Prosodic Structure of Russian: A Psycholinguistic Investigation of the Metrical Structure of Russian Nouns

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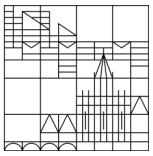

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Abstract

Russian is an unpredictable stress language, where stress is not fixed to a particular morpheme or a syllable, but is rather assumed to be marked lexically for each morpheme (roots and affixes). Although Russian lexical stress and factors determining its location in a word have been extensively examined, it is not clear whether there are some phonological properties that may influence the location of stress. In this dissertation, I investigate non-lexical stress placement in Russian, i.e. the default stress placement expected to arise whenever there is no lexically specified accent in a word and explore which *phonological* factors affect stress placement in Russian. In particular, I ask (i) which principles govern the assignment of stress in the absence of lexical information, and (ii) whether the default stress emanates from a particular foot type (trochee or iamb) that underlies the Russian prosodic system.

Previous research on the Russian default stress pattern and metrical structure has yielded conflicting results and incoherent description of facts. The proposed default positions of stress range from word-initial (Melvold 1990), stem-final (Crosswhite et al. 2003) to post-stem (Alderete 2001). Analyses of the type of metrical foot in Russian also diverge remarkably: Revithiadou (1999) claims that Russian has a trochaic foot, van der Hulst (1999) and Hayes (1995) classify Russian as an unbounded lexical accent system, whereas Halle & Vergnaud (1987), Melvold (1990), Crosswhite (2000) argue for an iambic foot. Previous experimental studies that attempted to reveal speakers' underlying knowledge, however, fail to tease apart the contribution of morphological information from purely phonological grounds in default stress assignment (e.g., Crosswhite et al. 2003).

In this dissertation, I present results from a series of production studies that examined the default stress pattern in Russian novel words without lexically pre-specified accent. The first two experiments controlled for the various inconsistencies in previous studies by using a group of indeclinable words, in particular place names and acronyms, which permitted the exclusion of

morphological factors. The findings revealed the following default pattern: final stress in consonant-final words, penultimate stress in vowel-final words. I provide a unified account of default stress in both consonant- and vowel-final words by assuming that all Russian words (including consonant-final ones) underlyingly end in a vowel. In light of these findings as well as diachronic and typological observations, I claim that the phonological default stress pattern in Russian is a syllabic trochee built from the right word-edge in both indeclinable and declinable words.

The third experiment investigated prominence relations in novel compounds with the primary objective being to understand whether an underlying metrical structure, presumably the trochee, plays a role in secondary stress assignment in Russian. The primary assumption here was that rhythmic prominences should emerge from a phonological stress mechanism that assigns default stress since secondary stress placement may not be assigned in the lexicon (there is no underlying accent within the root). The elicited compounds were characterized by consistent rhythmic patterns: compounds with three- and four pre-stressed syllables got secondary stress predominantly on the initial syllable whereas the preferred position of stress for compounds with five pre-stressed syllables was the second syllable. The results indicate that rhythmic secondary stress is assigned by means of left-headed metrical feet constructed from right to left starting from the linking vowel. Based on these findings, I argue that the trochaic foot underlies the Russian metrical structure and emerges in both default stress and rhythmic alternations.

Zusammenfassung

Die russische Sprache besitzt eine Betonung, die man als frei und beweglich bezeichnet, d.h. sie ist nicht auf einer bestimmten Silbe oder einem Morphem fixiert. Es wird behauptet, dass alle Morpheme (Stämmer und Suffixe) eine Akzentmarkierung tragen. Die russische lexikalische Betonung und die Faktoren, die die Akzentposition in einem Wort bestimmen, sind umfassend untersucht. Allerdings ist immer noch nicht klar, ob es Wortakzentregeln gibt, die sich nicht auf die phonologischen Eigenschaften beziehen. In dieser Dissertation wird der Defaultakzent im Russischen untersucht. Es wird argumentiert, dass wenn das Wort keinen lexikalisch spezifizierten Akzent hat, erhält es den Defaultakzent. Dieses Vorhaben beinhaltet eine Untersuchung der phonologischen Faktoren, die die Akzentplatzierung beeinflüssen könnten. Insbesondere werden die folgenden Fragen gestellt (i) welche Prinzipien die Akzentplatzierung regulieren, wenn es keine lexikalische Akzentspezifizierung in einem Wort gibt, und (ii) ob der Defaultakzent durch das Errichten eines bestimmten Fußes (Trochäus oder Jambus), der dem russischen prosodischen System unterliegt, zugewiesen wird.

Die bisheringen Forschungen zu dem Defaultakzent und den metrischen Strukturen im Russischen haben zu widersprüchlichen Ergebnissen geführt. Die vorgeschlagenen Defaultakzentplazierungen sind verschieden: die erste Silbe des Wortes (Melvold 1990), die letzte Silbe des Stammes (Crosswhite et al. 2003) und die Flexionsendung (Alderete 2001). Analysen des metrischen Fußes im Russischen weichen stark voneinander ab: Revithiadou (1999) behauptet, dass Russisch einen trochäischen Fuß besitzt, van der Hulst (1999) und Hayes (1995) betrachten Russisch al metrisch ungebundenes Akzentsystem, während Halle & Vergnaud (1987), Melvold (1990), Crosswhite (2000) behaupten, dass Russisch einen Jambus aufweist. Frühere experimentelle Studien haben versucht, die zugrundeliegenden Kenntnisse der Muttersprachler festzustellen. Allerdings, schlugen die Versuche fehl, die morphologische Information von phonologischen Gründen in der Platzierung des Defaultakzents aufzutrennen (Crosswhite et al. 2003).

In dieser Dissertation werden die Ergebnisse einer Reihe von Experimenten präsentiert, die den Defaultakzent in russischen Nichtwörtern ohne lexikalisch spezifizierten Akzent untersuchten. Die ersten zwei Experimente haben die früheren Studien ergänzt, indem sie den Einfluss der morphologischen Faktoren durch die Nutzung der undeklinierbaren Wörtern ausgeschlossen haben. Die Ergebnisse haben das folgende Default-Akzentmuster erbracht: die Betonung auf der letzten Silbe in den Wörtern, die auf einen Konsonanten enden; die Betonung auf der vorletzten Silbe in den Wörtern, die auf einen Vokal enden. Es wird eine gemeinsame Erklärung für die beobachteten Default-Akzentmuster präsentiert, unter der Annahme, dass alle russischen Wörter (einschließlich Wörter, die auf einen Konsonanten enden) in ihrer zugrundeliegenden Form auf einen Vokal enden. Angesichts dieser Ergebnisse sowie diachronischer und typologischer Beobachtungen wird behauptet, dass der Defaultakzent im Russischen ein silbischer Trochäus ist, der an dem rechten Wortrand für deklinierbare und undeklinierbare Wörter aufgebaut ist.

Das dritte Experiment hat Prominenzrelationen in neuen Komposita untersucht, mit dem vorrangigen Ziel festzustellen, ob die zugrundeliegende metrische Struktur (vermutlich ein Trochäus) eine Rolle in der Platzierung der Nebenbetonung spielt. Die Hauptannahme war, dass die rhythmischen Prominenzen von dem phonologischen Mechanismus, der den Defaultakzent zuweist, abhängig sind. Das hängt damit zusammen, dass die Nebenbetonung nicht im Lexikon zugewiesen sein kann (es gibt keinen lexikalisch spezifizierten Akzent in dem Stamm). Die Komposita haben die folgenden rhythmischen Strukturen aufgewiesen: in den Kompositen mit drei und vier Silben vor der Hauptbetonung ist die Nebenbetonung überwiegend auf der ersten Silbe aufgetreten, während die Komposita mit fünf Silben vor der Hauptbetonung größtenteils auf der zweiten Silbe betont werden. Die Ergebnisse deuten darauf hin, dass die sekundäre Betonung durch den trochäischen Fuß zugewiesen ist, der von rechts nach links von dem Verbindungsvokal aufgebaut ist. Aufgrund dieser Ergebnisse wird behauptet, dass der trochäische Fuß der russischen metrischen

Struktur zugrundeliegt und sowohl in dem Defaultakzent, als auch in den rhythmisch präferierten Mustern auftritt.

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List of abbreviations

ACA	affix-controlled accent
acc	accusative
Adj	adjective
Adv	adverb
AR	accent resolution
aug	augmentative
B	Bulgarian
BAP	Basic Accentuation Principle
BND	bounded
CG	clitic group
CR	Contemporary Russian
CS	Common Slavic
Cz	Czech
D	dominance
dat	dative
dim	diminutive
emph	emphatic
ES	ending sequence
fem	feminine
gen	genitive
HT	head-terminal
inf	infinitive
imp	imperative
instr	instrumental
interr	interrogative
LCS	Late Common Slavic
lf	long form
masc	masculine
MS	main stress
N	noun
neut	neuter
nom	nominative
OT	Optimality Theory
perf	perfect
pers	person
pl	plural
prep	prepositional
PS	Proto-Slavic
PPh	phonological phrase
PW	phonological word
PW_{Rec}	recursive phonological word

R	Russian
RCA	root-controlled accent
REO	restricted edge-orientation
RSS	rhythmic secondary stress
SC	Serbian, Croatian
SS	secondary stress
SSS	semantic secondary stress
sf	short form
sg	singular
TAF	transderivational anti-faithfulness
UG	Universal Grammar
V	verb

Chapter 1 Introduction

1.1 Aims and objectives of the dissertation

Stress placement has been the topic of numerous linguistic analyses. However, relatively little is known about the mental representation of stress, and how it interacts with rhythm and intonation. To reach a better understanding of prosody in linguistic theory, it is important to know how stress is represented and processed in the mind, how stress assignment works, and how this interacts with other phonological processes as well as other components of grammar such as morphology and syntax. Word stress in many languages is fairly predictable, i.e. it is governed by rules that apply to almost the entire vocabulary, or lexicon. These languages are said to be fixed-stress languages (e.g., Polish, Hungarian, Turkish). Other languages are said to have free or lexical stress, as stress placement is difficult to predict (e.g., Spanish, Italian, Russian). In lexical stress languages, stress assignment is usually not sensitive to the phonological make-up of words, i.e. syllable structure, syllable weight or metrical structure. However, languages with unpredictable stress may have some phonological restrictions, for example, stress in Spanish and Italian may not surface beyond the antepenultimate syllable; in English, German and Dutch stress is equally determined by phonology, morphology and the lexicon.

Russian offers a particularly interesting case for studying stress assignment as it is generally assumed that there are no phonologically-driven stress rules. It is known to be an unpredictable stress language in which stress is not fixed to a particular location within a certain phonological domain but rather marked lexically for a number of individual morphemes (e.g., roots and affixes). Although there is no unified treatment of stress in all inflected and derived words in Russian, basic stress patterns for different grammatical categories are well-established and classified (for a detailed discussion see, for example, Red'kin 1971, Fedjanina 1976, Zaliznjak 1977). There is a clear consensus in the literature

that stress is conditioned morphologically, i.e. inherent accentual properties of roots and suffixes determine stress location in a word. It is still not clear, however, whether there are some phonological properties that may influence the location of stress. This dissertation aims to contribute to the investigation of non-lexical stress placement in Russian, i.e. the default stress placement which is expected to arise whenever there is no lexically specified accent in a word. The default stress positions proposed for Russian are far from unified ranging from word-initial (Kiparsky and Halle 1977, Halle 1973, 1997, Melvold 1990, Idsardi 1992, Revithiadou 1999), stem-final (Crosswhite et al. 2003) to post-stem (Alderete 2001). I demonstrate that theoretical research on Russian stress makes assumptions about default stress assignment only in light of limited data, ignoring various types of morphemes in Russian. Experimental research using novel words, on the other hand, is a much better tool for determining a default location of stress as stimuli have no lexical entries and thus are unmarked for stress. Previous experimental work, however, does not set apart the contribution of morphological information from purely phonological grounds in default stress assignment due to the use of declinable words. Thus, the phonological default stress position in Russian remains relatively understudied due to confounding effects of morphology in both theoretical and experimental studies.

This dissertation extends research into the default position of stress in Russian. Furthermore, it investigates the foot type that underlies the Russian metrical structure and arguably emerges in both default stress and rhythmic patterns. These issues are explored from theoretical, experimental and historical perspectives. As such, I offer a systematic and unified account of highly disputable issues in Russian prosody. The three production studies of this dissertation have been conducted to investigate stress realization by Russian native speakers in words without lexically pre-specified accent. The first two experiments controlled for the various inadequacies in previous studies by using a group of indeclinable words, in particular place names and acronyms, as the only way to investigate speakers' underlying stress pattern is through their realization

of words that crucially lack morphological information. I also studied the potential contribution of vowel quality (back/ front) in the last two syllables, the type of penultimate syllable (closed/ open), as well as word length (two-/ three-syllable) to stress assignment. The results of these studies indicate a robust tendency for the default stress to appear on the penultimate syllable of indeclinable vowel-final words while consonant-final declinable words receive final stress in the absence of inflectional endings. In light of these findings as well as diachronic and typological observations, I argue that the phonological default stress pattern in Russian is a syllabic trochee built from the right word-edge in both indeclinable and declinable words. The third experiment investigates prominence relations in novel compounds to see whether the same underlying metrical structure plays a role in secondary stress assignment. In addition, the phonology of Russian compounds is examined: what the acoustic parameters of secondary stress are, whether secondary stress should be attributed to word-prosodic or phrase-prosodic effects and, finally, whether there is a prosodic word boundary between compound components. The results indicate that secondary stress is directly connected to rhythm which means that its assignment results from the construction of metrical feet. Based on these findings, I argue that the trochaic foot underlies the Russian metrical structure and arises in both default stress and rhythmic alternations. I offer a full-fledged account of the much disputed default stress pattern and the type of metrical structure in Russian that is not only psycholinguistically valid but also accords with diachronic developments.

To summarize, the research area of this dissertation encompasses phonological stress assignment at the word level, metrical foot type, and secondary stress assignment as an implementation of a rhythmic structure in Russian. I investigate which mechanisms are involved in Russian stress assignment in the absence of lexical representation and provide further empirical evidence for the relationship between stress and foot structure. Therefore, the present study not only points to the phonological default stress pattern in Russian,

but also explains why the default looks like this and how it is connected with the overall metrical structure of the language.

1.2 Outline

Chapter 2 presents the relevant theoretical background on Russian phonology and morphology with a special emphasis on suprasegmental units. I concentrate on the phonemic inventory of Russian, Russian syllable structure and provide a general overview of Russian stress assignment. This is followed by the presentation of the Russian nominal declension system. Chapter 3 gives an overview of the evolution of the Russian accentual system, in particular the development of the Old Russian syllabic structure and the evolution of the accentual properties of the Russian morphemes. The most important prosodic changes are also specified from Late Common Slavic to Modern Russian. This leads to a detailed presentation of the accentual system of Standard Russian in Chapter 4. I present the accentual nominal paradigms and give a detailed account of the most important theoretical studies on the assignment of stress in Russian nouns. In particular, I examine factors which are considered to affect stress placement in underived and derived Russian words, and present the most important analyses of the Russian stress assignment (Zaliznjak 1977, 1985, Halle 1975, 1997, Melvold 1990, Revithiadou 1999, Alderete 2001). Furthermore, I systematically analyze the previous theoretical research on the Russian default stress assignment as it is of particular relevance to this dissertation. Chapter 5 discusses the phonological default in lexical stress systems and its connection to metrical structure followed by an analysis of the existing theories of the Russian metrical foot type. Chapter 6 introduces a new approach to the investigation of the default stress assignment in Russian. It presents some previous experimental research on the investigation of the Russian default stress pattern. I discuss the conflicting results of the theoretical and experimental studies that investigated the default stress pattern in Russian, and lay out the aims and research objectives of the current study. Chapter 7 presents the two experimental studies which explore stress realization by

Russian native speakers in novel words in the absence of morphological factors, namely in novel place names and acronyms. I provide a unified analysis of stress responses and discuss the foot type that arguably underlies the Russian metrical structure. Chapter 8 is devoted to previous research on Russian compound stress. The chapter begins with a discussion of different types of compounds in Russian followed by an extensive overview of phonological properties of Russian compounds. I discuss compound stress, its connection to foot type, and analyze previous accounts of the phonological status of compounds in Russian. Chapter 9 presents a current production study on secondary stress placement. I investigate the following questions: (i) the conditions under which secondary stress surfaces in a word, (ii) the acoustic properties of secondary stress, and (iii) the relationship between secondary stress and rhythm. Chapter 10 offers a systematic analysis of the findings of this dissertation and presents a unified account of a highly disputable issue in Russian prosody, the default stress pattern in Russian, and its ramifications for the metrical structure. Furthermore, I analyze the data and provide a new account of the phonological status of compounds in Russian. Chapter 11 provides a concluding summary of the results of the experimental studies and proposes ideas for future research.

Chapter 2 Preliminaries: Russian stress at the phonology-morphology interface

This chapter provides a general survey of the phonological system of Standard Russian based on the Moscow dialect. It presents the phonemic inventory of Russian segmental units with the examples of strong and weak positions for consonants and vowels. It is demonstrated that stress is an important suprasegmental feature affecting Russian vowels which are subject to considerable allophony depending on the stress position in a word. I also present different approaches to syllabification in Russian as the syllable is an important domain for suprasegmental processes. This is followed by a brief account of Russian basic stress patterns which include fixed and mobile stress paradigms. As mobile stress paradigms are defined by an accentual alternation between a stem vowel and an inflection, it is relevant to provide an introduction to Russian inflectional morphology. Section 2.2 presents the main declension types of Russian nouns: most nouns decline, i.e. they change their endings to express a particular case and number. Stress alternations between a stem and an inflection define an accentual paradigm of a noun. This chapter provides a theoretical background for the discussion of the Russian nominal paradigms with accentual mobility that are presented in Chapter 4.

2.1 Overview of Russian phonology

2.1.1 Phonemic units

According to the Moscow phonological school, a phoneme can be defined only in the strong position: for vowels it is the position under stress, for consonants these are the positions before vowels, sonorants and the consonant /v/, in which voiced and voiceless consonants are differentiated. Strong pronunciation positions of phonemes are those in which they are not affected by neighboring sounds: it is a word-initial position before a non-palatalized consonant for vowels, and a position

before /a/ for consonants. Thus, an absolute strong position for vowels is the word-initial position under stress before a non-palatalized consonant; for consonants it is the position before the stressed phoneme /a/.

2.1.1.1 Consonants

This section does not provide an exhaustive treatment of phonemic units as this work is intended primarily to investigate suprasegmental components of the Russian language. However, it is necessary to provide a broad overview of the sound system of Russian as it is of high relevance for the subsequent discussion of such processes as consonant voicing assimilations, vowel reduction patterns, different modifications of sounds in connected speech.

Russian differentiates up to 37 consonant phonemes pre-vocalically which are presented in Table 2.1.[1] Palatalization, indicated here by a superscript <j>, is a phonemic feature in Russian and almost every consonant has a palatalized counterpart.

Table 2.1: The Russian consonant inventory (based on Jones & Ward 1969, Timberlake 2004)

	labial	**labio-dental**	**dental**	**(alveo-)palatal**	**velar**
stop	p p^{j}		t t^{j}		k k^{j}
	b b^{j}		d d^{j}		g g^{j}
affricate			t͡s	t͡ɕ	
fricative		f f^{j}	s s^{j}	ʂ ɕː	x x^{j}
		v v^{j}	z z^{j}	ʐ ʑː	
glide				j	
nasal	m m^{j}		n n^{j}		
lateral			l l^{j}		
trill			r r^{j}		

[1] The Russian phonemic inventory is represented by the IPA symbols. Russian examples in this dissertation are presented in the *linguistic system* of transliteration (see Appendix A). The diacritic ' is used as a marker of palatalization in transliteration.

However, there is no agreement as to the exact number of consonant phonemes in Russian. Some linguists do not regard velar palatalized consonants /kʲ gʲ xʲ/ as separate phonemes because plain /k, g, x/ and their palatalized counterparts do not contrast word-finally. There is also controversy concerning the phonemic status of the long palatalized /ɕ:/ and /ʑ:/. In particular, /ʑ:/ is present in some idiolects and absent in the others; /ɕ:/ is regarded by some linguists as a combination of /s/ and /t͡ɕ/ or /ʂ/ and /t͡ɕ/.

Both voiced and voiceless consonants may appear before vowels (e.g., *d̲om* 'house'- *t̲om* 'volume'), before sonorants (e.g., *s̲loj* 'layer'- *z̲loj* 'angry'), and before /v/ and /vʲ/ (e.g., *d̲vorec* 'palace' - *t̲vorec* 'creator') (Moiseev 1980: 57). These are the strong positions for the voicing contrast. The voicing contrast is neutralized word-finally (e.g., *sad̲* [sát] 'garden') and before an obstruent (except /v/ and /vʲ/ which do not trigger voicing assimilation) where consonant sequences agree in voicing (e.g., *skaz̲ka* [skáskə] 'fairy tale', *proʂ'b̲a* [prózʲbə] 'request').

The strong positions for the contrast between palatalized and non-palatalized consonants are the word-final position (e.g, *ugol* 'corner' - *ugol'* 'coal'), the position before the vowels /a/, /o/, /u/ (e.g., *luk* 'bow'- *l'uk* 'hatch'), for dental consonants it is the position before palatalized and non-palatalized velar consonants (e.g., *redko* 'seldom' - *red'ka* 'radish'), and before non-palatalized labial and labio-dental consonants (e.g., *izba* 'peasant's house' - *rez'ba* 'carving') (Moiseev 1980: 59-61).

