

With long vowels two linking options are possible: HL and LH:

- LH on a long vowel is possible only as a result of stress-linked spreading
- HL on a long vowel is only possible otherwise
- HH is impossible

Why?

Inkelas & Zec 1988: an H cannot be linked to the second mora of a syllable (because tones are assigned to syllables but spread over moras)

Zec 1994: tones are assigned to those moras that act as heads of the syllable

Summary:

- H spreads to the preceding mora if it can
- stress is assigned to the leftmost H
- the two moras of a long vowel cannot both bear H

Various analytic possibilities of accounting for this have been explored, in function of what is supposed to be the TBU (tone-bearing unit) in Serbo-Croatian

Our focus: the three main accentual patterns of Serbo-Croatian verbs

Core question: Where does the stress-associated H come from?

2 LINKED AND FLOATING H IN SERBO-CROATIAN

Where does the stress-associated H come from? It could be...

- assigned by a rule (cf. obligatory initial stress in Czech)
- associated (but not linked) to a morpheme
- linked to a particular syllable/mora/V-slot in a morpheme
- any combination of the above

2.1 Assigned H

In the absence of a lexically specified H in a phonological word, H and stress are assigned to the first syllable:

Representations in parentheses are the traditional representations of length and tone in Serbo-Croatian

(4) a. gla a vu (trad. *glāvu*)

σ σ
μ μ μ
⋮
H

b. u gla a vu (trad. *ù glāvu*)

σ σ σ
μ μ μ μ
⋮
H

Neither the word nor the preposition have their own tone, so H is assigned to the first mora and stress, to the first syllable

When we talk of moras as TBUs we do not intend this to be a theoretical position, it is just convenient

This is why falling tones occur only on the first syllable

Bidwell 1963: not true for loanwords, e.g., *lavabò* ‘washstand’

Inkelas & Zec 1988:238: spreading may fail in loanwords, e.g., *asistènt* ‘assistant’, and in adverbs, e.g., *verovàtno* ‘likely’ or *eventuàlno* ‘possibly’ (Langston 1997:81)

2.2 Associated non-linked H

Serbo-Croatian has the equivalent of Russian post-accenting morphemes: H appears on the first syllable of the inflection if present, on the last syllable of the stem otherwise:

(5) a. ju na a k-a (SC traditional representation *junáka* ‘hero.SG.GEN’)
σ σ σ
μ μ μ μ
H

b. ju na ak (trad. *jùnāk* ‘hero.SG.NOM’)
σ σ
μ μ μ
H

There are good reasons to believe the nominative singular ending is a zero, not a yer

Inkelas & Zec 1988, Zec 1994, 1999, Zec & Zsiga 2010, Simonović & Kager 2020, Simonović 2022, etc.: the stem-final position of H is determined by the language system

Zec 1994: there are no stems that have an H linked to a final long syllable

All stems whose stem-final vowel is long are post-accenting (or stressed on the penult?)

Hypothesis: an underived stem may come with a floating H, which must be assigned (linked)

H cannot be assigned to a long vowel

H can be spread or retracted onto a long vowel, as we will see below

Q: If tones are specified lexically, how come there are no words with a tone-bearing stem-final long vowel?

A: The location of the tone is not lexically given

(6) Inkelas & Zec 1988

In a derived environment, assign H to the first syllable of the suffix if the stem-final syllable is long, otherwise to the stem-final syllable

(7) Zec 1994

- a. only those moras that act as syllable heads are assigned tonal nodes
- b. link the floating tone to the rightmost mora of the stem linked to a tonal node

(8) Zec 1999

H aligns with the rightmost mora of a morpheme (stem), unless it is the second mora of a long vowel (in which case H aligns with the next syllable, i.e., links to the suffix)

Also Simonović 2022, Becker 2007...

