

3. A diachronic view on the Bulgarian data

The modern Bulgarian alternations involving ghost vowels (including metathesis) can be viewed as resulting from a series of sound changes affecting Old Church Slavonic (OCS) reduced vowels (jers) and syllabic liquids.

3.1. *Jers and liquids*

Our claim is that OCS had in its inventory of phonemes both reduced vowels (the front jer ѣ and the back jer ѓ) and syllabic liquids (orthographically, *r* or *l* followed by either the front or the back jer; i.e. *rѣ*, *lѣ*, *rѓ*, *lѓ*).

3.1.1. Strong and weak jers. Havlík's Law

The jers were "basically high lax vowels, but subject to considerable phonetic variation according to phonological surroundings" (Lunt 1974:2.11). They are "traditionally viewed as a special case of *reduced vowels* and opposed to all the other *full vowels*" (Lunt 1974:2.5).

In so-called *strong* positions – before another jer in the next syllable – jers were lowered to mid vowels: the front jer was replaced by *e* and the back jer by *o* in orthography.¹ When several jers occurred in successive syllables in a single word², every second jer, counting from the end of the word, was in strong position and could be lowered. This process is known in Slavic historical phonology as Havlík's Law (cf. Carlton 1991:165). Thus, the stem *vъzъm-* 'take', containing two jers in successive syllables, occurred with the first jer lowered in *vozъmi*, imper. 2p.sg., where the second jer is in weak position, because followed by the non-jer vowel 'i' in the next syllable, and with the second jer lowered in *vъzemъ*, past active part. nom.sg.masc.neut., where the second jer of the stem is in strong position, because followed by the jer vowel 'ъ' in the next syllable.

¹ This was most probably a process of regressive dissimilation for vowel height (cf. Velcheva 1988:123, Velcheva 1990).

² The phonological word in OCS could include neighbouring clitics, e.g. prepositions.

3.1.2. Two types of 'liquid-jer' sequences in Old Church Slavonic

It is well known that "Old Church Slavonic orthography fails to make a distinction between syllables originally containing $\text{b/b} + \text{r/l}$ and those with original $\text{r/l} + \text{b/b}$, but regularly puts the jer after the liquid" (Lunt 1962:350).

For simplicity, we use Y for b/b and L for r/l . Thus, we distinguish between two types of LY ('liquid-jer') sequences in OCS:

$LY_1 (< *LY)$

$LY_2 (< *YL)$

The two types of LY sequences behave differently in identical phonological contexts. $LY_2 (< *YL)$ "shows no signs of behaving like syllables containing jers" (Lunt 1962:351).

Jers in LY_1 sequences were involved in lowering according to Havlík's Law: $krbstb$ and $krestb$ 'cross', $slbzь$ and $slezь$ 'tear' gen.pl., $krьvb$ and $kronь$ 'blood' nom.sg., $plьtb$ and $plotь$ 'flesh' are attested alternative forms in OCS manuscripts (cf. Vaillant 1964:33).

Conversely, jer lowering was impossible in LY_2 sequences: $*prevь$, $*vrexь$, $*skrobь$ were impossible, and are not attested, as variants with lowered "jers" for $prьvb$ 'first', $vrьxь$ 'top' and $skrьbb$ 'sorrow', respectively, where rb , $rь$ are LY_2 sequences, coming from older $*br$, $*brь$.

As for the distribution of strong and weak jers, a LY_2 sequence produced the effects typical of a full vowel, not those of a jer:

- It could trigger the loss of a previous jer: $s'mrbti$, 'death' gen. sg., is an attested form (Suprasliensis 489.16) for $sьmrьti$.
- It was not to be counted in a sequence of contiguous syllables containing jers, when determining the distribution of weak and strong jers: $oto sьmrьti$ 'from death' is an attested (Psalterium Sinaiticum CXIV,7) alternative form for $otь sьmrьti$. The lowering of the jer at the end of the preposition means that the initial jer of $sьmrьti$ is in weak position even though it is followed by another jer. But rb in $sьmrьti$ is a LY_2 sequence and its "jer" is not to be counted as a real jer for Havlík's Law: $otь sьm(rь)ti$, yielding $oto sьm(rь)ti$.

Lunt (1962) makes the following assumptions about the phonetic value of jers in the Cyrillic texts and the Kiev Fragment: the symbols ѣ and ѧ have a double function:

- they have no phonetic value of their own, but just denote the quality of the consonant they follow (palatalized or not) ³
- "under proper conditions", they denote an independent vowel phoneme ə

According to Lunt, this schwa-like phoneme ə is found:

- in the place of the old strong jers⁴
- in the place of the weak jers which were retained in certain roots
- as the basis of the back nasal vowel: ǫ > ǫ̃⁵

Moreover, Lunt assumes that the phoneme ə was identified "with the vocalic element accompanying the syllabic liquids (and also the new syllabic nasals)" (Lunt 1962:356).