2.1.1.2 Vowels

There are five vowel phonemes in Standard Russian: /a/, /e/, /i/, /o/, and /u/ as presented in Table 2.2. They contrast in stressed syllables whereas in an unstressed position, vowels change their quality and neutralization occurs: the distinction between unstressed /o/ and /a/ is lost.

Table 2.2: The Russian vowel inventory (based on Jones & Ward 1969, Timberlake 2004)

	front	central	back
close	i	(ɨ)	u
mid	e		o
open		a	

According to the Leningrad phonology school, there is a sixth vowel phoneme /ɨ/ in Russian. The Moscow phonological school, however, treats [ɨ] and [i] as allophones of /i/ because they are in complimentary distribution: [i] is preceded by palatalized consonants or by vowels whereas [ɨ] is realized after non-palatalized consonants; word-initially [ɨ] is rather rare and occurs only in few borrowed proper names.

As mentioned at the beginning of the section, an absolute strong position for vowels is the stressed word-initial position before non-palatalized consonants. With vowel quality specification we may differentiate some more absolute strong positions for vowels: for the vowels /a/, /o/, /u/, it is the stressed position after a non-palatalized consonant word-finally (e.g., *vodá* 'water'), and between non-palatalized consonants word-medially (e.g., *sád* 'garden'). For the front vowel /i/, it is a stressed word-final position after a palatalized consonant (e.g., *nes'i* 'bring' inf. imp.), and between a palatalized and a non-palatalized consonant (e.g., *m'ír* 'peace'). All the other positions are weak pronunciation positions as vowels undergo some qualitative changes, for example, non-front vowels raise to accommodate to adjacent palatalized consonants and front vowels are pronounced more closed between palatalized consonants (Moiseev 1980: 37). For this reason, the system of Russian vowel allophones is rather complicated as the choice of an allophone depends on the phonetic environment of the phoneme, namely the palatalization of the neighboring consonants and stress position in a word.

Unstressed vowel positions are functionally weak as vowels undergo qualitative and quantitative reduction so that fewer vowel sounds are differentiated. The phenomenon of vowel reduction in Modern Standard Russian

has been extensively analyzed (e.g., Avanesov 1956, 1972, Halle 1959, Jones & Ward 1969, Lightner 1972, Ward 1975, Crosswhite 2000, 2001, Padgett 2004, Barnes 2006, 2007). This issue is closely investigated in Chapter 5, where the connection between vowel reduction patterns and metrical foot type in Russian is discussed.

2.1.2 Suprasegmental units

2.1.2.1 Syllabification

Syllable boundaries are not phonologically clear in Russian and consonant clusters may exhibit various syllabification patterns depending on the speaker. There are different theories of syllabification in Russian, the most popular ones are the muscular tension theory of syllable formation and division (Ščerba 1953), and the sonority theory (Avanesov 1956). According to the muscular theory, the syllable is formed by intensification of articulation towards the syllabic peak and its subsequent decreasing. There are initially strong consonants with a weak final tension, finally strong consonants with an weak initial tension and consonants with an equal tension at the beginning and at the end. Finally strong consonants form a syllable onset as the tension grows towards the vocalic peak (e.g., *sa*) , initially strong consonants occur in the coda position, where the tension is stronger at the beginning of a consonant being close to the vocalic peak (e.g., *as*), whereas consonants with an equal tension can occur between two syllables (e.g., *essay*). Syllabification of consonant clusters is thought to be determined by stress placement: if stress falls on a vowel preceding the consonant cluster, the syllabic boundary lies after the first consonant (e.g., *ván-na* 'bath tub'); after an unstressed vowel, the consonant cluster makes up the onset of the following syllable (e.g., *vo-lná* 'wave').

The sonority theory of syllable formation was originally put forward by Jespersen (1904) and developed by Avanesov (1954) with respect to the Russian language. According to this theory, the most sonorous sounds form the peak of a

syllable while the marginal elements are characterized by sonority decrease. Syllabification of complex clusters is guided by the Sonority Sequencing Principle according to which segments must rise in sonority towards the syllable peak and fall in sonority thereafter. Two adjacent sounds of the same sonority profile are allowed so that in intervocalic obstruent-obstruent, sonorant-sonorant or obstruent-sonorant consonant clusters, the syllable boundary lies before a cluster, whereas combinations of a sonorant followed by an obstruent are divided by a syllable boundary. The same syllabification principles are deemed to apply at a proclitic plus the host juncture, i.e. the clitic-final consonant is resyllabified to form an onset of the following syllable. The same does not apply, however, to adjacent lexical words which are assumed to be separated by a syllable boundary.

According to Bondarko (1969, 1977), an important characteristic of a syllable is a strong consonant-vowel coarticulation. Her acoustic study revealed that CV sequences formed more cohesive units than VC sequences: consonants became labialized preceding a rounded vowel regardless of stress and the number of consonants in clusters (e.g., *már^{w}k^{w}u* 'stamp' N. acc.sg.). A vowel does not affect the following consonant which suggests that the syllable boundary lies between the vowel and the consonant cluster. She claims that all syllables in Russian are open: even if a word ends in a consonant and is followed by a pause, an open final syllable appears. Final stops get aspiration, which has the functional role of a vowel so that the word */kot/* 'cat' is interpreted as [ko-tə].

Thus, an intervocalic consonant always forms an onset of the following syllable in Russian; syllabification of word internal consonant clusters is not straightforward as they may be syllabified in different ways. However, we may sum up the following main principles of syllabification in Russian: (1) the principle of rising sonority of non-initial syllables according to which an obstruent-sonorant cluster makes up the onset of the following syllable (e.g., *ste-kló* 'glass'), and a sonorant-obstruent cluster is divided by a syllable boundary (e.g., *tol-pá* 'crowd'), (2) the principle of syllabification at the points of the lowest

sonority according to which segments of the same sonority level are parsed in the same onset (e.g., *dí-ktor* 'announcer', *šú-mnyj* 'noisy').

2.1.2.2 Russian stress assignment

This section is intended primarily to give a general overview of the Russian stress system as it is of high relevance for the historical survey of the Russian accentual system presented in the next chapter. The most comprehensive analysis of the nominal accentual paradigms is provided in Chapter 4, in which different theories of stress assignment in Modern Standard Russian are examined with a special emphasis on the central issue of this dissertation, the default stress assignment.

2.1.2.2.1 Lexical stress

In Russian, the assignment of stress is generally characterized as 'free' as it is independent of the phonological form of a word. More specifically, it is not fixed to a particular syllable in a word and syllable structure does not play a role in stress assignment. There are words that differ only in the position of stress (e.g., *múka* (N.nom.sg.) 'torture', *muká* (N.nom.sg.) 'flour'). The position of stress is unpredictable due to its contrastive nature. As such, it is arguably marked for every word.

Russian underived words are composed of a root and an inflectional ending that expresses number, gender and case. Words change their endings depending on their function in the sentence, thus, nouns are declined. Nominal declension is subject to six cases in Russian (nominative, genitive, dative, accusative, instrumental and prepositional), and each case has its own ending. Roots and affixes are underlyingly marked for accent[2] in the lexicon, i.e. stress placement is lexical.

[2] The term *accent* is used to refer to an abstract entity, an autosegmental unit in the form of a grid mark, which is sponsored by a particular morpheme as its idiosyncratic property. An accent is phonetically realized as *stress* in a stress-accent language, or as *pitch* in a pitch-accent language (e.g., Revithiadou 1999, Alderete 2001, Kabak & Revithiadou 2009a).

There are three basic patterns of stress in Russian. According to Zaliznjak (1977) (cited in Alderete 2001), in 92% of nouns, stress is fixed on one and the same vowel of the stem in all case forms (Pattern A), as illustrated in (1).

(1) Pattern A: Fixed stem-stress (invariable stem-stress)

(a) Nom. sg. *právil-o* 'rule'

(b) Acc. sg. *právil-u*

(c) Nom.pl. *právil-a*

Pattern B, on the other hand, accounts for nouns with a fixed stress on the inflection in all forms (2), which represents 7% of all nouns.

(2) Pattern B: Fixed stress on inflection (invariable inflection-stress)

(a) Nom.sg. *gospož-á* 'lady'

(b) Acc.sg. *gospož-ú*

(c) Nom.pl. *gospož-í*

There are also mobile stress patterns (Pattern C) in Russian nouns (2%) when forms of a word differ in stress placement. In particular, some forms of a word may have stem stress, while others have stress on the inflection. For example, there are nouns where the location of stress alternates between the initial syllable and the inflection (3).

(3) Pattern C: Mobile stress pattern-1 (initial stem-stress ~ inflection-stress alternation)

(a) Nom.sg. *górod*	'town'	Nom.sg. *skovorod-á*	'frying pan'
(b) Gen.sg. *górod-a*		Gen.pl. *skovorod-ý*	
(c) Nom.pl. *gorod-á*		Nom.pl *skóvorod-y*	

Last but not least, there are also nouns with alternating stress between the inflection and the final syllable of the stem (4).

(4) Pattern D: Mobile stress pattern-2 (final stem-stress ~ inflection-stress alternation)

(a) Nom.sg. *kolbas-á* 'sausage'
(b) Gen.sg. *kolbas-ý*
(c) Nom.pl *kolbás-y*

It is argued by some linguists (e.g., Halle 1975, 1997, Melvold 1990, etc.) that roots and inflections have underlying accentual properties in Russian whereas others (e.g., Zaliznjak 1977, 1985) assume that stress in underived nouns cannot be captured by any rules. It is unanimously agreed, however, that derivational morphology is directly connected to stress patterns in Russian as the accentual properties of roots and affixes determine stress placement in derived words. Some derivational suffixes are always stressed or induce stress shifting, i.e. they are either pre- or post-accenting while others have no effect on stress placement. Chapter 3 gives a detailed diachronic account of how derivational suffixes developed their inherent accentual properties while the next subsection introduces the morphology of nouns in Russian. In particular, it presents the Russian nominal declension which encompasses case, number and gender.

2.2 Russian noun morphology

Declinable nouns in Russian are marked for gender (masculine, feminine, neuter), number (singular, plural) and case. As mentioned in the previous section, nominal declension is subject to six cases — nominative, genitive, dative, accusative, instrumental, and prepositional. A case form indicates the function of a noun in the sentence, e.g. subject, direct object, possession, etc. This means that every declinable noun has six different forms differing in the inflection which are referred to as its declension. There are three declension types for nouns— first,

second, and third declensions. The set of singular endings for the three declensions is illustrated in Table 2.3:

Table 2.3: The declension of singular nouns in Russian

Case	**1st Declension**		**2nd Declension**		**3rd Declension**		
	Masc.	**Neut.**	**Fem.**	**Masc.**	**Fem.**	**Masc. (*put'*)**	**Neut.**
Nom.sg.	Ø	-o/-e /o/ /ɛ/	-a/-я /a/ /ja/	-a/-я /a/ /ja/	Ø	Ø	-a /a/
Gen.sg.	-a/-я /a/ /ja/	-a/-я /a/ /ja/	-ы/и /ɨ/ /i/	-ы/и /ɨ/ /i/	-и /i	-и /i/	-и /i/
Dat.sg.	-y/-ю /u/ /ju/	-y/-ю /u/ /ju/	-e /ɛ/	-e /ɛ/	-и /i/	-и /i/	-и /i/
Acc.sg.	=Nom./ Gen.	=Nom.	-y/-ю /u/ /ju/	-y/-ю /u/ /ju/	Ø	Ø	-a /a/
Instr.sg.	-ом/-ем /om/ /ɛm/	-ом/-ем /om/ /ɛm/	-ой/-ей /oj/ /ɛj/	-ой/-ей /oj/ /ɛj/	-ью /ju/	-ём /om/	-ем /ɛm/
Prep.sg.	-e/-y /ɛ/ /u/	-e/ /ɛ /	-e /ɛ/	-e /ɛ/	-и /i/	-и /i/	-и /i/

Almost all masculine nouns belong to the 1st declension with the exception of the masculine forms with the inflection *-a /a/* in the nominative changing according to the 2nd declension, and the word *put'* 'way' which belongs to the 3rd declension. Neuter nouns are also assigned to the 1st declension except a small group of nouns ending in *-мя /mʲa/*, which are changed according to the 3rd declension. The difference between the masculine and neuter nouns is manifested by different endings only in the nominative and accusative cases, the inflections of all other cases are the same. The 2nd declension comprises all feminine and masculine

nouns with the inflection *-a /a/* in the nominative. The 3rd declension includes feminine nouns ending in a palatalized consonant, one masculine noun *put′* 'way', and eleven neuter nouns ending in *-мя /mʲa/* (Russkaja Grammatika 1980: 484-491).[3]

The distinction of declensions in the singular is not preserved in the plural paradigms presented in Table 2.4:

Table 2.4: The declension of plural nouns in Russian[4]

Case	**1st Declension**		**2nd Declension**		**3rd Declension**		
	Masc.	**Neut.**	**Fem.**	**Masc.**	**Fem.**	**Masc. (*put′*)**	**Neut.**
Nom.pl.	-ы/-и /ɨ/ /i/	-а /a/	-ы/-и /ɨ/ /i/	-ы/-и /ɨ/ /i/	-и /i/	-и /i/	-а /a/
Gen.pl.	-ов/-ей /ov//ɛj/	Ø/-ей /ɛj/	Ø/-ей /ɛj/	Ø/-ей /ɛj/	-ей /ɛj/	-ей /ɛj/	Ø/-ей /ɛj/
Dat.pl.	-ам /am/	-ам /am/	-ам /am/	-ам /am/	-ям /jam/	-ям /jam/	-ам /am/
Acc.pl.	=Nom./ Gen.	=Nom.	=Nom./ Gen.	=Gen.	-и /i/	-и /i/	-а /a/
Instr.pl.	-ами /am'i/	-ами /am'i/	-ами /am'i/	-ами /am'i/	-ями /jam'i/	-ями /jam'i/	-ами /am'i/
Prep.pl.	-ах /ax/	-ах /ax/	-ах /ax/	-ах /ax/	-ях /jax/	-ях /jax/	-ах /ax/

[3] Some authors refer nouns ending in *-мя /mʲa/* and the noun *put′* 'way' to irregularly declined nouns (e.g., Valgina et al. 2002).

[4] Plural inflections in the dative, instrumental and prepositional cases alternate with -ям /jam/, -ями /jami/ and -ях /jax/ if the final consonant of the stem is palatalized.

All declinable plural nouns have the same forms in the dative, instrumental and prepositional cases irrespective of a declension type in the singular. Nominative and accusative forms coincide so that only two forms, nominative and genitive, have inflections differing according to declensions. Nearly every Russian word can be modified in case and number. Thus, if a Russian native speaker is presented with a non-word ending in a non-palatalized consonant without inflection, he/she would decline it in accordance with the 1st declension as null inflection in the nominative case signifies the masculine gender, and masculine nouns are changed according to the 1st declension. A word ending in *-a* and presented in the nominative case would be interpreted as a feminine noun and be changed according to the 2nd declension.

There are some groups of words in Russian which lack the internal morphological structure, i.e. they do not decline. These words refer to the null declension paradigm which consists of homonymous forms with no inflections so that they have only one form for all case-number combinations. The null declension is characteristic of common and proper names mostly of foreign origin which end in certain vowels; abbreviations and acronyms. As they do not change their forms in different cases, gender and number of such nouns are determined not morphologically but through syntactic agreement. The subsequent chapters will more closely discuss Russian indeclinable words and their accentuation as they will be used to explore the phonological default stress.

For a comprehensive treatment of the Russian synchronic phonological processes, it is crucial to discuss the main diachronic changes. The next chapter focuses on the most important sound changes in the Russian phonological system in the historical context.

Chapter 3 Historical approaches to Russian accentual system

To discriminate between lexical and default stress patterns, it is crucial to look into the historical development of the Russian accentual system since the interaction of morphological and phonological factors that accounted for accentual alternations in Common Slavic (CS) has direct consequences on stress placement in Modern Russian. A pure synchronic approach focuses on the description of stress patterns at a given moment of time often without making a distinction between phonological and morphological principles of stress assignment. I assume that an examination of the diachronic changes in metrical organization may present a powerful synchronic account of lexical as well as default stress patterns. Investigation of the historical development of the Russian prosodic system is not only relevant for understanding the contemporary stress patterns but also sheds light on such controversial issues as vowel reduction patterns, different assimilation processes (voicing, palatalization, etc.) and other ongoing changes in the language. Any analysis of the Russian accentuation system would be incomplete without considering the development of stress patterns and evolution of the relationship between stress and affixation.

This chapter does not attempt to provide a comprehensive overview of Slavic historical phonology. The primary aim is to provide a historical background which is necessary for the further discussion and predictions made in this dissertation. To that end, I provide a summary of the Common Slavic accentual system, explore the metrical organization of Late Common Slavic (LCS), Early and Late Old Russian, and present significant prosodic processes up to Modern Russian. It provides us with a unified picture of language variation over time and helps to understand the present state of the Russian prosody and changes the language is currently undergoing.

3.1 Evolution of the Russian accentual system

3.1.1 The Common Slavic prosodic system

The main tendencies within the period of Common Slavic (CS) (from the 5th to 8th centuries) were the Law of Open Syllables and the Law of Intrasyllabic Synharmony. The Law of Open Syllables was based on the principle of rising sonority from the beginning to the end of a syllable thus eliminating syllables closed by a consonant. The Law of Intrasyllabic Synharmony allowed only harmonious sounds within a syllable which manifested itself in different assimilation processes: palatalization of velar consonants before a front vowel, fronting of back vowels after palatal consonants, simplification of consonant clusters, etc. These two tendencies were aimed at making a syllable a basic organization unit in Slavic where segments were arranged in a strict order according to the principle of rising sonority (Kolesov 2005).

At the beginning of the 10th century, the CS vowel phoneme inventory included 12 vowels. The vowels */o, e/* and the jer vowels */ъ/* (back jer */ŭ/)* and */ь/* (front jer */ĭ/*) were short, the length was specified for the back vowels */a, ǫ, y/*, for the other vowels the feature [±long] was not relevant. CS vowels were characterized by a pitch accent. All accented long vowels had a distinction between two tones, the 'acute' and the 'circumflex'. The acute accent was realized as a rising tone whereas circumflex was pronounced with a falling intonation. There is no unanimity among linguists as to whether there was pitch accent on short vowels */o, e, ŭ, ĭ/* (Bethin 1998). The rising tone was lexically marked and the location of stress was predictable: stress occurred on the rightmost or only syllable with high tone in a word and, in the absence of high tone, stress fell on the initial syllable (Jacobson 1963). The distribution of the jer vowels /*ŭ, ĭ*/ was determined by their position in a word: weak positions started from the end of a word according to the alternating pattern strong-weak-strong-weak, which was explained by stress retraction from the final syllable to the preceding ones (Bethin 1998, Kolesov 2005).

All dialects of CS were characterized by the following prosodic changes: rise of the neo-acute and shortening of vowel length. The neo-acute resulted from the retraction of stress from weak jers to the preceding syllable: e.g., *stol'ъ* > *stól*. Stress was also retracted from long vowels with the falling intonation, which were followed by final jers, to the preceding vowel: e.g., *dvor'ěxъ* > *dvórěxъ* (Kolesov 2005: 76). The old acute and circumflex intonations occurred within two syllables: the acute accent started rising from the preceding syllable (for this reason it could not be retracted to the preceding syllable): e.g., *na bráta*; the circumflex accent started falling from the preceding syllable (that is why it could be retracted to the preceding syllable): e.g., *na 'lěsŭ* > *ná lěsŭ*. Words were characterized by different rhythmic contours in every form, i.e. they did not constitute a single prosodic domain. In contrast to the old intonations, the neo-acute could arise on both long and short syllables, it did not shift within a word and, most importantly, it combined two characteristics: accent and intonation. Moreover, it was the only intonation type that caused analogical leveling of word forms within a paradigm. With the rise of the neo-acute the vowels /*ŭ, ĭ*/ became reduced as they played no role in prosodic oppositions: they were always short, if stressed they were always under the neo-acute, if unstressed they were without any intonation. Old vowel length oppositions changed into vowel height opposition and, as a result, original long vowels lost their length: word-finally irrespective of stress, in any stressed syllable but under the neo-acute, in any unstressed syllable but the first pre-tonic one. In bisyllabic words, length was always retained in the first pre-tonic syllable, in trisyllabic words – only under the neo-acute (e.g., *nāródъ*); in post-tonic syllables, vowel length was shortened. We observe the correlation between prosodic characteristics, word length and its morphemic make-up (Kolesov 2005).

Stang (1957) was the first to establish the three nominal accentual paradigms for Middle and Late Common Slavic:

(1) (a) Fixed stem-stress with an acute intonation on the stressed syllable;
(b) post-stem accentuation (oxytonic);
(c) mobile accentual paradigm with stress alternating between the initial and the final syllable. Forms without lexical tone received initial stress by default realized as a falling pitch.

To sum up, with the rise of the neo-acute, stress became a prosodic feature of a word and not of a separate word form. Analogical leveling of stress position took place within a word with stress gradually losing its phonetic functions and acquiring the morphological ones (Kolesov 2005).

