I now show that this representation accounts for the fact that /ɔ/ undergoes an a-mutation (29a), while the other vowels do not (29b). Recall that operators I and U are not phonetically unexpressed when they do not branch in Russian (see Sections 2.2.2 and 2.2.3). The representations in (29a, b) are now adapted to element theory in (30a, b). Given that the root vowel is unstressed in the perfective form (which is a stem of the secondary imperfective, see Karcevski, 1927:87), it does not branch. In (30a), the vowel reduction implies that U in /ɔ/ is not associated to the skeleton (see 13). In (30b), the vowel /i/ is not reduced.

(30)

a. na-bra̲s-ɨva-tʲ ‘to sketch sth’ b. za-pʲi̲s-ɨva-tʲ ‘to record’

As a consequence, the hiatus in (30a) is made of two elements A only, and can be repaired by fusing them (31a). But the hiatus in (30b) is made of different elements. Thus the element on the left spreads (31b).

(31)

a. na-bra̲s-ɨva-tʲ ‘to sketch sth’ b. za-pʲi̲s-ɨva-tʲ ‘to record’

The basic assumptions of this analysis is that only vowels that are underlyingly reduced to an element A can undergo an a-mutation in verbs ending with -ɨva. Thus, this analysis supposes that the ɔ/a alternation is strongly related to stress and vowel reduction.

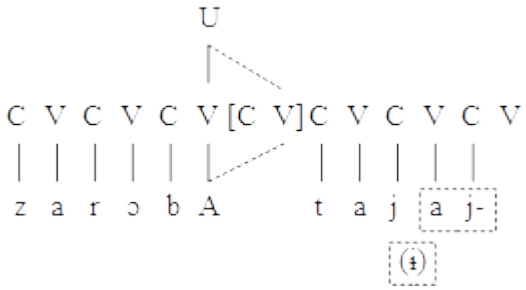
3.3 The Exceptions to the ɔ/a Alternation

Now, I show that the exceptions to the ɔ/a alternation can also be accounted for with this representation. I first address the exceptions that were attested before the 19th century. Then, I propose an interpretation of how this system evolved in present-day Russian.

3.3.1 19th Century. Recall that before the 19th century, exceptions to the ɔ/a alternation concerned verbs with a stressed /ɔ/ and an unstressed

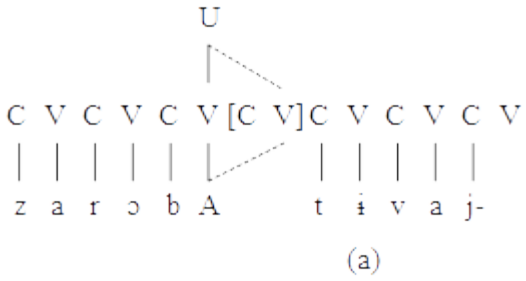
suffix in the perfective form (see Section 1.1.3). See the underlying representation of za-rɔbɔ̲t-ɨva-tʲ ‘to earn’ in (32). I assume that -ɨva results from the suffixation of a new suffix -aj *plus* the intervening floating /ɨ/ (boxed) to the perfective stem za-rɔbɔ̲t-aj- containing the unstressed thematic vowel -aj. The last root vowel is stressed. In terms of CVCV and element theory, all the elements of this vowel are branching and phonetically realized.

(32) /za-rɔbɔ̲t-aj-ɨ-aj-/ (underlying form)



As a consequence, after the floating /ɨ/ was associated to the nearest V-position (33) (see Section 3.1), the element A of the suffix becomes floating. But this floating A cannot involve the mutation of the root vowel, because this is not reduced to a single element A (see Section 3.2).

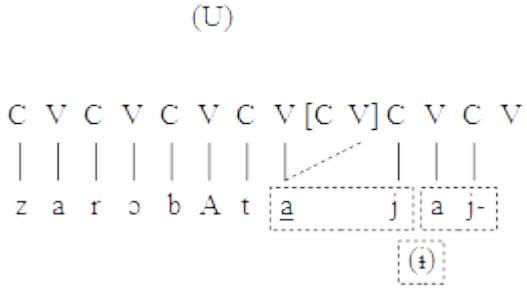
(33) za-rɔbɔ̲t-ɨvaj- (surface form)



In more simple terms, the ɔ/a alternation applied only when the root vowel /ɔ/ was underlyingly *reduced* to a single element A.

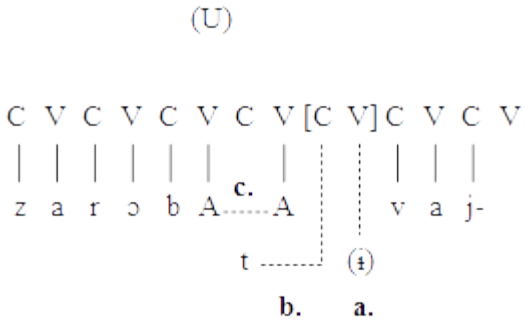
3.3.2 20th Century. In the 20th century, this situation changed. Some exceptions to the ɔ/a mutation came to show an a-mutation of the root vowel (e.g. za-rɔbat-ɨva-tʲ) (see Section 1.1.3). I assume that this change is due to a reanalysis of the representation of -ɨva. Before the 19th century, the first component of -ɨva (which is here analyzed as /-aj-ɨ-aj/, see Section 2.1) might be in some cases the unstressed thematic vowel -aj (as in Coats, 1974), hence the representations in (32) and (33). But in the 20th century, I assume that the first component of /aj-ɨ-aj/ was always the imperfectivizing suffix -aj (as in Feinberg, 1980), which is always stressed (Garde, 1980:§582; Melvold, 1989:295). In other terms, -ɨva now results from the suffixation of the whole /-aj-ɨ-aj/ (boxed) to a stem za-rɔbɔt- (i.e. the unstressed thematic vowel -aj of the perfective form is replaced) (34). Now, as the stressed suffix -aj is *dominant* (see Garde, 1980§158, §582 and Melvold, 1989: the stress of the last *dominant* morpheme of a word 'culminates'), it triggers the loss of stress in the preceding root or prefixes (e.g. v**ɨ**-brɔsʲ-ɨ-tʲ ~ /vɨ-brɔsʲ-**a**j-ɨ-aj-tʲ/ → vɨ-br**a**s-ɨva-tʲ 'to throw away').