Lunt (1962) concludes that, although OCS did not distinguish orthographically CLY₁C and CLY₂C sequences, it clearly made a phonological distinction between them. However, Lunt (1962) does not make any assumption about the exact nature, phonemic and phonetic, of the contrast: "The exact nature of the phonological distinction between *prѣstѣ* (< ѣr)⁶ and *krѣstѣ*⁷ escapes us, but it must have lain in the quality and prosody of the liquid." (Lunt 1962:355).

My claim is that LY₁ corresponded to a biphonemic sequence of a liquid and a schwa-like vowel /Lə/, while LY₂ stood for a syllabic liquid /L̩/. This phonological distinction was most probably realized, in the case of rhotics, as the contrast between a schwa vowel of normal duration (as in the modern Bulgarian *rhotic-schwa* and *schwa-rhotic* sequences) and a much shorter vocoidal phase with schwa-like formant structure (as in the syllabic rhotics of other modern Slavic languages, e.g. Czech and Serbocroatian).

³ This is similar to the function of the more modern 'hard-' and 'soft-signs' in Russian.

⁴ "The *krѣvѣ/krѣvѣ* and *plѣtѣ/plѣtѣ* of Supr. [Codex Suprasliensis] and Sav. [Savvina Kniga] might very well have represented a phonetic *krəv, plət*, entirely parallel to the *krov, plot* forms which the Mac. [Macedonian] spellings in glagolitic reveal clearly." (Lunt 1962:356)

⁵ The nasal element could be simultaneous with the vowel – [õ] > [ə̃] – or follow the vowel – [oN] > [ə̃N]; cf. Lunt (1962:356, footnote 14) and Velcheva (1988:150).

⁶ *prѣstѣ* 'finger' contains a LY₂ sequence.

⁷ *krѣstѣ* 'cross' contains a LY₁ sequence.

3.1.3. Acoustics: syllabic liquids vs. sequences 'liquid-schwa'

To give an idea of what the situation in OCS could be, let us consider the acoustics of the sequences *rhotic-schwa* in modern Bulgarian and the *syllabic rhotics* in one of the modern Slavic languages that has retained syllabic liquids in its inventory of phonemes, namely Czech. A comparison between the sequence 'rhotic-schwa' in post-consonantal position in Bulgarian and a syllabic rhotic in Czech (always in post-consonantal position) reveals considerable similarity in the respective acoustic images.

Consider the oscillograms of the Bulgarian word *grǎb* 'back', phonetically [gɾǎp] (fig.1), where the sequence 'rhotic-schwa' is preceded by [g] and followed by another stop [p], and the Czech word *trpět* 'endure', phonetically [tɾpʲɛt] (fig.2), where the syllabic rhotic [ɾ] is also found between stops: [t] and [p]. In Bulgarian as in Czech, the closure of the apical tap, an almost empty space on the oscillogram, is both preceded and followed by a vocoidal phase.

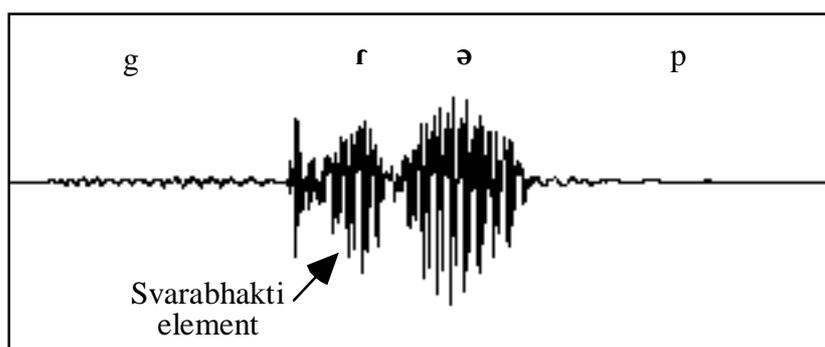


Figure 1. Oscillogram of a Bulgarian pre-consonantal rhotic in *grǎb*

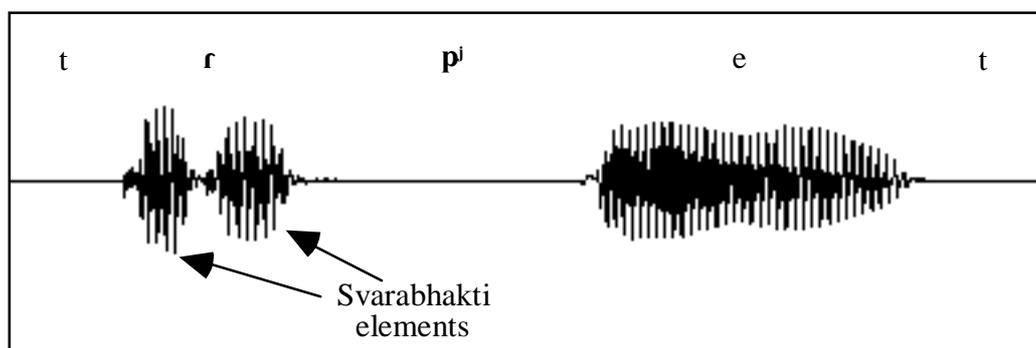


Figure 2. Oscillogram of a Czech inter-consonantal syllabic rhotic in *trpět*

Compare the left and the right vocoidal part in both cases. In the case of the Bulgarian word, the preceding vocoid is shorter and of lower intensity than the following

vocoid. This makes the acoustic image of the Bulgarian sequence *rhotic-schwa* asymmetrical.

