Pitch-accent and the phonologization of vowel length in Slavic

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1. Introduction: Slavic CL

The term Compensatory Lengthening (CL) refers to a set of phonological phenomena wherein the disappearance of one element of a representation is accompanied by the lengthening of another. Two types of CL are defined according to the nature of the trigger: CL through consonant loss (CVC → CV:) and CL through vowel loss (CV,CV → CV,C). CL through consonant loss is characterized by the lengthening of the vowel as a consequence of the loss of the consonant and also by a change in syllable structure. A closed syllable with a short vowel (as a historical or a synchronic input) ends up as an open syllable with a long vowel.

An example of CVC CL is shown in (1). In Lithuanian, nasals are deleted if followed by a voiceless fricative and are retained otherwise. The deletion of a nasal is accompanied by the lengthening of the preceding vowel, producing a synchronic vowel-length alternation.

(1) CL in Lithuanian

<table>
<thead>
<tr>
<th>3 SINGULAR</th>
<th>INFINITIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>spren-dʒa</td>
<td>spræ:-sti</td>
</tr>
<tr>
<td>sun-tʃe</td>
<td>sur-sti</td>
</tr>
</tbody>
</table>

The second type of CL differs strikingly from the first. CL through vowel loss is a process whereby the loss of the second vowel in a CVCV sequence is correlated with the lengthening of the first. This type of CL is characterized not only by a change in syllable structure—from two open syllables with short vowels to a closed syllable with a long vowel—but also by the fact that the syllable count is not preserved. Through the loss of the second vowel, a disyllabic input becomes one syllable in the output. Such CL is illustrated in (2), with an example of the diachronic development from Late Common Slavic as reflected in the Old Church Slavic (OCS) to Serbo-Croatian sound change.

(2) CL in Serbo-Croatian
Slavic CL occurred in Late Common Slavic, when jers (short lax high vowels) deleted in certain positions, giving rise to lengthening of the vowel in the preceding syllable. The rule of jers-deletion in Slavic was first stated by Havlík (1889) and was later canonized as Havlík’s Law. It is formulated by Isačenko (1970: 73) as follows: “Word-final jers and jers in syllables followed by jers become weak. Weak jers are dropped. Jers in syllables followed by a weak jer become strong. Strong jers merge with one or several of the ‘non-reduced’ vowels.”

Data from Upper Sorbian ((Schuster-)Šewc 1968) illustrate the basic mechanism of Slavic CL (3). Note that the reflexes of Pre-Upper-Sorbian *o are different in the genitive singular and nominative singular forms, [ɔ] vs. [o]. This shows that CL applied in the nominative, where a jer was lost, and did not apply in the genitive, where the ending was a full vowel.

Upper Sorbian represents the simplest case of Slavic CL through the loss of jers: CL applied across the board, regardless of the consonant between the two vowels in the CVCV sequence or the accent. However, CL is notoriously complex in many other Slavic dialects, since it depends on a number of various factors.

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1 In the general phonological literature jers are usually represented by the symbols [ ā] and [ū], while Slavists traditionally use symbols ą for the back jer and a for the front jer. In this paper I will use [i] and [u] to denote the front and the back jer respectively.

2 Two types of accent (short falling and short rising) are shown for the reconstructed forms to illustrate that accentuation was irrelevant for the purposes of CL in Upper Sorbian.
which interact with each other (Timberlake 1983a,b; 1988; 1993). The factors which may affect CL in various Slavic languages are summarized in (4). They include:

(4) (i) the identity of the intervening C₂ in a C₁V₁C₂V₂ sequence;
(ii) the identity of the target vowel V₁ in a C₁V₁C₂V₂ sequence;
(iii) prosody (the accent of the lengthening vowel);
(iv) position of the disyllabic C₁V₁C₂V₂ unit in the word (final vs. non-final);
(v) the identity of a trigger V₂ (front or back jer) in a C₁V₁C₂V₂ sequence.

I claim that the conditions on Slavic CL, though complex and intertwined, are not random but comprise a system with hierarchical organization. Their interaction can be explained by by the phonologization model developed in Kavitskaya (2002) and by the facts of Slavic chronology. The model is presented briefly in the next section.

