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Dissimilation, Assimilation and Vowel Reduction: Constraint Interaction in East Slavic Dialects with so-called Dissimilative *Akan'e* and *Jakan'e*

The unstressed vocalism in East Slavic has attracted the attention of phonologists – both traditional dialectologists and generative linguists – as involving an example of dissimilation. In this paper I argue that an approach in terms of dissimilation alone is simplistic and that the vowel patterns in question arise as a result of complex interaction of three factors, viz. dissimilation, assimilation and vowel reduction.[1]

Although the paper deals with Russian and Belorussian data, its implications go beyond the field of Slavic linguistics. Couched in Optimality Theory (Prince and Smolensky 1993, henceforth OT), the analysis demonstrates the value of a constraint-based approach in accounting for the interaction of phenomena like dissimilation, assimilation and reduction, and in explicating the relationship between closely related linguistic systems. Of particular interest for non-Slavists is the proposed treatment of assimilation. In OT, the focus has been on voicing assimilation in consonant clusters (Lombardi 1999). In the present study I extend Lombardi's approach to the interaction of syllable peaks and onsets with regard to the features [high], [low] and [cor].

The paper is organized as follows. After a presentation of the relevant data in section 1, dissimilation, assimilation and vowel reduction are explored in sections 2 through 4. Section 5 provides a discussion of the interaction of these phenomena before the contributions of the paper are summarized in section 6.

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[1] After this paper was completed, I became aware of Crosswhite (2001). She considers featural dissimilation irrelevant for all dissimilative akan'e/jakan'e patterns, and thus adopts a more radical position than the one proposed in the present paper.

1. Data and Scope

In many East Slavic dialects the oppositions between non-high vowels are neutralized in unstressed syllables. This applies to most Belorussian dialects as well as to south Russian and southern middle Russian dialects. In the present paper we are interested in a subgroup of the neutralizing dialects found in the border area between Belorussia and Russia, i.e. northeast Belorussian and southwest Russian dialects. The unstressed vocalism of these dialects is traditionally labelled 'dissimilative *jakan'e*' and 'dissimilative *akan'e*'. The former term refers to the pattern of vowels following a soft (palatal(ized)) consonant, whereas the latter is used about patterns found in other environments. For ease of reference I shall employ the traditional terms "soft" and "hard" about the two types of environment. The pattern found in the soft environment is illustrated by the data in (1) (from Avanesov and Orlova 1965:48ff.; Kasatkin 1989:48ff.). For expository purposes the vowels of interest in the present context are given in boldface, a practice that will be adopted throughout the article.

(1)

	/n^{j}ostí/ 'carry':	/l^{j}es/ 'forest':	/p^{j}at^{j}/ 'five':
a) C^{j} _ C$_0$ ú:	[n^{j}asú]	[l^{j}asú]	[p^{j}at^{j}jú]
b) C^{j} _ C$_0$ í:	[n^{j}as^{j}í]	[l^{j}as^{j}ína]	[p^{j}at^{j}í]
c) C^{j} _ C$_0$ á:	[n^{j}islá]	[l^{j}isá]	[p^{j}iták]

The data in (1) show that the non-high /o, e, a/ neutralize in unstressed position.[2] The occurrence of unstressed [a] before high stressed vowels in (1a-b), but unstressed [i] before a low stressed vowel in (1c) suggests that we are dealing with dissimilation, since the unstressed vowel differs from the stressed vowel in terms of vowel height. This is indeed the analysis which is assumed in traditional dialect descriptions (for overview

[2] I confine myself to describing dialects with five vowel systems (/i, e, a, o, u/), although some dialects in the area under analysis are reported to maintain an additional contrast between close-mid and open-mid vowel phonemes. However, this archaic feature is rare today (Avanesov and Orlova 1965:31), and since it does not bear on any conclusions to be drawn in the following, dialects of this type will not be treated in the present study.

cf. e.g. Avanesov and Orlova 1965; Kasatkin 1989), as well as in earlier generative approaches (Davis 1970; Halle 1962; Halle 1965; Suzuki 1998).

The examples in (1) concern the soft environment. What are the corresponding data for unstressed vowels in the *hard* environment? A priori there is no reason to think that dissimilation would yield different effects after soft and hard consonants. If the occurrence of [i] in (1c) is due to dissimilation, one would therefore expect a high vowel to occur after a hard consonant as well. That is, the dissimilation analysis predicts the existence of the pattern in (2).[3]

(2)

	/sová/	'owl':	/travá/	'grass':
a) _ C_0 ú:	[savú]	(acc.sg)	[travú]	(acc.sg)
b) _ C_0 í:	[saví]	(gen.sg)	[travi]	(gen.sg)
c) _ C_0 á:	[sivá]	(nom.sg)	[trivá]	(nom.sg)

Indeed, patterns like (2) are attested, but no less common is (3) (Avanesov, Bromlej and Stroganova 1986; Stroganova 1975:42f. and map 1), where instead of [i] we have *schwa* before a low stressed vowel, as is evident from a comparison of (2c) and (3c).

