

## 2. Phonology with Prosody

### 2.1. Inventories

The BCS SEGMENTAL PHONEMIC INVENTORY (i.e., the set of sounds which can be differentiated as separate segments of the strings of utterances in that language) consists of five VOWELS (i.e., the sounds of speech pronounced with a relatively open passage to the flow of air, with no audible friction) and twenty-five CONSONANTS (i.e., sounds of speech pronounced by creating an obstruction to the flow of air).

#### 2.1.1 The Vowels

The five VOWELS of BCS are *a, e, i, o, u*. They form the following TRIANGLE based on the height of the tongue (LOW, MIDDLE, HIGH) and their position in the mouth cavity (FRONT, REAR):

	<i>front</i>	<i>rear</i>
<i>High</i>	<i>i</i>	<i>u</i>
<i>Middle</i>	<i>e</i>	<i>o</i>
<i>Low</i>		<i>a</i>

Table 2.1.1.1: Bosniac/Croatian/Serbian Vowel Triangle

All five vowels function as SYLLABLE PEAKS (i.e., the most prominent part of the syllable), and bear any of six SUPRASEGMENTAL PROSODIC VALUES (i.e., word stress values, see below). In addition, the consonant *r* assumes the role of the syllable peak with the ability to carry any of the six suprasegmental prosodic values when not next to a vowel, as in *vr̂t* 'garden', *kr̂st* 'cross', etc. This function of the consonant *r* is called VOCALIC or SYLLABIC *r*. In normal writing it is not differentiated from a consonantal *r*, while specialized linguistic texts mark it as *r̂*. One should therefore differentiate between the PHONEMES (i.e., sounds capable of differentiating the meaning of two or more words, as in *rat* 'war' and *rad* 'work' differentiated by *d* and *ʈ*) which are capable of forming a syllable (*a, e, i, o, u, r̂*) on the one hand, and VOWELS on the other hand

(*a, e, i, o, u*), which in turn are distinguished by their articulatory and acoustic features (relatively open passage to the flow of air, with no audible friction).

Some grammarians in Croatia consider the sequence *ije*, as in *mlijeko* 'milk', *bijel* 'white', etc. to be a separate vowel called *jat* and marked *ě* in specialized linguistic texts. This claim is not accepted here primarily for the following three reasons. First, the sequence appears only in a very limited number of contexts, while even the most infrequent phonemes have a considerably wider distribution. Secondly, there exists no standard manner in which this sequence is pronounced. Some speakers pronounce all three phonemes distinctly; others pronounce it as a diphthong. This is not the case with other phonemes. Third, this sequence is not activated when foreign loanwords are accepted and phonologically adapted, while existing phonemes are.

In most instances when two vowels appear in combination (e.g., *posao* 'work') they are to be pronounced separately. The same is true about rare instances of doubled vowels, e.g. *kakaa* 'of cocoa, Gen. Sg.' (see Appendix 10.1 for more examples in the dictionary forms of the words).

### **Contrastive remarks:**

Contrastive matters, i.e., the differences relevant to English speakers, on the one hand, and the differences relevant to BCS learners, on the other, will be discussed in turn. The importance of the former in terms of this grammar is a matter of course. The latter differences are also important as they empower the professional user with the ability to identify a BCS speaker when he/she uses the English language and distinguish him/her from other non-native speakers of English.

The BCS vocalic system should not pose a difficulty to English learners. The English phonetic inventory with its twelve vowels and eight diphthongs constitutes a far more complex system. The subjective correspondences between the vowels in the two languages are as follows

<i>BCS vowel</i>	<i>English Equivalent</i>	<i>Example</i>
a	ɑ/a:	rak, dar
e	e/e:	peh, pet
i	i/i:	kit, vir
o	o/o:	oko, voz
u	u/u:	kup, usta

Table 2.1.1.2 Bosniac/Croatian/Serbian vs. English Vowels

The only correspondence requiring attention here is the one between the BCS *a* and the English *ɑ*, whereby BCS *a* is formed in a less rear position than the English *ɑ* and it can be both long and short. The other four vowels can have long or short English equivalents depending on their suprasegmental features. Missequivalence can occur if prosodic features are not captured properly, which is described below.

Correspondences from English to BCS, on the other hand, reveal the fact that the English vocalic system poses quite a hurdle for BCS speakers. In particular indiscriminate pronunciation of *æ* and *e*, *ɑ* and *ʌ* as well as the absence of the SCHWA sound (*ə* - see below) significantly contribute to the so-called BCS accent.

<i>English Vowel</i>	<i>BCS Equivalent</i>	<i>Example</i>
ɑ	a	arm, harm
æ	e	bad, bag
e	e	red, bet
ə	a	afresh
ə:	Ø	bird, girl
ʌ	a	but, nut
i	i	if, gift
i:	i	he, see
ɔ	o	long, strong
ɔ:	o	all, short
u	u	put, book
u:	u	too, you

Table 2.1.1.3 English vs. BCS Vowels

The eight English diphthongs do not have BCS equivalents. They are perceived as vowel groups by BCS speakers.