2. Phonologization model

2.1. Listener-oriented sound change

The view of sound change assumed here is listener-oriented: in certain contexts intrinsic phonetic properties of the speech signal can be misparsed and reinterpreted, yielding phonologization (Ohala (passim), Blevins and Garrett 1998, Blevins to appear).

Ohala (1992) cites nasalization to illustrate the phenomenon of hypocorrection as a listener-oriented sound change. For example, in Hindi the loss of a nasal consonant results in the nasalization of a preceding vowel. The table in (5) shows the stages of nasalization:

(5)               Stage 1               Stage 2

| speaker says | [vN]     | [vN]     |
| listener parses | /vN/     | /v/      |
At Stage 1 the vowel which is followed by the nasal is predictably nasalized and discounted by the listener. At Stage 2, however, the vowel is analyzed as distinctively nasalized, since the environment conditioning nasalization—the nasal—is lost.

In Kavitskaya (2002) I proposed that diachronic CL processes are analogous to hypocorrective nasalization. In the case of CL, vowel duration is present in the string in question at all times, but it is reanalyzed as phonemic length upon the loss of the environment, parallel to other hypocorrective changes. Thus, CL as a historical process does not in fact involve any transfer of length or weight. Rather, intrinsic phonetic vowel durations are reinterpreted as phonologically significant upon a change in the conditioning environment or syllable structure.

2.2. CL through consonant loss

This proposal analyzes CL through consonant loss as having its origin in the phonetic lengthening of vowels in the environment of neighboring consonants. The loss of the conditioning environment (the consonant) leads to the reanalysis of phonetic length as phonological. Such a hypothetical situation is illustrated in (6).

(6) Phonologization of vowel length: CL through consonant loss

<table>
<thead>
<tr>
<th></th>
<th>Stage 1 (before C-loss)</th>
<th>Stage 2 (C-loss and phonologization)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVX</td>
<td>C V C</td>
<td>C V CV:</td>
</tr>
<tr>
<td>CVY</td>
<td>C V C</td>
<td>C V CV</td>
</tr>
</tbody>
</table>

In the first instance, X is a consonant with relatively long vocalic transitions, e.g., a glide. In the second instance, Y is a consonant to which vocalic transitions are much shorter, e.g., a stop. Prior to the deletion of the consonants (Stage 1), both vowels are correctly analyzed as phonologically short, since the length of the transitions is parsed by listeners as caused by the neighboring consonant and is discounted. If both X and Y are not heard by
listeners, leading to their subsequent loss, the transitions are reinterpreted as a part of the vowels. A vowel which is inherently longer in the environment of X than in the environment of Y is more likely to be reinterpreted as contrastively long (Stage 2).

2.3. Origins of CVCV CL

To understand the origins of CL through vowel loss, it is important to take into account that vowels in open syllables are typically longer than vowels in closed syllables (Maddieson 1985, Rietveld and Frauenfelder 1987, among others). This generalization allows us to model most examples of CVCV CL as a phonologization process.

Consider the schematic example of CL through vowel loss in (7).

(7) Phonologization of vowel length: CL through vowel loss

Prior to the deletion of the final vowel, the longer vowel duration characteristic of open syllables is correctly parsed by listeners as a phonetic consequence of syllable structure (Stage 1). The vowel is interpreted as phonologically short, as is intended by the speaker. With the deletion of the final vowel, however, the duration of the vowel in the newly closed syllable becomes inexplicable, since it is longer than is expected in the closed syllable (Stage 2). The listener therefore parses the longer duration as having been intended by the speaker and reinterprets the vowel as phonologically long.
3. Prosodic conditions

Accentuation plays a role in the majority of CL cases in Slavic. Timberlake (1983b: 306) states that accent divides Slavic CL into two large areas: one is Northwestern South Slavic (Slovenian and dialects of Serbo-Croatian), the other includes Southwestern East Slavic (Ukrainian and Belarusian dialects) and West Slavic (Slovak, Czech, Upper Sorbian, Polish, and Kashubian). In Northwestern South Slavic, CL applies in more environments and is sensitive to fewer additional conditioning factors under the circumflex (falling accent) than under the acute or neo-acute (rising accents). However, in both Southwestern East Slavic and all of West Slavic CL is subject to fewer conditioning factors under the neo-acute (the new rising accent resulting from accent shift) than under either the circumflex or the acute (old accents). Moreover, the accentuation condition on CL is connected with the position in the word. In many cases the position in the word (final or medial) is irrelevant. But when it is relevant, final position coincides with CL more consistently under the new rising accent than under the old falling and rising accents. Under the old accents, however, CL seems to happen more regularly in word-medial position.