Zec & Zsiga 2010 appear to abandon this assumption

So, stems that might have looked as having a lexically specified final H can be reanalyzed along the same lines as post-accenting stems (H always surfacing on inflection)

Eventual generalization: for a stem associated with a (floating) H:

- if the stem-final vowel is long, the tone is linked to the suffix
- if the stem-final vowel is short, the tone is linked to it

Consistent post-stem stress ⇔ a long stem-final vowel

Langston 1997: this empirical generalization is incorrect; there are “hundreds” of native post-accenting stems with a short stem-final syllable:

- | | | |
|-----|--|-----------|
| (9) | a. bób/bobá (trad. <i>bòb/bòba</i>) ‘bean.NOM/GEN’ | masculine |
| | b. múdrac/mudracá (trad. <i>mùdrac/mudràca</i>) ‘wise man.NOM/GEN’ | |
| | c. borbá/borbú (trad. <i>bòrba/bòrbu</i>) ‘battle.NOM/ACC’ | feminine |
| | d. poljaná/poljanú (trad. <i>poljàna/poljànu</i>) ‘meadow.NOM/ACC’ | |
| | e. čeló (trad. <i>čèlo</i>) ‘forehead’, gospodstvó (trad. <i>gospòdstvo</i>) ‘reign’ | neuter |

In other words, an inflectional accent need not be due to a long stem-final vowel

Zec 1994: in these stems the H tone is “extraprosodic” until the next, inflectional cycle

Langston 1997: a morpheme can have a pre-linked H, a floating H or no H

2.3 Linked H

The existence of a pre-linked H is a matter of debate

Empirically, in native words, tones appear either on the stem-final syllable or post-stem

Zec 1994: the distribution of H is restricted to the stem-final vowel unless it is long, pre-linked tones are exceptional

What should evidence for a linked H look like:

- fixed position of the tone (no shifting to the prefix or to the suffix)
- preferably not stem-final (excludes all monosyllabic stems) because a fixed stem-final H can be derived from a richer underlying representation

Langston 1997: H linked to non-stem-final syllables are a productive feature of Serbo-Croatian

- | | | |
|------|--|--------|
| (10) | a. glágol (trad. <i>glàgol</i>) ‘verb’, jabúka (trad. <i>jàbuka</i>) ‘apple’ | native |
| | b. ambasá:dor (trad. <i>ambàsādor</i>), pozí:cija (trad. <i>pòzīcija</i>) | loan |

Penultimate pre-linked H seems extremely rare in native Slavic vocabulary

But native underived roots rarely exceed one syllable

Derived stems may end up with a linked H, of course

Most analyses of Serbo-Croatian tone we have seen do not make use of pre-linked tones

3 VERBAL ACCENT SHIFTS

Main accentual paradigms: **the infinitive vs. the present tense**

There is also the aorist 2/3SG forms, which are unaccented (H on the first syllable) and there is variation within the present tense, and participles do not all behave the same, but these are irrelevant for now

Problem 2: stems with **tone systematically on the stem**:

- (15) a. pévati (trad. pèvati)/pévam (trad. pèvām) ‘sing.INF/PRES.1SG’
b. vídeti (trad. vîdeti)/vídi:m (trad. vîdīm) ‘see.INF/PRES.1SG’
c. mísliti (trad. mîsliti)/mísli:m (trad. mîslīm) ‘think.INF/PRES.1SG’

Zec 1994: in this case, the theme vowel is rendered “invisible” by the stem, the stem vowel becomes the only available position at the $\sqrt{\text{-TH}}$ cycle

Problem 3: stems with short stem-final vowels and with **systematic post-stem tone** (e.g., *lomíti* (trad. *lòmíti*)/*lomí:m* (trad. *lòmīm*) ‘break’)

Zec 1994: these stems are toneless, and the theme vowel is affiliated with tone

Langston 1997: if an “affiliated” tone is floating, this is not enough because of tone resolution rules in her approach

3.1.2 Issues arising from theme lengthening in the present tense

If long vowels cannot bear H, no post-stem H is predicted in the present tense (unless, of course,

Problem 4: stems with a **long final vowel and with systematic post-stem tone** (e.g., *ta:jíti* (trad. *tájiti*)/*ta:jí:m* (trad. *tájīm*) ‘conceal’)

Zec: as the stem-final vowel is long, the tone cannot associate to it, so it must attach after it

This would correctly predict post-stem H in the infinitive, but not in the present tense

Hence the theme vowel is claimed to be “invisible” here, but only at the $\sqrt{\text{-TH}}$ cycle:

- H remains floating and is linked at the next cycle
- the infinitival suffix is also claimed to be extrametrical, so H is linked to the theme
- present-tense endings are not extrametrical, so H is linked to them

Problem: given that in reality, the post-stem vowel is long in the present-tense paradigm, H has nowhere to attach to