<i>English Diphthong</i>	<i>BCS Sequence</i>	<i>Example</i>
ai	aj	knife, wife
au	au	house
ei	ej	game, plain
ɜə	er	rare, there
iə	ier	near, hear
ou	ou	low, boat
oi	oi	boil, toil
uə	ur	sure, poor

Table 2.1.1.4 English Diphthongs vs. BCS Sequences

## 2.1.2 The Consonants

The twenty-five BCS consonants form the system presented in the Table 2.1.2.1 (adapted from Browne, 1993:310). The vertical categories in the table below refer to the MANNER of how the consonants are produced. They are accompanied by the VOICELESS (loose vocal cords) vs. VOICED (tense vocal cords) distinction. The horizontal categories, on the other hand, pertain to the PLACE in mouth cavity where the obstacle to the flow of air is created. A BCS consonant can be formed by:

- a. Fully blocking the flow of air (OBSTRUENTS),
- b. Creating a narrow passage to the flow of air (FRICATIVES),
- c. Combining a. and b. (AFFRICATES),
- d. Partially blocking the flow of air while enabling a passage,
  - through the nose (NASALS)

- on the sides of the tongue (LATERALS)
- by intermittently closing and opening a passage between the tongue and the palate (VIBRANTS)
- between the middle of the tongue and the palate (GLIDES)

The obstacle to the flow of air can be formed using:

- Lower and upper lip (BILABIAL)
- Lower lip and upper teeth (LABIO-DENTAL)
- Tip of the tongue and the upper teeth (DENTAL)
- Lower portion of the front palate (ALVEO-PALATAL)
- Upper portion of the front palate (PALATAL)
- Back palate (VELAR)

	<i>Bilabial</i>	<i>Labio-dental</i>	<i>Dental</i>	<i>Alveo-palatal</i>	<i>Palatal</i>	<i>Velar</i>
Obstruents						
Stops						
Voiceless	p		t			k
Voiced	b		d			g
Fricatives						
Voiceless		f	s	š		h
Voiced		v	z	ž		
Affricates						
Voiceless			c	č	ć	
Voiced				dž	đ	
Sonorants						
Nasals	m		n		nj	
Liquid						
Laterals			l		lj	
Vibrant			r			
Glide					j	

Table 2.1.2.1 BCS Consonants

### Contrastive remarks:

There are substantial differences between the two consonant systems. The list of correspondences from BCS to English is listed in Table 2.1.2.2.

<i>Spelling</i>	<i>IPA</i>	<i>English Equivalent</i>	<i>Example</i>
b	b	b	baba
c	ts	t+s	cipela
č	tʃ	tʃ	čar
ć	t	tʃ	ćar
d	d	d	dati
dž	dʒ	dʒ	džak
đ	ɖ	dʒ	đak
f	f	f	film
g	g	g	gar
h	h	h	hit
j	j	j	jaje
k	k	k	kola
l	l	l	lula
lj	ʎ	l+j	ljubav
m	m	m	mama
n	n	n	noga
nj	ɲ	n+j	njuška
p	p	p	pastir
r	r	r	rad
s	s	s	soba
š	ʃ	ʃ	šaka
t	t	t	torba
v	v	v	voda
z	z	z	zima
ž	ʒ	ʒ	život

Table 2.1.2.2 BCS vs. English Consonants

English speakers exhibit difficulties in the following areas:

- *č* and *ć* are not distinguished; English *f* (as in *cheat*) is pronounced for both of these
- *dž* and *đ* are not distinguished; English *dʒ* (as in *jeep*) is pronounced for both of these
- Initial *c* is pronounced either as a *ts* sequence or as an *s*, since English *c* appears only in intermediate and final positions, as in *blitz*
- *nj* and *lj* are pronounced as a sequence rather than one sound
- *r* is pronounced in a non-vibrant manner, i.e., the tongue is further behind and it does not vibrate on the alveolar ridge (lowest part of the hard palate)
- *b* and *p* are pronounced in an overly tense manner
- *t* and *d* are pronounced in an overly tense manner and as alveolars rather than dentals (i.e., the tip of the tongue touches the alveolar ridge rather than the teeth)
- *š* and *ž* are pronounced more palatally

Correspondences from English to BCS are equally complex as presented in the Table 2.1.2.3.

<i>IPA</i>	<i>BCS Equivalent</i>	<i>Example</i>
<b>b</b>	<b>b</b>	<b>bad, boy</b>
h	h	human
<b>d</b>	<b>d</b>	<b>do, hard</b>
f	f	friend, golf
g	g	great, bag
ŋ	n	strong, long
h	h	head, hate
j	j	yes, Indian
k	k	car, silk
l	l	long, still
m	m	mill, ham
n	n	no, news
<b>p</b>	<b>p</b>	<b>paper, post</b>

r	r	rare, dry
s	s	seldom, yes
ʃ	š	shine, shop
t	t	tie, hat
tʃ	č	church, fetch
v	v	very lively
w	v	we, what
z	z	these, crazy
ʒ	ž	pleasure
dʒ	dž	jam, jungle
θ	t	thank, death
ð	d	mother, this

Table 2.1.2.3 English vs. BCS Consonants

BCS speakers experience the following difficulties with English sounds:

- The sounds *θ* (as in *thank*) and *ð* (as in *this*) are pronounced as t and d respectively
- The sound *w* (as in *we*) is pronounced as v
- The sound *r* (as in *room*) is pronounced in a rolled manner
- The sounds *tʃ* (as in *church*), *ʃ* (as in *shine*), *dʒ* (as in *jungle*), and *ʒ* (as in *pleasure*) are pronounced in an overly hard manner
- The sounds *b* (as in *bad*) and *p* (as in *post*) are not pronounced tensely enough
- The sounds *t* (as in *tie*) and *d* (as in *do*) are pronounced as dentals rather than alveolars

## 2.2. Distribution

The linear phonological distribution of BCS phonemes is CONSTRAINED (i.e., limited by not being able to appear in the string of sounds) by the following:

- a. the next sound in the sequence,
- b. both the preceding and the following sound,
- c. the syllabic structure

CONSTRAINTS (limitations) a. and b. generate phonological ALTERNATIONS listed in this section (i.e., the fact that different phonemes are found at the same position of the same stem, as in English *foot* vs. *feet*). One should note that all these alternations are registered in spelling.