3.1.2 Metrical organization of Late Common Slavic

Bethin (1998) examines the changes of syllable structure in Common Slavic (CS) and the metrical organization of Late Common Slavic (LCS) and shows that the changes in the syllable structure were related to the expression of word prominence, and the metrical pattern was the syllabic trochee. She argues that changes in CS (compensatory lengthening, contraction, changes in the jers) are best described as taking place within a two-syllable group which were critically dependent on the nature of the second syllable. The distribution of relative strength was in favor of the first of two sequential syllables, a strong-weak bisyllabic grouping (Bethin 1998: 104).

Changes in the jers took place throughout LCS involving a bisyllabic domain. As mentioned above, the two short vowels known as jers (/ŭ/ and /ĭ/) were subject to either strengthening or weakening depending on the position in the word. Jers in word-final position were considered weak and were lost, while jers before a syllable with a weak jer were considered 'strong' and developed into a non-jer vowel so that a bisyllabic domain was the minimal requirement for jer strengthening: CS **dĭnĭ* 'day' > SC *dân*, B *den*, Cz *den*, R *den'*. Before a non-jer vowel, a jer was also considered weak and was lost: R *dn'a*, 'day' (gen.sg). (Bethin 1998:104).

As mentioned in the previous section, the syllable in CS was formed according to the 'principle of rising sonority'. It is generally assumed that the loss of weak jers marked the end of the period of Intrasyllabic Synharmony as consonants became free from the influence of the following vowel thus gaining a strong position. After the loss of weak jers final consonants became opposed to each other according to a new feature 'palatalization' (palatalized vs. non-palatalized). In contrast to the general opinion, Bethin (1998) argues that the changes in the syllable structure in CS (a change to closed syllables, changes in syllable onsets, monophthongization, changes in nasal vowels and liquid diphthongs, compensatory lengthening) can be explained by the changing relationship between syllable weight (mora) and syllable segments.

Bethin argues for a Moraic Constraint which allows only moraic segments in syllable-final position, an Onset Constraint which says that syllables must have onsets, and a No Coda Constraint which forbids syllable codas. She notes the unusual behavior of liquids: obstruents were more likely to be lost than sonorants (particularly liquids) in syllable-final position which suggests their moraic status so that the notion of open syllable structure was defined in terms of moras and not of sonority sequencing. Furthermore, she does not relate Intrasyllabic Synharmony to syllable structure since palatalization did not only occur before front vowels. Moreover, there was also progressive velar palatalization which was not tautosyllabic.

LCS syllable structures could be differentiated on the basis of changes in the liquid diphthongs. In the southern areas, the maximally bimoraic syllable became the dominant syllable structure (Vμμ/Rμμ). In the northwest, the syllable coda contributed to the bimoraicity of the syllable. The northeastern areas generalized monomoraic syllables of the CV structure. Thus, by the eighth century, the CS syllable structure was characterized by the above mentioned constraints. The CV syllable was the most common type with one exception: tautosyllabic sequences of vowels followed by liquids. The differences in the

liquid diphthongs reveal a crucial restructuring in the syllables of the LCS dialects.

There were two types of liquid diphthongs: TART type (A stands for a nonhigh, front/back vowel, T stands for a consonant, R denotes a liquid), and TURT type (U stands for a high, front/back vowels). New syllable types appeared through redefining the relationship of the liquid to syllable structure. In the south, liquid diphthongs were bimoraic, the liquid lost its moraic status and its mora was transferred to the vowel: CVR > CV:R > CRV: (metathesis and vowel length). The (North) West Slavic area experienced metathesis but no vowel lengthening (CRV). In the northeastern dialects, CVR sequences developed into CV.RV sequences, i.e. they were realized pleophonically. As the liquid could not license the mora as in the southern dialects, monomoraic syllables became the norm and the quantity distinctions were lost. Bimoraic liquid diphthongs were reinterpreted as bisyllabic.

Bethin (1998) claims that the reanalysis of CS syllable structure began before the change of jers and was related to the moraic status of segments in the coda. The southern dialects allowed bimoraic syllables such as long vowels or liquids, the North West Slavic dialects allowed bimoraic syllables including a sonorant syllable coda; the North East Slavic dialects allowed syllables of one mora (only vowel nuclei).

3.1.3 Accentual categories of Old Russian morphemes

This section presents one of the most systematic and comprehensive accentual descriptions of the Old Russian prosodic system by Zaliznjak (1985). Following Stang (1957), Ilič-Svityč (1963) and Dybo (1962, 1968, 1981), Zaliznjak tries to reconstruct the accentual system of the Early Old Russian (till the fall of jers) and the Late Old Russian (from the fall of jers till the end of the 14th century) using different diacritical markers for stems and affixes. This system is based on Jacobson's (1963) observation that there were phonologically accented and

unaccented syllables in Common Slavic (CS), and phonologically unaccented word forms, the so-called 'enclinomena'.

In Early Old Russian Slavic, every phrase consisted of the so-called 'tact groups' (Zaliznjak 1985: 118) comparable to Nespor & Vogel's (1986) 'clitic group' which included one or several prosodically unified word forms. Accented and unaccented syllables were phonologically opposed to each other so that enclinomena which consisted of unaccented syllables were opposed to word forms with at least one phonologically accented syllable (orthotonic forms). Phonological accent is characterized as some kind of a prosodic salience by Zaliznjak, whereas phonological absence of accent was realized either by some initial prosodic salience in the enclinomena tact group (which was, however, distinct from the phonological accent) or by the absence of any prosodic prominence in the other positions. Thus, enclinomena were realized with an 'automatic' stress on the initial syllable whereas the orthotonic groups were characterized by an 'autonomic' stress.

Zaliznjak developed the following accentual features of morphemes. Every morpheme (stems, inflections, derivational suffixes) was assigned an inherent accentual marking (+ or - : morphemes with + might be either auto-stressed +↓ or post-accenting shifting stress to the right + →; morphemes with – were unstressed). In some cases, a morpheme could receive an additional marking *Re* (from retraction) or *Min* (from minus): *Re* means that if a morpheme were to be stressed according to a general rule, stress shifted one syllable to the left; if a morpheme had a *Min* marking and a preceding morpheme had a → marking, then the marking → was replaced by a minus marking. In contrast to Modern Russian, there were no dominant morphemes and morphemes shifting stress to the left (←). The basic rule was as follows:

(2) (a) If a tact group or a word form contained only – markings, this group was an enclinomenon.

(b) If there was at least one + marking, this word group was orthotonic and accent was fixed to the leftmost +. If it was +↓, then accent fell on this morpheme, if it was +→, it fell on the vowel to the right. If stress was fixed to → and the marking on the right was *Re*, then stress remained on that syllable.

(c) If stress fell on a weak jer as a result of the previous rule, it shifted one syllable to the left.

(d) In complex words consisting of two stems (with an underived second member), there was the following accentual model: the last stem changed its marking for ↓, all the other morphemes for –.

Following Stang (1957), Zaliznjak (1985) distinguishes three accentual paradigms in the Early Old Russian:

(3) (a) The accentual paradigm *a* was typical for orthotonic groups with a fixed stress on a syllable of the stem (baritone paradigm).

(b) The accentual paradigm *b* was typical for orthotonic groups with stress on the first syllable of the ending and the last syllable of the stem (if the first post-stem syllable contained a weak jer or a morpheme with the *Re* marking). This paradigm was characterized by an accentual mobility between an ending and the last syllable of the stem. Fixed stress on the inflection in all forms was seldom (oxytone paradigm).

(c) The accentual paradigm *c* included enclinomena with initial stress and orthotonic forms with stress on the inflection (mobile paradigm).

The main distinction between CS and Early East Slavic lies in the fact that in the latter there were no reliable signs of differentiating between the old acute and the neo-acute (Zaliznjak 1985: 160). The merging of ‘automatic’ and ‘autonomic’

accents was the most important event in the history of East Slavic stress development. The old enclinomena merged with the old initially stressed orthotonic word forms which happened at approximately the same time as the fall of weak jers.

3.1.4 Main diachronic phonological changes

This section outlines the most important prosodic changes starting with the loss of weak jers up to the time of modern prosodic phenomena in Russian. First, the main consequences of the loss of weak jers for the phonological system of the Early East Slavic are demonstrated. Second, the tendencies of the accentual evolution of Russian up to the 17th century are introduced followed by a summary of the most important factors for the accentual development in Russian.

The loss of weak jers caused the transformation of the whole phonemic system in Late Common Slavic (LCS). As already mentioned above, the distribution of strong and weak jers was determined by their position in a word. Apart from the prosodic conditions, the usage of *ъ, ь (ŭ, ĭ)* was also determined by morphological factors. The functional value of /ъ/ was different in forms such as, for example, *mъnog(o)* 'much' (Adv.) and *mъx(a)* 'moss' (N.gen.sg.). In *mъx(a),* /ъ/ is more important as it surfaces in some word forms in the position before a weak jer as in *mъxъ* (N.nom.sg.), whereas /ъ/ in *mъnog(o)* never alternates with a strong /ъ/. In such words /ъ, ь/ are not only functionally weak, but also morphologically isolated (Kolesov 2005: 55). As a consequence of the loss of weak jers, new consonant clusters were created (e.g., *mъn* > *mn*) which marked the end of the Law of Open Syllables.

The fall of weak jers word-finally created the opposition between palatalized and non-palatalized consonants. The front jer caused palatalization of the preceding consonant, after its loss palatalization was retained thus creating minimal pairs: e.g., *pyl′* 'dust' – *pyl* 'zeal'. An allophonic palatalization of consonants before a front jer became phonemic. It led to the redistribution of relations within a syllable: consonants became the most important syllabic

elements whereas vowels differing only in the feature [±back] started to merge: */ÿ/* was merged with */y/*, */ä/* with */a/*, */u/* with */ы/* whereas */ъ/* and */ь/* were lost. The fall of final jers had an impact on full vowels as well: the vowels */u/*, */y/*, */a/* tended to disappear word-finally, especially if these vowels were not stressed and were not included into a morphological paradigm (Kolesov 2005: 137). New consonant clusters developed regressive assimilation with respect to voicing (e.g., PS *prasiba* > R *pros'ba* [proz^{j}ba] 'plea') (Bethin 1998).

The loss of weak jers also affected the vowel system. Old East Slavic inherited a purely phonetic quantitative word structure from Common Slavic (CS): the duration of the pre-tonic syllable with a long vowel was greater than the one of the stressed syllable with a short vowel (i.e. that one which does not originate from the neo-acute). The quantitative vowel opposition in unstressed syllables which lost its phonological meaning after the loss of weak jers was replaced by a qualitative vowel reduction (*akanje*[5] in a broad sense). This change dates from the middle of the 14th century and has many dialectal variances. Assimilation in the pre-tonic syllable is essentially the extension of the CS syllable synharmony and pronunciations like *kaláč*, *laptá* are typical even for the dialects which did not develop akanje (Kolesov 2005: 191).

Apart from the segmental transformations, the prosodic system of the language underwent enormous changes. I present the most important accentual developments based on the monograph of Zaliznjak (1985) which includes the most detailed analysis of the accentual evolution from the Early East Slavic system up to the Russian accentual system of the 17th century. In Late Old Russian, secondary stress surfaced in the post-tonic part of a word and it was determined by a rhythmic factor: it fell on the next but one syllable to the right of the main stress (e.g., *mílostìvo*). In the manuscripts of the 14th-17th centuries, the secondary stress was marked by the same diacritics as the main stress, however, this was rare. During this period, accentual leveling on the analogy began to assert itself in two directions: within the frames of a morphological paradigm of a

[5] Akanje is the reduction of unstressed non-high vowels to /a/.

certain word and within a group of words derived with one and the same suffix, thus suffixes gradually started to gain dominance. The next process common to this period was the definalization of stress (retraction of stress from the final syllable): e.g., *vinó* → *víno*. The nature of this process is not quite clear and some cases may be explained by phonetic factors whereas the others could be a result of a morphological reorganization.

Zaliznjak (1985) points out the following tendencies in the accentual evolution in Russian. First of all, stress on clitics tended to disappear: stress on enclitics was lost first whereas stress on prepositions was retained for quite a long time till the reorganization of such constructions began (17th-20th centuries). Nouns were characterized by the development of an accentual opposition between the singular and the plural (if stress was fixed on the stem vowel in the singular, it tended to fall on the inflection in the plural and vice versa). Neuter nouns were the first to develop this opposition followed by underived nouns of the historical accentual paradigm *a* (with stress being fixed originally on some stem syllable in all forms).

The *a*-declension showed the convergence of the two accentual paradigms *c* and *b* (Zaliznjak 1985: 373):

(4) (a) In the nom.sg. and nom.pl., the singular-plural opposition of the accentual paradigm *c* (word-initial ~ word-final alternations) was transferred to the accentual paradigm *b* (e.g., *žená* (nom.sg.) – *žény* (nom.pl.) instead of the original *žená* (nom.sg.) – *žený* (nom.pl.) 'wife') so that the final accent (oxytone) was replaced by the mobile accent.

(b) In the accentual paradigm *c*, stress in the dat.sg. and acc.sg. was leveled according to the stress location in the other cases of the singular paradigm (e.g., *rosé* (dat.sg.), *rosú* (acc.sg.) instead of the original *róse* (dat.sg.), *rósu* (acc.sg.) 'dew').

(c) In both paradigms *c* and *b*, which were originally characterized by an inflectional stress in the oblique cases in the plural, an accentual leveling on the nom.pl. and gen.pl. started to develop (e.g., *rós-am*, *-ami*, *-ax* instead of *ros-ám*, *-ámi*, *-áx* 'dew').

The process in (4a) refers to the 18th-20th centuries; the change in the dat.sg. in (4b) (*róse* became *rosé*) started taking place from the 16th century; the process in (4c), i.e. the transition from the mobile stress to the stem stress in the plural (*rosám* turned into *rósam*) dates only from the 19th-20th centuries.

In the masculine gender, the singular-plural opposition developed in words with the stem stress in the singular:

(5) (a) Words of the accentual paradigm *c* were characterized by the stress shift from the stem to the inflection in the nom. and acc. pl.: *dómy* → *domý* or *domá* (nom./acc.pl.) so that all plural forms became finally stressed.

(b) All word forms developed inflectional stress in the oblique cases.

The first process refers to the 16th-17th centuries. The process in (5b) was completed by the 17th century. It should be noted that the inflection *–a* (nom.pl.) became very productive over the years and it is commonly used in Modern Russian.

Pragmatic factors played an important role in accentual development. Assimilated underived words tended to have 'non-trivial' (desinential or mobile) stress whereas unassimilated words were likely to have 'trivial' (stress fixed on a vowel of the stem) stress. Zaliznjak (1985: 372-377) suggests that such a development might be connected to the fact that in Old Russian, nouns of the accentual paradigms *b* and *c* were most frequently used. Thus words of the accentual paradigm *a* changed their fixed-stem stress to a mobile stress pattern when their assimilation was complete. In contrast, some words of the accentual

paradigms *b* and *c* got a 'trivial' stress for lack of assimilation and low frequency use.

The most important tendency of accentual development in the Russian word formation was the transition from the system where stress placement of a derivative depended on the base word to the system where stress pattern of a derivative was determined by its morphological category (development of dominant accentual properties of suffixes).

3.2 Summary

In Common Slavic accentuation, one traditionally differentiates between orthotonic word forms with a phonological stress realized by a rising tone and enclinomena with an 'automatic' stress on the initial syllable. The exact phonetic nature of initial stress in phonologically unstressed forms is not quite clear, however. Opinions differ as to whether the 'automatic' stress was realized by a falling pitch or some kind of phonetic salience. Suffice it to say that there was a tonal opposition between these two kinds of stress.

Three nominal accentual paradigms (fixed and mobile) have been reconstructed for Late Common Slavic: mobile paradigms were characterized by stress alternations so that stress shifted within a word-form. The Slavic historical accentology was expanded by the theory of morpheme valencies or accentual marking (Dybo 1973, 1981, Zaliznjak 1985), according to which stress placement was governed by the inherent accentual properties of morphemes which could be either strong (+), or weak (-). These properties were lexical, i.e. they could not be explained by phonological features. Thus, the accentual system of Old Russian should be described by the interaction of accentual features of morphemes.

It has also been shown that historically, stress might shift for phonetic reasons and analogy. One of the central issues in the accentual evolution of Russian was that morphemes started developing dominance, i.e. suffixes tended to become more dominant and determine stress placement in a word. The idea that suffixes in Russian may be either dominant or recessive is developed in every

approach to stress assignment in Modern Russian in an attempt to account for variation in Russian stress. Researchers resort to this distinction not only to describe the existing stress patterns in derived and underived words but also to deduce the default position of stress in Russian.

The next section presents the accentual paradigms of Modern Russian and analyzes a wide range of theoretical studies on stress assignment in Russian. The theories by Melvold (1990), Revithiadou (1999) and Alderete (2001) are of particular interest to this dissertation as they not only investigate different morpho-accentual alternations but also look into the question of what the default stress pattern in the synchronic Russian phonology is.

Chapter 4 Russian noun stress: theoretical background

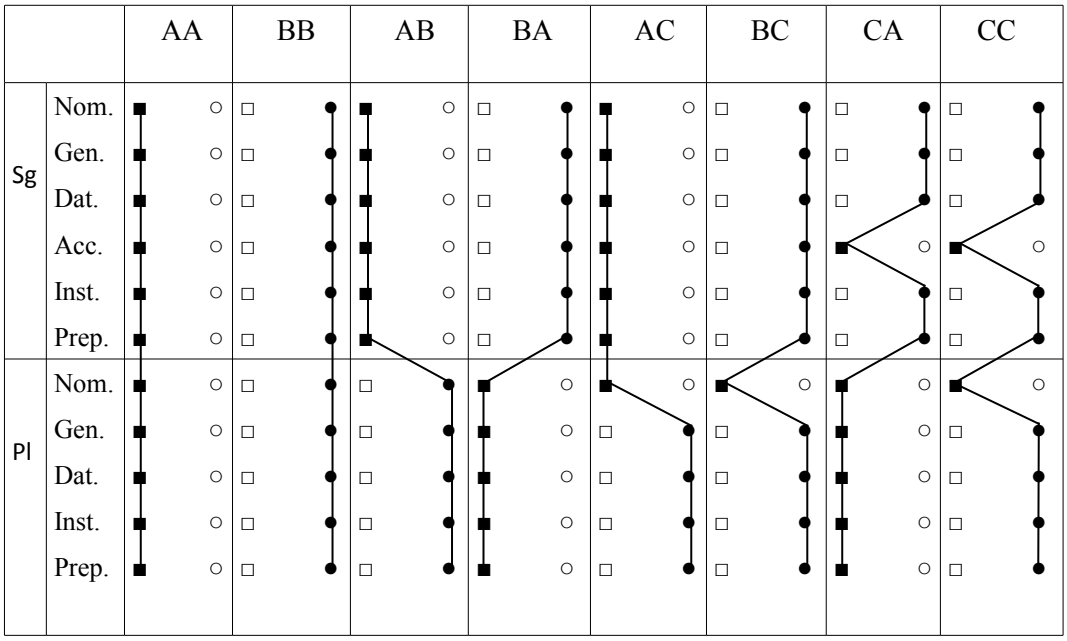
4.1 Accentual paradigms of Russian nominal stress

Russian stress patterns have been described by many linguists (e.g., Lunt 1963, Zaliznjak 1967, 1985, Halle 1970, Red'kin 1971, Levin 1975, Steele 1975, Coats 1976, Fedjanina 1976, Feldstein 1980, 1984, 1986, Lehfeldt 1993, 2006). These approaches account for the accentual alternations within nominal, adjectival and verbal paradigms with reference to the morphology of words, i.e. their division into a stem and an inflection. In some forms stress is fixed on the stem, in others it falls on the inflection. Words with the same accentual alternations form an accentual paradigm: there are accentual paradigms with stress fixed on the stem in all forms, and paradigms with accentual mobility between the stem and the inflection.

Traditionally, one distinguishes three major accentual classes (A, B, C): A is used to designate stress fixed on the stem, B indicates inflectional stress and C is used for mobile stress patterns. Since an accentual paradigm contains both singular and plural forms, every word gets a two-letter designation, for example, AB means that stress is fixed on one and the same vowel of the stem in the singular and on the desinence in the plural.

In the literature, nouns are usually divided into eight accentual patterns (e.g., Bloomfield & Petrova 1945, Lunt 1963, Fedjanina 1976, Russkaja Grammatika 1980) presented in Table 4.1 (according to Kasatkin 2008:68):

Table 4.1: Russian accentual patterns



Notes: Stem is marked by a square, inflection by a cirle. Stress placement is indicated by black figures. Acc. pl. forms are not included as they may coincide with Nom. or Gen.pl. forms.

When an inflection or a stem is non-syllabic, i.e. when an inflection is null marked here as Ø as in *stól+Ø* (nom.sg.) 'table', or when a stem is vowelless as in *sn+á* (gen.sg.) 'dream', the actual stress pattern is not considered (as stress has no other syllable to fall on), but rather the stress pattern of a 'control' form which is the dative case of the same number and gender for nouns (*stolú*, *snú*).

According to Zaliznjak (1977), in 92 % of Russian nouns, stress is fixed on a vowel of the stem, which makes the AA accentual paradigm the most common stress pattern; the BB pattern with stress fixed on the inflection in all forms includes more than 2000 words (7%); the remaining six paradigms with a mobile stress constitute about 2% of the vocabulary: the AB stress pattern contains about 300 words; the BA pattern comprises more than 150 words; the AC pattern includes 120 words; the BC pattern is limited to 40 words; the CA pattern is characteristic of 12 and the CC pattern of only 13 words. However, whereas stem stress predominates in the lexicon it is significantly less common for high-frequency words (Cubberly 1987, in Crosswhite et al., 2003).