(3)

	/sová/	'owl':	/travá/	'grass':
a) _ C_0 ú:	[savú]	(acc.sg)	[travú]	(acc.sg)
b) _ C_0 í:	[saví]	(gen.sg)	[travi]	(gen.sg)
c) _ C_0 á:	[səvá]	(nom.sg)	[trəvá]	(nom.sg)

The data in (1) through (3) will serve as the starting point for the discussion in this paper, although they do not illustrate all the variation in

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[3] In a narrower transcription [i] and unstressed [a] could be represented as [ɨ] and [ʌ], respectively, in the hard environment. However, since in the present paper we are interested in neutralization of phonemic contrasts, I ignore allophonic variation in the transcription. Notice that (2) and (3) do not include examples with /e/ after a hard consonant, since the only examples of this type involve /ʂ, ʐ, t͡s/. These consonants have developed from soft consonants in historical times, and their interaction with unstressed vowels involve irregularities of no relevance for the present study (cf. Kasatkin 1989:53f. for a brief overview).

the dialects under scrutiny. First, some sources, e.g. Kasatkin (1989:45), report forms with [e] instead of schwa or [i] in the hard environment, e.g. [sevá] and [trevá]. However, forms of this type are extremely rare (Stroganova 1975:43), and are not included in the authoritative Belorussian and Russian dialectological atlases (Avanesaŭ, Krapivy and Mackevič 1963a; Avanesov, Bromlej and Stroganova 1986). Therefore they will not be discussed in the present paper. Rounded vowels are also attested in some dialects instead of schwa, especially in words containing hard /l/, labial or velar consonants and/or rounded vowels (Stroganova 1975:45f.). However, since the factors favouring rounded vowels are independent of the dissimilation-assimilation-reduction interaction which is the topic of the present paper, rounded vowels in unstressed syllable will not be treated in what follows.

Another source of variation not addressed in (1)-(3) is the realization of /e, a, o/ before stressed *mid* vowels, i.e. in forms like /sovój/ 'owl (instr. sg.)' and /travój/ 'grass (instr. sg.)'. In some varieties unstressed vowels in such forms behave in the same way as before high vowels, in others as before low vowels. There are also dialects where the behaviour of the unstressed vowel depends on the roundedness of the following stressed vowel. This variation has been treated extensively in the generative literature (Davis 1970; Halle 1965; Suzuki 1998). The focus of the present study, however, is on the interaction of dissimilation with assimilation and vowel reduction. For the purposes of this discussion unstressed vowels before *high* and *low* vowels provide the best starting point, since in these environments the difference in vowel height may be optimum and the effects of dissimilation most visible. However, we will return to the variation before stressed mid vowels in section 2 below because it bears on the definition of the constraints encoding dissimilation.

A third source of variation concerns different positions in the word. While (1)-(3) illustrate the variation in the syllable immediately before the stressed syllable, dissimilative *akan'e/jakan'e* patterns are also reported to exist in other positions in the word (cf. e.g. Kasatkin 1989:54f.). However, in this paper I shall follow common practice and concentrate on the unstressed syllable immediately before a stressed syllable for which the best data material exists. In his analysis of the unstressed vocalism of Contemporary Standard Russian, Alderete (1995:12) refers to the sequence

of an unstressed plus a stressed syllable as an iambic foot. Although no particular claims about the prosodic status of this domain will be made in the present paper, Alderete's usage will be adopted. In other words, I will delimit myself to exploring the variation in foot-internal unstressed syllables.

There is a fourth way in which the data offered in (1) through (3) do not present the full range of variation. In this study I shall treat dialects which combine dissimilative *akan'e* and *jakan'e*. However, according to the dialect atlases of Russian and Belorussian, the isoglosses of these phenomena do not coincide completely in that dissimilative *jakan'e* is attested in a slightly larger area (Avanesaŭ, Krapivy and Mackevič 1963a; Avanesov, Bromlej and Stroganova 1986).[4] Also, dissimilative *jakan'e* is reported to be more persistent diachronically (Avanesov and Orlova 1965:63f.). In the present paper, I shall restrict myself to analysing the patterns found in the core area because they must be reasonably well understood before an analysis of the more complex transitional patterns in the periphery can be pursued.

The data in (1) through (3) indicate that one can distinguish between the two vowel patterns summarized in tables 1a-b. Since the only difference between them is the occurrence of [i] vs. schwa in forms like *sová* and *travá*, I shall refer to them mnemonically as the '*i*-dialect' and the '*schwa*-dialect'. The geographical distribution of the two dialects is complex. The *i*-dialect is found in scattered islands within the overall area of the so-called dissimilative *akan'e/jakan'e* dialects. It is most widespread in the western part of the area, especially around Mogilev in Belorussia, while the *schwa*-dialect dominates in the east.

	soft env.	hard env.
_ high V	[a]	[a]
_ low V	[i]	**[i]**

Table 1a. '*I*-dialect'

	soft env.	hard env.
_ high V	[a]	[a]
_ low V	[i]	**[ə]**

Table 1b. '*Schwa*-dialect'

[4] The precise location of the isoglosses is somewhat controversial. Based on his own fieldwork Čekmonas (1987) claims that dissimilative *akan'e* is attested further to the west than indicated in the Belorussian Dialect Atlas.

Tables 1a-b facilitate a fresh look at the vowel patterns in at least two respects. First, the tables bring together soft and hard environments, which have traditionally been treated separately. In most handbooks different chapters are provided for the two types of environment (Avanesov and Orlova 1965; Kasatkin 1989; Kuznecov 1973; Meščerskij 1972), while generative studies have focused on soft environments to the exclusion of the corresponding patterns in the hard environment (Davis 1970; Halle 1965; Suzuki 1998). Secondly, tables 1a-b highlight the difference between the *i*- and *schwa*-dialects. Although the distinction is well attested, its linguistic implications have not been a matter of major concern in the literature.