This entire section (2.2.) provides lists of alternations by stating the description, then a general formalized rule, using the MINIMAL INFORMATION GRAMMAR format (in some way akin to OPTIMALITY THEORY), followed by concrete examples. The rule 2.2.1.3 below (nasal-labial alternation) can be used to demonstrate the format of the rules and examples. First, there is the table which states that the category of the character *n* is N1, *m* is L1, *b* is L2, and *p* is L3. The rule  $N\{1\}L\{2,3\} \Rightarrow L\{1\}L\{2,3\}$  then states that if there is an *m* in front of a *b* or *p*, it will change into *m*. The arrow thus shows how the constraint will change the final outcome of a non-allowed sequence. The example: *stan* 'apartment' + *-beni* 'the adjective of', i.e., *stanbeni*, which is not allowed and has to be changed into *stambeni* shows how the alternation rule works. Positional ALLOPHONES (i.e., positional variants of different phonemes, such as the *ŋ* allophone of the *n* sound in *bank* [baŋk]) will not be discussed here as they do not constitute a problem for native speakers of the English language.

## 2.2.1 Assimilation Alternations

### 2.2.1.1 Voiceless-voiced alternation

*Description:*

A voiceless consonant in front of a voiced consonant will be replaced with its voiced equivalent.

A voiced consonant in front of a voiceless consonant will be replaced by its voiceless equivalent.

*Rule:*

n	1	2	3	4	5	6	7	8	9	10
V	B	d	g	dž	đ	ž	z			
L	P	t	k	č	ć	š	s	f	h	c

$V\{1..7\}L\{1..10\} \Rightarrow L\{1..7\}L\{1..10\}$

$L\{1..7\}V\{1..7\} \Rightarrow V\{1..7\}V\{1..7\}$

Note: All groups undergoing this alternation, with the exception of *ds* and *dš*, are registered in writing, thus *vrabac* 'sparrow, Nom. Sg.' vs. *vrapca* 'of sparrow, Gen. Sg.'

*Examples:*

*top* 'cannon' + *džija* 'male profession suffix' ⇒ *tobdžija* 'cannoneer'

to p dž ija ⇒ to b dž ija

L1 V4 ⇒ V1 V4

*raz-* 'start, commence' + *paliti* 'burn' ⇒ *raspaliti* 'start burning, initiate fire'

ra z p aliti ⇒ ra s p aliti

V7 L1 ⇒ L7 L1

*od-* 'finish' + *hraniti* 'feed, support financially' ⇒ *othraniti* 'finish supporting'

o d h raniti ⇒ o t h raniti

V1 L9 ⇒ L1 L9

### 2.2.1.2 Hard-soft alternation

*Description:*

Hard *s*, *z*, and *h* in front of soft consonants will be replaced by soft equivalents *š*, *ž*, and *š*.

*Rule:*

n	1	2	3	4	5	6	7	8
H	z	s/h						
S	ž	š	č	ć	dž	đ	lj	nj

$H\{1..2\}S\{1..8\} \Rightarrow S\{1..2\}S\{1..8\}$

*Example:*

*trbuh* 'belly, stomach' + *-čić* 'diminutive suffix'  $\Rightarrow$  *trbuščić* 'small belly'

trbu	h	č	ić	$\Rightarrow$	trbu	š	ć	ić
	H2	L3		$\Rightarrow$		S2	S3	

### 2.2.1.3 Nasal-labial alternation

*Description:*

Nasal alveolar *n* in front of the labial *b* and *p* will be replaced by the nasal labial *m*.

*Rule:*

n	1	2	3
N	n		
L	m	b	p

$N\{1\}L\{2,3\} \Rightarrow L\{1\}L\{2,3\}$

*Example:*

*stan* 'flat, apartment' + *-beni* 'pertaining to'  $\Rightarrow$  *stambeni* 'pertaining to apartments'

sta	n	b	eni	$\Rightarrow$	sta	m	b	eni
N1	L2			$\Rightarrow$	L1	L2		

## 2.2.2 Reductional Alternations

### 2.2.2.1 Reduction of geminates (dual consonants)

*Description:*

All dual consonants will be reduced to a simple consonant.

*Rule:*

$L = \{b, c, \check{c}, \acute{c}, d, d\check{z}, \acute{d}, f, g, h, j, k, l, l_j, m, n, n_j, p, r, s, \check{s}, t, v, z, \check{z}\}$

$L1=L2$

$L1L2 \Rightarrow L2$

*Example:*

*Rus* 'Russian' + *ski* 'pertaining to'  $\Rightarrow$  *ruski* 'pertaining to Russians and Russia'

Ru	<b>s</b>	<b>s</b>	ki $\Rightarrow$	ru	<b>Ø</b>	<b>s</b>	ki
	L1	L2	$\Rightarrow$			L2	

### 2.2.2.2 Stop-affricate reduction

*Description:*

The stops *t* and *d* will be deleted in front of the an affricate and the suffix *-ština*

*Rule:*

$P = \{t, d\}$

$A = \{c, \check{c}, \acute{c}, \check{d}, d\check{z}, \text{ština}\}$

$PA \Rightarrow A$

*Example:*

*gospod(a)* 'gentleman' + *-ština* 'condition of being'  $\Rightarrow$  *gospoština* 'condition of being a gentleman'

gospo    **d**    **ština**     $\Rightarrow$     gospo    **Ø**    **ština**

          P    A                     $\Rightarrow$                     A

### 2.2.2.3 Middle stop reduction

*Description:*

The stops *t* and *d* are deleted if they are preceded by fricatives and at the same time followed by most other consonants.

*Rule:*

L = {s, z, š, ž}

M = {d, t}

R = {b, c, č, ć, d, dž, đ, f, g, h, k, l, lj, m, n, nj, p, s, š, t, z, ž}

LMR ⇒ LR

*Example*

*korist* 'utility' + *ni* 'pertaining to' ⇒ *korisni* 'useful'

kor	<b>s</b>	<b>t</b>	<b>n</b>	i ⇒	kor	<b>s</b>	<b>∅</b>	<b>n</b>	i
	L	M	R	⇒	L		R		

#### 2.2.2.4 Affricate-fricative reduction

*Description:*

The fricative *s* /*š* is deleted after the affricates *č* and *ć*.