Before we consider the relevance of accentuation to CL, it is necessary to recall that the Common Slavic vowel system was one based on quantity, consisting of /i, æ, a, u/ and their long counterparts. In addition to the distinctive length, Common Slavic prosody was characterized by a pitch accent system, traditionally described as consisting of four distinct accents, shown in (8): long falling (circumflex) and short falling, restricted to initial syllables; short rising, occurring only on non-initial syllables; and long rising (acute), whose distribution was unrestricted.

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1. In this paper we are concerned only with the effects of accent on the outcome of CL in Slavic. See Kavitskaya (2002) for an account of segmental conditioning of Slavic CL.
2. Generally said to have existed some time around the ninth century A.D., in the period just prior to the disintegration of the Slavic family into its respective branches. Some of this disintegration, however, even at this time, was already underway dialectally.
3. Oral, liquid, and nasal diphthongs will not concern us here.
(8) Accents of Common Slavic

<table>
<thead>
<tr>
<th>Accent</th>
<th>Symbol</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumflex (long falling)</td>
<td>^</td>
<td>Restricted to initial syllables&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Short falling</td>
<td>~</td>
<td>Initial syllables only. Often conflated with short rising as one accent because of complementary distribution.</td>
</tr>
<tr>
<td>Acute (long rising)</td>
<td>~</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Short rising</td>
<td>~</td>
<td>Non-initial syllables only.</td>
</tr>
</tbody>
</table>

4.1. Old rising and falling accent: a reanalysis

It is more convenient for our purposes to think of accents in Slavic as different configurations of High tone. A recent analysis of Slavic accent in terms of tone is that of Bethin (1998). According to Bethin a rising accent can be represented as a High tone on a mora (9a-b) and a falling accent as an absence of tone (9c-d). Long rising accent is distinguished by the location of the High on the second mora (9b).

(9) Bethin’s system of Slavic accentuation

\[
\begin{align*}
\text{Acute} &\quad \text{a. short rising} \quad \text{b. long rising} \\
\sigma & \quad \sigma \\
\mu & \quad \mu \quad \mu \\
H & \quad H \\
\text{Circumflex} &\quad \text{c. short falling} \quad \text{d. long falling} \\
\sigma & \quad \sigma \\
\mu & \quad \mu \quad \mu \\
\end{align*}
\]

<sup>6</sup> See Timberlake 1993 for discussion of indirect evidence for non-initial circumflexes in certain oxtone verbal paradigms.
<sup>7</sup> Asterisk stands for stress.
For the purposes of current analysis I will use the system of Slavic accentuation proposed in Barnes and Kavitskaya (1998), which slightly modifies Bethin’s analysis. We hypothesize that rising accents in Common Slavic were realized over two moras, just in the case of modern Slavic dialects with pitch accent such as dialects of Serbo-Croatian (Inkelas and Zec 1988). According to this model a short rising accent is centered by definition over a monomoraic vowel. The other mora of the high tone necessary for a rising accent is thus realized on the preceding syllable. So with the short rising accent, the pre-tonic syllable participates in the pitch contour of the accent, constituting a part of the rising slope. This explains why the short rising accent never occurs initially (i.e., without a pre-tonic syllable).

(10) Slavic accentuation (Barnes and Kavitskaya 1998)

\[
\begin{align*}
\text{Acute} & \quad \text{a. short rising} & \quad \text{b. long rising} \\
& \quad \sigma & \quad \sigma \\
& \quad \mu & \quad \mu \\
& \quad \downarrow & \quad \downarrow \\
& \quad \downarrow & \quad \downarrow \\
& \quad \downarrow & \quad \downarrow \\
& \quad H & \quad H \\