Some linguists use one-letter designations (Zaliznjak 1985, Lehfeldt 2006) to describe the accentual patterns. Zaliynjak (1985: 15) distinguishes the following ten accentual schemes of Russian underived words:

(1) *a* – stress always on the stem;
b – stress always on the inflection;
c – stress on the stem in the singular, on the inflection in the plural;
d – stress on the inflection in the singular, on the stem in the plural;
e – stress on the stem in the singular and nom.pl., on the inflection in the oblique cases in the plural;
f – stress on the inflection except for nom.pl.;
b' – as in *b*, but stress on the stem in instr.sg.;
d′ – as in *d*, but stress on the stem in acc.sg.;
f′ – as in *f*, but stress on the stem in acc.sg.;
f″ – as in *f*, but stress in the stem in instr.sg.

Feldstein (e.g., 1980,1984) redefined the accentual types presented in Table 4.1 narrowing them down to five major stress patterns. The AA type is the only pattern with unpredictable stress as it may occur on any stem syllable in a word; in the other types, stem stress is predictable as it is either stem-initial, predesinential or desinential which is conditioned morphologically. He reviews Fedjanina's (1976) designations and substitutes the A in the AB and AC types with C (yielding correspondingly CB and CC) as stem-stress in the singular is predictably initial: the original AB type is, for example, *kólokol* (nom.sg.) – *kolokolá* (nom.pl.) 'bell'. The B indication is used to denote predesinential stress so that the original BA and CA types are termed accordingly BB and CB as stress is constantly predesinential in the plural forms and not unpredictable, for example, the original BA type is *kolbasá* (nom.sg.) – *kolbásy* (nom.pl.) 'sausage'.

These observations are important with respect to markedness of stress patterns. For example, Feldstein (1996) regards an immobile, lexically assigned

stem stress in Russian as marked because it may fall on any syllable within the stem. Mobile stress alternations are considered to be unmarked as these alternations are grammatically predictable: stem stress is either word-initial or stem-final (Feldstein 1996: 205-206). In a similar vein, many linguists (e.g., Halle 1997, Melvold 1990, Revithiadou 1999) represent stems of the mobile paradigm in Russian as unaccented, i.e. unmarked. In the subsequent chapters, I will demonstrate that these accounts make use of unaccented stems as opposed to stems with fixed stress to determine the default stress pattern in Russian.

To sum up, the existing stress patterns of underived nouns are the result of the historical accentual developments presented in Chapter 3. The Old Russian morphemes had inherent accentual properties which determined stress placement as described by Zaliznjak (1985). Orthotonic forms with the acute accent were opposed to enclinomena without the lexical accent. In the course of time, however, these accents were merged, the tonal distinctions were lost and the pitch accent was replaced by a stress accent. Some original stress alternations were lost: analogical leveling processes started taking place, accentual patterns were used to mark an opposition between the singular and plural paradigms so that stress acquired a morphological function, many derivational suffixes gained dominance. The question is how we should treat the existing Russian stress patterns. It has been shown that classification of the Russian underived stress patterns does not cause much controversy among linguists. However, the principles underlying the synchronic stress alternations are a matter of dispute. According to some theories (e.g., Halle 1975, 1997), stress patterns of Modern Russian can be attributed to diachronic patterns and inherent properties of morphemes. Other approaches (Alderete 2001) make use of the accentual properties of morphemes without regard to historical stress patterns, however. According to Zaliznjak (1985), in contrast to derived words, stress patterns of underived nouns cannot be explained by any rules. The next section provides an overview of these theories followed by their subsequent evaluation with a special emphasis on the default stress assignment in Russian.

4.2 Theoretical studies on Russian stress assignment

4.2.1 Zaliznjak's (1977, 1985) morphemic account

In addition to the classification of Russian nouns according to their accentual patterns presented in the previous section, Zaliznjak (1985) also divides underived nouns according to accentual types: he makes a distinction between *'trivial'* and *'non-trivial'* stress: 'trivial' stress is stress on one and the same stem-syllable in all forms (*a*-type); 'non-trivial' stress occurs in all other cases and corresponds to Feldstein's B and C types. 'Non-trivial' stress is divided into inflectional (desinential) (*b*-type) and mobile stress. Mobile stress, in its turn, has two main types: stem-final ~ desinential alternation (*d*-type) vs. stem-initial ~ desinential alternation (*c*-, *e*-, *d'*-, *f*-, *f'*-, *f''*- types including some exceptions).

It is argued that accentual patterns of underived nouns cannot be deduced from the characteristics of a word. In contrast to derived words, underived words have no restrictions on the location of stress, i.e. stress placement is lexical and cannot be deduced from a word's structure. Words with one and the same ending may have different accentual schemes (e.g., words with the inflection *-a* have up to seven different accentual schemes). However, Zaliznjak (1985) defines some factors which may affect stress position:

(2) (a) *Pragmatic factor:* words that are non-common or not quite assimilated have a tendency towards 'trivial' stress (fixed-stem stress) whereas assimilated words rather display 'non-trivial' stress patterns (mobile stress).

(b) *Semantic factor*: monosyllabic masculine nouns tend to have 'trivial' stress in the singular and desinential stress in the plural (*c*- type) if they are uncountable (e.g., *súp* (nom.sg.), *súpa* (gen.sg.), *supý* (nom.pl.) 'soup'), countable forms are apt to have desinential stress in the singular and in the plural (*b*-type) (e.g., *býk* (nom.sg.), *byká* (gen.sg.), *bykí* (nom.pl.) 'ox').

As opposed to underived words, the morphological make-up of derived words is considered to play an important role for stress placement. Zaliznjak uses the following morpheme markings to describe the accentual rules:

(3) ***Main markings:***

↓ (auto-stressed morpheme)

← (stress is on the left of a morpheme)

→ (stress is on the right of a morpheme)

In contrast to Old Russian, suffixes in Modern Russian may also be dominant so that they are divided into six groups according to their main markings: ← , ↓, → , ←D , ↓D, →D. Dominance is characteristic of only derivational suffixes. Stems are divided into strong, weak and intermediate. Words with *'trivial'* stress have a *strong* stem while those ones with *'non-trivial'* stress have a *weak* stem. Strong stems are further divided into *dominant* and *non-dominant*: stems acquire dominance if they are part of nominal compositions, i.e. a stem preceded by a prefix or another stem changes its marking into a new dominant one ↓D, e.g., in *bezljúdnyj* 'uninhabited', *skoroxód* 'footman' the stems *ljúd-, xód-* get the ↓D marking. There are some groups of exceptions to this rule (see Zaliznjak, 1985 for further details). One of the most important restrictions on morpheme combinations is that dominant stems never combine with dominant suffixes in Russian, e.g., **narod* (↓D)+*ist* (↓D). The basic stress placement rules for underived words are presented in (4):

(4) (a) Stress is fixed to the rightmost morpheme with a D marking; if this marking is →D, stress is determined by the following marking.

E.g., *band – it – izm* *banditízm* 'racketeering'

↓ ↓D ↓D

(b) If there are no D markings, stress is fixed to the leftmost ↓ or ← marking.

E.g., *goroš – in – k – (a)* *gorôšinka* 'pea' (dim.)
↓ ↓ ←

(c) If there are no ↓ or ← markings, stress is fixed to the rightmost → marking.

E.g., *slep – yš* *slepýš* 'mole-rat'
→ →

If a suffix has an additional marking (5), the result of this basic rule is altered according to the marking (Zaliznjak 1985: 57-58):

(5) ***Additional markings (only for suffixes):***

Init – the marking occurs only together with the main marking ←*D* and causes initial stress placement (instead of stress on the vowel to the left), e.g., the suffix -e*n′* with the marking ←*D Init* derives *óboroten′* (nom.sg.) 'were wolf' from *oborót* (nom.sg.) 'turn' (**obóroten′*).

Monosyll – every non-dominant monosyllabic base component is treated as weak, e.g., the suffix -*ar*' is → *Monosyll* so that it derives *puškár′* (nom.sg.) - *puškarjá* (gen.sg.) 'artilleryman' from the base word *púška* (nom.sg.) 'cannon' (cf. *aptéka* (nom.sg.) 'pharmacy' – *aptékar′* (nom.sg.) 'pharmacist'.

Polysyll – if the base component is polysyllabic, stress in the derivative falls one syllable to the left, e.g., the suffix -*áž* has the marking →*D Polysyll* which means that it is post-accenting for monosyllabic stems (*tipáž* (nom.sg.) - *tipažá* (gen.sg.) 'type') but in polysyllabic stems, stress

moves one syllable to the left (*špionáž* (nom.sg.) - *špionáža* (gen.sg.) 'espionage').

Marg – the suffix becomes post-accenting if the base word has a stem-final ~ desinential alternation: suffixes with the marking ↓ or ← behave as if they had the marking → (there are no examples for noun derivatives).

Triv – mobile stress (initial ~ desinential alternation) of the base word is treated as 'trivial', i.e. stress in the derivative is on the same stem-vowel as in the base word, e.g., the suffix *-ša* has the marking ←*Triv* deriving *sekretárša* (nom.sg.) 'secretary' (fem.) from *sekretár'* (nom.sg.) 'secretary' (masc.).

Deox – desinential stress of the base word is interpreted as 'trivial': if the derived word is polysyllabic and the base word is masculine and has a desinential stress (*b*-type), the base word is treated as having a 'trivial' stress. The marking ↓Deox (e.g., the suffix *-in*) brings about the stress pattern in the derivative which coincides with the stress pattern of the base word in the nom.sg., e.g., *mindálina* (nom.sg.) 'almond' (singulative) derived from *mindál'* (nom.sg.) – *mindaljá* (gen.sg.) 'almond'.

Suffixes with the ↓D marking are mostly of foreign origin (e.g., *-izm, -ist, -ad, -al, -at, -et*, etc.), however, they may also be native (e.g., *-ag(a)*, *-ux(a)*, *-uš(a)*, *-un(ja)*, *-an,* etc.). Suffixes with the →D marking are native (e.g., *-ež, -j-o, -njak, -čak, -nja*, etc.). Suffixes with the ←D are not numerous and without an additional marking ***Init*** they may be only of foreign origin (e.g., *-ik(a), -tor, -sor*).

There are also suffixes with vacillating markings, for example, the main marking of the suffixes *-ak* and *-jak* is →D, e.g., *rybák* (nom.sg.) - *rybaká* (gen.sg.) 'fisherman'. However, in a small group of words these suffixes are characterized by a ↓D, e.g., *polják* (nom.sg.) - *poljáka* (gen.sg.) 'Pole'. The main

marking of the suffix *-až* is →D Polysyll, however, it also has the marking ↓D, mostly in non-common words, e.g., *drenáž* (nom.sg.) - *drenáža* (gen.sg.) 'drainage'. The suffixes *-ar*, *-jar*, along with the main marking ↓D as in *gonorár* (nom.sg.) - *gonorára* (gen.sg.) 'fee', also have the marking →D as in *maljár* (nom.sg.) - *maljará* (gen.sg.) 'house-painter'.

To sum up, according to Zaliznjak (1985), stress placement in Russian underived nouns cannot be explained by any rules. In contrast, stress assignment in derivative words is the result of a complex interaction of the accentual propeties of roots and affixes.

4.2.2 Halle's (1975, 1997) accentual rules

Halle (1975) distinguishes nine types of Russian nominal accentual patterns: *A*-type is characterized by fixed stem-stress, *B*-type by desinential stress, *C*-types (Cα, Cβ, Cγ, Cδ, Cε) are defined by initial ~ desinential alternation, *D*-type indicates predesinential stress in the plural and desinential stress elsewhere, words of *E*-type have initial stress in acc.sg., predesinential in the plural, and desinential in other cases. To account for these stress patterns, he postulates two principles (6) and two assumptions (7) (Halle 1975: 107):

(6) *Principle A.* If a stressed syllable is deleted, the stress is transferred to the immediately preceding syllable.
Principle B. If a word has more than one stress, it will appear in the output with stress on the leftmost stressed syllable; if a word has no stress, in the output it will have stress on the first syllable.

(7) *Assumption 1*. Case endings of nouns are inherently stressed.
Assumption 2. Nouns exhibiting stress pattern A have inherent stress; all other nouns lack inherent stress.

Fixed stem-stress and fixed desinential stress are accounted by Principle B: *goróx+ú* → *goróxu* (dat.sg.) ‘pea’; *gospož+á* → *gospožá* (nom.sg.) ‘lady’. Nouns of D and E types are subject to the *metatony rule* in the plural that retracts stress one syllable to the left (e.g., *kolbasá* (nom.sg.) - *kolbásy* (nom.pl) ‘sausage’). Nouns of C types have alternating stress between the initial syllable and the desinence: principle B and both assumptions explain finally stressed forms, initially stressed forms are accounted for by the rule of *stress deletion*: delete the stress on certain specially marked morphemes. These morphemes are the acc.sg. *-u* endings of feminine nouns in types Cδ, (e.g., *bórodu* ‘beard’) Cε (e.g., *skóvorodu* ‘frying pan’); all singular case endings (except loc.sg.) of Cβ (e.g. *zérkala, -u, -om)* ‘mirror’), Cγ (e.g., *vólka, -u, -om* ‘wolf’); the nom.pl. *-i/-y* ending of the nouns in Cγ (e.g., *vólosy* 'hair') and Cε (e.g., *gvózdi* ‘nail’). Singular case endings of E type nouns are also subject to this rule.

To sum up, Halle (1975) proposes inherently stressed and unstressed stems for Russian and postulates that all endings are inherently stressed. Stress surfaces on the leftmost stressed syllable or on the initial syllable in the absence of inherent stress; predesinential stress and initial stress in unstressed stems are explained by the rules of metatony and stress deletion correspondingly.

More than two decades later, Halle (1997) regards the accentuation of Russian nouns within Idsardi's (1992) metrical theory of prosody which states that stress is represented on a separate autosegmental plane. Stressable segments project grid marks onto the metrical plane - line 0, line 0 projections are grouped into constituents according to a set of rules, the heads of these groups are projected onto the higher plane which represents feet - line 1, the line 1 edge-marking rule projects a grid mark onto line 2 which represents the main stress.

According to Halle (1997), inherently stressed morphemes are supplied with a left parenthesis on line 0 which groups elements on its right up to the next parenthesis as presented in (8). The heads of these groupings (feet) are leftmost in Russian, which are projected onto the next line 1. Line 1 is subject to the edge-marking rule LLL, which inserts a Left parenthesis to the Left of the Leftmost

element in the string. Line 1 is subject to the head-marking Rule Left, according to which the leftmost foot is projected onto line 2 becoming the head of the prosodic word. All the steps are illustrated with the following example taken from Halle (1997: 279):

(8)

```
        *                line2
       (*    *           line1
   *   (*    (*   *      line0
g o r ó x + a m i                    'pea' (N.instr.pl.)
```

When morphemes (both stems and endings) are unaccented, i.e. they lack an inherent parenthesis, it is assumed that Line 0 is subject to the edge-marking RRR which places a Right parenthesis to the Right of the Rightmost syllable of the string. As Line 1 is subject to the head-marking rule Left, we end up with the following representation (Halle 1997: 280):

(9)

```
      *              line2
     (*              line1
      *  *     *)     line0
g ó r o d + u                    'city' (N.dat.sg.)
```

Halle assumes the endings of the *a*-stem (fem.) (except for the acc.sg. *-u*) and the plural endings (except for the nom.pl. *-i/y*) to be inherently accented whereas the endings of the *o/e*-declension (masc. and neut. nouns) and *i*-declension (nouns ending in *-mja*) are considered to be stressless.

Halle defines three major accentual paradigms as accented, post-accenting and unaccented. In the *unaccented* paradigm (C), stress is determined by the ending; in the other two paradigms, stress is determined by the accentual

properties of the stem. In the *accented* paradigm (A), an inherently accented element of the stem is supplied with a left parenthesis so that stress falls on the stem. If the stem is *post-accenting* (B), it gets a parenthesis after its last asterisk so that stress falls on the post-stem syllable. *Post-accenting* stems are responsible for finally stressed words (corresponds to Halle's (1975) B-type accentual pattern) as well as for forms with desinential ~ predesinential stress alternation (D and E accentual patterns). To account for stem-final stress in the plural, he postulates a rule (10) which retracts stress one syllable to the left of where it would otherwise have been assigned illustrated with the example in (11) (Halle 1997: 283):

(10) *Retraction rule 1*

Insert (/____*(*

S D (S lexically marked stem; D certain suffixes)

(11)

	line2		*	line2
	line1		(* *	line1
* * (* *	line0		* (* (* *	line0
k o l b a s + a m i		→	k o l b á s + a m i	

Halle also states another retraction rule for words with underlying jers. He assumes that the abstract vowels (jers) are present in the underlying representation, e.g., the nom.sg. suffix of *i*-stems and *o/e*-stems is the abstract jer as it may surface in the stem-final syllable in other case forms. For example, the word *koról'* 'king' bears stem-final stress only in the nominative singular whereas the other case forms have stress on the inflection (e.g., *korol'á* (gen.sg.)). Stem-final stress in the nominative singular is explained by the retraction rule in (12) that inserts a parenthesis before a stem-final stress bearing element, which precedes a jer. The example in (13) demonstrates the application of this rule in the word *koról'* 'king'.

(12) *Retraction rule 2*

Insert (/____*(*

O/E (jers)

(13)

```
                                                    *
  *  *   (*)          *  (*   (*)          *  (*)
k o r o l, -O   →   k o r o l, -O   →   k o r ó l
```

To summarize, Halle distinguishes between accented, post-accenting and unaccented stems, affixes may be either accented or unaccented. The rule of stress retraction is posited to account for forms with stem-final stress.

4.2.3 Melvold (1990)

4.2.3.1 Stress placement in underived nouns

Melvold (1990) presents a comprehensive analysis of stress patterns in Russian inflectional and derivational words within the framework of the cyclic theory (Halle & Vergnaud 1987, Halle & Kenstowicz 1989). She identifies four basic stress patterns:

(14) (a) Fixed stem-stress;
(b) Fixed desinence-stress;
(c) Stress alternating between the stem-initial syllable and the inflection;
(d) Stress alternating between the final syllable of the stem and the inflection.

Melvold uses the term mobile stress to refer to the pattern in (c) and shifting stress to refer to the pattern in (d). Following Kiparsky & Halle (1977), it is assumed

that Russian stress placement is governed by the Indo-European Basic Accentuation Principle (BAP):

(15) *Basic Accentuation Principle (BAP)*
Assign stress to the leftmost accented vowel; if there is no accented vowel, assign stress to the initial vowel.

She assumes that Russian morphemes may be either accented or unaccented. Nouns with accented roots have fixed-stem stress (*a*-type); if the root is unaccented, the accentual property of the inflection will determine stress placement in a word: if it is accented, the word will surface with desinential stress, if it is unaccented, stress will be assigned to the initial vowel by default (*c*-type). For nouns with stress fixed on the inflection (*b*-type), Melvold posits a rule which transfers stress one syllable to the right which is called the *Rule of Post-Accentuation*:

(16) [. . .ǿn-1 ɵn] → [. . .ɵn-1 ǿn]

The morphemes that trigger this rule are referred to as accented and subject to post-accentuation. To account for the shifting stress pattern (*d*-type) with stress alternating between the inflection in the singular and the last syllable of the stem in the plural, Melvold assumes that such nouns have accented roots which are subject to post-accentuation in all forms, and to retraction which applies in the plural forms of the paradigm shifting stress one syllable to the left (17) (p/r means roots with the features post-accentuation and retraction). The BAP does not apply on the first cycle as stress would be on the accented vowel of the root in all forms:

(17)

	Dat.sg.		Dat.pl.
	*		* *
Cycle 2	[[koles] $_{p/r}$ u]	Cycle 2	[[koles] $_{p/r}$ am]
BAP	[[kolés] $_{p/r}$ u]	BAP	[[kolés] $_{p/r}$ am]
→	[[koles] $_{p/r}$ ú]	→	[[koles] $_{p/r}$ ám]
←	n.a.	←	[[kolés] $_{p/r}$ am]
	kolesú		*kolésam*
	'wheel'		

Melvold (1990: 29) explains null inflections in declension cases (e.g., the gen. pl. of neuter and feminine nouns ending in *-a*) using the notion of jers (18):

(18) *borodá* (fem.) 'beard'

	Sg.	Pl.
Nom.	borod+á	bórod+y
Gen.	borod+ý	boród+Ø

She assumes that the null inflection in the gen.pl. is an underlying vowel that is accented, the deletion of which causes the stress to move leftwards. If there is no underlying vowel, the word should surface with an initial stress according to the BAP. Stress alternating between the initial and final vowels suggests that the root is unaccented and the inflections in the nom.sg. and gen.sg. are accented.

4.2.3.2 Stress placement in derived nouns

As stated in the previous section, the BAP does not apply on the first cycle as alternating stress would be impossible. In contrast to non-derived words, derived words are not characterized by mobile stress patterns. To account for fixed stress in derived words, Melvold makes the following assumption: there are accented and unaccented derivational suffixes; the stress rule applies cyclically; all suffixes are cyclic. With an additional property of dominance, one can differentiate four

accentual classes of derivational suffixes: [-accented, -dominant], [+accented, -dominant], [+accented, +dominant] and [-accented, +dominant]. If both a root and a derivational suffix are unaccented, stress will be assigned to the initial syllable by default; the accentual property of the inflection does not affect stress placement in derived nouns. For example, the word composed of the unstressed non-dominant suffix *-ost′* and an unstressed adjectival stem *molod* surfaces with an initial stress (*mólodost′* 'youth'). Even if an inflection is inherently stressed (e.g., dat.pl. *-ám*), stress remains on the initial syllable (*mólodost'am*). Inflectional endings are added on cycle 3, the word enters this cycle with an accent already assigned by BAP on the previous cycle. If an unaccented non-dominant suffix attaches to an accented root, a derivative gets fixed stress on the root in all forms of the inflectional paradigm, e.g., *-ost′* attached to an accented stem *gorbát* derives *gorbátost′* 'condition of being humpbacked'.