*Rule:*

A = {*č*, *ć*}

F = {*s*}

AF ⇒ A

*Example:*

*mladić* 'boy, youngster' + *ski* 'pertaining to' ⇒ *mladićki* 'pertaining to boys'

mladi	ć	s	ki	⇒	mladi	ć	Ø	ki
	A	F		⇒	A			

#### 2.2.3 Syllabic structure constraints

*Description:*

BCS syllables consist of an obligatory NUCLEUS (i.e., the vowel or vocalic r) and optional LEFT- and RIGHT-SIDE MARGINS. Both left and right side margins are organized using the following precedence rules. If the precedence rules for the syllabic margin are preserved, the margin is associated with the next rather than with the previous nucleus:

*Rule:*

M1={f, h, s, š, z, ž}

M2={b, c, č, ć, d, dž, đ, g, k, p}

M3={j, l, lj, m, n, nj, r, v}

K={a, e, i, o, u, r (if MrM)}

B= syllabic border

+ = one or more instances of the previous sound

Syllable=B(M1M2M3)K(M3M2M1)B

KMK  $\Leftrightarrow$  KBMK iff M={M1+, M2+, M3, M1M2, M1M3, M2M3, M1M2M3}

Example:

	p	r	a		k	t	i		č	n	a		'practical'
B	M2	M3	K	B	M2	M2	K	B	M2	M3	K	B	

### 2.3. Morphophonemic Alternations

MORPHOPHONEMIC ALTERNATIONS are sound changes caused by inflectional (e.g., cases, tenses, etc.) and derivational forms (e.g., diminutives), i.e., one inflectional or derivational form features one character while another form has another character in the same phonotactic context.

Simple HEURISTICS (i.e., a rule of thumb) to match the form altered by the sound change with its basic (dictionary) form can be established for most of these alternations, which will be presented in turn.

The alternations will be listed briefly in this part and their full elaboration will be provided in the relevant sections of the morphological section.

#### 2.3.1 Alternations in the Stems

##### 2.3.1.1 The $a \Leftrightarrow \emptyset$ and $\emptyset \Leftrightarrow a$ alternations (FLEETING A and ZERO)

*Description:*

One form of a lexeme has an *a*, while the other does not have anything (linguistic ZERO or  $\emptyset$ ) in the same position.

*Rule:*

stem={form<sub>1</sub>, form<sub>2</sub>...form<sub>n</sub>}

L,R = {b, c, č, ć, d, dž, đ, f, g, h, j, k, l, lj, m, n, nj, p, r, s, š, t, v, z, ž}

\* - any single phoneme or cluster of phonemes

form1=\*La(R\*)

form2=\*L $\emptyset$ (R\*)

*Example:*

*kratak* 'short-masc'  $\Leftrightarrow$  *kratka* 'short-fem'

krat **a** k  $\Leftrightarrow$  krat  $\emptyset$  ka

\*L a R                      \*L  $\emptyset$  R

*Heuristics:*

If there are two consonants at the end of the stem and there is no basic word with such a stem, one should insert an *a* between these two consonants, for example:

*kratka* 'short-female':

[match with *kratk* ⇒ no such stem]-[insert *a*]-*kratak* [stem found]

Morphological categories:

Animate masculine nouns: Nom.Sg., Gen.Pl. *a*, all other forms  $\emptyset$ : *prasac* 'hog-Nom.Sg.', *prasaca* 'hogs-Gen.Pl.' ⇔ *prasca* ('hog-Gen.Sg.), *prasci* 'hog-Nom.Pl'...

In last names from northwestern Croatia this alternation appears as *e* ⇔  $\emptyset$ , for example:

Nom.Sg. *Gubec* ⇔ Gen.Sg. *Gupca*.

Inanimate masculine nouns: Nom.Sg., Acc.Sg., Gen.Pl. *a*, all other forms  $\emptyset$ : *anisovac* 'anis-tree-Nom.Sg.', *anisovaca* 'anis-tree-Gen.Pl.' ⇔ *anisovca* 'anis-tree-Gen.Sg.', *anisovci* 'anis-trees-Nom.Pl'...

In geographical names from northwestern Croatia this alternation appears as  $e:\emptyset$ , for example:

Nom.Sg. *Čakovec*  $\Leftrightarrow$  Gen.Sg. *Čakovca*.

Feminine nouns: Nouns with a consonant cluster different from *št* and *žd* at the end of the stem:

Gen.Pl. *a*, all other forms  $\emptyset$ : *krušaka* 'pears-Gen.Pl.'  $\Leftrightarrow$  *kruška* 'pear-Nom.Sg.', *kruške* 'pear-Gen.Sg.'...

Neuter nouns: Nouns with a consonant cluster different from *št* and *žd* at the end of the stem:

Gen.Pl. *a*, all other forms  $\emptyset$ : *zvonaca* 'bells-Gen.Pl.'  $\Leftrightarrow$  *zvonce* 'bell-Nom.Sg.', *zvonca* 'bell-Gen.Sg.'...

Adjectives and Pronouns: Nom.Sg.masc. indefinite form *a*; all other forms  $\emptyset$ : *sitan* 'minute-Nom.Sg.masc indefinite'  $\Leftrightarrow$  *sitna* 'minute-Nom.Sg. fem.'

Verbs: the Infinitive stem  $\emptyset$ , the Present Tense stem *a*: *trti* 'rub-Inf.'  $\Leftrightarrow$  *tares* 'I rub'

Prepositions: the preposition *sa* 'with' when followed by *mnom* 'me-Ins.' or a word beginning with *s, z, š, ž, s* or *sa* in other cases: *sa mnom* 'with me'  $\Leftrightarrow$  *sa tobom* or *s tobom* 'with you'.