3.1.3 Theme lengthening as the solution?

Langston 1997: tones can be pre-linked, floating or absent, leftmost wins

In essence, this is Halle 1997 applied to Serbo-Croatian

Retraction is due to the deletion of the H-bearing theme vowel on the assumption that the stem has no tone and the theme vowel does:

- (16) a. pev-a-aam → pev-aam ‘sing-TH-PRES.1SG’
b. vol-e-iim → vol-iim ‘love-TH-PRES.1SG’
c. misl-i-iim → misl-iim ‘think-TH-PRES.1SG’

The absence of retraction is resolved by assuming that such verbs have a floating rather than a linked H on the theme vowel (with the $\sqrt{\text{-TH}}$ stem apparently treated as unanalyzable):

- Constant post-stem H is due to a floating H on the stem
- Hypothetical: constant stem H is due to a pre-linked H on the stem

Covers additional data: PPPs and aorist patterns, treated as triggering H-deletion

3.2 Intermediate summary

Empirical generalization: verbal and nominal stems with a long final vowel cannot have a pre-linked H on that vowel, i.e.,

(17) The final H-generalization

H can surface on the stem-final long vowel only in alternation with other accentual positions

Zec: no pre-linked H in Serbo-Croatian, a morpheme can bear a floating H whose association is subject to a number of constraints

Her concrete proposal overgenerates and sometimes requires additional stipulations

Langston: the final H-generalization is a result of diachronic development of the language with no synchronic status

Retraction is just one of the three patterns

3.3 Theme-vowel lengthening

Simonović 2022: the present-tense suffix is a mora

Simonović 2022: three types of *i/i* stems, depending on the properties of the thematic vowel

Table 2: Serbo-Croatian CVC imperfective verbs in the *i/i* class (Simonović)

	prelinked H lomiti ‘break.IPFV’	floating H moliti ‘pray.IPFV’	epenthetic H nuditi ‘offer.IPFV’
UR	/lom-i _H /	/mol-i,H/	/nud-i/
INF	lomíti	molíti	núđiti
IMP.2SG	lomí	molí	núđi
PAST.PTCP	lomíó	molíó	núđio
PRS.3SG (a mora)	lomíi	mólíi	núđii
PPP	lóm _{len}	mó _{len}	núdz _{en}
deverbal noun	lom _{léene}	mo _{léene}	núdz _{eene}

The High tone can be pre-linked to the thematic suffix *-i-*, floating on it or inserted by a special rule

Simonović 2022: “all [*i-*]verbs that require the specification of a lexical H somewhere before the stem-final syllable are denominal or deadjectival” (p.3)

Simonović: present-tense retraction is caused by the lengthening of the theme vowel:

(18) *H-LONGTHEME: Assign a violation mark for every long theme vowel associated with a H.

If the present-tense suffix is a mora, it accounts for the lengthening of the theme vowel, except in verbs with a “pre-linked H” on the theme vowel, where it is preserved by IDENT-LINK

Long stem vowels are not covered by the “parochial constraint” (18) and hence can bear H

Importantly, Simonović also discusses passive past participles (which uniformly shift the H to the stem-final vowel) and deverbal nouns (which permit H on a long vowel)

3.4 Assessment

Theoretical issue: Why should the link between tone retraction and length be limited to theme vowels?

Especially since the same three accentual classes are found with C-final stems, see below

Problem with Table 2: do we really want three accentual allomorphs of the same theme vowel? Remember, Simonović analyzes accentual variation as different properties of the theme vowel:

- H pre-linked to the thematic suffix *-i-*: post-stem H
- floating H: retraction
- inserted by a special rule: stem-final H

The same three classes are found with the *a/a*-theme (Barić et al. 1997:261–265)

Barić et al. 1997 is Croatian, Stevanović 1964 is Serbian; when they disagree, this is explicitly indicated. In the table below, the alternation between [h] and [v] corresponds to the Croatian/Serbian divide

Table 3: Serbo-Croatian CVC imperfective verbs in the *a/a* class

	post-stem jačati ‘strengthen.IPFV’	retraction igrati ‘play.IPFV’	stem-final kuhati/kuvati ‘wear.IPFV’
INF	jačati (<i>jáčati</i>)	igrati (<i>igrati</i>)	kúhati/kúvati (<i>kùhati/kùvati</i>)
PRS.3SG	jačaa (<i>jáčā</i>)	ígraa (<i>igrā</i>)	kúhaa/kúvaa (<i>kùhā/kùvā</i>)