Although Melvold adopts the theory of cyclicity in the description of Russian stress, she does not confine cyclicity to dominance as Halle & Mohanan (1985) do. As shown above, the unaccented suffix *-ost′* is not accent-deleting as accented roots retain their stress in derivative forms, however, it is a cyclic suffix as it triggers application of the BAP. As all suffixes are cyclic, then a word with at least one derivational suffix can never enter the inflectional cycle without an accent already having been assigned by the BAP. For this reason, mobile stress occurs only in non-derived words. The difference between dominant and non-dominant (recessive) suffixes is explained as follows: dominant suffixes are affixed on a plane distinct from the stem, while non-dominant suffixes are represented on the same plane as the stem (Melvold 1990: 63). The feature dominance is associated with a suffix: dominant suffixes delete the base accent and determine stress placement in a word.

Stress assignment with accented recessive suffixes (*-ic,-išč*) will depend on the accentual property of the root: if it is accented, a derivative will be stressed on the root (e.g., *lúža* (A-type) 'puddle' → *lúžica* 'puddle' (dim.)); if it is unaccented, stress will fall on the suffix (e.g., *čast′* (C-type) 'part' → *častíca* 'part' (dim.)).

Accented dominant derivational suffixes trigger the deletion of the underlying stem accent. According to Melvold, most of these suffixes are post-accenting, i.e. the accent shifts one syllable to the right onto the inflection (*-ač*, *-ak*, *-jak*,*-yk*, *-Ek* where E represents a jer): e.g., *síla* (A-type) 'strength' → *siláč* (nom.sg.), *silačá* (gen.sg.) 'strong man'. Such suffixes have a special diacritic marking *p*: a words enters the inflectional cycle 3 with the suffixal accent assigned by the BAP where the rule of post-accentuation transfers the accent one syllable to the right. Suffixes which surface with stress in all forms are the augmentative suffixes *-jag*, *-yg*, *-jug* and the borrowed suffix *-ist* (e.g., *svjazíst* (nom.sg.), *svjazísta* (gen.sg.) 'signaller').

The only unaccented dominant suffix *-en'* deletes the stem accent and, since it is unaccented, brings about the application of the BAP which assigns stress to the initial syllable, e.g., *oborót* 'turn' → *óboroten'* 'werewolf'.

4.2.4 Revithiadou's (1999) accentuation principles

Revithiadou (1999) provides an analysis of languages with unpredictable stress (Greek, Russian) within the framework of Optimality Theory. Russian is presented as a lexical stress system, in which prosody is determined by morphology. Similar to the previously discussed theories, it is assumed that morphemes can be either accented or unaccented in Russian. One of the most important proposals of Revithiadou's account is that systems like Greek or Russian are sensitive to morphological headedness. The accent that wins over other accents in a word belongs to the 'head of the word', i.e. a morphological head becomes a prosodic head. In Greek and Russian, the 'head of the word' is understood as the element that determines the syntactic category, class and gender of the word. In non-derived words, the morphological head is the root whereas in derived words, it is the derivational suffix. Since Russian stress is deemed to depend on the morphological head of the word, this system is referred to as a head-dependent system with lexical accent.

A lexical accent is presented as an autosegmental feature that can be floating, i.e. it can be realized outside the morpheme that sponsors it. Two main types of Russian morphemes are posited: marked and unmarked. *Unmarked* morphemes lack an inherent accent whereas *marked* morphemes can be *accented* when they have a lexically pre-specified head on some vocalic peaks, or *unaccentable* when the accent is floating. For example, Russian nouns with alternating stress patterns (e.g., *zérkalo* (nom.sg.) - *zerkalá* (nom.pl) 'mirror') are assumed to have unmarked roots. In this example, the initial stress in the nominative singular is argued to be assigned by default whereas the nominative plural suffix is considered to be inherently accented. In words with a fixed stem stress (e.g., *právilo* (nom.sg.) - *právila* (nom.pl) 'rule'), the accent of the root overrides the accent of the suffix as the root is the morphological head of the word. Fixed stress on the inflection (e.g., *gospožá* (nom.sg.) - *gospoží* (nom.pl.) 'lady') suggests that the root is unaccentable and its floating accent is realized on the inflection.

In this approach, derivational suffixes are almost always 'heads' because they are considered to define the lexical category, class or gender of the derived form. Revithiadou (1999) distinguishes between two groups of derivational suffixes. The first group includes accented, unaccentable and unmarked derivational suffixes. Accented suffixes (e.g., *-ast*) always bear stress in the derivative (e.g., *gorlásta* 'loud-mouthed' (Adj.sf.fem.)), unaccentable suffixes (e.g., *-ač*) induce stress on the inflection (e.g., *borodáč* (nom.sg.) - *borodačí* (nom.pl.) 'bearded man') whereas unmarked suffixes (e.g., *-en′*) lack lexical accents and bring about the default stress (e.g., *xóloden* (Adj.masc.sf.) - *xolodná* (Adj.fem.sf.) 'cold').

The second group includes evaluative suffixes. These suffixes give priority to the root, e.g., the suffix – *išča* is stressed combined with an unmarked stem (e.g., *golová*, *gólovy* 'head' – *golovíšča* 'head' (aug.)) and unstressed attached to a marked accented stem (e.g., *jáma* 'pit' - *jámiíšča* 'pit' (aug.)). It is argued that evaluative suffixes are transparent as derivatives preserve the syntactic category

of the base word. More specifically, the derived forms are characterized by the same gender (masculine, feminine or neuter) as the base words. This suggests that evaluative suffixes are not heads as opposed to category-changing suffixes that are considered to be morphological heads of the words.

Revithiadou (1999) maintains that the distribution of lexical accents is prosodically controlled. It is proposed that *templatic marking* is responsible for well-formed prosodic words in Russian. For example, the following templates are considered to be acceptable for Russian because they are binary: ('σσ), ('σσ)σ, σ('σσ), ('σσ)(σσ), (σσ)('σσ). Binarity is derived by the principle of *hierarchical alignment:* Every prosodic constituent is aligned with some prosodic constituent that contains it. For lexically marked words, hierarchical alignment is formulated as follows (Revithiadou 1999: 55):

(19) HIERARCHICAL ALIGNMENT (HIERAL):

A lexical accent is left/right aligned with the prosodic constituent that contains it, a syllable is left/right aligned with the prosodic constituent that contains it, a foot is left/right aligned with the prosodic constituent that contains it.

The unattested patterns for Russian are *σ('σσ)σ, *σ(σσ)('σ), *(σσ)σ('σ) because they are not binary. For example, the stress pattern of the word *čečevícy* (nom.pl.) 'lentil' is derived through the following ranking for templatic marking (Revithiadou 1999: 138):

(20)

če(čevic-, -y	FAITH(HEAD)	HIERAL	*FLOP
→a. (čeče)(vícy)			*
b. če(čevi)(cý)		*!	*
c. če(čévi)(cy)		*!	

FAITH(HEAD) is not violated as accent is realized in the output. Both candidates in (20b) and (20c) violate HIERAL as they are not binary. The candidate in (20a) is the winner because it is binary, i.e. it consists of two binary feet. *FLOP demands that lexical accents remain faithful to their lexical association, i.e. it bans deletion or movement of accents. This constraint is violated by the first two candidates as accent is moved in the output.

In words with unaccentable roots, stress patterns are derived through the interaction of the following constraints: FAITH(HEAD), *DOMAIN and ALIGN-R (LA, PRW, R). The constraint *DOMAIN ensures that a floating accent is realized in a morpheme other than its sponsor. The constraint ALIGN-R (LA, PrW, R) requires that a lexical accent must be aligned to the right efge of the prosodic word. The example in (21) demonstrates the effects of these constraints (Revithiadou 1999: 140).

(21)

* gospož-	FAITH(HEAD)	ALIGN-R	*DOMAIN
* | →a. go(spož)			*
* | b. (gospož)		*!	*
c. (góspož)	*!		

The form *gospóž* (gen.pl.) ‘lady’ is the most optimal candidate as its accent is aligned to the right edge of the word. The candidate in (21c) is ruled out as the underlying accent is deleted and stress is assigned by default.

To derive the genitive singular form *gospoží* with an accent realized on the inflection, the faithfulness constraints are split into FAITH_{R} and $\text{FAITH}_{\text{InflS}}$ with

faithfulness to the root ranked higher than faithfulness to inflection. The tableau in (22) demonstrates how the stress pattern of *gospoží* is derived (Revithiadou 1999: 141).

(22)

* gospož-, -i	FAITH(HEAD)$_R$	*DOMAIN	DEP(HEAD)$_{InflS}$	FTBIN
* | →a. (gospo)-(ž-i)			*	*
* | b. (gospo)ž-i		*!		
c. góspož-i	*!			

The last candidate is initially stressed by default so that faithfulness to the root accent is violated. The candidate in (22b) is ruled out as the accent must be realized outside its sponsor. The candidate in (22a) is the winner as it satisfies FAITH(HEAD)$_R$ and *DOMAIN.

The following example in (23) displays the accentuation of words with accented inflectional suffixes. In the word *skovorodá* (nom.sg.) 'frying-pan', the inflection is considered to be inherently stressed whereas the root is assumed to be unaccented.

(23)

skovorod-,-(a	FAITH(HEAD)$_R$	HIERAL	FAITH(HEAD)$_{InflS}$	FTBIN
→a. (skovo)ro(dá)		*		*
b. (skovo)(róda)	*!			

The candidate in (23b) violates the higher-ranked FAITH(HEAD)$_R$ constraint as accent is realized on the root. Thus, although the winner in (23a) does not conform to binarity, it is chosen as the most optimal candidate.

Words that lack inherent lexical accent are assumed to consist of unmarked morphemes. As already mentioned at the beginning of the section, Revithiadou (1999) argues for the initial default position of Russian stress which is determined by the EDGEMOST-L constraint: A peak of prominence lies at the left edge of the word. The tableau below shows how the accentuation of the unmarked word *skóvorody* (nom.pl.) 'frying-pan' is derived.

(24)

skovorod-, -y	TROCHEE	EDGEMOST-L
→a. (skóvo)(rody)		
b. sko(vóro)dy		*
c. (skovó)rody	*!	*

The initially stressed candidate in (24a) is the winner as it satisfies both the trochaic patterning and leftmost stress.

To sum up, a lexical accent implies that morphemes are supplied with a prespecified metrical structure. The 'head' of the morphological stucture determines which syllable will bear primary accent in a word. Marked words are characterized by unpredictable stress while unmarked words surface with initial stress assigned by default.

4.2.5 Alderete (2001)

4.2.5.1 Prosodic faithfulness and stress patterns

Alderete (2001) examines the role of morphological factors like the accentual properties of roots and suffixes in stress placement in Russian. He argues for two

distinct types of morpho-accentual properties, *Root-Controlled Accent* (RCA) and *Affix-Controlled Accent* (ACA). In RCA, roots retain accent blocking the application of other accentual processes. In ACA, on the other hand, an affix causes a change in the prosody of the base. Alderete accounts for the properties of these morpho-accentual processes within the framework of the Optimality Theory (OT). He argues that RCA is a consequence of the privileged Faithfulness status for roots, whereas ACA is an obligatory violation of Faithfulness being the result of a new constraint type, Anti-Faithfulness. This constraint evaluates a pair of morphologically related words and forces a prosodic alternation of the base.

Faithfulness constraints aim to preserve phonological identity between the input and the output whereas Markedness constraints require well-formedness of the output. Alderete (2001: 24) proposes three Prosodic Faithfulness constraints:

(25) *Prosodic Faithfulness (Pros-Faith)*:
MAX-PROM: Every prominence in S1 must have a correspondent in S2.
DEP-PROM: Every prominence in S2 must have a correspondent in S1.
NO-FLOP-PROM: Corresponding prominences must have corresponding sponsors and links.

MAX-PROM prohibits the deletion of input stress and DEP-PROM bans the insertion of stress in the output. Faithfulness to the accent position is regulated by NO-FLOP-PROM which militates against shift in prominence. Alderete argues for Faithfulness constraints for roots ($\text{MAX-PROM}_{\text{Root}}$) that are distinct from the Faithfulness constraints for affixes ($\text{MAX-PROM}_{\text{Affix}}$). Universally, roots tend to retain information over affixes which is explained as the interaction of Faithfulness constraints in OT with root faithfulness ranked above affix faithfulness: *Root Faith >> Affix Faith*. This ranking leads to the formulation of the *Root-Controlled Accent Hypothesis*: "In lexical-to-surface mappings of a word with more that one inherent accent, if accent is deleted, accent in the root is realized over accent elsewhere in the word" (Alderete 2001: 43).

Alderete studies the morphological principle of root control and the phonological principle of directionality in the analysis of *Accent Resolution* (AR). He argues for three constraints that are at work in AR: EDGEMOST, MAX-PROM$_{Root}$ and MAX-PROM$_{Affix}$. Directional AR implies the constraint EDGEMOST (leftward or rightward edge orientation), while root-controlled AR involves MAX-PROM constraints with MAX-PROM$_{Root}$ ranked above MAX-PROM$_{Affix}$.

Russian stress in underived words is considered to be 'root-controlled' so that the Root Faithfulness constraints (MAX-PROM$_{Root}$ and NO-FLOP-PROM$_{Root}$) dominate other prosodic well-formedness constraints. That is, the inherent root accent in the input will be realized in the output regardless of the accentual properties of affixes. In words with unaccented roots, these constraints are irrelevant and the constraint POST-STEM-PROM becomes activated: the left edge of the stress prominence must coincide with the right edge of a stem. This constraint ensures that the stress falls on the first vowel of the inflectional ending which is, according to Alderete, a default stress pattern in Russian. The following constraint ranking accounts for the predominant stress patterns (fixed stem stress and fixed inflection stress) in Modern Russian (Alderete 2001: 91):

(26) { MAX-PROM$_{Root}$ / NO-FLOP-PROM$_{Root}$ } >> POST-STEM-PROM >> PROS-FAITH$_{Affix}$

The tableau in (27) illustrates the results of the constraint ranking for nouns with accented roots whereas the tableau in (28) presents the default stress assignment for nouns with unaccented roots (Alderete 2001: 88-89):

(27) *Positional contrast in disyllabic roots*

Input	Output	MX-PM$_{Rt}$	NO-FLOP-PM$_{Rt}$	PSP	MX-PM$_{Af}$
/kómnat + í/	→ kómnat-i			*	*
	*komnát-i		*!	*	*
	*komnat-í	*!			

(28) *Default Ending Stress with Unaccented Root*

Input	Output	MAX-PROM$_{Root}$	POST-STEM-PROM
/stol + i/	→ stol-í		
	*stól-i		*!

In words with unaccented stems, root faithfulness constraints are irrelevant so that POST-STEM-PROM locates stress on the first syllable of the inflectional ending, which is argued to be the default position of stress in Russian. If there is no overt ending, the gradient nature of POST-STEM-PROM ensures that stress falls on the stem-final vowel. Stress patterns of the mobile paradigms are explained by dominance effects discussed in the next section.

4.2.5.2 Anti-faithfulness in morpho-accentual processes

Root-Controlled Accent (RCA) is a consequence of a privileged faithfulness for roots and requires preservation of a root accent while Affix-Controlled Accent (ACA) involves an obligatory violation of Faithfulness inducing a change of the root accent. Contrary to RCA, where *Root Faith* is driven by culminativity requirements, ACA is motivated by morphology and is predictable from the properties of individual morphemes. Affix-controlled morpho-accentual processes are characterized by dominance effects which means that a dominant affix triggers a deletion of the base prosody and the emergence of a default accentual pattern.

While culminativity effects in RCA follow from a general property of Universal Grammar (UG), i.e. *Root Faith* is ranked above *Affix Faith*, dominance effects in ACA have a morphemic source and follow from a new constraint-type, Anti-Faithfulness, which causes an alternation by requiring a violation of a related faithfulness constraint. Alderete examines different morpho-phonological operations such as deletion, ablaut/consonant mutation, spreading, metathesis, exchanges and claims that they cannot be modelled as the realization of lexically specified structure through the interaction of Markedness and Faithfulness constraints. These alternations are motivated by the so-called transderivational anti-faithfulness constraints that trigger alternations in morphologically related words. The theory of *Transderivational Anti-Faithfulness* (TAF) is introduced as a cross-linguistic model of morpho-phonological operations developed from *Transderivational Correspondence Theory* (Benua 1997, 1998) which is based on the following assumptions (Alderete 2001: 147):

(29) (a) *Transderivational (OO) correspondence*
Morphologically related words stand in correspondence and are regulated by OO faithfulness.

(b) *Base priority*
Recursive constraint hierarchies simultaneously evaluate a word and its immediate morphological derivative, giving priority to the former, the base.

(c) *Affix specificity*
Subcategorisation frames specify the OO-correspondence relation that links a base and derivative in a paradigmatic identity relation.

In this theory, pairs of surface forms are linked by transderivational (OO) correspondence relation where two outputs are compared by OO-Identity constraints. The base of an OO-correspondence is a morphologically and phonologically well-formed word (output). An affix requires an OO-

correspondence relation between the derived output and the base output. The theory of Transderivational Anti-Faithfulness also builds on the notion of OO-correspondence, however, the TAF constraints require a violation of Faithfulness producing a contrast between morphologically related words (Alderete 2001: 165):

(30) *Anti-Faithfulness*
Given the Faithfulness constraint F, ¬F is the related Anti-Faithfulness constraint that is satisfied in a string S if S has at least one violation of F.

The theory of TAF is applied to affix-controlled accent which derives from anti-faithfulness constraints. Affix-controlled processes are characterized by a set of properties. First, they are lexically-idiosyncratic which means that alternations are idiosyncratic properties of a given affix and they are lexically specified. Second, they correlate with the application of a mophological process. Third, alternations induced by an affix affect only the base of a derived form. The next property of affix-controlled processes is that they are always grammar-dependent. The output is determined by an independent constraint system. For example, dominant affixes cause deletion of a base accent, but the canonical faithfulness properties of the structures define the result thus bringing about a default pattern. Subject to locality requirements is a final property of affix-controlled phenomena which determines where the target of the process is located, for example, pre- and post-accentuated affixes often insert an accent on an immediately adjacent syllable.

Alderete does not confine dominance effects to derivational suffixes. Russian underived words of pattern C have initial stress in singular forms and inflectional stress in the plural. Pattern D nouns have ending stress in singular forms and stem-final stress in the plural. It is argued that final stress of pattern C looks like a dominance effect induced by the plural suffixes (initial stem accent is deleted and final stress is assigned by default), while stem-final stress of pattern D presents an example of pre-accentuation (Alderete 2001: 217):

(31)

	Base	Derivative	
(a) Pattern C	*kólokol-u*	*kolokol-ám*	= Effect of ¬OO-MAX-PROM
(b) Pattern D	*kolbas-é*	*kolbás-am*	= Effect of ¬OO-DEP-PROM

In (31a), the ¬OO-MAX-PROM constraint requires a deletion of prominence in the base, the final default stress is assigned by the grammar. The ¬OO-DEP-PROM constraint in (31b) requires an insertion of accent into the stem; the POST-STEM-PROM constraint ensures that stress appears as close as possible to post-stem vowel.

Alderete (2001) analyzes morphologically induced dominance effects in terms of Transderivational Anti-Faithfulness. The behaviour of dominant affixes in Russian is examined within the TAF theory where dominance effects are explained as the negation of MAX-PROM faithfulness constraint. As was discussed above, accent is root-controlled in underived words in Russian. If the input contains an accented root, it will be realized throughout the paradigm. If the input has an unaccented root, the result will be the default ending stress, even if the ending is unaccented.

As far as derived words are concerned, there are certain suffixes that run counter to the pattern of root-controlled accent, i.e. they trigger de-accentuation of the stem. These accent-deleting suffixes are referred to as 'dominant' suffixes and they themselves can be accented ('auto-stressing') or unaccented ('post-accenting') which require stress on the following vowel of the inflectional ending. The Russian dominant accented suffixes are, for example, the suffixes *-úx*, *-án*, *-jág* which are always stressed regardless of the accentedness of the stem:

(32)

/gólod + úx + a/	→	*golod - úx - a*	'hunger'
/molod + úx + a/	→	*molod - úx - a*	'young married woman'

The dominant unaccented suffixes include suffixes *-ač*, *-un*, *-a*, *-ež* which delete the base accent and require a stress on the following inflectional ending by default:

(33) */púz + ač + u/* → *puz - ač - ú* 'man with paunch'(dat.sg.)
/borod + ač + u/ → *borod - ač - ú* 'man with beard' (dat.sg.)

There are also derivational recessive suffixes, for example *-íc* and *-íšč*, which are unstressed when they are attached to an accented stem (a), and stressed when they combine with an unaccented stem (u):

(34) *lúž-a* (a) *lúž - ic - a* 'puddle' (dim.)
gorá, góry (u) *gor - íšč - a* 'mountain' (aug.)