Following Quilis (1987:296), we call the vocoidal phase between the initial consonant and the closure of the apical tap a svarabhakti element (*elemento esvarabático*). It is an automatic vocoid that inserts itself between the burst of the preceding stop and the closure of the apical tap (fig.1).

With pre-consonantal rhotics, e.g. in *gǎrbav* ['gǎrbaf] 'hunchbacked' (fig.3), the oscillogram of a sequence *schwa-rhotic* is the mirror image of fig.1:

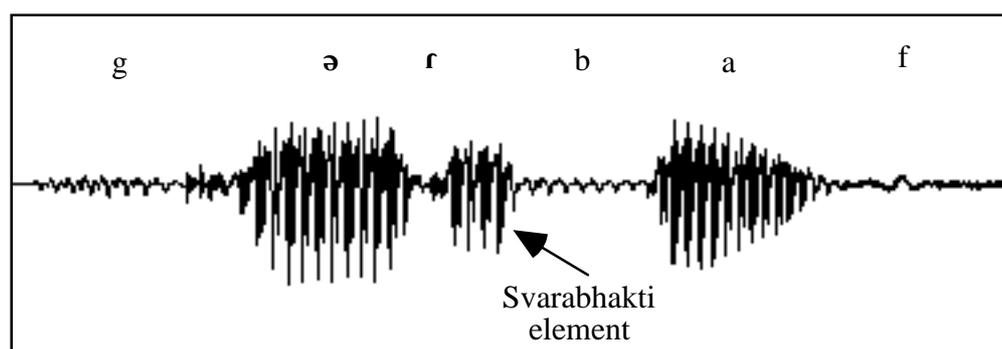


Figure 3. Oscillogram of a Bulgarian pre-consonantal rhotic in *gǎrbav*

In the Czech word (fig.2), the two vocoidal parts are roughly of equal duration and intensity. The acoustic image of the Czech syllabic rhotic is rather symmetrical. Both vocoids of the syllabic rhotic function as svarabhakti elements.

The following phonetic differences between a *rhotic-schwa* sequence and a *syllabic rhotic* has been noted in the literature:

- the duration of svarabhakti elements (about 30 ms; cf. Quilis 1987:298 for Spanish and Jetchev 1995 for Bulgarian and Czech) is shorter than the average duration of a Bulgarian schwa (80 ms if stressed, 74 ms if unstressed, according to Lehiste & Popov 1970);
- svarabhakti elements are of lower intensity
- the duration of the vocoidal part of a syllabic /r/ is inversely correlated to the number of closures: the overall duration of the sequence *svrabhakti element + closure + svarabhakti element* is approximately equal to the average duration of a vowel in Serbocroatian; the average duration of one-closure /r/ and two-closure /r/ is roughly the same in Serbocroatian, while in Bulgarian liquid-schwa and schwa-liquid sequences, /ə/ maintains its duration independently of the manifestation of the liquid as one-closure tap or two-closure trill (Lehiste & Popov 1970:45)
- the relative value of durations as ratio of [ə]:[r] (Cubberley 1987:9) is significantly greater in Bulgarian 'rhotic-schwa' sequences (the average ratio for

Bulgarian is of 1.46) than in syllabic rhotics of other Slavic languages (the average ratios are: for Czech 0.76, for Slovak 0.60, for Serbocroatian 0.89).⁸

3.1.4. Sound changes: schwa epenthesis and schwa loss

When perceiving the acoustic signal containing svarabhakti elements, the listener normally factors them out. However, if the listener fails to correct the acoustic signal, he will perceive additional vowels. This kind of misperception (hypo-correction, according to Ohala 1992:348) will produce a sound change: the epenthesis of a vowel. This sound change is largely attested in different languages. In informal style of Spanish, the svarabhakti element in CL sequences produces the phenomenon traditionally known as 'vocal relajada': insertion of a vowel which is identical to that of the next syllable, e.g. *Inglaterra* > *Ingalaterra* 'England', *crónica* > *corónica* 'chronicle', *iglesia* > *igelesia* 'church', etc. (Ohala 1992:348). An epenthetic schwa ('Sproßvokal') occurred in the Middle High German (MHG) period, as can be seen if the MHG forms are compared to the corresponding Modern Standard German (MSG) forms: *Middle Bavarian* *zoren*, *arem*, *melichen*, *galigen*; cf. *MSG* *Zorn* 'anger', *Arm* 'arm', *melken* 'to milk', *Galgen* 'gallow-trees' (Noske 1996:15).