The data in tables 1a-b illustrate the inadequacy of an analysis in terms of dissimilation alone. Admittedly, as mentioned, an analysis along these lines predicts the existence of the *i*-dialect, in which the descriptive generalization is that an unstressed vowel is maximally different from the following stressed vowel in terms of vowel height. However, the problem is that such an analysis is not sufficient to explain the distribution of [ə] vs. [i] in the *schwa*-dialect. I shall propose an analysis of this in terms of assimilation and vowel reduction, which will be substantiated in sections 3 and 4 below. However, first it is necessary to take a closer look at dissimilation.

2. Dissimilation: OCP-APERTURE and Positional Faithfulness

Dissimilation is commonly analysed in terms of the Obligatory Contour Principle (OCP), which in the words of Goldsmith (1990:309) 'prohibits consecutive or adjacent identical segments' (McCarthy 1988; see also Odden 1986; Odden 1988; Yip 1988). In OT, OCP effects can be accounted for in terms of constraints that penalize identical values for a feature in a domain, as is pointed out by Suzuki (1998:27), who has advanced a recent OT analysis of dissimilation in Russian dialects. The dialects we are concerned with in the present paper distinguish between three vowel heights, so two features, [high] and [low], are relevant here. I would like to propose one constraint for each feature:

(4) *[αhigh]$^2_{foot}$:
Vowels with the same specification for [high] are prohibited within the foot.

(5) *[αlow]$^2_{foot}$:
Vowels with the same specification for [low] are prohibited within the foot.

I follow Alderete (1997) who suggests that constraints for dissimilation can be stated in terms of local self-conjunction. In local conjunction (cf. Kager 1999:392ff. for an overview; Smolensky 1993) a complex constraint is formed by conjoining two simple constraints. The complex constraint is violated whenever both conjuncts are violated, while violation of one conjunct is not sufficient to incur a violation mark for the complex constraint. The constraints in (4) and (5) are *local* conjunctions in the sense that they refer to the domain of the foot. The constraints are *self*-conjunctions in that constraints that punish vowels of a certain height are conjoined with themselves so as to militate against the occurrence of two vowels with the same value for the relevant features.

The two constraints are evaluated categorically. Whenever two vowels with the same values for [high] occurs in the same foot, one violation mark is incurred for *[αhigh]$^2_{foot}$. In the same fashion candidates receive one star for *[αlow]$^2_{foot}$ if they contain two vowels with the same values for [low] inside a foot. The evaluation is illustrated in (6) and (7) with the form /travój/ 'grass (instr.sg.)' as pronounced in two different varieties of the *i*-dialect.

(6)

	/travój/	*[αlow]$^2_{foot}$:	*[αhigh]$^2_{foot}$:
☞ a.	travój		*
b.	trivój	*!	

(7)

	/travój/	*[αhigh]$^2_{foot}$:	*[αlow]$^2_{foot}$:
a.	travój	*!	
b. ☞	trivój		*

As shown by these tableaux, *[αlow]$^2_{foot}$ >> *[αhigh]$^2_{foot}$ yields candidate (a) as optimal, whereas (b) emerges as optimal under the opposite ranking. Both types of dialect are attested, so the two constraints are clearly needed as independent constraints in a full description of the dissimilative *akan'e/jakan'e* dialects.

The dialect variation in forms with mid vowels under stress is treated at length by Suzuki (1998:159ff.) who, however, does not invoke local conjunction. As mentioned in section 1 above, the present study also differs from Suzuki's analysis in focusing on forms with low and high vowels in stressed position. Relevant examples are the accusative singular /travú/ and the nominative singular /travá/ of *travá* 'grass' given in (8) and (9).

(8)

	/travú/	*[αlow]$^2_{foot}$:	*[αhigh]$^2_{foot}$:
a. ☞	travú		
b.	trivú	*!	*!

(9)

	/travá/	*[αlow]$^2_{foot}$:	*[αhigh]$^2_{foot}$:
a.	travá	*!	*!
b. ☞	trivá		

These forms provide the clearest examples of dissimilation insofar as candidates (8b) and (9a) are punished by both constraints, while the competing (8a) and (9b) do not receive any violation marks. Forms of this type therefore provide a good point of departure for a discussion of the interaction of dissimilation with assimilation and reduction, which is the topic of the present paper.

Since in (8) and (9) the two constraints have exactly the same effect in that they give the same number of violation marks to the same candidates, I shall not treat them separately in what follows. As a cover term for the two constraints I shall employ OCP-APERTURE, since we are dealing with OCP effects concerning vowel height. Notice, however, that this is a descriptive convention only, and that the evaluation in all tableaux in this paper is based on the two separate constraints *[αlow]$^2_{foot}$ and *[αhigh]$^2_{foot}$ defined in (4) and (5) above.