Alderete (2001: 210) points out that there is no correlation between dominance and derivational suffixes: there are recessive derivational suffixes (*-íc*), and there are inflectional dominant suffixes, as shown in the previous section. For example, the plural suffix *-a* is stressed even attached to accented stems:

(35) */máster + a/* → *master - á* 'foremen' (nom.pl.)
/jákor' + a/ → *jakor' - á* 'anchors' (nom.pl)

Stress with dominant suffixes is governed by the following set of constraints:

(36) $\neg OO_{Dom}$-MAX-PM >> OO-MAX-PM >> MAX-PM_{Stem} >> PSP

The constraint $\neg OO_{Dom}$-MAX-PM is highly ranked because the accent of the base will not be preserved in the derived form. An accented affix will realize its stress because MAX-PM_{Stem} dominates PSP. Completely unaccented words receive

default ending stress due to the constraint PSP which assigns stress on the first vowel of the inflectional ending.

4.3 Evaluation of the theories and issues with 'default' stress in Russian

4.3.1 Default as inferred from the stress patterns of underived nouns

In this section, I discuss whether it is possible to deduce the Russian default stress pattern from the accentual alternations of underived nouns. As has been demonstrated in Section 4.1, there are several nominal accentual paradigms which differ in the accentual curves, i.e. stress patterns in the singular and plural. There are different classifications of the Russian accentual system, all of them agree, however, on the division of nouns into the paradigms with fixed stem stress (A), fixed desinential stress (B), and mobile stress patterns (C) which means that stress falls on the stem in one forms, and on the inflection in others. There are two major mobile stress patterns in Russian: the first pattern is characterized by stress on the stem in the singular and on the inflection in the plural (AB in Table 4.1); in the second one, stress is on the inflection in the singular and on the stem in the plural (BA in Table 4.1). It is important to note, however, that stem-stress in the AB paradigm is word-initial whereas it is stem-final in the BA paradigm. For this reason, Feldstein (1996) does not use the designation A to refer to stem stress in the mobile stress paradigms. He differentiates between marked fixed stem stress which is unpredictable, and unmarked word-initial and stem-final stress patterns in the mobile paradigms which are grammatically predictable. As is clear from the previous sections, it is generally assumed that words with the mobile stress have unaccented stems. Since default is deemed to arise when there is no lexically specified accent in a word, nouns with unaccented stems are considered to bring information about the default location of stress. The controversial issue at hand is whether the default is word-initial or word-final (inflectional). Assuming word-initial default implies that word-final stress is lexically assigned. In contrast, if we regard inflectional stress as the default pattern, word-initial stress must be

accounted for by lexical prespecification. The question is whether this accentual information can give us enough evidence to infer the Russian default stress pattern.

According to Melvold (1990) and Halle (1997), underived nouns with the initial ~ desinential alternation have unaccented stems. In this group of nouns, inflections are argued to be underlyingly accented whereas initial stress is assigned by default. In a similar vein, Revithiadou (1999) suggests that this alternating pattern indictates the unmarkedness of the roots and the initial stress is assigned by default. In these accounts, initial stress is the residual of the *Basic Accentuation Principle* inherited by Russian from Proto-Indo-European which assigns stress to the leftmost accented morpheme, or to the leftmost syllable if the morphemes are unaccented. How legitimate is it to make use of historical patterns in order to gain an insight into the synchronic default stress pattern? As discussed in Section 3.1.3, words without an inherent accent (enclinomena) received a falling tone or some other kind of prosodic salience in Common Slavic (CS). If it is still characteristic of Modern Russian, we should assume that all initially stressed words of the mobile paradigm arise from enclinomena which is not the case. We should make the same assumption with respect to inflectional suffixes: all stressed inflectional suffixes originate from orthotonic forms. This is also not the case. According to Zaliznjak (1985), initial stress was 'automatic' which was manifested as a falling tone and not phonological; word forms did not yet form a single unit (phonological word) by means of stress. The old intonations (acute and circumflex) required two syllables to be realized so that initial circumflex could be retracted onto the preceding syllable (for examples see 3.1.1). Only with the rise of the neo-acute could the accent be realized not only on long, but also on short syllables and it did not shift within a word. For this reason, it was exactly the neo-acute intonation which brought about analogical leveling of word forms in a certain paradigm (Kolesov 2005). Section 3.1.4 has presented the most important tendencies with respect to analogical leveling, for example, words of the original B paradigm could change their stress patterns and become declined like words of

the C paradigm, i.e. words tended to establish a singular-plural opposition by means of stress. Next, within a paradigm nouns were apt to level stress in the singular or plural according to stress patterns in the other declension cases. Thus, Russian nouns belonging to the paradigms B and C according to the existing theories should not necessarily be traced back to the historical B and C paradigms. Other factors that might have played a role for words in following a particular accentual paradigm are semantic, pragmatic and others such as word length, etc.

Furthermore, stress on proclitics tended to disappear in the course of time and most of such structures have become lexicalized in Modern Russian: "stress on proclitics with c-class stems is retained only as a fossilized relic" (Baerman 2010). As stress shift occurs with certain words and prepositions, these cases are often regarded as phraseological units. Assuming an initial default, we would expect stress on proclitics with every initially stressed word of of the c-paradigm, which is not the case. Furthermore, transferring the initial default stress pattern into Modern Russian makes us assume that a Russian native speaker, confronted with an unknown word, will assign stress to the initial syllable by default. Experimental studies on stress placement in non-words in Russian have brought different results, but none has revealed an initial stress assignment.

Historical developments and experimental findings demonstrate that initial stress has become lexical in Russian. What about word-final stress? Originally, Halle (1975) explained fixed desinential stress by the suggestion that all inflections had an underlying stress in Russian. Later, Halle (1997) put forward the idea of inherently post-accenting stems. Melvold (1990) essentially follows Halle in the explanation of accentual patterns, however, she does not posit post-accenting stems, but postulates a rule of Post-Accentuation. According to Revithiadou (1999), finally stressed nouns have unaccentable roots with a floating accent realized on the inflection.

Forms with the desinential ~ stem-final alternation are explained by Melvold (1990) and Halle (1997) by the Stress Retraction Rule in the plural. Revithiadou (1999) accounts for this stress alternation by the 'head-attraction'

phenomenon. Unaccentable roots become accented in the plural and the constraint ALIGN-R ensures stress on the final syllable of the root, e.g., *kolbas-á* (nom.sg.) - *kolbás-y* (nom.pl) 'sausage'. Thus, in some cases, final stress is accounted by the rule of Post-Accentuation or realization of floating accent on the inflection (b-type), in others, by lexically stressed inflections (c-type).

In general, historical development of word stress patterns is crucial for describing stress regularities and systematizing accentual patterns. The question is whether all these accentual patterns are lexical or some of them are assigned by default. It has been demonstrated that it is highly problematic to determine the synchronic default stress from accentual alternations of underived nouns. I assume, however, that initially and finally stressed words do not bring information about the default pattern because, as we have seen, these stress patterns are used to form a singular-plural opposition, i.e. they have a morphological role.

4.3.2 Stress as the result of prosodic faithfulness and anti-faithfulness

A completely different view of accentual patterns in Russian underived nouns is suggested by Alderete (2001). In his account, the default stress pattern is post-stem (inflectional) whereas initially stressed words are lexically specified. In contrast to the theories by Halle (1975, 1997) and Melvold (1990), which make use of historical alternations in the description of the synchronic stress patterns, Alderete's theory seeks no support in diachrony and is based on universal principles. He accounts for the two major stress patterns of Russian underived nouns (fixed stem stress and fixed inflectional stress) as the result of the interaction of Prosodic Faithfulness constraints, with root faithfulness ranked above affix faithfulness. Words with fixed stem stress have inherently stressed stem vowels whereas words with fixed inflectional stress have unaccented stems and stress is assigned to the final vowel by default.

Alderete argues against the Basic Accentuation Principle, according to which the leftmost accented vowel in a word receives stress irrespective of the morphological structure of a word. *Restricted Edge Orientation* (REO) does not

allow structures like /áf + róot/ → [áf – root] where the prefix retains its accent over the root accent. It is assumed that unproductivity of most Russian prefixes speaks against the analysis in terms of directional *Accent Resolution* (AR). In Russian, there must be only one verbal prefix *vi-* that always wins over the root accent.

It is important to note that prefixes are generally more independent than suffixes in Russian: they usually do not change the grammatical category of the base, some prefixes attach to words of different parts of speech without changing their meaning (in contrast to suffixes), thus the connection between prefixes and stems is not necessarily too strong. There are, however, prefixes that get main stress in derived words. Zaliznjak (1985: 45) distinguishes the following groups of such prefixes:

(37) (a) The prefixes *pra-* and *su-* (however, unproductive in Modern Russian): e.g., *prá-ded* 'great-grandfather', *prá-vnuk* 'great-grandson', *sú-merki* 'twilight'.

(b) A monosyllabic prefix attached to a stem ending in *-k*: e.g., *prí-znak* 'feature', *zá-pusk* 'launch', *pó-isk* 'search'.

(c) A monosyllabic prefix attached to a stem ending in /*i*/ or /*u*/ and a voiceless/voiced consonant: e.g., *pód-kup* 'bribery', *ót-kup* 'pay-off', *prí-kus* 'bite', *prí-svist* 'whistle', *prí-vizg* 'squel', *ób-žig* 'burning'.

(d) Some others: e.g., *prí-vod* 'drive', *prí-gorod* 'suburb', *zá-govor* 'conspiracy', *vó-zglaz* 'exclamation'.

The words which are semantically derived from the above mentioned nouns retain their accent on the prefix: e.g., *prí-gorodnyj* (Adj.) 'suburban', *prí-zračnyj* (Adj.) 'illusory', *sú-mračnyj* (Adj.) 'gloomy'. Stress on the prefix is often observed in

Russian adverbs, e.g., it is the norm for the patterns *iz-a*, *syz-a*, *na-o*, *za-o*: e.g., *íz-redk-a* ‘occasionally’, *sýz-nov-a* ‘anew’, *ná-bel-o* ‘clean’, *zá-svetl-o* ‘before dark’.

As we see, in some cases, the prefix accent dominates the root accent which contradicts the REO hypothesis: the Positional Faithfulness constraints account for accent retention in the roots but fail, however, to explain cases with the prefixed accent. The root-controlled Accent Resolution cannot account for the above examples so that the Positional Faithfulness constraints need some modification.

Positional faithfulness constraints are supplemented by anti-faithfulness constraints to account for the mobile stress. The Transderivational Anti-Faithfulness theory is used to explain stress patterns of the mobile paradigms C and D, in which two well-formed outputs are compared by OO-Identity constraints, and dominant suffixes trigger OO Dom-Correspondence. Alderete uses unmarked forms as base outputs: singular forms are used as the base for the plural forms; singular masculine forms are used for adjectives as masculine is claimed to be the unmarked gender. As mentioned earlier, he proposes the following constraint ranking for dominance effects:

(38) $\neg$OO$_{\text{Dom}}$-MAX-PM >> OO-MAX-PM >> MAX-PM$_{\text{Stem}}$ >> PSP

$\neg$OO$_{\text{Dom}}$-MAX-PM triggers the deletion of the stem accent, MAX-PM$_{\text{Stem}}$ is decisive for derivatives with auto-stressing suffixes, PSP is crucial for derivatives with dominant post-accenting suffixes. It is suggested that Pattern C (stem stress in the singular, word-final in the plural) is the result of the dominant effect induced by the plural suffixes. Let us see whether this constraint ranking makes sure that the optimal candidate wins. The example below in (39) demonstrates root mutation induced by the inherently stressed dominant plural inflection *-a* in the word *gorodá* (nom.pl) ‘city’ which triggers the activation of the $\neg$OO$_{\text{Dom}}$-MAX-PM constraint.

(39) *Dominance effect with dominant accented -a*

Base	/górod-á/	¬OO$_{Dom}$-MAX-PM	OO-MAX-PM	MAX-PM$_{Stem}$	PSP
górod	[górod]-a	*!			*
→ górod	[gorod]-á		*		

The candidate *gorodá* is the winner as it satisfies the highly ranked anti-faithfulness constraint ¬OO$_{Dom}$-MAX-PM which requires the deletion of the base prosody. *Górod* serves as the base for the OO-correspondence as singular forms are argued to be the unmarked ones. What about Pattern C forms with final stress in the singular and initial stress in the plural as in *golová* (nom.sg.) - *gólovy* (nom.pl) 'head'? The following example illustrates that this constraint ranking fails to derive the correct stress pattern in this group of words.

(40) *Lack of dominance effect in OO-correspondence*

Base	/golov-y/	¬OO$_{Dom}$-MAX-PM	OO-MAX-PM	MAX-PM$_{Stem}$	PSP
golová	[gólov]-y				*
→ *golová	[golov]-ý				

The constraint ¬OO$_{Dom}$- MAX-PM is not activated as there are no dominant suffixes, OO-MAX-PM bans accent deletion in the output so that it is the PSP constraint that determines stress placement, the winner is thus the incorrect form **golový.* The singular form is finally stressed so the stem must be unaccented according to Alderete's theory. The plural form consists of unaccented morphemes which leads to the word-final default which is the wrong resulting stress pattern, however. If we assume that the base form is the plural form *gólovy* with the accented stem, we derive the correct singular *golová*. Nevertheless, plural forms cannot be used as base forms in this approach. Another important issue to

consider is that both forms are derivatives consisting of a root and an inflectional suffix. If *golová* is the base for the derivation of plural forms, what is the base for the derivation of the singular form *golová*? *Golóv* can be an occurring word in the gen.pl., however, it cannot serve as the base of derivation because it is a marked form. However, even in this case, we can derive the form *golová*, but not *gólovy*. We can only speculate how these examples are explained within the Transderivational Anti-Faithfulness theory as Alderete ignores the forms of the mobile paradigm C with final stress in the singular and initial stress in the plural.

Let us consider the pattern D with final stress in the singular and stem-final stress in the plural (e.g., *kolbasá – kolbásam* 'sausage'). In the singular, stems are considered to be unaccented so that final stress is assigned by default; in the plural, the process of pre-accentuation is argued to take place. Another TAF constraint is introduced: ¬OO-DEP-PROM which imposes an insertion of accent into the stem. PSP is a gradient constraint that requires that stress is inserted close to the post-stem vowel. What remains unexplained is why plural suffixes are pre-accenting with some stems and are unaccented or stressed with the other ones (e.g., *kolbás-am*, but *dom-ám*, *bórod-am*). Why does the suffix *-am* (dat.pl) insert the stem-final accent in *kolbás-am,* but not in *bórod-am*, for example, which also has an unaccented base in the singular (*borod-á*)? It is not quite clear how stems 'select' a correct allomorph.

4.3.3 Analysis of dominance effects in derived words

Alderete (2001) divides the Russian derivational suffixes into three groups: dominant accented ('auto-stressing'), dominant unaccented ('post-accenting') and recessive accented suffixes. Let us start with the groups of recessive accented suffixes. These suffixes realize their accent when they are combined with an unaccented stem and they surface unstressed being attached to an accented stem. To account for the stress patterns with the recessive accented suffixes, the constraint MAX-PROM$_{Stem}$ is introduced which is ranked below MAX-PROM$_{Root}$: a

root accent beats out a stem accent (outside the root), and a stem accent can cause non-ending stress (Alderete 2001: 213). The result is illustrated in (41) below.

(41) *Root-controlled accent in derived nouns*

/[lúž-íc]-a/	MAX-PROM$_{Root}$	MAX-PROM$_{Stem}$	PSP
a. [luž-ic]-á	*!	**	
b. [luž-íc]-a	*!	*	*
c. → [lúž-ic]-a			*

In the above example, the winning form is *lúžica* 'puddle' (dim.) as the suffix *-ic* loses its stress to an accented stem. When a stem is unaccented, the suffix realizes its accent as presented in (42) (Alderete 2001: 213).

(42) *Stem faithfulness in derived nouns*

/[časť-íc]-a/	MAX-PROM$_{Root}$	MAX-PROM$_{Stem}$	PSP
a. [časť-ic]-á		*!	
b. → [časť-íc]-a			*

The dominant/recessive distinction is expressed through the constraint ranking in (43):

(43) ¬OO$_{Dom}$-MAX-PROM >> OO-MAX-PROM >> ¬OO$_{Rec}$-MAX-PROM

The ¬OO$_{Dom}$-MAX-PROM constraint is highly ranked as dominant suffixes trigger the deletion of the base prosody; the recessive suffixes also trigger OO-Correspondence but, since they do not delete the stem accent, the TAF constraint

¬OO_{Rec}-MAX-PROM is ranked below OO-MAX-PROM. Lack of dominance effect with the suffix *-ic* is demonstrated in (44) (Alderete 2001: 214).

(44) *Lack of dominance effect with -íc*

Base	/[lúž-íc]-a/	OO-MAX-PROM	¬OO_{Rec}-MAX-PROM	PSP
a. lúž-u	[luž-ic]-á	*!		
b.→ lúž-u	[lúž-ic]-a		*	**

The candidate in (44b) is the winning form as it preserves the prosody of the base. Let us regard the derivation with the suffix *-ic* attached to an unaccented stem. We have seen the derivation of the word *časť'ica* 'particle' through the Input-Output constraints in (42). The derivation of this word within the TAF theory is presented in (45). The base is assumed to be unaccented.

(45) *Derivation with the recessive accented suffix -íc*

Base	/[časť-íc]-a/	OO-MAX-PROM	¬OO_{Rec}-MAX-PROM	PSP
a. časť	[čáť-ic]-a			**
b. časť	[časť-íc]-a			*
b. → * časť	[časť-ic]-á			

The winning candidate, albeit in the wrong form, is **časť'icá*, as it satisfies all the constraints. We remember though that in the OO-Correspondence theory, the base must be a morphologically well-formed word in the singular and not a root (accented or unaccented). In the singular, the noun *časť'* is stressed, the derivation of *časť'ica* with the accented base is presented in (46).

(46) *Derivation with the recessive accented suffix -íc*

Base	/[část'-íc]-a/	OO-MAX-PROM	¬OO_{Rec}-MAX-PROM	PSP
a. →* část'	[část'-ic]-a		*	**
b. část'	[čast'-íc]-a	*!		*
b. část'	[čast'-ic]-á	*!		

This time the winning form is *část'ica* which is also the wrong resulting stress pattern. To sum up, it is impossible to derive a correct output form (with the stress on the suffix) in both cases using this constraint ranking. Another issue to consider is whether we need the constraint ¬OO_{Rec}-MAX-PROM at all as it is OO-MAX-PROM which plays a decisive role in the stress assignment.

The last point of discussion with respect to recessive suffixes concerns the group of unaccented recessive suffixes. According to the definition, these suffixes being attached to unaccented stems should bring about a default stress pattern. Alderete makes a reference to Melvold's (1990) example, the suffix *-ost'*. In Melvold's account, this suffix induces an initial default stress pattern which is in complete agreement with her theory (e.g., *molodá*, *mólody* 'young' – *mólodost'* 'youth'). According to Alderete, however, we should expect word-final default. We do not know how the TAF theory accounts for this word-initial stress pattern as there are no explanations provided.

The analysis of dominant unaccented derivational suffixes is the same as the analysis of the dominant unaccented inflectional suffix *-a* considered in the previous section. They trigger the deletion of the stem accent and bring about the final default stress pattern, e.g., */púz + ač + u/ → puz-ač-ú* (dat.sg.) 'man with a paunch'. The dominance effect of the suffix - *ač* is presented in (47) (Alderete 2001: 215).

(47) *Dominance effect with -ač*

Base	/púz + ač + u/	¬OO_{Dm}-MX-PR	OO-MX-PM	MX-$PROM_{Stem}$	PSP
a. púz-u	[púz - ač] - u	*!			
b. púz-u	[puz - áč] - u		*	*	*!
c. → púz-u	[puz - ač] - ú		*	*	

Let us present the derivation with the suffix *-ač* when the base for the OO-correspondence is an unaccented stem as in (48).

(48) *Derivation with the suffix -ač attached to an unaccented stem*

Base	/trub + ač + u/	¬OO_{Dm}-MX-PR	OO-MX-PM	MX-$PROM_{Stem}$	PSP
a.→* trub-á	[trúb - ač] - u			*	*
b.→* trub-á	[trub - áč] - u			*	*
c. trub-á	[trub - ač] - ú			**!	

We see that the correct pronunciation form *trub-ač-ú* (dat.sg.) 'trumpeter' is ruled out by this constraint ranking. As the stem is unaccented, the first two constraints are not decisive in determining the stress placement, the MX-$PROM_{Stem}$ constraint eliminates the correct candidate.

Dominant accented suffixes always bear stress irrespective of the accentual properties of the base. For example, the suffix *-úx* realizes its inherent accent even when attached to an accented stem (e.g., *sivúxa* 'raw alcohol') as presented in (49) (Alderete 2001: 215).

(49) *Dominance effect with -úx*

Base	/ s'ív + úx + a/	¬OO$_{Dm}$-MX-PR	OO-MX-PM	MX-PROM$_{Stem}$	PSP
a. s'ív	[s'ív - ux] - a	*!		**	*
b. s'ív	[s'iv - ux] - á		*	**!	
c. → s'ív	[s'iv- úx] - a		*	*	*

To summarize, the OO-correspondece theory has difficulties in deriving words with an unaccented base with both recessive and dominant derivational suffixes. Accentual patterns are best explained through the interaction of the Input-Output constraints as presented in (41) and (42), and not through the Output-Output interaction. The group of recessive unaccented suffixes is not considered in the present approach. Under Alderete's analysis, we would expect forms with the post-stem stress pattern, however, no examples are provided to support this analysis. I have demonstrated that the TAF constraints can consistently derive the correct output only with the dominant accented suffixes.