Derivatives: Stems ending in two consonants if the suffix begins with a consonant: *Bosn(a)* 'Bosnia'  $\Leftrightarrow$  *bosanski* 'Bosnian'

### 2.3.1.2 Alternation *k, g, h* $\Leftrightarrow$ *č, ž, š*

*Description:*

The sounds *k, g, h* alternate with *č, ž, š* in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

H={k, g, h}

S={č, ž, š}

form1=\*H(\*)

form2=\*S\*

\* - any single phoneme or cluster of phonemes

*Example:*

*vojn*ik 'soldier-Nom.Sg.' ⇔ *vojni*če 'soldier-Voc.Sg.'

vojn*ik* **k** ⇔ vojni **č** **e**

\* **H** \*                      \* **∅** \*

*Heuristics:*

If there is *č*, *ž*, or *š* at the end of a stem and it cannot be matched with a basic word, replace *č*, *ž*, *š* with *k*, *g*, *h* respectively, for example:

*vojniče* 'soldier-Voc.Sg.':

[match with *vojnič* ⇔ no such stem]-[replace *č* with *k*]-*vojnīk* [stem found]

*Morphological Categories:*

Masculine nouns ending in a consonant: Voc.Sg. *č*, *ž*, *š*, other cases *k*, *g*, *h* or *c*, *z*, *s* (see 2.3.1.3): Voc.Sg. *vojniče*, Nom. Pl. *vojnīci* ⇔ Nom.Sg. *vojnīk*, Acc.Pl *vojnīke*...

Verbs: 2<sup>nd</sup> and 3<sup>rd</sup> person Singular of the Aorist Tense *č*, *ž* Past-tense stems endings in *k*, *g*: 2<sup>nd</sup> and 3<sup>rd</sup> Aorist: *reče* ⇔ Past Participle masculine Singular: *rek(ao)*

Derivatives: Base form has *k*, *g*, *h*, while its derivative has *č*, *ž*, *š*: *trbuh* 'belly, stomach' ⇔ *trbuščić* 'tummy'

### 2.3.1.3 Alternation *k*, *g*, *h* ⇔ *c*, *z*, *s*

*Description:*

The sounds *k*, *g*, *h* alternate with *c*, *z*, *s* in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

H={k, g, h}

S={c, z, s}

form1=\*H(\*)

form2=\*S\*

\* - any single phoneme or cluster of phonemes

*Example:*

*majka* 'mother-Nom.Sg.'  $\Leftrightarrow$  *majci* 'mother-Dat./Loc.Sg.'

maj    k    a     $\Leftrightarrow$     maj    c    i

L       H                L       Ø    R

*Heuristics:*

If there is *č*, *ž*, or *š* at the end of a stem and it cannot be matched with a basic word, replace *c*, *z*, *s* with *k*, *g*, *h* respectively, for example:

*majci* 'mother-Dat./Loc.Sg.':

[match with *majc* ⇒ no such stem]-[replace *c* with *k*] ⇒ *majk* [stem found]

*Morphological Categories:*

Masculine nouns ending in a consonant: Nom.,Dat.,Ins.,Loc.Pl. *c, z, s*, other cases *k, g, h* or *č, ž, š* (see 2.3.1.2): Nom.Pl. *vojnici*, Dat.Pl. *vojnici* ⇒ Nom.Sg. *vojnik* ⇒ Voc.Sg. *vojniče*...

Feminine nouns ending in an *a*: Dat., Loc. Sg. *c, z, s*, all other cases *k, g, h*: Dat.Sg: *majci* ⇒ Nom.Sg. *majka*, Nom.Pl. *majke*...

Verbs: Imperative mood *c* Past-tense stems endings in *k*: Imperative: *reci* ⇒ Past Participle masculine Singular: *rek(ao)*

See Appendix 10.3.9 for exceptions to this rule.

#### 2.3.1.4 Alternation *c, z, s* ⇔ *č, ž, š*

*Description:*

The sounds *c, z, s* alternate with *č, ž, š* in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

H={c, z, s}

S={č, ž, š}

form1=\*H(\*)

form2=\*S\*

\* - any single phoneme or cluster of phonemes

*Example:*

*knez* 'prince-Nom.Sg.' ⇔ *kneže* 'prince-Voc.Sg.'

kne    **z**    ⇔    kne    **ž**    e

L       H            L       Ø    R

*Heuristics:*

If there is č, ž, or š at the end of a stem and it cannot be matched with a basic word, and its replacement with k, g, h does not match any stem, replace č, ž, š with c, z, s respectively, for example:

*knez* 'prince-Voc.Sg.':

[match with *knež* ⇒ no such stem]-[replace *ž* with *g*]-*kneg*-[match with *kneg* ⇒ no such stem]-

[replace *ž* with *z*]-*knez*-[stem found]

*Morphological Categories:*

One-syllable masculine nouns ending in a consonant: Voc.Sg. and all Plural forms *č, ž* other cases *c, z*. Voc.Sg. *striče*, Nom.Pl. *stričevi* ⇔ Nom.Sg. *stric*...

Other masculine nouns ending in a consonant: Voc.Sg. *č, ž, š*, other cases *k, g, h* or *c, z, s* (see 2.3.1.3): Voc.Sg. *vojniče* ⇔ Nom.Sg. *vojník*, Nom. Pl. *vojnici*, Acc.Pl *vojnike*...

Derivatives: Base form has *c, z*, while its derivative has *č, ž*: *zec* 'hare' ⇔ *zečevina* 'hare meat'

### 2.3.1.5 Alternation *l* ⇔ *o* and *o* ⇔ *l*

*Description:*

The lateral *l* alternates with the vowel *o* in different forms of the same word.

*Rule*

stem={form1, form2...formn}

form1=\*l\*[end of syllable]

form2=\*o[end of syllable]

\* - any single phoneme or cluster of phonemes

*Example:*

*anđeo* 'angel-Nom.Sg.' ⇔ *anđela* 'angel-Gen.Sg.'

anđe o ⇔ anđe l a

\* o end of syllable \* l \* end of syllable

*Heuristics:*

If there is an *o* at the end of the syllable and it cannot be matched with a basic word, replace the *o* with an *l*, if there is an *l* in the word and it cannot be matched with a basic word, replace the *l* with an *o*.