Before we leave the OCP, it is necessary to clarify one point. In (6) through (8) it has been tacitly assumed that dissimilation always affects the unstressed, but not the stressed syllable of the foot. However, the constraints *[αhigh]$^2_{foot}$ and *[αlow]$^2_{foot}$ are inherently non-directional. Therefore, in (9) [traví] with dissimilation in the stressed syllable would be as good as [trivá] with regard to markedness. In the same way as Alderete (1995) I suggest to solve this problem by invoking positional faithfulness (Beckman 1997), i.e. faithfulness constraints referring to prominent positions in the word, in our case the head syllable of the foot. I assume the following ranking:

(10) FAITH-HEAD, OCP-APERTURE >> FAITH

Under this ranking candidates showing dissimilation in the stressed syllable will not be evaluated as optimal, because they violate faithfulness to the prosodic head. The tableau in (11) illustrates this.

(11)

		/travá/	FAITH-HEAD	OCP-APERTURE	FAITH
a.		travá		*!*	
b.	☞	trivá			*
c.		traví	*!		*
d.		triví	*!	*!*	**

3. Assimilation: AGREE-VOCALIC and Positional Faithfulness

As can be seen from table 1b in section 1, in the *schwa*-dialect the quality of the unstressed vowel is sensitive to the softness of a preceding consonant. After a soft consonant, this dialect evinces [i] before a stressed low vowel (/n^{j}oslá/ -> [n^{j}islá]), whereas [ə] is pronounced in the hard environment (/sová/ -> [səvá]). Since the unstressed vowel is articulated closer to the hard palate when preceded by a soft (i.e. palatal(ized)) consonant, we seem to be dealing with an assimilation effect. In this section I shall formulate a constraint which accounts for this effect. We shall see that closely related dialects provide ample evidence for this constraint.

The relationship between a soft consonant and a following [i] is explicated in figure 1 which incorporates standard assumptions about the

internal organization of segments (Clements and Hume 1995).[5] Vowels have a Vocalic node which dominates the nodes Aperture and V-place. Since we are dealing with a high front vowel, the former node has the feature specifications [+high] and [–low], and the latter [cor]. I assume that the C-place node of soft consonants in addition to specifications for their primary place of articulation (represented by the arbitrary feature [F] in figure 1) also contain a node Vocalic with the same specifications as a high front vowel. The assimilation of a vowel to a preceding soft consonant can be construed as the linking of the Vocalic node of the consonant to the following vowel, as indicated by the dashed line in figure 1.

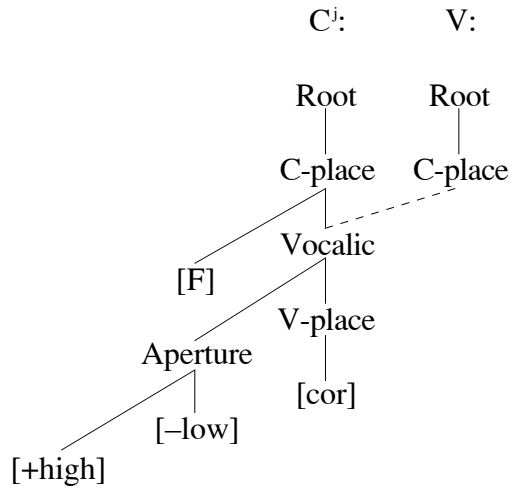

Figure 1. Feature geometry

I am not aware of any OT analyses of the kind of assimilation under scrutiny here, but it is possible to extend Lombardi's (1999:270) account of voicing assimilation in consonant clusters. She assumes markedness constraints which require agreement in some feature specification of segments in a domain. The relevant constraint can be stated as follows:

(12) AGREE-VOCALIC:
Syllables where either onset or peak is specified as [+high, –low,

[5] A somewhat different model has been proposed by Odden (1991), but the differences in architecture do not bear on any conclusion to be drawn in the present paper.

cor], but the other constituent is not, are prohibited.

AGREE-VOCALIC is non-directional in that it is satisfied equally well by progressive assimilation from the consonant to the following vowel as by regressive assimilation from the vowel to the preceding consonant. In the same way as Lombardi (1999), I propose to account for the direction of assimilation in terms of positional faithfulness (Beckman 1997). I assume two faithfulness constraints, FAITH-PEAK and FAITH-ONSET, which may interact with AGREE-VOCALIC in the following ways:

(13)

a) Progressive assimilation:
FAITH-ONSET, AGREE-VOCALIC >> FAITH-PEAK:

b) Regressive assimilation:
FAITH-PEAK , AGREE-VOCALIC >> FAITH-ONSET:

c) No assimilation:
FAITH-ONSET, FAITH-PEAK >> AGREE-VOCALIC:

In order to handle the progressive assimilation in the CV-clusters being analysed in the present paper, ranking (13a) must be adopted. Since this ranking prioritizes faithfulness to the onset, the peak assimilates to the onset so as to satisfy AGREE-VOCALIC through *progressive* assimilation, e.g. /n^{j}oslá/ -> [n^{j}islá]. Ranking of FAITH-PEAK above FAITH-ONSET as in (13b) would enforce *regressive* assimilation in that the onset would have to comply with the following vowel in order to meet the agreement requirement. Under (13c) assimilation cannot apply, since AGREE-VOCALIC is outranked by both faithfulness constraints.