4.3.4 Stress patterns triggered by dominant unaccented affixes

There is no doubt that accentual properties of derivational suffixes play a decisive role in stress assignment in Russian. Closer examination, however, reveals that previous accounts offer a rather simplistic characterization of Russian derivational suffixes. In particular, suffixes may not only be dominant or recessive, self-stressed, unstressed or post-accenting, but also pre-accenting. More specifically, there are pre-accenting *dominant* suffixes, such as *–ik*, *-ika*, *-l'nja*, *-nja*, deriving nouns from nouns and verbs, *-i|j|*, and pre-accenting recessive suffixes, e.g., *-čik* and *-ost'*, deriving nouns from adjectives.[6] These are illustrated in (50) and (51), respectively.

[6] The accentual properties of the suffixes are based on descriptions given in *Russkaja grammatika* (1980) and Zaliznjak (1985). Here they are labelled as "pre-accenting dominant" and "pre-accenting recessive", as these would be the closest characterization of these suffixes.

(50) Pre-accenting dominant suffixes (examples taken from Russkaja grammatika 1980):

(a)	*dógma* (N.nom.sg., acc.stem)	'dogma'
	dogmát<u>ik</u> (N.nom.sg.)	'dogmatist'
(b)	*ispovédat'* (V.inf.acc.stem)	'to confess'
	ispovedá<u>l'nja</u> (N.nom.sg.)	'confessional'

(51) Pre-accenting recessive suffixes (examples taken from Zaliznjak 1985, Russkaja grammatika 1980):

(a)	*ángel* (N.nom.sg., acc.stem)	'angel'
	ángel'<u>čik</u> (N.nom.sg.)	'angel' (dim.)
(b)	*rukáv* (N.nom.sg.), *rukavá* (N.gen.sg.)	'sleeve'
	rukáv<u>čik</u> (N.nom.sg.), *rukávčika* (N.gen.sg.)	'sleeve' (dim.)

Moreover, the properties of a particular suffix may be different depending on the part of speech from which the word is derived. For example, the suffix *–k(a)* behaves like a recessive pre-accenting suffix when it derives nouns from nouns and adjectives, e.g., *znáxar'* (N.nom.sg.masc.acc.stem) 'healer, medicine man' – *znáxarka* (N.nom.sg.fem.) 'healer, medicine woman' vs. *graždanín* (N.nom.sg.masc.unacc.stem) 'citizen' – *graždánka* (N.nom.sg.fem.) 'female citizen'). The same suffix behaves like a dominant pre-accenting suffix when it derives nouns from verbs (e.g., *zakolót'* (V.inf.) 'pin up' – *zakólka* (N.nom.sg.fem.) 'hairpin').

Finally, not only the accentual properties of suffixes and roots, but also the syllabic structure of the word, are decisive in determining stress placement. For example, while the suffix *-ec* deriving nouns from adjectives is always post-accenting when it follows a monosyllabic root irrespective of its accentual properties (the marking →*Monosyll* in Zaliznjak's (1985) account) as in 52 (a) and (b), it behaves like a recessive post-accenting suffix in polysyllabic words as in 52 (c) and (d). Namely, it is unstressed being attached to an accented stem (52c) and post-accenting being attached to an unstressed stem (52d).

(52) (a) *xítryj* (Adj.nom.sg.masc.lf.), *xitrá* (Adj.nom.sg.fem.sf.) ‘cunning’
xitr<u>éc</u> (N.nom.sg.masc.) ‘cunning person’
xitrecá (N.gen.sg.masc)

(b) *vdóvyj* (Adj.nom.sg.masc.lf.acc.stem) ‘widowed’
vdov<u>éc</u> (N.nom.sg.masc.) ‘widower’
vdovcá (N.gen.sg.masc)

(c) *lukávyj* (Adj.nom.sg.masc.acc.stem) ‘sly’
lukáv<u>ec</u> (N.nom.sg.masc.) ‘sly person’
lukávca (N.gen.sg.masc)

(d) *udalój* (Adj.nom.sg.masc.lf.), *udalá* (Adj.nom.sg.fem.sf.) ‘bold’
udal<u>éc</u> (N.nom.sg.masc.) ‘bold fellow’
udal'cá (N.gen.sg.masc)

The semantics also play a role in stress properties of the suffix *-ec*: when it is used for forming diminutive nouns, it has the marking ←*Triv*. Furthermore, as presented by Zaliznjak (1985), if a derived word has a complex structure (a compound or a prefixed word), the stress remains on a derivational suffix in all forms. For example, the suffix *–ok* which is a dominant unaccented suffix according to Alderete (2001), and an accented dominant suffix with a post-accenting property according to Melvold (1990), loses its stress when attached to a prefixed word, as illustrated in (53).

(53) *nabrosát'* (V.inf.) ‘to sketch’
[na-brós]ok (N.nom.sg.), *[nabrós]ka* (N.gen.sng.) ‘sketch’

Likewise, recessive accented affixes are never stressed in prefixal-nominal words, where stress is retained on the stem in all forms (54).

(54) *[bez-dél]ica* (N.nom.sg.) ‘trifle’
[bez-dél]icy (N.gen.sg.)

All these facts raise suspicion over the predictions of Melvold and Alderete about the default pattern for Russian stress. According to them, the dominant unaccented suffixes trigger deletion of the stem accent and bring about a default stress pattern, namely final stress in Alderete's theory and initial stress in Melvold's theory. As we have seen, however, not all dominant unaccented suffixes behave this way in Russian. There are suffixes (e.g.,-*ka*,-*ika*,-*l'nj*a) that also de-accentuate the stem but bring about pre-suffixal stress, which is not predicted by either of the two accounts. Besides, the part of speech as well as the syllabic structure of a base word also play a role in determining stress placement in a derived word along with the accentual property of a deriving suffix, which suggests that default stress cannot solely be a matter of a fixed pattern that emerges in the absence of lexical stress. In conclusion, derivational morphemes play an important role in stress assignment, however, the previous theories by Melvold (1990) and Alderete (2001) have employed only a set of these suffixes to support their claims about the default stress positions in Russian, which are nevertheless fundamentally different. Moreover, they do not provide adequate empirical coverage of seemingly distinct 'default' stress patterns when we consider other dominant derivational morphemes in Russian.

4.3.5 Stress as morphological headedness

Revithiadou (1999) argues that in underived words, the root faithfulness overides inflection faithfulness: HEAD FAITH >> FAITH. It ensures stress on the root if both the root and the inflection are inherently accented, i.e. the root is the morphological head. When there is no lexical stress in the word, stress is assigned to the initial syllable by default. In derived words, category-changing derivational suffixes are considered to be the morphological heads in Russian words: the accent of the suffix wins over the accent of the root.

Evaluative suffixes (e.g., -*ic*, -*išč*) can be compared with accented recessive suffixes in Melvold's (1990) theory and derivational recessive suffixes in Alderete's (2001) theory. Both Melvold and Revithiadou claim that these

suffixes lose their accent if attached to an accented stem. According to Melvold, these suffixes are stressed when they are combined with an unaccented stem. Revithiadou predicts that these suffixes are stressed being attached to unaccented and post-accenting stems. She claims that evaluative suffixes cannot become morphological heads as they do not change the syntactic category of the base word.

Let us examine whether the behaviour of evaluative suffixes is as straightforward as presented by Revithiadou. For instance, the diminutive suffix *-k-o* is pre-accenting if attached to an unaccented stem (55a) and unstressed with an accented stem (50b).

(55) (a) *sérdce*, *serdcá* 'heart' – s*erdéčko* 'heart' (dim.)
(b) *jábloko* (acc.stem) 'apple' – *jábločko* 'heart' (dim.)

However, there are also some exceptions to this pattern (Zaliznjak 1985) as presented in (56):

(56) (a) ózero, *ozjóra* 'lake' – o*zerkó* 'lake' (dim.)
(b) *mjáso* (acc.stem) 'meat' – *mjaskó* 'meat' (dim.)

In both examples in (56), stress surfaces word-finally irrespective of the accentual properties of the stem. The diminutive suffix *-čik* with the pre-accenting recessive property has been described in the preceding section. The diminutive suffix *-ik* is characterized by the same accentual property: these suffixes surface without stress if attached to accented stems, but they are pre-accenting if they are attached to unaccented or post-accenting stems. The examples in (57) present derivation with the suffix *-ik*:

(57) *karandáš* (nom.sg.), *karandaší* (nom.pl.) 'pencil' – *karandášik* 'pencil'(dim.)
avtóbus (acc.stem) 'bus' – *avtóbusik* 'bus' (dim.)

There are also some other diminutive suffixes (e.g., *-c-o*, *-ec-o*) whose accentual properties are not straightforward: stress placement in the derivatives depends not only on the accentual properties of the base word, but also on its syllabic structure (see Zaliznjak 1985, for more details).

The next issue concerns the prediction that 'derivational suffixes are almost always heads because they define the lexical category, class or gender of the derived form' (Revithiadou 1999: 20). For instance, the suffix *-ast* derives adjectives from nouns and always bears stress in the derivative, e.g., *jazyk-ú* (N.dat.sg.) 'tongue'- *jazykásta* (Adj.sf.fem.) 'sharp-tongued'. However, in Russian adjectives, gender is always determined by the inflection irrespective of the accentual propeties of derivational suffixes, e.g., *jazykástyj* (Adj.lf.masc.) - *jazykástaja* (Adj.lf.fem.) 'sharp-tongued'. Thus, suffixes deriving adjectives cannot be regarded as morphological heads as they do not determine the gender of the derived forms.

Revithiadou's (1999) proposal that morphological heads are elements that determine stress location in a word is fully consistent with the examples of stress placement demonstrated in this chapter. There is a strong correlation between morphological structure of Russian words and the position of the accent. As presented in Chapter 3 of this dissertation, the most important tendency of the accentual development in Russian was the transition from the system where stress placement of the derivative depended on the base word to the system where stress pattern of the derivative was determined by its morphological category (Zaliznjak 1985). Thus, the general accentual development of Russian suffixes is heading in the direction of dominance. It should be noted, however, that one and the same suffix (e.g., *-ist*) can create nouns (*puškiníst* 'Pushkin scholar') as well as adjectives (*golosístyj* 'loud-voiced') thus forming different syntactic categories. Thus, there is a certain relationship between morphology and prosody in Russian words, however, morphological heads do not always determine class and gender of the derived nouns.

4.4 Interim conclusions

This chapter has presented the accentual paradigms of Russian underived nouns and the most important theories accounting for these stress patterns. Some accounts are based on universal principles whereas others regard the accentual alternations as historical residues. It is obvious that the synchronic stress is the result of the historical prosodic development. The question is, however, whether we can apply the same principles of stress assignment to contemporary stress patterns. Russian lost the tonal distinctions centuries ago, the pitch accent was converted into a dynamic stress, a number of accentual leveling processes took place, some nouns changed their original accentual paradigms, different semantic and pragmatic factors also played a role in stress placement of Russian nouns. Words which had 'automatic' accent (enclinomena) developed initial stress and merged with forms with old acute intonation. Thus, nowadays initial word-stress must be lexically represented just like forms with the inflectional stress. Initial ~ inflectional stress alternation is used as a morphological device to mark a singular-plural opposition in Modern Russian.

It is unanimously agreed that stems with the fixed stem stress are inherently stressed; mobile paradigms, on the other hand, are generally considered to be unaccented. The most important issue for most theories in this respect is to ascertain what the underlying form is: what is inherently accented, a stem or an inflection? Halle (1975, 1997), Melvold (1990) and Revithiadou (1999) consider inflections to be inherently accented whereas Alderete (2001) regards initial stress to be lexically specified. For this reason, we end up with different accounts of the Russian default stress pattern. Stress patterns induced by unaccented dominant suffixes are used as additional evidence for a particular default stress pattern. We have seen, however, that dominant unaccented suffixes bring about not only word-initial and word-final stress patterns, but they may also be pre-accenting.

I suggest that alternating stress patterns are also specified in the lexicon. If the default is still initial in Contemporary Russian, we expect Russian native speakers to assign initial stress to any word without an inherent accent. Previous

experimental studies investigating stress placement in novel Russian words did not reveal this pattern. Conversely, assuming word-final default, we expect that stress would be on the inflection in unknown words, for which no empirical evidence has been found either. Thus, the post-stem default is supported neither historically nor experimentally.

There are a lot of questions that arise with respect to the default stress pattern: whether we can deduce the default stress from lexical words, whether it is the most frequent stress pattern, whether it is revealed in rhythmic alternations. What we need to determine is the most unmarked stress pattern in the language: 'unmarked' not in terms of representation (Feldstein 1996), and not in terms of frequency of use (fixed stem stress is the most common stress pattern in Russian, however, stress may fall on any syllable within a stem). We need to identify the stress pattern that represents speakers' underlying knowledge.

As we have seen, initial and final stresses are rather marked in this respect as they are not used in novel words. So how can we derive the default stress pattern? First of all, we should take into consideration general tendencies of language change as such processes reflect most common phonological phenomena characteristic of the language. Bethin (1998), for example, presents phonological processes in Late Common Slavic (LCS) (compensatory lengthening, changes in the jers, etc.) which speak in favor of a strong-weak metrical pattern. It is highly important to look into the synchronic metrical organization of a language as default stress has been shown to be connected to the foot structure in many languages.

In some languages (e.g., Spanish), the most unmarked stress pattern coincides with the most common stress pattern in the lexicon. For this reason, we should also consider the most common stress patterns in Russian. More than 90% of words in the Reverse Dictionary are stressed on the last three final syllables. It would be wrong, however, to consider that Russian stress placement is regulated by purely phonetic factors such as word length (Novikov 1999: 104). First, the tendency towards the middle of a word depends on its morphemic structure. For

example, in three-syllable verbal forms of 4-6 morphs length, there is a tendency towards stress placement in the middle of a word; in word forms of 2-3 morphs length, however, stress falls on the final syllable. Second, the tendency towards the 'central' stress may be explained by the accentual properties of morphemes. As polysyllabic words exhibiting this tendency are mostly derivatives, it is necessary to take into consideration the manner of their derivation.

Thus, stress must be assigned to a morpheme and not to a syllable in Russian. This constitutes the most important finding with respect to the notion of the default. To reveal the unmarked stress pattern, we need to establish a *phonological default*, i.e. the default assigned in the absence of derivational and inflectional morphemes. After the deletion of the stem accent in Russian, the resulting stress pattern is not uniform, yielding initial, final or pre-suffixal stress. This suggests that these accents are not the result of a phonological default.

Stress placement in real words cannot be then teased apart from lexical stress. Experimental research using non-words, on the other hand, constitutes a more promising tool for determining the phonological default since non-words have no lexical entry and thus are unmarked for stress. In this case, if the stress pattern is not provided by morphology, some phonological mechanism must assign rhythmic stress. Hayes (1995) distinguishes between rhythmic versus morphological stress. In the purely rhythmic stress system, stress is determined by phonological factors. In a morphological stress system, stress is the result of the accentual properties of stems and affixes. A rhythmically determined default stress pattern arises when morphemes exert no influence on stress placement in a word. In metrical theory, stress is assumed to be assigned not by a rule, but through the construction of metrical feet. Thus, we expect that in the absence of pre-specified accentual information, the mechanism of foot building assigns a default stress in Russian.

In the following chapters, I discuss the relationship between the default stress and foot type in lexical stress languages and analyze the existing accounts of the Russian metrical structure. This is followed by the analysis of previous

experimental studies on the default stress pattern in Russian and introduction of the present study which expands on the previous experimental research.

Chapter 5 Foot-based accounts of Russian stress

5.1 Phonological default and foot structure in lexical stress systems

In lexical stress languages like Russian, stress assignment is usually not sensitive to the phonological make-up of words, i.e. syllable structure, syllable weight or metrical structure. Morphemes (stems and affixes) are underlyingly specified for stress so that every lexical entry is stored in the lexicon together with its stress pattern. The phonological default is often deemed to arise when stress is not lexically assigned. For instance, investigating default stress in Italian nouns, Krämer (2009) points out that the existence of lexical stress does not imply the absence of a default mechanism for stress placement in Italian, and suggests that default stress arises in morphologically-bare forms. In a similar vein, Revithiadou (1999) specifies morphemes in Greek as stressed, unstressed, pre- and post-accenting in order to show that stress is morphologically determined. The default is argued to emerge in the absence of underlying accents (Revithiadou et al. 2011, 2013). Likewise, as presented in the previous chapter, Halle (1975, 1997), Melvold (1990), Revithiadou (1999) and Alderete (2001) argue for morphologically conditioned stress placement in Russian nouns, where the default stress pattern is assigned in the absence of pre-specified accentual information. It is unanimously agreed that when there is no inherent accent in a word, some *phonological mechanism* must assign stress, which should then reveal speakers' underlying prosodic knowledge.

Adopting the fundamental assumptions of the Metrical Stress Theory (Hayes 1995), the emerging stress pattern, i.e. the phonological default, is considered to be the manifestation of a rhythmic structure construed as a result of the parsing of a word into *feet*, the lowest metrical constituent. Crosslinguistic variation in rhythmic structure is then characterized on the basis of foot types that languages choose. For example, a moraic trochee is assumed for Italian (Krämer 2009), as well as for Spanish (Harris 1992, Dunlap 1991). Revithiadou (1999)

argues for the syllabic trochaic grouping for Greek while Shinohara (2000) defines the default accentuation in Japanese as the head of a non-final bimoraic trochaic foot.

Default stress, however, may not be very straightforwardly identified due to a number of phonological factors coming into play. In Italian and Spanish, for example, while stress in nouns may not surface beyond the antepenultimate syllable, thus being restricted to a three-syllable window, syllable weight has been argued to play an additional role in stress assignment (Harris 1983, 1992 for Spanish; Sluyters 1990, D'Imperio & Rosenthall 1999, Morén 2001 for Italian). Variation in stress placement must therefore be explained by a complex interaction of a multitude of factors such as syllable structure, word length, segmental quality and quantity, position in a phrase, etc. These factors may also account for dialectal variation in stress assignment. For example, while in some Arabic dialects stress never occurs on the final syllable, these syllables may bear stress only when they contain a long vowel in other dialects, or a long vowel in a closed syllable in some others (e.g., de Jong & Zawaydeh 1999: 4), showing the contribution of syllable structure on the one hand, and vowel duration on the other, as well as the interaction between the two, to stress assignment.

We have seen that in contrast to languages in which stress assignment is, at least to some extent, governed by some phonological principles (e.g., syllable weight or window restrictions on stress placement), stress in Russian is morphologically controlled. The default is deemed to emerge in the absence of pre-specified accentuation. However, the question is whether the default stress patterns that have been presented in the previous chapter (initial and post-stem) are assigned as a result of a foot construction as in accordance with the Metrical Stress Theory. The subsequent section demonstrates that the initial default stress postulated for Russian (Melvold 1990) does not, however, imply a trochaic foot construction. According to Melvold (1990), Russian is characterized by an iambic foot type. This assumption is based on stress shift to the left when an accented vowel is deleted. Halle's (1997) account of Russian stress based on the metrical

theory presupposes the construction of unbounded non-exhaustive left-headed feet as constituents on line 0 are subject to the head-marking rule Left as mentioned in Section 4.2.2. However, the trochaic foot for Russian is not explicitly specified in his account. Furthermore, there are approaches (Alderete 1995, Crosswhite 2000) that use vowel reduction patterns as evidence in favor of an iambic footing in Russian. Revithiadou (1999), on the other hand, presents evidence for trochaic footing with exhaustive parsing in Russian. This chapter examines the above mentioned theories on Russian metrical foot type and demonstrates why it may be problematic to use the phonological processes underlying these assumptions as evidence for a particular foot structure.