The pattern of this sound change can be reversed: then, a vowel is erroneously factored out (misperceived as a svarabhakti element) in the neighborhood of a liquid and the resulting sound change is a vowel loss, e.g. the early vowel deletions that took place in Pre-Classical Latin: *calidus* > *caldus*, *laridus* > *lardus*, *validus*, adj., without vowel loss vs. *valde*, adv., etc. (Zink 1986:38). Vowel deletions also characterized Early New High German, where a progressive development towards the MSG situation can be observed, e.g., *beliben* > *bliben*, *bleiben* 'to stay', *genade* > *Gnade* 'mercy', *anefang* > *anfang* 'begin' (Noske 1996:14).

As for syllabic laterals, additional length is used as a durational cue by the listener to identify them (Prince 1980, Fokes & Bond 1993). Some mechanism, similar to the misperception of svarabhakti elements of rhotics as schwa vowels, must be responsible for the schwa epenthesis in the neighborhood of laterals. Probably, the extra length portion of syllabic laterals is misperceived as an independent vowel. Conversely, a vowel adjacent to a lateral can be factored out (misperceived as the extra length portion of a syllabic lateral) and the resulting sound change will be a vowel loss. However, from a purely phonetic point of view, the explanation of vowel

⁸ A ratio of 1.00 means equal proportions of vocoidal/consonantal part; a ratio < 1.00 corresponds to a syllabic (vocalic) /r/.

epenthesis and vowel loss with adjacent laterals is less obvious than with adjacent rhotics.

In Bulgarian, the formant structure of the vocoidal part of /r/ is identical to that of a schwa (approximately, F1 = 500 Hz, F2 = 1500 Hz, F3 = 2400 Hz; cf. Lehiste & Popov 1970, *table I* for independent schwa and *table III* for vocoidal part of /r/). Therefore, the epenthetic vowel is expected to be a schwa.

Moreover, schwa is an independently existing vowel phoneme in Bulgarian.

It will be claimed that the following mechanism distinguished the asymmetrical [ʳrə] sequences (fig.1) from the symmetrical [ʳrʳ] sequences (fig.2) in OCS: the former were phonologically interpreted, by factoring out only the first schwa-like segment, as sequences of a rhotic and an independent schwa-like vowel (jer), while the latter were phonologically interpreted, by factoring out both schwa-like vocoids, as syllabic rhotics.

3.2. Merger of syllabic sonorants and sequences 'sonorant-jer'

The fall of weak jers created new syllabic liquids. The result was a merger of LY₁ sequences, where Y₁ was a weak jer, with LY₂ sequences, interpreted here as representing OCS syllabic liquids. The sequences 'liquid-weak jer' gave rise to 'syllabic liquids', e.g. in *kr̃sta* 'cross' gen.sg., *sl̃za* 'tear' nom.sg., *kr̃vi* 'blood' gen..sg., *pl̃ti* 'flesh' gen.sg. The newly created syllabic liquids in the above words were merged with the old syllabic liquids in words like *vr̃xa* 'top' gen.sg. and *skr̃bi* 'sorrow' gen.sg.

Jers in weak position were located in two contexts: at the word-end and word-internally at morpheme boundaries, when followed by a syllable whose nucleus was a non-jer vowel.

The deletion of word-final jers produced new syllabic liquids, but also some syllabic nasals ([ŋ] and [ɱ]) and labiodentals ([ɣ]).

The normal spelling for all syllabic sonorants (and [ɣ]) was *SY*, where *S* stands for *r*, *l*, *n*, *m*, *v*, i.e. *SY* could be *ñ*, *m̃*, *ṽ*, *ñ*, etc. Here are some forms from the Manasi Chronicle, a 14th-century manuscript: *m̃dr̃* 'wise', *m̃sl̃* 'thought' acc.sg., *ž̃zl̃* 'sceptre', *p̃asñ* 'song', *k̃zñ* 'craft', *kos̃m̃* 'strand of hair', *m̃r̃tṽ* 'dead'. My claim is that the italicized letters in the above examples corresponded to syllabic consonants.

The deletion of weak jers at morpheme boundaries gave rise also to some word-internal syllabic sonorants, including [ɣ], that were normally spelled in the same way as word-final syllabic sonorants (as *SY*): *s̃rebr̃ñ* 'silver' adj., *m̃dr̃c̃* 'wise man' acc.pl., *k̃zññymi*, 'craft' adj., instr.pl., *m̃r̃tṽci*, 'deceased' nom.pl. (Manasi Chronicle).

However, in manuscripts from the 13th (Dobrejšov Gospel, Bologna Psalter, Grigorovič Parimeinik) and 14th centuries (Manasi Chronicle), the spelling *SY* was often replaced by *YSY* or *YS*. The variety of spellings for the sequences of a sonorant, including *v*, and a former weak jer (*SY*, *YSY*, *YS*) indicates that their actual pronunciation was subjected to variation.