How are various CV-clusters evaluated by AGREE-VOCALIC? Table 2 summarizes my proposal. The evaluation is gradient in the sense that more than one violation mark can be assigned to one candidate. However, the gradience derives from the fact that the constraint refers to several features. Each feature can only yield one or zero marks per candidate. If the match in relevant feature specifications between the segments is total, as in (a), the constraint is not violated and the sequence C^{j}i thus receives no stars. In (b) and (c) there is one mismatch, and one violation mark is assigned in each case. In the former case the specifications for frontness are different, in the latter the specifications differ for height. Sequence (d)

receives two violation marks, since it involves two featural mismatches. Finally, (e) is assigned three stars, since the vowel is different from the preceding consonant with regard to all relevant features. Not only has [a] got the wrong specifications for [high] and [low], it also fails to display [cor], since it is neutral to the front-back dimension. As will become clear below, gradient evaluation is necessary in order for the analysis to work. If AGREE-VOCALIC were evaluated categorically, the analysis would not be able to handle *ekan'e*, a vowel pattern I return to shortly.[6]

Output:	Features on C^j:	Features on V:	Mismatches C^j-V:	Violation marks:
a) C^ji	[cor, +hi, –low]	[cor, +hi, –low]	0	
b) C^ju	[cor, +hi, –low]	[dor, +hi, –low]	1	*
c) C^je	[cor, +hi, –low]	[cor, –hi, –low]	1	*
d) C^jo	[cor, +hi, –low]	[dor, –hi, –low]	2	**
e) C^ja	[cor, +hi, –low]	[–hi, +low]	3	***

Table 2. Evaluation for AGREE-VOCALIC

In order to see how AGREE-VOCALIC works, it is fruitful to leave dissimilative *akan'e/jakan'e* and look at some closely related dialects where the assimilation effects are not blurred by interference from dissimilation or reduction. Traditionally, these dialects are labelled *ikan'e*, *ekan'e* and *(strong) jakan'e*. The neutralization patterns in these dialects are summarized in table 3.

[6] AGREE-VOCALIC may be interpreted as one constraint referring to three features or three constraints each involving one feature. However, as the object of this study provides no positive evidence for three independently ranked constraints, I have adopted the former alternative. It is possible that [round] is also relevant for the evaluation of AGREE-VOCALIC. The inclusion of [round] would yield a slightly different hierarchy of preference, viz. $C^ji > C^je > C^ju > C^jo$, C^ja instead of $C^ji > C^je$, $C^ju > C^jo > C^ja$. However, since the difference between these two hierarchies have no bearing on my line of argumentation, I shall assume the simplest option, i.e. the one which involves fewer features.

	ikan'e:	*ekan'e*:	*(strong) jakan'e*:
a) soft (/p^{j}aták/, /n^{j}oslá/, /l^{j}esá/):	[i]	[e]	[a]
b) hard (/travá/, /sová/):	[a]	[a]	[a]

Table 3. Neutralization in *ikan'e*, *ekan'e* and *(strong) jakan'e*

In addition to AGREE-VOCALIC we need two constraints in order to account for these patterns:

(14) *MID:
Mid vowels are prohibited.

(15) *HIGH:
High vowels are prohibited.

*MID punishes vowels specified as [–high, –low], while *HIGH penalizes [+high] vowels. Both constraints are evaluated categorically; they receive one violation mark for each vowel with the prohibited vowel height. In order to ensure that mid and high vowels are only banned in *unstressed* syllables, I assume highly ranked FAITH-HEAD, as suggested in section 2 above.[7]

The three constraints AGREE-VOCALIC, *MID and *HIGH can be ranked in six different ways, summarized in (16):

(16)

a) AGREE-VOCALIC >> *MID >> *HIGH
b) AGREE-VOCALIC >> *HIGH >> *MID
c) *MID >> AGREE-VOCALIC >> *HIGH
d) *MID >> *HIGH >> AGREE-VOCALIC
e) *HIGH >> *MID >> AGREE-VOCALIC
f) *HIGH >> AGREE-VOCALIC >> *MID

[7] At this point one remark is in order with regard to *HIGH. While its function is to militate against raising of /e, o, a/ to [i, u], it also punishes the realization of /i, u/ as [i, u], thus motivating lowering of high vowels in unstressed syllables. To the best of my knowledge, no such lowering is attested in East Slavic. The undesirable effect is avoided if *HIGH is outranked by IDENT[+hi] (McCarthy and Prince 1999; Pater 1999) or *[–hi] & IDENT[hi] (Baković 2000). A discussion of the relative merits of these proposals is beyond the scope of this study.

The factorial typology is illustrated in (17) through (19) where /nʲoslá/ 'carry (fem.pret)' is used as an example. The three first rankings yield *ikan'e*; no matter where *MID is ranked, candidate (a) is optimal as long as AGREE-VOCALIC outranks *HIGH:

(17)

	/nʲoslá/	AGREE-VOC	*HIGH	*MID
a. ☞	nʲislá		*	
b.	nʲuslá	*!	*	
c.	nʲeslá	*!		*
d.	nʲoslá	*!*		*
e.	nʲaslá	*!**		

Rankings (16d-e) give (strong) *jakan'e* as can be seen from tableau (18):

(18)

	/nʲoslá/	*HIGH	*MID	AGREE-VOCALIC
a.	nʲislá	*!		
b.	nʲuslá	*!		*
c.	nʲeslá		*!	*
d.	nʲoslá		*!	**
e. ☞	nʲaslá			***

Finally, *ekan'e* emerges as a result of ranking (16f), as shown by tableau (19). Notice that the optimality of candidate (c) hinges on a gradient evaluation of AGREE-VOCALIC. If candidates (b) through (e) had received only one violation mark for AGREE-VOCALIC, candidate (e) incorrectly would have been evaluated as optimal since it does not violate *MID.