\text{Circumflex} & \quad \text{c. short falling} & \quad \text{d. long falling} \\
& \quad \sigma & \quad \sigma & \quad \sigma \\
& \quad \mu & \quad \mu & \quad \mu \\
& \quad \downarrow & \quad \downarrow & \quad \downarrow \\
& \quad \downarrow & \quad \downarrow & \quad \downarrow \\
& \quad \downarrow & \quad \downarrow & \quad \downarrow \\
& \quad (L) & \quad H & \quad (L)
\end{align*}
\]

4.2. Lengthening under the falling accent

We can now turn to the analysis of the accentuation as a factor in Slavic CL. First, we will look at the instances of vowel lengthening where the segmental environments for CL under the falling accent are a superset of the environments in which CL occurs under the rising accent. This is the case in a few North-Western South Slavic dialects.
4.2.1. Data

In Slovenian, vowels under the short falling accent are lengthened (11a), but vowels under the rising accents (acute and neo-acute) (11b) are not (Timberlake 1983b: 296).

(11) Late Common Slavic       Slovenian
    a. *bōgu  HL >  bōg       ‘god’
    b. *kōstū  HL >  kō:st    ‘bone’
    b. *konjū  HH >  kōnj      ‘horse’

In Serbo-Croatian, CL happens under all accents, but it is more restricted under the rising accents, where it is sensitive both to the nature of the intervening consonant and occasionally to the position of the disyllabic CL unit in the word (Timberlake 1983a: 222). For example, in Štokavian dialects (except Posavian) under the rising accents CL in the final position occurs only before a palatal glide j (12a) and not before other sonorants (12b). Internally, however, CL occurs before all sonorants, as in (13).

(12) NW South Slavic8         Štokavian
    a. *krājī  HL >  krāj̆ī   ‘place’
    b. *rājī  HL >  rāj̆ī    ‘heaven’
    b. *konjū  HH >  kōnj    ‘horse’
    b. *dimū  HL >  dim     ‘smoke’

(13) Štokavian word-internally
    *stārtsa  HLL >  stārtsa  ‘old man’
    *pǎltsa  HLL >  pǎltsa  ‘finger’

4.2.2. Analysis

The development of the rising accents in North-Western South Slavic can shed light on the outcome of CL under different accents. A series of mergers created a situation where the lax vowels e and o (the only ones to undergo CL in most dialects of Slavic including North-Western South Slavic) could be only short under the rising

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8 This reconstruction represents the stage after the shortening of the new rising accent in North-Western South Slavic: krājī (HHL) > krājī (HL).
accent. If the shortening of the rising accents happened before the shortening of the falling accents in these dialects, as Timberlake (1983b) suggests, it can be argued that at some point in the history of Slavic (which coincided with the fall of the jers) only vowels under the falling accent could be long in North-Western South Slavic dialects. It is entirely plausible that North-Western South Slavic maintained the allophonic length of the falling accent longer than the length of the rising accent. Thus, I propose that vowels under the falling accent were phonetically longer than vowels under the rising accent, which was an additional factor in the phonologization of vowel duration as length.

Additionally, both long and short falling accents were restricted to the initial syllable of words lacking a rising accent (Jakobson 1963; for a few potential exceptions see Timberlake 1993). So if CL has fewer restrictions under the falling accent, it will necessarily have fewer restrictions in the non-final position of a word. Indeed, in South Slavic CL is sensitive to fewer additional conditions in word-medial rather than in word-final position.

### 4.3. Lengthening under the new rising accent

The situation in Southern West Slavic is the opposite of that of North-Western South Slavic. Although it has been claimed that the new rising accent merely “favored” CL (Timberlake 1983 and references therein), I will argue that it resulted in vowel lengthening with no contextual restrictions.

#### 4.3.1. Data

According to Timberlake (1983b: 295), Slovak (Southern West Slavic) has CL of *e, o “only under the NAct, and then across any consonant and in any word position”, as shown in (14a). In (14b) I show that CL does not occur under the old falling or rising accents in Slovak.

(14) Slovak

a. *3enò HH > 3en ‘wife’ gen.pl.
   *vedlò HH > vedol ‘to lead’ pptcpl
   *noʒíka HHL > noʒka ‘leg’ dim.
b. *mêdu HL > med ‘honey’
   *mâtoka HLL > matka ‘mother’

In Northern West Slavic, in addition to regular reflexes of length before sonorants and voiced obstruents, in Old Polish and in modern Polish dialects there are occasional examples of long vowels before voiceless obstruents (Timberlake 1983a: 216). All these reflexes involve the new rising accentuation (15).