Mirčev (1978:141) reports that in the Dobrejšov Gospel the spellings *LY* prevail, but many forms exhibit deviating spellings: *YLY* (*сѣвѣръшеніе* 'accomplishment', *мѣръзостѣ* 'abomination', *тѣрѣми* 'three' instr., *вѣлъкъ* 'wolf', *мѣлъва* 'rumor'), *YL* (*хѣлъмѣ* 'hill', *мѣлъчѣ* 'be silent' 1p.sg.pres., *рѣлъти* 'flesh' gen.sg., *кълънетсѣ*, 'swear' 3p.sg.pres.)

Similar deviations can be found with the sequences *vY* and *nY*: *дѣврехѣ* vs. *дѣврехѣ* 'gate' loc.pl. (Bologna Psalter), *сѣвтѣше* vs. *сѣвтѣше*, 3p.sg.pres. of *сѣвтѣти* 'shine' infin., *мрѣтъвци* vs. *мрѣтъвци* 'deceased' nom.pl. (Manasi Chronicle), *кѣтъвна* vs. *кѣтъвна*, fem.nom.sg. of *кѣтъвнѣ*, adjective derived from *кѣтъва* 'oath' (Grigorovič Parimeinik); *къзънми* vs. *къзънми* 'craft', instr.pl., *къзъннѣми* vs. *къзъннѣми*, instr. pl. of *къзъннѣ*, adjective derived from *къзънѣ* 'craft' (Manasi Chronicle).

Syllabic liquids could develop from liquids adjacent to strong jers as well. If strong jers in *LY₁* sequences were identified with a schwa-like vowel, as claimed by Lunt (see footnote 4), they could be misperceived, by hyper-correction, as svarabhakti elements of the adjacent liquids, and finally, be lost. This would result in syllabic liquids in the place of sequences 'liquid-strong jer' as well. The latter process could be favored by a constraint on the amount of morphophonological variation in stem (see 3.5).

Koorbanoff (1992:49) assumes that in Bulgarian strong jers were preserved in the neighborhood of liquids. In her interpretation, adjectives like *крѣвнѣ* 'blood' and *грѣмѣкъ* 'loud' developed a syllabic liquid only in the masculine singular, where the jer adjacent to *r* found itself in weak position: *крѣвнѣ*, *грѣмѣкъ*. By contrast, in the feminine, neuter and plural of the same adjectives, the root jer adjacent to *r* was in strong position: *крѣвна*, *крѣвно*, *крѣвни*; *грѣмка*, *грѣмко*, *грѣмки*. According to Koorbanoff, the latter forms did not give rise to syllabic liquids. However, if we assume that jer loss by hyper-correction took place next to liquids in OCS, then all adjectival forms of the type *крѣвнѣ*, *крѣвна*, *грѣмѣкъ*, *грѣмка*, regardless of whether the jer in the *LY₁* sequence was strong or weak, must have developed syllabic liquids.

3.3. Schwa- and [e]-epenthesis

A later stage of Middle Bulgarian did not tolerate the occurrence of sonorants as syllable peaks. During this period leftward or rightward anaptyxis of a mid vowel— /ə/ or, rarer, /e/ — took place in the neighborhood of formerly syllabic sonorants.

Some anaptyctic [ə] developed before a formerly syllabic sonorant that had become word-final after the loss of a final jer: mōdrъ > mādār 'wise', myslъ > misāl 'thought', žъzlъ > žezāl 'sceptre', kosmъ > kosām 'strand of hair', mrъtvъ > märtāv 'dead'. As for rhotics, this sound change consisted in a reanalysis of the svarabhakti element between the preceding consonant and the closure of the syllabic rhotic, e.g. mōdrъ [mōdʳ], as an independent vowel schwa: [mōdər]. For laterals, nasals and voiced labiodentals, what was erroneously perceived as a vowel is probably the extra length portion of the syllabic sonorant. Before a word-final nasal, the epenthetic vowel was sometimes [e] instead of [ə]: desnъ > desen 'right-hand', tāsнъ > tesen 'narrow', pāsнъ > pesen 'song', plāsнъ > plesen 'mould'. This anomaly could be due to confusion with the productive adjectivizing suffix *-en* (< *-enъ*).

Other anaptyctic [ə] appeared before a word-internal, formerly syllabic sonorant in pre-consonantal position: mlъčati 'be silent' infin. [mltʃati] > mālča 'be silent' 1p.sg.pres.; cvъtitъ > cāfti 'blossom' 3p.sg.pres. After a [-anterior] coronal consonant, the epenthetic vowel could be [e] instead of schwa: črъpati > čerpja 'ladle out', črъta > čerta 'line', žrъtva > žertva 'victim'.

Before two consonants, the syllabic liquid was desyllabified by means of rightward, rather than leftward, anaptyxis: *tъlstъ (cf. Rs. *tolstj*) > tlāst 'fat'; *pъrstъ (cf. Rs. *perst*) > OCS pъrstъ, pъrstъ > prāst 'finger'; *krъstъ (cf. Rs. *krest*) > OCS krъstъ > krāst 'cross'.