(19)

	/nʲoslá/	*HIGH	AGREE-VOCALIC	*MID
a.	nʲislá	*!		
b.	nʲuslá	*!	*	
c. ☞	nʲeslá		*	*
d.	nʲoslá		**!	*
e.	nʲaslá		**!*	

Tableaux (17) through (19) demonstrate that candidates (b) and (d) with back (rounded) vowels after a soft consonant never emerge as optimal – in the terminology of Prince and Smolensky (1993; see also Prince 2000) they are harmonically bounded by the candidates with front vowels. In this way the three constraints allow us to account for all and only the attested patterns. This result lends strong support to the approach to assimilation adopted in the present paper, in which the constraint AGREE-VOCALIC plays the most important part. In section 5, we shall return to the role of this constraint in the dialects of primary concern in this paper, viz. dissimilative *akan'e* and *jakan'e*. However, first we must discuss the constraint MAX-VOCALIC with regard to vowel reduction.

4. Vowel Reduction: MAX-VOCALIC

In table 1b in section 1, we saw that in unstressed syllables followed by a syllable containing a stressed [á] the *schwa*-dialect evinces [i] after a soft consonant, but [ə] elsewhere ([nʲislá], but [səvá]). In section 3, AGREE-VOCALIC was introduced in order to account for the occurrence of [i]. We now turn to the motivation of schwa.

Traditionally in the literature on Russian dialects, schwa has been classified as a mid vowel (cf. e.g. Kasatkin 1989:45). However, in line with Anderson (1982), Alderete (1995:13) and Oostendorp (2000) schwa could also be conceived of as an 'empty' vowel, i.e. 'a root node with no feature material dependent on it' (Oostendorp 2000:134).[8] Distributional facts about schwa support the latter approach for the East Slavic dialects under

[8] Oostendorp (2000:134) assumes the major class features to be specified on the root.

scrutiny in the present study. Schwa is not attested in stressed syllables. This sets it apart from the mid vowels /e, o/, since in the vast majority of East Slavic dialects evincing neutralization of unstressed vowels, /e, o/ occur in stressed syllables only. Although dialects with unstressed mid vowels exist (cf. e.g. the discussion of *ekan'e* in section 3), there is a very strong tendency in East Slavic that mid vowels are found in stressed syllables only. Therefore, if schwa were a true mid vowel, one would expect it to occur exclusively or, at least, predominantly in stressed syllables. However, as this prediction is not borne out, an analysis of schwa as a mid vowel is jeopardized. Analytical problems of this type do not arise if schwa is considered an empty vowel. Since an empty vowel is not able to express any phonemic contrasts, one would expect to find it in environments unfavourable for such contrasts. Unstressed syllables provide such an environment insofar as they tend to be shorter than stressed syllables (cf. Gabka 1975:108), which makes it more difficult for the hearer to distinguish between different vowels in unstressed syllables. In other words, the analysis of schwa as empty correctly predicts its occurrence in unstressed syllables.

Under the assumption that schwa is best described as an empty vowel, it is clear that the traditional analysis according to which its occurrence is explained in terms of dissimilation, cannot be correct. OCP-APERTURE introduced in section 2 bans candidates containing two foot-internal vowels with the same value for the features [high] and [low]. However, schwa does not bear these features, and forms like [səvá] therefore do not incur any violation marks for this constraint.

Instead, I would like to suggest motivating the occurrence of schwa in the *schwa*-dialect in terms of a member of the MAX constraint family (cf. e.g. McCarthy and Prince 1999 for discussion), MAX-VOCALIC, which can be stated as follows:

(20) MAX-VOCALIC:
For each feature under the vocalic node in the input, there is a corresponding feature in the output.

I assume one violation mark for each feature in the input that lacks a corresponding feature in the output. Thus, a candidate [savá] from /sová/ incurs one violation mark since [a] is not specified for V-place (the front-

back dimension). More importantly, however, MAX-VOCALIC penalizes the occurrence of schwa in the output. In a form like *sová* a candidate with schwa incurs three violation marks, since schwa is not only unspecified for V-place, but also for the features [high] and [low] on the Aperture node. Therefore, a high ranking of MAX-VOCALIC with respect to the constraints causing assimilation and dissimilation will militate against the occurrence of schwa, whereas low ranking will have the opposite effect. In functional terms, MAX-VOCALIC regulates vowel reduction, since low ranking facilitates a more neutral, i.e. centralized, vowel articulation. In other words, the occurrence of schwa in the *schwa*-dialect is not due to dissimilation, but rather to vowel reduction.

5. Constraint Interaction

In the previous three sections we have seen the relevance of dissimilation (OCP-APERTURE), assimilation (AGREE-VOCALIC) and vowel reduction (MAX-VOCALIC) for the so-called dissimilative *akan'e/jakan'e* dialects. We now turn to the interaction of these factors. The analysis I shall propose makes the relationship between the *schwa*- and *i*-dialects explicit, and indicates the inadequacy of the traditional approach in which the unstressed vocalism has been explained in terms of dissimilation alone.

Since the discussion will focus on the differences between the *i*- and *schwa*-dialects, I will not include in the tableaux constraints that are equally ranked in both dialects. This pertains to the positional faithfulness constraints (sections 2 and 3) as well as *MID (section 3). The latter must be highly ranked in both dialects since mid vowels never surface in unstressed syllables. In order to avoid complications irrelevant at this stage, candidates with unstressed mid vowels will not be included in the tableaux.