So the variation is not in the theme vowel, it is in the stem:

- none of these $\sqrt{+TH}$ stems can be unaccented (because in their prefixed counterparts the tone does not shift to the prefix)
- systematic stem H is likely to be a linked one

The C-final verbs, i.e., those with no theme vowel, exhibit a different type of alternation:

Table 4: Serbo-Croatian CVC imperfective verbs in the C-final class

	post-stem peći ‘bake.IPFV’	“reverse retraction” plesti ‘knit.IPFV’	stem-final jesti ‘eat.IPFV’
INF	peći (<i>pèći</i>)	plésti (<i>plěsti</i>)	jésti (<i>jěsti</i>)
PRS.3SG (a mora)	pećé(e) (<i>pècē/pèce</i>)	pleté(e) (<i>plètē/plète</i>)	jéde(e) (<i>jèdē/jède</i>)
stem:	-pek-	-plet-	-jed-

The vocalic segment in the present tense of C-final verbs can be analyzed either as epenthetic or as realizing the present-tense morpheme

Its surface form might reflect its historical development or dialectal differences (*-e-* is found in both Barić et al. 1997 (Croatian) and in Stevanović 1964 (Serbian); the short variant, *-e-*, is only found in Barić et al. 1997)

4 TENTATIVE PROPOSAL

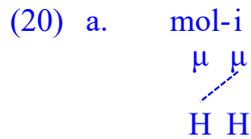
The root can be unaccented, accented, or post-accenting (encoded as a floating H), just usually assumed:

- (19) a. lom- b. nud- c. mol-
- |
- H H

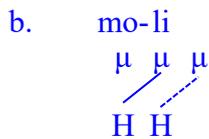
Either the theme introduces its own floating H or H is epenthetic, triggered by merge

This would be Zec’s hypothesis and insert an H at the right boundary of the stem ($\sqrt{+TH}$)

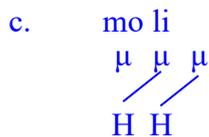
Starting with the present-tense form of a post-accenting verb:



Another mora is introduced by the present-tense suffix, and the second H is linked to it:
The mora may start out as a floating front vowel, which would provide the source of the glide in the PRES-3PL of *a*-verbs and explain what happens to the suffix *-e-* (fronting), but not what happens to the vowel of the suffix *-nu-*



This creates an illicit configuration (a long vowel with HH)



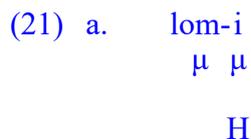
This configuration is repaired by reassociating the first H to the stem:



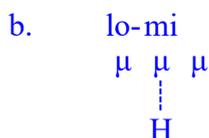
Hence present-tense retraction, nicely linked to the length of the theme vowel

With an accented root, H stays on the root

With an unaccented root, only one H is introduced, by the theme:



Another mora is introduced by the present-tense suffix, and H is linked to the stem edge, as in Zec's account:



Hence no retraction despite the long theme vowel

In the infinitive and in the past tense no extra moras or extra tones appear, so nothing special happens on the systematic basis (individual verbs exhibit some peculiarities, of course)

Retraction is caused not by an H on a long vowel, but by HH on a long vowel (which we independently know to be disallowed)

But if we assume pre-linked tones, we need to explain the final H-generalization (17): there is no pre-linked H on a long vowel:

(17) The final H-generalization

H can surface on the stem-final long vowel only in alternation with other accentual positions

It seems, however, that the final H-generalization is not without exceptions

Masculine C-final nouns with a long stem vowel with a pre-linked H seems to exist in Croatian:

- (22) a. *cṛ:v/cṛ:va* (trad. *cṛv/cṛva*) ‘worm.NOM/GEN’ Barić et al. 1997:120
 b. *vú:k/vú:ka* (trad. *vûk/vûka*) ‘wolf.NOM/GEN’

For feminine C-final nouns a long stem vowel with a pre-linked H seems unquestionable:

- (23) a. *slá:st/slá:sti* (trad. *slâst/slâsti*) ‘sweetness.NOM/GEN’ Stevanović 1964
 b. *ká:p/ká:pi* (trad. *kâp/kâpi*) ‘drop.NOM/GEN’ Barić et al. 1997:169