When a syllabic liquid immediately preceded a single word-final consonant, the direction of anaptyxis could be either leftward or rightward. Examples with rightward schwa epenthesis: *vъrxъ (cf. Rs. *verx*) > vrxъ, OCS vrxъ > vrāx 'top'; *mъlkъ (cf. Rs. *molk* 'become silent' past tense masc.sg.), cf. OCS mlъčati 'be silent' infin. > mlāk 'be silent' interj. Examples with leftward schwa epenthesis: *xъlmъ (cf. Rs. *xolm*) > OCS xъlmъ > xālm 'hill'; *vъlkъ > OCS vъlkъ, vъlkъ > vālk 'wolf'. Words that chose leftward epenthesis do not belong to the metathesizing paradigm in modern Bulgarian.

Koorbanoff (1992:47) assumes that all forms with a CLY₂CY# sequence "passed through a stage with a syllabic liquid [...], followed by a reinterpretation of the syllabic liquid as /ъL/, since the segment was followed by a single consonant". Therefore, such forms should not have given rise to metathetic roots in modern Bulgarian. However, forms like *vrъxъ* 'top' (< *ъr) and *skrъbbъ* 'sorrow' (< *ъr) 'top'

developed a post-liquid, instead of pre-liquid, schwa (*vrǎx, skrǎb*) and they do belong to the metathesizing paradigm in the modern language (cf. the respective plurals *vǎrxove, skǎrbi*) even though they came from OCS words with CLY₂CY# sequences. The schwa-like reflexes of the back nasal vowel ǫ (cf. Velcheva 1988:156) must also have given rise to syllabic liquids, when preceded by *r* or *l*. Thus, we can explain why some OCS words containing the nasal ǫ in adjacency with a liquid developed metathetic roots in modern Bulgarian: grǫdъ > grǎd 'bosom' fem.sg., grǫdi > gǎrdi, pl., meaning 'breast'. Another example that can be accounted for by assuming a syllabic [l] from former *lǫ* is: glǫbokъ 'deep' masc.sg. (> glǎbok > gl̥bok > d̥bok) > dǎlbok.

In sum, our assumptions are:

- 1) In Middle Bulgarian manuscripts, the word-final *sonorant-jer* (SY) orthographic sequences represented phonemic syllabic sonorants /ʂ/. So did word-internal SY sequences at morpheme boundaries where Y was in weak position. Even SY sequences with a strong jer could correspond to syllabic sonorants, assuming that the schwa-like reflex of the strong jer could be misperceived as a svarabhakti element (extra length portion) of a syllabic rhotic (or a lateral, nasal, voiced labiodental).
- 2) Word-internally, if followed by a single consonant, these syllabic sonorants later gave rise to leftward schwa epenthesis:

$$(1) \quad \text{ʂ} \rightarrow \text{əS} / \text{__ CV}$$

Conversely, if followed by more than one consonant, they yielded rightward epenthesis:

$$(2) \quad \text{ʂ} \rightarrow \text{Sə} / \text{__ C}_2\text{V}$$

3.4. *Reanalysis of Havlík's Law*

After the loss of weak jers, the lowered strong jers are involved in morphophonological *vowel ~ zero* alternations.

Consider one of the modern Bulgarian GV roots that end in an obstruent: *lakăt* 'elbow', *lakt+i*, pl. The corresponding OCS forms were:

lakътъ lakъti lakътъпъ lakътъпа

These forms are subjected to the changes required by Havlík's Law. This yields the following pattern:

(3) lakə̃t lakti lakten lakə̃tna

Note that the difference between the singular and the plural of the noun is limited to the presence/absence of a single vowel (ə̃), while the masc.sg. and the fem.sg. of the adjective differ by the presence/absence of two of their vowels (ə̃, e). This is not the case with the modern Bulgarian forms where the difference within both the nominal and the adjectival paradigm is reduced to the presence/absence of only one vowel:

lakẵt lakt+i lakẵt+en lakẵt+n+a

The mid vowels [ə̃] and [e], reflexes of the retained strong jers, alternate with zero. If we represent them as underlying floaters, the lexical forms will be:

lak<ə̃>t lak<ə̃>t+i lak<ə̃>t+<e>n lak<ə̃>t+<e>n+a

During Middle Bulgarian, Havlík's Law has been replaced by a rule of floater anchoring. Originally, as a corollary of the older Havlík's Law, floaters anchored only when a consonant would otherwise remain unsyllabifiable. The rule was most probably an intra-level (W,W) rule. This yielded the forms in (3).

Havlík's Law, and the resulting rule of floater anchoring, created a situation where two ghost vowels in successive syllables were never both retained. Either the first or the second of the two successive ghost vowels could manifest itself. This means that a floater was anchored only when the subsequent consonant was otherwise by no means syllabifiable. Hence, at that stage of Middle Bulgarian, the rule that anchored floaters was harmonic, not arbitrary.