It is convenient to start the discussion of constraint interaction with unstressed vowels in the hard environment. For these vowels, softness assimilation from the previous consonant is not relevant, and we are thus in a position to establish the relationship between dissimilation and vowel reduction before invoking assimilation. Forms where the stressed vowel is high (e.g. /sovú/ and /travú/) are of no help in establishing the ranking, because candidates with unstressed [a] ([savú] and [travú]) satisfy all constraints. They are therefore optimal under any ranking. However, forms with a *low* vowel under stress facilitate a partial ranking of *HIGH, MAX-

VOCALIC and OCP-APERTURE with regard to each other, as can be seen from tableaux (21) and (22). The former demonstrates that in the *i*-dialect *HIGH is outranked by both MAX-VOCALIC and OCP-APERTURE:[9]

(21) The *i*-dialect:

	/sová/	OCP-APERTURE	MAX-VOCALIC	*HIGH
a. ☞	sivá			*
b.	savá	*!*	*	
c.	səvá		**!*	

The *schwa*-dialect differs from the *i*-dialect in that MAX-VOCALIC is ranked below *HIGH as can be seen from (22) which concerns /sová/. The low ranking of MAX-VOCALIC facilitates vowel reduction, and candidate (22c) with schwa in the unstressed syllable emerges as optimal.[10]

(22) The *schwa*-dialect:

	/sová/	OCP-APERTURE	*HIGH	MAX-VOCALIC
a.	sivá		*!	
b.	savá	*!*		*
c. ☞	səvá			***

Now that we have established the ranking relationships between OCP-APERTURE, MAX-VOCALIC and *HIGH, the question arises as to the

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[9] Notice that in the tableaux double violations are incurred for OCP-APERTURE. As the reader will recall from section 2, this is because we are dealing with OCP violations with regard to two features, viz. [high] and [low]. Notice, also, that there is nothing in tableau (21) that prevents a fourth candidate [suvá] from being selected as a second optimal candidate in addition to candidate (21c). In order to rule out [suvá], one would need a constraint militating against back vowels, say *DORSAL. This constraing would solve the problem regardless of its ranking with regard to *HIGH, MAX-VOCALIC and OCP-APERTURE. In order to avoid unnecessary complications of the argument, however, I have not included *DORSAL and [suvá] in the tableaux.

[10] A third ranking order, *HIGH, MAX-VOCALIC >> OCP-APERTURE is also possible. It yields unstressed [a] in both /sová/ and /sovú/. This pattern, which is traditionally known as strong *akan'e*, is widely attested in East Slavic, but not in the dialects under analysis in the present paper.

place of AGREE-VOCALIC. In section 3, I discussed this constraint with regard to full vowels, but not the empty schwa. Bear in mind that AGREE-VOCALIC requires a vowel to be specified as [+high, –low, cor] when preceded by a soft consonant. Given that schwa is analysed as empty, candidates like [nʲəslá] and [nʲəsú] fail with regard to all three features, and therefore incur three violation marks for AGREE-VOCALIC. By contrast, candidates with unstressed schwa do not violate OCP-APERTURE, as the reader may recall from section 4. Since this constraint bans candidates with two foot-internal vowels with the same values for the features [high] and [low], empty vowels – which do not have these features – are not at variance with the constraint.

In the *i*-dialect, AGREE-VOCALIC must be ranked below OCP-APERTURE because otherwise candidate (24a) [nʲisú] would incorrectly be evaluated as optimal. There is no basis for ranking AGREE-VOCALIC with regard to MAX-VOCALIC and *HIGH, so we arrive at the ranking order summarized in figure 2.

(23) The *i*-dialect:

	/nʲoslá/	OCP-APER	AGR-VOC	MAX-VOC	*HIGH
a. ☞	nʲislá				*
b.	nʲaslá	*!*	***	*	
c.	nʲəslá		*!**	***	

(24) The *i*-dialect:

	/nʲosú/	OCP-APER	AGR-VOC	MAX-VOC	*HIGH
a.	nʲisú	*!*			*
b. ☞	nʲasú		***	*	
c.	nʲəsú		***	**!*	

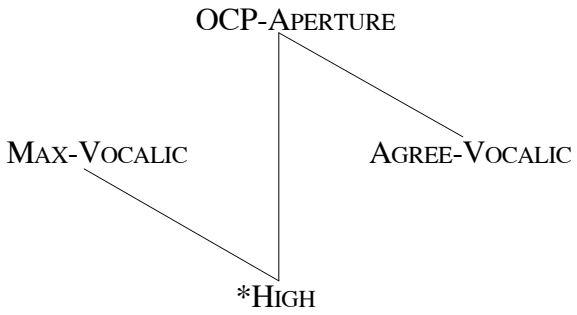

Figure 2. Constraint ranking in the *i*-dialect

The ranking order for the *schwa*-dialect can be established on the basis of (25) and (26). The former tableau shows that AGREE-VOCALIC must outrank *HIGH, because otherwise candidate (25c) would incorrectly be evaluated as optimal. Tableau (26) demonstrates that AGREE-VOCALIC must be ranked below OCP-APERTURE in order to prevent (26a) from being optimal. In other words, the *schwa*-dialect is defined by the ranking OCP-APERTURE >> AGREE-VOCALIC >> *HIGH >> MAX-VOCALIC.