In event nominals, the high tone seems attracted by a long vowel (cf. Table 2 from Simonović 2022):

- (24) a. *lóm̩ljen* ‘broken’ – *lom̩ljé:nje* ‘breaking’
 b. *mól̩ljen* ‘prayed’ – *mol̩ljé:nje* ‘praying’

More work is needed to determine what the actual generalizations are

5 ADDITIONAL DATA

5.1 Present-tense realization

There are three surface realizations of the post-stem vowel in the present tense

The person-number endings are the same across these sets and may differ only in the 3PL:

The notations in Table 5 are the traditional ones: H pattern is the alternating one, the stem vowel is short

Table 5: Serbo-Croatian present-tense conjugation classes

	singular			plural		
	<i>-e-/i- & -i-/i-</i>	<i>-nu-/ne- & C</i>	<i>-a-/a-</i>	<i>-e-/i- & -i-/i-</i>	<i>-nu-/ne-</i>	<i>-a-/a-</i>
1	<i>vòz-ī-m</i>	<i>vèn-ē-m</i>	<i>pèv-ā-m</i>	<i>vòz-ī-mo</i>	<i>vèn-ē-mo</i>	<i>pèv-ā-mo</i>
2	<i>vòz-ī-š</i>	<i>vèn-ē-š</i>	<i>pèv-ā-š</i>	<i>vòz-ī-te</i>	<i>vèn-ē-te</i>	<i>pèv-ā-te</i>
3	<i>vòz-ī</i>	<i>vèn-ē</i>	<i>pèv-ā</i>	<i>vòz-ē</i>	<i>vèn-ū</i>	<i>pèv-aj-ū</i>
UR	<i>vóz-ii</i>	<i>vén-ee</i>	<i>pév-aa</i>			
INF	<i>vòz-i-ti</i>	<i>vèn-u-ti</i>	<i>pèv-a-ti</i>	<i>vòz-i-ti</i>	<i>vèn-u-ti</i>	<i>pèv-a-ti</i>
UR	<i>voz-í</i>	<i>ven-é</i>	<i>pev-á</i>			

The 3PL form of the *a*-conjugation is special:

- there’s a glide (inserted here or deleted elsewhere)
- the theme vowel is not lengthened
- tone retraction does not occur

Either the present-tense suffix is not a mora, or this mora can be realized as *j* before a vowel and cause fronting (for *e*-verbs, surfacing with the post-stem *i*: in the present tense)

5.2 The fuller vocalic paradigm: aorist, imperfect, imperative, and non-finite forms

The position of the stress in the imperfect is the same as in the present tense (except PRES-3PL)

The position of the stress in the aorist is the same as in the infinitive, except for the 2/3SG form, which is unaccented

Except perhaps for C-final stems (see Stevanović 1964:369)

Neither of them is productive in contemporary Serbo-Croatian

The remaining forms (the imperative, the gerunds and the participles) do not seem to exhibit systematic cross-paradigm identity either with the present tense or with the infinitive

The accent of the verbal noun (event nominal) seems to be predictable (Simonović 2022)

5.3 Further data notes

In the discussion of C-final verbs, Barić et al. 1997 seems far more permissive than Stevanović 1964

- B1977 systematically indicates two possible options for the present-tense post-stem vowel, short and long (i.e., *pečé:* (trad. *pečē*) & *pečé* (trad. *pece*)), Stevanović only uses the long one (i.e., *pečé:* (trad. *pečē*))
- B1977 often suggests two possible variants for the infinitive, post-stem tone, as in the present tense (*pečí* ‘bake’, *plèsti* ‘knit’), or stem tone in the infinitive only (*pečí* ‘bake’, *plèsti* ‘knit’), with retraction in the present tense. The systematic post-stem tone is never the only option for her. Stevanović usually provides only one
- there’s no correlation between these two facts
- the only C-verbs that do not fit into these patterns are those with nasal alternation in the stem (B253–254) and prefixed verbs with a glide in the present-tense stem (*òbuti/òbujēm*), showing H on the prefix in the present tense (B255–256), i.e., the two types where there is a sonorant that disappears/is deleted? before a consonant
- tone retraction is not limited to environments with a long theme vowel (PPPs) and long vowels may fail to trigger retraction (event nominals, all *e*-verbs but one (?))