But this manner of application of the rule created considerable morphophonological variation in stems containing two successive syllables with floaters. In a later stage of Middle Bulgarian a constraint on the amount of variation in stems developed. It required that different forms of one and the same stem exhibit no more than one discrepancy in vowels between them.

Probably, to reduce variation in stems, the status of the rule of floater anchoring was changed: it became a cross-level (M,W) rule, thus applying on every floater followed by a consonant that was not yet syllabified on M-level (see 2.4.3.1). Thus, the rule of floater anchoring ceased to be entirely conditioned by syllabification. In its new version, the rule triggered the anchoring of some floaters that were not followed by unsyllabifiable consonants.

The change in the rule that anchored floaters can be viewed as a kind of repair strategy that served to reduce morphophonological variation in stems.

3.5. *Reanalysis of lexical representations*

Middle Bulgarian developed some other strategies aiming to reduce morphophonological variation in stems. They were also used when a twofold discrepancy between vowels in forms of the same stem was created.

Consider the following inflectionally and derivationally related forms of the OCS nouns *ǫglъ* 'corner' (I), *pāsнь* 'song' (II) and *skrъbbъ* 'sorrow' (III)⁹. (a) gives the masc.sg.nom. of the noun, (b) the pl.nom., (c) the masc.sg.nom. short form of the *-bn-* suffixed adjective and (d) the fem.sg.nom. of the same adjective.

(4)	a	b	c	d
I	ǫglъ	ǫgli	ǫglънь	ǫglъna
II	pāsнь	pāsni	pāsньнь	pāsньna
III	skrъbbъ	skrъbbi	skrъbbънь	skrъbbъna

Imagine a regular development for all the forms according to the assumptions we made in section 3.3. The jers were subjected to Havlík's Law. At an earlier stage, weak jers adjacent to liquids were lost, giving rise to syllabic liquids. Thus, the pronunciation for the above forms after the loss of weak jers and the lowering of strong jers should have been as follows:

(5)	a	b	c	d
I	ǫgl̩	ǫgli	ǫglen	ǫgl̩na
II	pās̩	pāsni	pāsnen	pās̩na
III	skr̩b	skr̩bi	skr̩ben	skr̩bna

Later, all forms with syllabic sonorants should have developed leftward anaptyctic mid vowels except *skr̩bna*, where the epenthesis should have been rightward, because the syllabic *r̩* is followed by 2 consonants. This should have yielded the following pattern:

⁹ *skrъbbъ* 'sorrow' contains a LY₂ sequence; cf. Russian *skorb'*.

(6)	a	b	c	d
I	ægǣl	ægli	æglen	ægǣlna
II	pesen	pesni	pesnen	pesenna
III	skrǣb	skǣrbi	skǣrben	skrǣbna

Now compare these with the modern standard forms:

(7)	a	b	c	d
I	ǣgǣl	ǣgl+i	ǣgǣl+en	ǣgǣl +n+a
II	pesen	pesn+i	pesen+en	pesen+n+a
III	skrǣb	skǣrb+i	skrǣb+en	skrǣb+n+a

Next consider the same inflectional and derivational forms of the OCS nouns *myslъ* 'thought' (IV), *ognъ* 'fire' (V) and *vrъvъ* 'twine' (VI)¹⁰:

(8)	a	b	c	d
IV	<i>myslъ</i>	<i>mysli</i>	<i>myslъnъ</i>	<i>myslъna</i>
V	<i>ognъ</i>		<i>ognъnъ</i>	<i>ognъna</i>
VI	<i>vrъvъ</i>	<i>vrъvi</i>	<i>vrъvъnъ</i>	<i>vrъvъna</i>

According to Havlík's Law, these forms should have yielded the following:

(9)	a	b	c	d
IV	<i>mysl̥</i>	<i>mysli</i>	<i>myslen</i>	<i>mysl̥na</i>
V	<i>ogn̥</i>		<i>ognen</i>	<i>ogn̥na</i>
VI	<i>vr̥v</i>	<i>vr̥vi</i>	<i>vr̥ven</i>	<i>vr̥vna</i>

After the reanalysis of syllabic liquids by mid vowel anaptyxis, the forms should have been as follows:

¹⁰ *vrъvъ* 'twine' also contains a LY₂ sequence.

(10)	a	b	c	d
IV	misəł	misli	mislen	misəłna
V	ogən		ognen	ogənna
VI	vrəv	vərvi	vərven	vrəvna

Now compare the above forms with the actual forms of the modern language:

(11)	a	b	c	d
IV	misāl	misl+i	misl+en	misl+en+a
V	ogǎn		ogn+en	ogn+en+a
VI	vrǎv	vǎrv+i	vǎrv+en	vǎrv+en+a

Note that the differences between (6) and (7) are located in their column 'c', while (10) and (11) differ in their column 'd'.

My hypothesis is that the anaptyctic vowels /ə/ and /e/ that can be seen in (6) and (10) were later treated in two different manners in Bulgarian. Some were reanalyzed as underlying floating vowels. This was the case of the epenthetic schwa in Ia and Id, IIIa and IIIId, as well as of the epenthetic [e] in IIa and IId. Others kept their epenthetic nature, e.g. in IVa, Va and VIa. In IV-VI it is the /e/ in the suffix that changed its status from floating to stable. This is why IV-VId in (10) and (11) are different.