*rukovodioca* 'manager-Gen.Sg.':

[match with *rukovodioc* ⇔ no such stem]-[replace *o* with *l*]-*rukovodilac*-[stem found]

*Morphological Categories:*

Masculine Nouns Ending in *-lac*: Nom.Sg. and Gen.Pl.: Nom.Sg. *davalac* 'donor', Gen.Pl. *davalaca* 'donors' ⇔ Gen. Sg. *davaoca*, Dat.Sg. *davaocu...*

Other Masculine Animate Nouns: Nom.Sg. *o*, all other cases *l*: Nom.Sg. *anđeo* 'angel' ⇔ Gen.Sg. *anđela*, Acc.Sg. *anđela*, Nom.Pl. *anđeli*

Other Masculine Inanimate Nouns: Nom. and Acc.Sg. *o*, all other cases *l*: Nom.Sg. *deo* ⇔ Gen.Sg. *delo*, Acc.Sg. *deo* ⇔ Nom.Pl. *delovi*

Adjectives: masc.Sg. indefinite form *o*, all other forms *l*: *veseo* 'happy-masc.Sg.' ⇔ *vesela* 'happy-fem.Sg.'

Verbs: Past Participle: masc.Sg. *o*, all other forms *l*: *video* 'saw-masc.Sg.' ⇔ *videla* 'saw-fem.Sg.'

Derivatives: Base form has *l* while its derivative with the suffixes *-ba*, *-ski*, or *-n* has *o*: *seliti* 'move' ⇔ *seoba* 'moving', *selo* 'village' ⇔ *seoski* 'rural', *tele* 'calf, the animal' ⇔ *steona* 'pregnant, of a cow'

**2.3.1.6 Hard-soft alternation**

*Description:*

Soft and hard consonants alternate in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

H={b, c, d, f, g, h, k, l, m, n, p, s, t, v, z}

S={blj, č, đ, flj, ž, š, ć, lj, mlj, nj, plj, š, ć, vlj, ž}

form1=\*H(\*)

form2=\*S\*

\* - any single phoneme or cluster of phonemes

*Example:*

*skup* 'expensive' ⇔ *skuplji* 'more expensive'

sku    p    ⇔    sku    plj    i

\*        H        \*        S        \*

*Heuristics:*

If there is a soft sound at the end of the stem and it cannot be matched with a basic word, replace the soft sound with its hard counterpart.

*duži* 'long-comp.':

[match with *duž* ⇒ no such stem]-[replace *ž* with *g*]-*dug*-[stem found]

*Morphological Categories:*

Feminine nouns ending in a consonant: Ins.Sg. soft, other cases hard: Ins.Sg. *gladu* 'with famine' ⇔ Nom.Sg. *glad* 'famine'

Adjectives: comparative and superlative soft, absolute hard: comp. *mladi* 'younger', sup. *mladi* 'youngest' ⇔ abs. *mlad* 'young'

Verbs: Past Participle *lj, nj*, other forms *l, n*: Inf. *posoliti* 'salt' ⇔ *posoljen* 'salted'

Verbs: Present Tense stem soft, other stems hard: Inf. *pisati* 'write' ⇔ 1<sup>st</sup>p.Pres. *pišem* 'I write'

Derivatives: base word hard, derivative soft: *jesen* 'Autumn-noun' ⇔ *jesenji* 'Autumn-adj'

⌘ 2.3.1.7 Alternation *ije* ⇔ *je* and *je* ⇔ *ije* (only in the ljekavian pronunciation)

*Description:*

The sequence *ije* alternates with *je* in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

form1=\*ije(\*)

form2=\*je(\*)

\* - any single phoneme or cluster of phonemes

*Example:*

*dijete* 'child-Nom.Sg.' ⇔ *djeteta* 'child-Gen.Sg.'

d    **ije**   te   ⇔   d    **je**   teta

\*    **ije**   \*            \*    **je**   \*

*Heuristics:*

If there is a *je* in a stem and it cannot be matched with a basic word, replace the *je* with the *iје* sequence; if there is an *iје* in a stem and it cannot be matched with a basic word, replace the *iје* with the *je* sequence.

*cvjetovi* 'flowers':

[match with *cvjet* ⇒ no such stem]-[replace *je* with *iје*]-*cvijet*-[stem found]

### *Morphological Categories*

Neuter nouns with an extended stem in the Singular: nominative and Accusative Singular *iје*, other stems *je*: Nom.Sg. *dijete* 'child', Acc.Sg. *dijete* ⇔ Gen.Sg. *djeteta*, Nom.Pl. *djeca*

Other nouns with an extended stem in the Plural: Singular *iје*, Plural *je*: Nom.Sg. *cvijet* 'flower' ⇔ Nom.Pl. *cvjetovi*

Adjectives: absolutive *iје*, comparative and superlative *je*: abs. *bijel* 'white' ⇔ comp. *bjelji* 'whiter'

The verb *sječī* 'cut': the infinitive stem *je*, present tense stem *iје*: *sječī* 'cut-Inf' ⇔ *sječem* 'I cut'

Derivatives: base word *iје*, derivative *je* or vice versa: *rijeka* 'river' ⇔ *rječīca* 'small river', *odjeti* 'put on, wear' ⇔ *odijelo* 'garment'

### 2.3.1.8 Alternation *ije* ⇔ *e* and *e* ⇔ *ije* (only in the Ijekavian pronunciation)

*Description:*

The sequence *ije* alternates with *e* in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

form1=\*e(\*)

form2=\*ije(\*)

\* - any single phoneme or cluster of phonemes

*Example:*

*leći* 'lie flat-perfective.' ⇔ *lijegati* 'lie flat-imperfective'

l      e    ći   ⇔   l      ije   gati

\*      e    \*        \*      ije   \*

*Heuristics:*

If there is an *e* in a stem and it cannot be matched with a basic word, replace the *e* with the *ije* sequence; if there is an *ije* in a stem and it cannot be matched with a basic word, replace the *ije* with the *e* sequence.