Theme suffixes do not behave the same. The partial results are:

- The thematic suffix *-e-* does not create verbs with tone retraction (except for one verb, *vòleti/vòlim* ‘love.INF/PRES.1SG’)
- The thematic suffix *-nu-* does not create verbs with systematic post-stem H

Table 6: Serbo-Croatian CVC verbs in the *nu/ne* class

	retracting vènuti ‘wither.IPFV’	stem stress dìgnuti ‘push.PFV’
INF	venúti (<i>vènuti</i>)	dìgnuti (<i>dìgnuti</i>)
PRS.3SG (a mora)	vènee (<i>vènē</i>)	dìgnēe (<i>dìgnē</i>)

Two options only, no *nu*-verbs with the H tone staying on the theme

For a long stem-final vowel, only the stem H pattern is attested (e.g., *vìknuti*), no other patterns mentioned

REFERENCES

- Barić, Eugenija & Lončarić, Mijo & Malić, Dragica & Pavešić, Slavko & Peti, Mirko & Zečević, Vesna & Znika, Marija. 1997. *Hrvatska gramatika*. Zagreb: Školska knjiga.
- Becker, Michael. 2007. Tone licensing and categorical alignment in Serbo-Croatian. In Bateman, Leah & O'Keefe, Michael & Reilly, Ehren & Werle, Adam (eds.). *Occasional Papers in Linguistics 32: Papers in Optimality Theory III* Amherst, MA: GLSA.
- Bidwell, Charles E. 1963. The phonemics and morphophonemics of Serbo-Croatian stress. *The Slavic and East European Journal* 7 (2), 160–165. <https://doi.org/10.2307/304608>.
- Browne, Wayles E. & McCawley, James D. 1973. Serbo-Croatian accent. In Fudge, Erik C. (ed.). *Phonology*, 330–335. Harmondsworth: Penguin.
- Halle, Morris. 1997. On stress and accent in Indo-European. *Language* 73, 275–313.
- Inkelas, Sharon & Zec, Draga. 1988. Serbo-Croatian pitch accent: the interaction of tone, stress, and intonation. *Language* 64 (2), 227–248. <https://doi.org/10.2307/415433>.
- Jakobson, Roman. 1948. Russian conjugation. *Word* 4, 155–167.
- Jakobson, Roman. [1937] (1962). On the identification of phonemic entities. In *Selected Writings I*, 418–425. The Hague: Mouton.
- Langston, Keith. 1997. Pitch Accent in Croatian and Serbian: Towards an Autosegmental Analysis. *Journal of Slavic Linguistics* 5 (1), 80–116, <http://www.jstor.org/stable/24599009>.
- Simonović, Marko. 2022. Neo-Štokavian deverbial *je*-nominalisations contain passive participles. *Journal of Slavic Linguistics* 30 (FASL 29 extra issue), 1–13, <https://ojs.ung.si/index.php/JSL/article/view/91>.
- Simonović, Marko & Kager, René. 2020. Serbo-Croatian is developing stem-based prosody. Why so? In Marušič, Franc & Mišmaš, Petra & Žaucer, Rok (eds.). *Advances in Formal Slavic Linguistics 2017*, 305–322. Berlin: Language Science Press. <https://doi.org/10.5281/zenodo.376486>.
- Stevanović, Mihailo. 1964. *Savremeni srpskohrvatski jezik: Uvod, fonetika, morfologija*. Beograd: Naučno delo.
- Zec, Draga. 1994. *Sonority constraints on prosodic structure*. New York: Garland Publishing.
- Zec, Draga. 1999. Footed tones and tonal feet: rhythmic constituency in a pitch-accent language. *Phonology* 16 (2), 225–264, <http://www.jstor.org/stable/4420150>.
- Zec, Draga & Zsiga, Elisabeth. 2010. Interaction of stress and tone in Standard Serbian. In Browne, Wayles & Cooper, Adam & Fisher, Alison & Kesicic, Esra & Predolac, Nikola & Zec, Draga (eds.). *Proceedings of the Formal Approaches to Slavic Linguistics 18 (FASL 18): The Second Cornell Meeting*, 535–555. Ann Arbor, Michigan: Michigan Slavic Publications.