The patterns of (6) and (10) would be obtained if the underlying forms were:

	a	b	c	d
I	əgl	əgl+i	əgl+<e>n	əgl+<e>n+a
II	pesn	pesn+i	pesn+<e>n	pesn+<e>n+a
III	krv	krv+i	krv+<e>n	krv+<e>n+a
IV	misl	misl+i	misl+<e>n	misl+<e>n+a
V	ogn		ogn+<e>n	ogn+<e>n+a
VI	vrv	vrv+i	vrv+<e>n	vrv+<e>n+a

To achieve the modified patterns in (7) and (11), the above underlying forms must have been reanalyzed in the following way:

	a	b	c	d
I	əg<ə>l	əg<ə>l+i	əg<ə>l+<e>n	əg<ə>l+<e>n+a
II	pes<e>n	pes<e>n+i	pes<e>n+<e>n	pes<e>n+<e>n+a
III	kr<ə>v	kr<ə>v+i	kr<ə>v+<e>n	kr<ə>v+<e>n+a
IV	misl	misl+i	misl+en	misl+en+a
V	ogn		ogn+en	ogn+en+a
VI	vrv	vrv+i	vrv+en	vrv+en+a

IV-VI choose the non-GV variant of the -EN suffix, because the underlying form of their root ends in a 'consonant-sonorant' (CS) sequence. This is not the case with I-III, where a floater separates the root-final consonant and sonorant in the underlying form.

The double treatment of anaptyctic vowels accounts for the existence of two different patterns of alternation in derivatives from roots with a formerly syllabic sonorant where the suffix contained another jer.

The first pattern (with reanalysis of the root) is illustrated by I-III. It involves suspension of the mid vowel syncope before another alternating vowel, the reflex of a former jer.

The second pattern (with reanalysis of the suffix) is illustrated by IV-VI. It involves regular syncope of the alternating mid vowel in the root. In this case another allomorph of the adjectivizing suffix, with a non-alternating /e/, began to be used.

Both treatments applied on stems whose morphophonological variation went beyond a given limit.

All stems that were subjected to reanalysis exhibit a twofold discrepancy in vowels between their surface forms of column 'c' and column 'd'.

Consider the forms of I-IIIc vs. I-IIIId taken from (6) above:

(12)	c	d
I	əgØ ₁ le ₂ n	əgə ₁ lØ ₂ na
II	pesØ ₁ ne ₂ n	pese ₁ nØ ₂ na
III	skə _r <u>1</u> be ₂ n	skrə ₁ bØ ₂ na

In each of the above pairs, the double difference between its members is as follows:

I. 1) Ø ~ ə ; 2) e ~ Ø ; II. 1) Ø ~ e ; 2) e ~ Ø ; III. 1) ə_r ~ rə ; 2) e ~ Ø .

The situation is similar in IV-VIc vs. IV-VId of (10) above.

I conclude that the reanalysis of the forms in (6) as (7) and the reanalysis of the forms in (10) as (11) took place in order to satisfy the constraint on the amount of morphophonological variation that operated at a given stage of Middle Bulgarian.

This constraint restricted the discrepancy between forms of the same stem to a single difference in absence/presence of vowels and/or sequential order of vowel-liquid. A twofold discrepancy required restructuring of the lexical representation of the stem.

3.6. Conclusion

To sum up, we give a synopsis of the sound changes that were described in the different sections of this chapter:

Section	Type of diachronic change	Reanalysis of representations and rules
3.1.1	Lowering of strong jers and Loss of weak jers	reduced vowels → floaters Havlík's Law → Rule of Floater Anchoring
3.2	Syllabification of sonorants	sequences 'sonorant-jer' → syllabic sonorants
3.3	Desyllabification of sonorants by means of Mid vowel epenthesis	syllabic sonorants → sequences 'mid vowel-sonorant' or 'sonorant-mid vowel'
3.4	Change in the rule of Floater Anchoring: it ceased to be entirely conditioned by the process of syllabification	(harmonic) intra-level rule → (arbitrary) cross-level rule
3.5	Reanalysis of lexical representations in order to minimize morphophonological variation in stems	epenthetic vowel → underlying floater; suffixal floater → stable vowel

Thus, in our interpretation, the synchronic alternations involving ghost vowels in modern Bulgarian (GV alternation and metathesis) are the product of three types of diachronic changes that took opposite directions in different stages of Middle Bulgarian:

- loss of vowels vs. anaptyxis of vowels
- syllabification of sonorants vs. desyllabification of sonorants
- creation of floaters vs. stabilization of epenthetic/floating vowels

As for the phonologically conditioned suspensions of GV alternations and metathesis, they can be viewed as a corollary of the constraint on the amount of morpho-phonological variation in stems, that later developed.