(15) Polish

<table>
<thead>
<tr>
<th>NOM.SG.</th>
<th>GEN.PL.</th>
</tr>
</thead>
<tbody>
<tr>
<td>stopa</td>
<td>stopɔ &lt; stopò HH ‘foot’</td>
</tr>
<tr>
<td>kosa</td>
<td>kosɔ &lt; kosò HH ‘braid’</td>
</tr>
<tr>
<td>osa</td>
<td>osɔ &lt; osò HH ‘wasp’</td>
</tr>
</tbody>
</table>

This shows that in Polish, CL under the new rising accent developed regardless of the identity of the intervening consonant, whereas under other accents it applied only before sonorants and voiced obstruents and not before voiceless obstruents.

This allows us to conclude that while CL in West Slavic was sensitive to the nature of the intervening consonants under the old falling and rising accents, under the new rising accent lengthening applied across the board. How do we account for this pattern?

4.3.2. Analysis

Earlier we argued that CVCV CL crucially depends on the inherent phonetic length of the target vowel. However, since Late Common Slavic was a pitch accent system, accents did not require durational cues (compare modern Serbo-Croatian, which is a pitch accent language and has no durational cues for accent).

We have seen that in Northern West Slavic dialects CL is conditioned by the new rising accent (the neo-acute) whatever the intervening consonant is. The neo-acute arose from the retraction of the original rising acute from the jer to the preceding vowel, as illustrated in (16).
In most dialects, the new rising accent is realized on long vowels only (Carlton 1991: 198), unless it shortens and merges with the old short rising accent. There is a disagreement in the literature on where the neo-acute length comes from, but at least some researchers believe that the neo-acute lengthening was a separate process which applied after jers were sufficiently reduced to cause the retraction of accent, but were not yet lost (Carlton 1991 among others).

We have shown that the short rising accent requires the second mora of the High tone to be realized on the preceding vowel, as repeated in (17).

(17) Acute

<table>
<thead>
<tr>
<th>a. short rising</th>
<th>b. long rising</th>
</tr>
</thead>
<tbody>
<tr>
<td>σ</td>
<td>σ</td>
</tr>
<tr>
<td>μ [μ]w</td>
<td>μ [μ]w</td>
</tr>
<tr>
<td>*H</td>
<td>H</td>
</tr>
</tbody>
</table>

Thus, the old short rising tone was phonetically manifested as a pitch rise over two vowels. In (18) I show this state of affairs before the loss of a final short rising accent.

(18) Short rising accent realized over two vowels

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C V_1 H C V_2 H
```
With the reduction of the second vowel, the rising slope on the first one could be easily reinterpreted as a new rising tone. If the original word was longer than two syllables, there was no rising slope on the vowel preceding the newly accented vowel, as in (19a), or the newly accented vowel was in the first syllable in a word, so the whole entirety of the rising pitch contour was now realized over a monomoraic vowel (19b).

(19) Short rising accent realized over two vowels

a. L H
   V C V_i

b. H
   C V_i

However, in Late Common Slavic, rising accents had to be realized over two moras, leading to the circumstance in West Slavic languages, such as Slovak, dialects of Polish, and Kashubian, that the newly accented vowel was reinterpreted as long.

This analysis treats the neo-acute retraction and CL as unrelated events and provides an explanation of why the lengthening of vowels under the neo-acute accent happened across the board in the West Slavic dialects in question. While CL was sensitive to the nature of the intervening consonant, the neo-acute lengthening applied in all cases when the accent on a jer was originally rising.

**Conclusion**

I have argued that in the cases were CL applied with fewer restrictions in the falling-accent environment, vowels under the falling accent were longer than vowels under the rising accent not by virtue of their inherent phonetic properties but for the reasons of chronology. From the phonetics side alone we would expect the opposite outcome: phonetic studies show that rising accents take longer than falling accents. In those cases where the opposite situation obtained (where CL applied in the superset of the possible environments under the rising accent), my account again crucially depends not only on phonetic facts but also on the chronology of
the sound changes in question. It does not constitute a counterexample to the predictions of the phonologization model.

References