*bregovi* 'hills':

[match with *breg* ⇨ no such stem in Ijekavian]-[replace *e* with *ije*]-*brijeg*-[stem found]

Morphological Categories

Neuter nouns with an extended stem in the Singular: nominative and Accusative Singular *ije*, other stems: *e*: Nom.Sg. *ždrijebe* 'colt, the animal', Acc.Sg *ždrijebe* ⇨ Gen.Sg. *ždrebeta*, Nom.Pl. *ždread*

Other nouns with an extended stem in the Plural: Singular *ije*, Plural *e*: Nom.Sg. *brijeg* 'hill' ⇨ Nom.Pl. *bregovi*

Adjectives: absolute *ije*, comparative and superlative *e*: abs. *triježan* 'sober' ⇨ comp. *trezniji* 'more sober'

Verbs: perfective verb *e*, imperfective *ije*: *leći* 'lie down-perfective' ⇨ *lijegati* 'lie down-imperfective'

Derivatives: base word *ije*, derivative *e*: *vrijedan* 'diligent' ⇔ *vrednoća* 'diligence'

### 2.3.1.9 Alternation *i* ⇔ *je* and *je* ⇔ *i* (only in the Ljekavian pronunciation)

*Description:*

The sound *i* alternates with *ije* and *je* in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

form1=\*io

form2=\*je(\*)

\* - any single phoneme or cluster of phonemes

*Example:*

*vidjetl* 'see-Inf.' ⇔ *vidio* 'he saw'

vid    **je**    ti    ⇔    vid    **i**    o

\*        je    \*            \*        i    o

Heuristics:

If there is an *e* in a stem and it cannot be matched with a basic word, replace the *i* with the *je* sequence; if there is a *je* in a stem and it cannot be matched with a basic word, replace the *i* with the *e* sequence.

*vidio* 'he saw':

[match with *vidi* ⇒ no such stem in ljekavian]-[replace *e* with *je*]-*vidje(ti)*-[stem found]

*Morphological Categories:*

Nouns: Nom. and Acc.Sg. *i*, other cases *je*: *razdio* 'chapter-Nom.Sg.' ⇔ *razdjela* 'chapter-Gen.Sg.'

Past participle: masc.Sg. *i*, other forms *je*: *htio* 'wanted-masc.Sg.' ⇔ *htjela* 'wanted-fem.Sg.'

### 2.3.1.10 Alternation *ije* ⇔ *i* and *i* ⇔ *ije* (only in the ljekavian pronunciation)

*Description:*

*ije* alternates with *i* in different forms of the same word.

*Rule:*

stem={form1, form2...formn}

form1=\*ije(\*)

form2=\*i(\*)

\* - any single phoneme or cluster of phonemes

*Example:*

*zality* 'water-perfective' ⇔ *zalijevati* 'water-imperfective'

zal    i    ti    ⇔    zal    **ije**    vati

\*        i        \*            \*        ije        \*

*Heuristics:*

If there is an *i* in a stem and it cannot be matched with a basic word, replace the *i* with the *ije* sequence; if there is an *ije* in a stem and it cannot be matched with a basic word, replace the *ije* with the *i* sequence.

*zalijem* 'I water':

[match with *zaliije* ⇒ no such stem in Ljekavian]-[replace *ije* with *ij*]-*zali(ti)*-[stem found]

*Morphological Categories:*

Nouns: Nom. and Acc.Sg. *i*, other cases *ije*: *dio* 'part-Nom.Sg.' ⇔ *dijela* 'part-Gen.Sg.'

Adjectives: masc.Sg. *i*, other forms *ije*: *cio* 'whole-masc.Sg.' ⇔ *cijela* 'whole-fem.Sg.'

Past participle: masc.Sg. *i*, other forms *ije*: *donio* 'brought-masc.Sg.' ⇔ *donijela* 'brought-fem.Sg.'

Verbs: imperfective *ije*, perfective *i*: *lijevati* 'pour-imperfective' ⇔ *liti* 'pour-perfective'

Derivatives: basic word *ije*, derivative *i*: *dijeliti* 'separate' ⇔ *dioba* 'separation' ✂

### 2.3.1.11 Alternation *e, o, u* ⇔ Ø and Ø ⇔ *e, o, u*

#### *Description:*

The sounds *e, o, u* alternate with nothing (zero) in different forms of the same word.

#### *Rule:*

stem={form1, form2...formn}

V={e,o}

form1=\*Ø\*

form2=\*V\*

\* - any single phoneme or cluster of phonemes

*Example:*

*brati* 'pick-Inf.' ⇔ *berem* 'pick-1p.Pres.'

b      Ø    rati   ⇔   b   e    rem

\*      i    \*           \*   V    \*

*Heuristics:*

If there is a vowel in a stem and it cannot be matched with a basic word, delete it; if there is a consonant cluster in a stem and it cannot be matched with a basic word, insert a vowel between the consonants.

*berem* 'I pick':

[match with *bere* ⇔ no such stem]-[replace *e* with Ø]-*br(ati)*-[stem found]

*Morphological Categories:*

Verbs: Infinitive stem Ø, Present Tense stem: *e, a*: *zvati* 'call-Inf' ⇔ *zovem* 'I call-1<sup>st</sup> p.Pres.'

### 2.3.1.12 Alternations in Front of the Suffixes —stvo and —ština

*Description:*

The consonants *k, g, h, c, č, z, ž* all alternate with *š* in front of the suffixes *–stvo* and *–ština*.

*Rule:*

stem={form1, form2...formn}

H={k, g, h, c, č, z, ž}

S={stvo, ština}

form1=\*HS\*

form2=\*šS\*

\* - any single phoneme or cluster of phonemes

*Example:*

*junak* 'hero' ⇔ *junaštvo* 'heroism'

juna    k    ⇔    juna    š    stvo

\*        H        \*        š        \*

*Heuristics:*

If there is a *š* in a stem preceding the suffixes *-stvo* and *-ština* and it cannot be matched with a basic word, replace the *š* with *k, g, h, c, č, z, or ž*.