(34) /za-rɔbɔt-aj-ɨ-aj-/ (underlying form)



As a consequence, the root vowel /ɔ/ is reduced to a single element A, and it can now undergo an a-mutation (35): **i.** the floating vowel /ɨ/ associates to the skeleton, thus triggering a hiatus (35a); **ii.** the last root consonant /t/ shifts in order to repair this hiatus (35b); and **iii.** the two neighboring A elements fuse (35c). The ɔ/a alternation with pre-suffixal stress is obtained.

(35) za-rɔbat-ɨvaj- (surface form)



3.3.3 Denominal Verbs. But present-day Russian still has some exceptions. Recall that these are denominal verbs (see Section 1.1.3). I argue that the absence of a-mutation is not due to phonological reasons in this case, but to morphological reasons. For this, I follow the framework *Affixes as Roots* introduced in Lowenstamm (2012, 2014). This framework is based on the *Phase Impenetrability Condition* (PIC) defined in Chomsky (1998), and adapted to morphology in Marvin (2003) (36)[11].

(36) For strong phase HP with head H: the domain of H is not accessible to operations outside HP; only H and its edge are accessible to operations. The edge being the residue outside of H-bar, either SPECs or elements adjoined to HP.

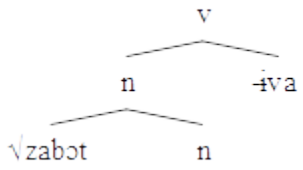
Consider the simplified[12] representation (after head movement) of the denominal verb ɔ-zabɔ̲ʧʲ-iva-tʲ 'to disquiet' in (37). The head v selects an nP the complement of which is the lexical root. Following PIC (36), phonological operations are not possible between the material situated in

11It is very important to notice that the generalization of PIC is *not* too strong in the framework *Affixes as Roots*. Lowenstamm (2012) proposes an alternative solution to the locality issue addressed in Embick (2010). This solution is based on the hypothesis that all affixes may be sub-categorial.

12For convenience, prefixes are not represented, and the complex structure aj-ɨ-aj is here represented with the surface form -ɨva on the head v.

v (or higher) and the root. Thus we do not expect any a-mutation of the root.

(37) ɔ-zabɔ̲ʧ-iva-tʲ



Note that this analysis does not involve that *all* denominal verbs necessarily have the structure in (37). In other words, it does not predict that *all* denominal verbs are exceptions to the ɔ/ɑ alternation. A verb that apparently derives from a noun can also be represented with v selecting a bare root. The most important here is that the structure in (37) can be assumed *only* for denominal verbs. Thus it accounts for the fact that only denominal verbs are exceptions to the ɔ/a alternation in present-day Russian.

In sum, I showed that the spread of the ɔ/a alternation during the 20th century is due to a reanalysis of the suffix -ɨva. This suffix first was a sequence of a stem suffix -aj or -a̲j plus another imperfectivizing suffix -aj (with an interlayer expletive root /ɨ/, see Section 2.1). Then it was reanalyzed solely as a sequence of two imperfectivizing suffixes -a̲j (see also Anonymous, XXXX): -a̲j-ɨ-aj. Given the accentuation and dominance of -a̲j, the root vowel /ɔ/ came to be always reduced to a single element A, and was likely to undergo the a-mutation. Finally, I showed that the exceptions that are still found in Russian can be accounted for by PIC. This analysis captures the fact that the exceptions to the ɔ/a alternation were phonologically conditioned before the 19th century, but morphologically conditioned during the 20th century (see Section 1.1.3).

5 Conclusions

As a conclusion, I proposed a CVCV analysis of the Russian ɔ/a alternation and its exceptions. The novelty of this analysis lies in the fact that it accounts for the correlation between ɔ/a alternation and stress.

This proposition is based on the folowing three assumptions: **i.** the a-mutation is due to the underlying representation of the -ɨva suffix as /-aj-ɨ-aj/ (see Anonymous, XXXX); **ii.** stressed vowels are underlyingly branching vowels (via a skeletal representation of stress as a CV unit); and **iii.** the non-branching vowel /ɔ/ is reduced to a single element A. First, pre-suffixal stress results from some repair mecanisms involving the skeletal representation of stress and the underlying representation of -ɨva. Second, the a-mutation of /ɔ/ applies only when /ɔ/ is reduced to an element A (i.e. when it is underlyingly unstressed). Finally, I proposed an account of the fact that the exceptions to the ɔ/a alternation, which were phonologically conditioned before the 19th century, came to be morphologically conditioned during the 20th century.

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