(25) The *schwa*-dialect:

	/nʲoslá/	OCP-APER	AGR-VOC	*HIGH	MAX-VOC
a. ☞	nʲislá			*	
b.	nʲaslá	*!*	***		*
c.	nʲəslá		*!**		***

(26) The *schwa*-dialect:

	/nʲosú/	OCP-APER	AGR-VOC	*HIGH	MAX-VOC
a.	nʲisú	*!*		*	
b. ☞	nʲasú		***		*
c.	nʲəsú		***		**!*

The discussion of the constraint interaction allows us to draw two conclusions. First, the proposed analysis makes the close relationship between the two dialects explicit. In fact, one dialect can be derived from the other by means of one single operation, viz. the reranking of *HIGH with respect to MAX-VOCALIC. If the two constraints change places in the

ranking order of the *schwa*-dialect given in (27a), we arrive at (27b), which is one of several rankings compatible with the ranking order for the *i*-dialect stated in figure 2.

(27)

a) *Schwa*-dialect:
   OCP-APER >> AGR-VOC >> *HIGH >> MAX-VOC
b) *I*-dialect:
   OCP-APER >> AGR-VOC >> MAX-VOC >> *HIGH

Since there is only one step from one system to the other, one would expect extensive variation between them. This prediction is indeed borne out. In terms of dialect geography the *i*-dialect represents scattered islands within the overall area of the so-called dissimilative *akan'e/jakan'e* dialects (Avanesov, Bromlej and Stroganova 1986:map 2; Stroganova 1975:map 1). However, even within a single speech community a great deal of vacillation between *i*- and *schwa*-forms is attested (Avanesaŭ, Krapivy and Mackevič 1963b:263ff.; Stroganova 1975:41). This variation, which can be represented in OT terms as the uncertainty of the speakers concerning the relative ranking of *HIGH and MAX-VOCALIC, lends support to the analysis advanced in the present study.

The second conclusion to be drawn from the discussion of the interaction of the constraints is that the traditional analysis of the relevant dialects in terms of dissimilation alone is not fully adequate. Admittedly, AGREE-VOCALIC, which accounts for assimilation, is not decisive in the *i*-dialect – in fact it could be removed from tableaux (23) and (24) altogether without affecting the choice of optimal candidate. However, in the schwa dialect assimilation plays a crucial role as can be seen from tableau (25) where AGREE-VOCALIC blocks candidate (c) from being incorrectly evaluated as optimal.

The ranking of MAX-VOCALIC, which regulates vowel reduction, is crucial in order to describe the difference between the two dialects with regard to the form /sová/ (cf. (21) and (22)). In the *i*-dialect, [i] surfaces in the optimal candidate (a) because MAX-VOCALIC outranks *HIGH, whereas in the *schwa*-dialect candidate (c) with [ə] is optimal due to the opposite ranking of these constraints. Therefore, a fully adequate analysis of the *i*- and *schwa*-dialects must take into account not only dissimilation (OCP-

APERTURE), but also assimilation and vowel reduction as modelled by AGREE-VOCALIC and MAX-VOCALIC, respectively.

6. Summary and Implications

Summarizing, I would like to emphasize two aspects of the proposed analysis. First of all I have shown that the traditional approach according to which the dialects under scrutiny have been explained in terms of dissimilation alone, is simplistic. By juxtaposing soft and hard environments, analysing schwa as an empty vowel, and systematically considering both the *i*- and *schwa*-dialects it has been possible to demonstrate how the attested patterns arise from a complex interaction of dissimilation with assimilation and vowel reduction.

Secondly, invoking local conjunction and positional faithfulness, the proposed analysis explicates the relationship between the *i*- and the *schwa*-dialects in terms of different rankings of a small set of constraints modelling dissimilation, assimilation and vowel reduction. In this way the analysis testifies to the value of OT for a formal analysis of dialectal variation.

Although the analysis advanced in this study is strictly synchronic, it has implications for the diachronic study of East Slavic dialects where the genesis and development of the unstressed vocalism has been a long-standing issue (cf. e.g. Avanesov 1952; Birnbaum 1970; Kuznecov 1964; Lekomceva 1978; Stipa 1974; Ward 1985; Čekmonas 1987 and references in these works). In OT, language change is viewed as constraint reranking. On the basis of the ranking orders for various dialects, it is possible to reconstruct more and less probable paths of development in a more precise way than was previously possible. In establishing the rankings of two dialects, the present paper offers a contribution in this respect although a detailed synchronic investigation of more dialects is necessary before an OT-based analysis of the development of the unstressed vocalism in East Slavic is possible. It is my hope that the present paper can be seen as the first step towards this goal.

However, the implications of the present paper go beyond Slavic linguistics. Not only does the proposed analysis reexamine the well-known example of so-called dissimilative *akan'e* and *jakan'e*, it also takes the OT approach to assimilation beyond the study of voicing in consonant clusters.

I have demonstrated how a new member of Lombardi's (1999) constraint family AGREE, viz. AGREE-VOCALIC, facilitates a principled account of assimilation between syllable onsets and peaks with regard to the features [high], [low] and [cor]. The interaction of dissimilation, assimilation and vowel reduction explored in the present paper is likely to be of interest for anyone engaged in the analysis of related phenomena in other languages.

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