*junaštvo* 'heroism':

[match with *junaš* ⇒ no such stem]-[replace *š* with *k*]-*junak*-[stem found]

### 2.3.1.13 Alternations in Front of the Suffix —ski

*Description:*

The consonants *g* and *h* alternate with *š*, while *k* and *c* alternate with *č* in front of the suffix *-ski*.

*Rule:*

stem={form1, form2...formn}

H1={g, h}

H2={k, c}

S={ki}

form1=\*H1S\*

form2=\*šS\*

\* - any single phoneme or cluster of phonemes

form1=\*H2S\*

form2=\*čS\*

*Example:*

*vraški* 'diabolically' ⇔ *vrag* 'devil'

vra **g** ⇔ vra **š** ski

\* H1 \* š S

*Heuristics:*

If there is a *š* in a stem preceding the suffix *-ski* and it cannot be matched with a basic word, replace the *š* with *g* or *h*; if there is a *č* in the stem preceding the suffix *-ki* and it cannot be matched with a basic word, replace the *č* with *k* or *c*.

*vraški* 'diabolically':

[match with *vraš* ⇔ no such stem]-[replace *š* with *g*]-*vrag*-[stem found]

*Krk* 'an island in Croatia' ⇔ *krčki* 'pertaining or belonging to the island of Krk'

## 2.3.2 Alternations in the Endings

The following heuristics pertain to the choice of inflectional endings. A form can thus be linked to basic forms without any changes.

### 2.3.2.1 The e ⇔ o Alternation

*Description:*

The vowel *e* alternates with *o* in the same ending.

*Rule:*

form={stem+ending}

S={č, ć, dž, j, lj, nj, š, ž, št, žd}

H={ b, c, d, f, g, h, k, l, m, n, p, r, s, t, v, z }

stem1={\*H}

stem2={\*S}

ending1={o\*}

ending2={e\*}

form1=stem1+ending1

form2=stem2+ending2

\* - any single phoneme or cluster of phonemes

*Example:*

*robom* 'slave-Ins.' ⇔ *kraljem* 'king-Ins.'

ro    b    om            ⇔    kra    lj    em

\*    H    ending 1            \*    S    ending2

See Appendix 10.3.2 for exceptions where *c*, *z*, *s*, and *r* are soft.

*Grammatical Categories:*

Nouns: Nom.Sg.neuter, Ins.Sg.masc. and neut., long plural masculine: *selo* 'village-Nom.Sg.'

⇔ *polje* 'field-Nom.Sg'

Adjectives and Pronouns: Nom.Sg. neuter, Gen.Sg. neuter and masculine: *dobrog* 'good-

Gen.Sg.' ⇔ *vrućeg* 'hot-Gen.Sg'

### 2.3.3 Alternations in the Affixes

#### 2.3.3.1 The a ⇔ Ø Alternation

*Description:*

The sound *a* alternates with nothing ( $\emptyset$ ) in the same prefix.

*Rule:*

form={prefix+stem}

S={s, š, z, ž }

K={b, c, d, f, g, h, j, k, l, lj, m, n, nj, p, r, t, v }

V={a, e, i, o, u, KrK}

prefix1={sa}

prefix2={s}

prefix3={\*Ka}

prefix4={\*K}

stem1={S\*}

stem2={KV\*}

stem3={KK\*}

form1=prefix1+stem1

form2=prefix2+stem2

form3=prefix1 or prefix3+stem3

form4=prefix4+stem2

\* - any single phoneme or cluster of phonemes

*Example:*

*skupiti* 'finish collecting' = *s* 'finish' + *kupiti* 'collect'

*sašiti* 'finish sawing' = *s* 'finish' + *šiti* 'saw'

*razastrti* 'finish hanging' = *raza* 'finish' + *strti* 'hang'

s	k	upiti	⇔	sa	ši	ti	⇔	raza	st	rti
prefix1	K	V*		prefix2	KV	ending2		prefix3	KK	ending2

### 2.3.3.2 The o ⇔ e Alternation

*Description:*

The vowel *e* alternates with *o* in the same suffix.

*Rule:*

form={stem+suffix}

H={č, ć, dž, j, lj, nj, š, ž, št, žd}

S={ b, c, d, f, g, h, k, l, m, n, p, r, s, t, v, z }

stem1={\*H}

stem2={\*S}

suffix1={o\*}

suffix2={e\*}

form1=stem1+suffix 1

form2=stem2+suffix 2

\* - any single phoneme or cluster of phonemes

*Example:*

*robov* 'slave's' ⇔ *kraljev* 'king's.'

ro    b    ov            ⇔    kra    lj    ev

\*    H    suffix 1            \*    S    suffix 2

See Appendix 10.3.2 for exceptions where *c*, *z*, *s*, and *r* are soft.

### 2.3.4 Optional Vowels

Some adverbial as well as adjectival and pronominal endings have an optional final vowel, for example:

*sad* ⇔ *sada* 'now'

*kad* ⇔ *kada* 'when'

*mom* ⇔ *mome* 'mine-Dat.Sg.'

The list of these words and forms is provided in Appendix 10.2.1.

### 2.3.5 Chained Alternations

In numerous instances morphophonemic alternations occur combined both with each other and with phonological alternations, for example:

*otac* 'father' ⇔ *očevi* 'fathers'

o t a c

o Ø Ø č evi

r a:Ø c:č

e

d

u

c

t

i

o

n

*orao* 'eagle-Nom.' ⇔ *orla* 'eagle-Gen'

or a o

or Ø l a

a:Ø o:l

In order to match an inflectional form or derivative with its basic form one needs to take into consideration all previously mentioned morphophonemic and phonological alternations.