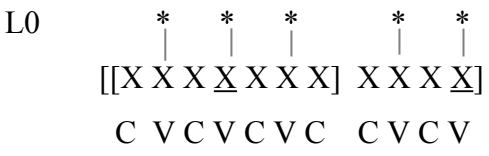
5.2 Metrical foot type in Russian. Analysis of the existing theories

5.2.1 Melvold (1990), Halle (1997)

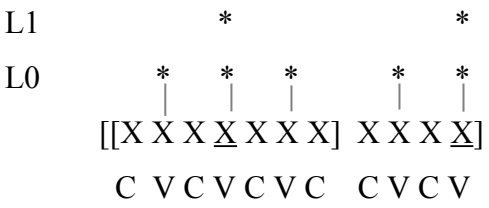
Section 4.2.3 presented a detailed account of Melvold's (1990) theory on Russian stress. She uses an autosegmental representation of stress in Russian: all stressable elements are represented on the stress plane (Line 0); Line 0 metrical constituents are unbounded, head-terminal, and right-headed. Following Halle & Vergnaud (1987), she assumes an unbounded right-headed (iambic) foot for Russian. They present the following explanation for this assumption: if an accented vowel is deleted, then stress shifts to the left implying right-headed feet (e.g., *zajóm* (nom.sg.) – *zájma* (gen.sg.) 'loan') (Halle & Vergnaud 1987: 29). In languages with left-headed feet, stress will move to the right (Melvold 1990:39). It is assumed that Line 0 metrical constituents are unbounded, head-terminal and right-headed. This will account for accent moving to the left when an accented vowel is deleted. Stress assignment rules are illustrated by means of a derivation of a hypothetical form consisting of two accented morphemes (Melvold 1990: 42):

(1) *Stress derivation*

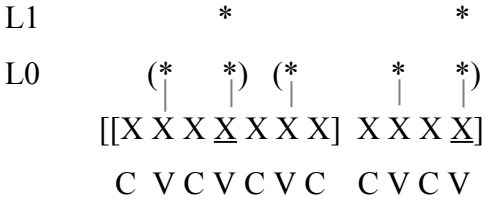
(i) Underlying representation



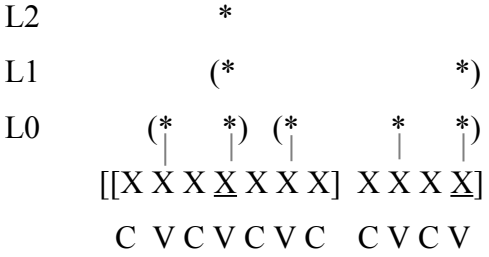
(ii) Assign a Line 1 asterisk to all lexically accented vowels



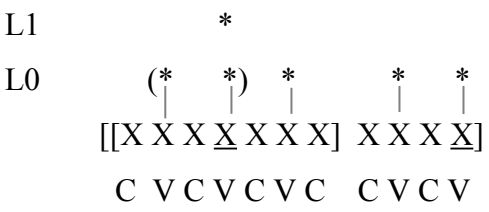
(iii) Construct constituent boundaries on Line 0
(Line 0 constituents are [-BND, +HT, R-Headed])



(iv) Construct constituent boundaries on Line 1 and mark the head on Line 2
(Line 1 constituents are [-BND, +HT, L-Headed])



(v) Conflate Lines 1 and 2



If there is no accented vowel, a Line 1 asterisk is assigned to the initial vowel. Another rule constructs an unbounded, left-headed constituent on Line 1. Melvold assumes the Exhausitivity Condition for foot construction although there is no evidence for iterative foot construction in Russian. It means that any elements on the right edge of the word which do not fall within the domain of an accented vowel are incorporated into an unbounded right-headed foot. Melvold follows Halle & Vergnaud (1987) in their view that all footing rules are iterative.

It is questionable, however, whether the deletion of an accented vowel and stress shift to the left may speak in favor of an iambic footing in Russian. This synchronic process of vowel deletion and stress shift is the result of the historical jer changes discussed in Chapter 3. Before 'the fall of jers' (this process took place between the 10th and the 14th centuries) these vowels did not alternate with zero. Jers were weakened and lost in the word-final position, while jers before a syllable with a weak jer were considered 'strong' and developed into a full vowel (e.g., CS *dĭnĭ* > R *den'* 'day' (nom.sg.)). Before a non-jer vowel, a jer was considered 'weak' and was lost (e.g., CS *dĭna* > R *dn'a* 'day' (gen.sg.)). A jer was considered 'weak' everywhere except before a jer in the following syllable. Loss of jers was a systematic process (Havlik's Law): the pattern was alternating weak-strong-weak-strong-weak from the end of the word. According to Bethin (1998), a bisyllabic domain was the minimal requirement for jer strengthening. This domain functioned as a metrical group, i.e. it tended to be a *strong-weak* trochaic grouping (Bethin 1998: 104-107).

Synchronically, jers are vowels that alternate with zero (e.g., *den'* (nom.sg.) – *dn'a* (gen.sg.) 'day'). There are different analyses for the synchronic jer alternations: the epenthetic approach analyzes jers as the result of epenthethis (e.g., Laskowski 1975, Gorecka 1988), Rubach (1986) regards jers as underlyingly moraless vowels while ordinary vowels are linked to a mora in their underlying representation, Yearley (1995) proposes an analysis of jer vocalization within the Optimality Theory. Following Rubach, she assumes that jers are underlyingly moraless vowels and they are realized in some word forms to avoid a complex coda. The traditional approach by Lightner (1972) assumes that the lost jers are abstractly present in the language. According to this view, a jer is vocalized if it is followed by a jer in the subsequent syllable (*Lower rule*: high lax vowels are lowered to be realized) (Lightner 1972: 39). Lightner claims that there are no null inflections as null suffixes are unrealized jers. This dissertation is not intended to examine the existing theories on the synchronic jer alternations. It solely aims to demonstrate that no matter how we analyze these 'fleeting vowels' synchronically, these alternations are not connected to rhythm in Modern Russian.

Thus, stress shifts in word forms in which accented vowels are deleted are the result of historical changes as described by Bethin (1998). Even if we assume that stress shifts may speak in favor of any kind of foot, we could suggest a trochaic foot as well, as stress shifts to the right after the deletion of the fleeting vowel are very common in Russian (e.g., *kusók – kuská* 'piece', *ljubóv – ljubví* 'love', *kostjór – kostrá* 'bonfire'). Strictly speaking, however, we can hardly speak about stress shift in these cases. Stress 'shifted' to the right not for rhythmic reasons but because the jer was followed by a non-jer stressed vowel. As mentioned above, a jer before a non-jer vowel was in the 'weak' position and was lost. Rhythmic effect, however, was observed if a word contained vowels (jers) of the same status: every even jer was vocalized starting from the end of the word which conformed to a strong-weak bisyllabic grouping.

Under Halle's (1997) later analysis of Russian stress, we cannot assume right-headed unbounded feet. Chapter 4 presented Halle's (1997) account of stress

in Russian underived words within Idsardi's (1992) metrical theory. Let us regard this stress derivation in terms of foot structure as demonstrated in (2).

(2)

```
        *                line2
       (*    *           line1
   *   (*    (*   *)      line0
g o r ó x + a m i                    'pea' (N.instr.pl.)
```

Inherently accented morphemes are supplied with a left parenthesis on Line 0. According to this analysis, 'a left parenthesis groups all metrical elements on its right up to the next parenthesis or to the end of the string, whereas a right parenthesis groups the elements on its left up to the next parenthesis or beginning of the string. Elements that are not to the right of a left parenthesis or to the left of a right parenthesis are not part of any constituent or foot' (Halle 1997: 277). The head of the foot may be either at the left or at the right end of a foot as specified by a head-marking rule. As Line 0 is subject to the head-marking rule Left in Russian, we may assume that the feet are unbounded and left-headed. The form illustrated in (2) has two feet. According to the Basic Accentuation Principle, the leftmost accent wins. The edge-marking rule RRR (insert a Right parenthesis to the Right of the Rightmost element) on Line 0 insures word-initial stress if both the stem and the inflection are unaccented as illustrated in (3):

(3)

```
        *                line2
       (*                line1
        *   *      *)     line0
g ó r o d + u                        'city' (N.dat.sg.)
```

Thus, although Halle (1997) does not explicitly discuss the foot type in Russian, the stress algorithm presented in (2) and (3) presupposes the construction of

unbounded left-headed feet. There are still, however, some issues to be clarified with respect to this approach. It does not explain stress assignment in morphologially derived words with auto-stressing, pre- or post-accenting suffixes. A dominant accented suffix always wins over the stem accent in Russian derivatives. However, this approach makes an incorrect prediction such that the word would surface with stress on the stem vowel, because Line 0 and Line 1 are subject to the head-marking rule Left.

To summarize, Russian is considered to have an unbounded iambic foot (Halle & Vergnaud 1987, Melvold 1990) based on the assumption that the deletion of an accented vowel and stress shift to the left implies a right-headed foot. Halle's (1997) edge- and head-marking rules of Russian stress presuppose the construction of unbounded left-headed feet. This section has demonstrated, however, that the process of stress shift after the stressed vowel deletion does not present evidence for any kind of foot in Russian since it is the consequence not of rhythmic alternations but of the historical changes in the jers. Halle (1997) does not present a particular account of the Russian foot structure. His analysis solely presupposes that feet are unbounded in Russian and metrical constituents are subject to the head-marking rule Left.

5.2.2 Alderete (1995), Crosswhite (2000)

Alderete (1995) and Crosswhite (2000) argue for an iambic foot structure in Russian based on different vowel reduction patterns in the language. As presented in Chapter 2, Russian distinguishes five vowels under stress: /i, u, o, e, a/. In an unstressed position, vowels are reduced as they are shorter than stressed vowels and there is less time for the tongue to reach the articulatory positions of stressed vowels (Timberlake 2004: 43). Traditionally, one distinguishes two degrees of vowel reduction: first degree (Timberlake 2004) or moderate (Crosswhite 2000) reduction occurs in the immediately pre-tonic syllable; second degree (Timberlake 2004) or extreme (Crosswhite 2000) reduction operates in other unstressed syllables. More specifically, the vowels [i, e, u, o, a] reduce to [i, u, ʌ] in the

immediately pretonic syllable and to [i, u, ə] in other pre- and post-tonic syllables. Vowel reduction patterns are also sensitive to the palatalization of preceding consonants: after palatalized consonants, more vowels are merged than after non-palatalized consonants. In particular, three vowels are distinguished after non-palatalized consonants ([i], [u] and [ʌ] (or[ə][7])) whereas two vowels are distinguished after palatalized consonants ([i] and [u]).

According to Alderete (1995), stressed vowels in Russian do not undergo vowel reduction as they remain faithful to underlying featural contrasts. He assumes that the pre-tonic and stressed syllables together support an iambic foot in Russian. Vowel reduction in Russian is analyzed as the domination of faithfulness constraints by certain featural markedness constraints. Mid vowels are only licensed in stressed syllables, and only the peripheral vowels are licensed in the stress foot (Alderete 1995: 13). He presents vowel reduction as feature minimization: the feature markedness *MID constraint (no mid vowels, e.g. *[Phar, Dor][8]) dominates the general featural identity IDENT(F) constraint. He uses the following feature classification system:

(4) Major Articulator Theory of Vowel Contrasts (Selkirk 1991)

	Cor		Lab
Dor	i		u
Dor/Phar	e		o
		ə	
Phar		a	

Head identity constraint HEAD(σ)-IDENT(F) insures preservation of underlying mid vowels in tonic positions; HEAD(F)-IDENT(F) constraint specifies head identity to the larger stress foot (prohibiting schwas in the pre-tonic syllable). Vowel reduction patterns are derived from the constraint ranking presented in (5) (Alderete 1995: 15).

[7] [ʌ] in the immediately pre-tonic syllable, [ə] in other unstressed syllables.

[8] [Phar] stands for [pharyngeal]. [Dor] stands for [dorsal].

(5)

input: vodavóz	HEAD(σ)-IDENT(F)	*MID	HEAD(F)-IDENT(F)	*[Phar]	IDENT(F)
vo{davóz}		**!		***	
vo{daváz}	*!	*		***	
va{davóz}				***!	*
və{dəvóz}			*!		***
→ və{davóz}				**	**

Outside the foot underlying featural contrasts in the input are no longer protected by the head identity constraints; /o/ in the second pre-tonic syllable will reduce to schwa as a means of satisfying *[Phar].

Along similar lines, Crosswhite (2000) also provides an analysis of Russian vowel reduction patterns by referring to a foot structure. The vowel in the immediately pre-tonic syllable is not usually extremely reduced as other unstressed vowels which, according to Crosswhite (2000), suggests that these two syllables constitute a prosodic domain – a foot. The proposed foot structure is right-prominent: (σ´σ) suggesting that Russian is characterized by a disyllabic iamb. She claims that the footed syllables of Russian are moraic, while the unfooted syllables are nonmoraic so that [i, u, a] are observed in moraic unstressed syllables and [i, u, ə] in nonmoraic unstressed syllables. The moraic distribution is achieved by using the following constraints:

(6) *STRUC-μ: Moras do not occur in output forms.
CULMINATIVITY: A prosodic word has exactly one stress.
FTBINμ: Feet have at least two moras.

(7) Deriving foot structure: CULMINATIVITY, FTBINμ >> *STRUC-μ (Crosswhite 2000: 118)

/σσσ′σσσ/	CULMINATIVITY	FTBINμ	*STRUC -μ	comments:
→ σσ(σμ′σμ)σσ			**	winner
σμσμ(σμ′σμ)σμσμ			******	too many moras
σσ (σ′σμ)σσ		*!	*	foot isn't binary
σσσ(′σμ)σσ		*!	(	foot isn't binary
σσσσσσ	*!			no stress
(σμ`σμ)(σμ′σμ)(σμ`σμ)	*!		******	too many stresses

However, such constraint ranking specifies only that the winning form has to have two moras in the footed syllable so that feet must be binary, but it does not derive an iambic or a trochaic foot. Thus, the output form σσσ(′σμσμ)σ would also be a winning candidate along with the form σσ(σμ′σμ)σσ. To derive an iambic foot type, we need an ALIGN-R (Ft,Hd) constraint which demands that every foot has its head on the right head-edge. However, if we do that, we cannot account for the forms with initial stress patterns. If we assume that the initially stressed syllable has two moras and thus can form a monosyllabic iambic foot, we should conclude that all stressed syllables are bimoraic which is not the case.

There are, however, deviations from the above described pattern. Vowels /*a,o*/ undergo moderate and not extreme reduction if they occur at the left edge of the word even if they are not in the immediate pre-tonic position, for example, *ogoród* 'vegetable garden' is pronounced as [agarót], not [əgarót]. Crosswhite (2000: 119) posits an alignment constraint ALIGN-μ to derive this effect which states that the left edge of every word must align with a mora. Furthermore, as onset consonants are non-moraic, this constraint is argued to play a role only if a word begins with a vowel. To account for extreme vowel reduction, the *NONMORAIC/-high constraint, which prohibits nonmoraic vowels that have a sonority greater than that of *i, u*, is used.

The vowel sub-inventories discussed so far are typical of the majority of Russian dialects. However, in the south and south-western regions, the two-

pattern reduction system will hold only if the stressed vowel is low in sonority (*i, u*). If the stressed vowel is high in sonority (*e, o, a*), extreme neutralization will take place in all syllables. These patterns are called 'dissimilative' vowel reduction patterns. 'Dissimilative' dialects in which extreme reduction takes place in the pre-tonic syllable when the stressed vowel is high in sonority are analyzed as having different foot boundaries depending on the quality of the stressed vowel. The pre-tonic syllable is parsed as part of the foot if the stressed vowel is low in sonority whereas it is not included as part of the foot when the stressed vowel is high in sonority (Crosswhite 2000: 123). For example, the dissimilative pattern of the Don dialect looks as follows:

(8) immediately pretonic /a,e,o/ → [a] / ___ í, ú
→ [ə ,i] /___ é, ó, á

In this dialect, the high-sonority stressed vowels *e*, *o*, *a* cause extreme reduction in the preceding syllable thus conditioning the appearance of a monosyllabic foot, while the other stressed vowels must be footed together with the pre-tonic syllable. The monosyllabic foot is analyzed as containing a single bimoraic vowel, and the disyllabic foot as containing two monomoraic vowels: [Cé], [Có], [Cá] vs. [CV.Cí], [CV.Cú]. It is assumed that high vowels are not sonorous enough to be bimoraic. These patterns are derived by the interaction of Prominence Alignment Constraints (*μμ/i,u >> *μμ/e,o >> *μμ/ɛ, ɔ >> *μμ/a,æ) and WSP (Weight-to-Stress Principle) which demands that stressed vowels should be moraic. The constraint *μμ/X that dominates WSP will block vowel lengthening for its specific vowel quality. If WSP is ranked below the *μμ/X constraints, the result will be a disyllabic foot. As dissimilative patterns (Zhizdra, Obojan, Don) differ with respect to stressed vowels that could form monosyllabic feet, rankings of *μμ/X constraints and WSP are different depending the dialect as presented in (9).

(9) Possible Rankings for WSP, and Resulting Reduction Patterns (Crosswhite 2000: 128)

Pattern	Ranking
Non-dissimilative	*μμ/i,u >> *μμ/e,o >> *μμ/ɛ, ɔ >> *μμ/a >> WSP
Zhizdra	*μμ/i,u >> *μμ/e,o >> *μμ/ɛ >> WSP >> *μμ/a
Obojan	*μμ/i,u >> *μμ/e,o >> WSP >> *μμ/ɛ, ɔ >> *μμ/a
Don	*μμ/i,u >> WSP >> *μμ/e,o >> *μμ/ɛ, ɔ >> *μμ/a

Moderate reduction is accounted for by the licensing constraint LIC-NONPERIPH/STRESS: A non-peripheral vowel may not occur in the output unless under stress. It means that only the peripheral vowels [i, u, a] can occur in the pre-tonic position. As mentioned above, moderate vowel reduction patterns differ depending on the type of the preceding consonant (palatalized vs. non-palatalized). The high vowels /i/ and /u/ do not undergo severe qualitative changes whereas /o/ and /a/ are usually neutralized in an unstressed position. They are reduced to [i] after palatalized consonants and to [a] after non-palatalized consonants. Furthermore, in addition to the standard pattern, there are dialects in which unstressed [e] and [o] do not undergo reduction. To account for these various vowel reduction patterns in the dissimilative and non-dissimilative dialects, in addition to the above described constraints, such constraints as MAX[-HI], DEP+LO, C^j/[+FT], DEP[+HI] are used which are ranked differently depending on the neutralization pattern.

To sum up, vowel reduction patterns are taken as providing evidence for the existence of a foot in Russian which comprises the tonic and the pre-tonic syllables. Extreme reduction is considered to be non-moraic while moderate reduction is claimed to be moraic. Mora determines syllable weight which is connected to stress in some languages. It is generally considered that heavy syllables consist of two morae whereas light syllables consist of one mora (Hayes 1989). With respect to vowels, the moraic theory differentiates between long (bimoraic) and short (monomoraic) vowels. In some languages, syllable weight

depends only on vowel length while in others, coda consonants add weight to syllables. Thus, we can say that in non-dissimilative dialects, the pre-tonic and the tonic syllables are argued to be affiliated with one mora each. In dissimilative dialects, high-sonority vowels are judged to be associated with two weight units while low-sonority vowels are associated with one weight unit. If we assume that Russian (or at least, some dialectal variants) is weight-sensitive and syllable weight is based on the sonority of the stressed vowel, we would expect that high-sonority vowels generally attract stress much stronger than low-sonority vowels, which is not the case as Russian is a lexical stress language.

5.2.2.1 Problems with vowel reduction as evidence for foot structure

The question is whether vowel reduction patterns can provide unequivocal evidence in favor of a particular foot structure in Russian. Previous experimental investigations have convincingly shown that the contrast between moderate and extreme vowel reduction in Russian is not phonological, but a gradient phonetic one. For example, the hyperarticulation study by Barnes (2006) which investigated the relationship between phonetic vowel durations and the implementation of reduction patterns has demonstrated that moderate and extreme vowel reduction are not two distinct processes. They do not contrast phonologically so that Russian does not need the two reduction patterns. Therefore, one can argue that the issue of vowel reduction on its own cannot reliably serve as evidence for any kind of foot. Even if one employs a phonological analysis of vowel reduction, well-known principles of foot well-formedness would rather provide support for a *trochaic* footing for Russian, as will be demonstrated below.

Hayes (1995) proposes an asymmetric foot typology, where he argues for a durational asymmetry between iambic and trochaic feet. Trochaic systems contain no durational contrasts whereas iambic systems are quantitatively unbalanced because the head of the foot is longer in duration than the unstressed element. Iambic systems tend to increase durational contrasts by vowel lengthening or

consonant gemination in the head of the foot and by vowel shortening in the weak part of the foot. Thus, according to the iambic-trochaic law, the pre-tonic syllable in Russian would display an extreme rather than moderate reduction in order to maintain an iambic foot, which is not the case. Furthermore, it has been demonstrated that not only iambic systems tend to increase durational contrasts between the head and the non-head of the foot, but also trochaic ones (Revithiadou & van de Vijver 1997, Revithiadou 2004). That is, phonological processes such as lengthening of stressed vowels and vowel shortening in non foot-head positions are also employed by syllabic trochee systems. Thus, should we adhere to the phonological analysis of vowel reduction, extreme neutralization of the post-tonic syllable would rather suggest a trochaic footing for Russian as it enhances the prosodic salience of the stressed syllable.

In fact, the existing vowel reduction patterns in the dissimilative dialects of Russian are argued to be the result of the strong-weak bisyllabic domain which was common for Late Common Slavic (LCS). According to Bethin (1998: 145), North Central LCS including Polish, Slovac, Ukranian, sourthern Russian and some Belarussian dialects today, generalized the trochaic metrical foot as the prosodic grouping. In North Central Common Slavic, pre-tonic lengthening is assumed to be the result of the neo-acute shift onto pretonic vowels which was used as a way to conform to a trochaic metrical foot. In contrast to the South Central LCS dialects with a mora-based prosody, the northeastern LCS did not maintain a bimoraic syllable and stress became a prominence marker. In the south, the neo-acute was taken as a retraction of high tone and the pretonic syllable acquired a rising pitch accent if it was long, an accent if short. In the north, the neo-acute retraction was one of stress as quantity played no role. It is assumed that the loss of phonemic quantity distinctions was probably a precursor to the development of dissimilative vowel reduction (Bethin 1998: 154).

5.2.3 Revithiadou (1999)

Revithiadou (1999) analyzes Russian as a trochaic system. She argues against Alderete's (1995) iambic analysis based on vowel reduction patterns. She notes that in an iambic system, the vowel in the head position lengthens because it is both stressed and foot-final, whereas the vowel in the dependent position is likely to be deleted or reduced. Thus, vowel reduction patterns would rather support a trochaic analysis of Russian. Furthermore, secondary stress alternations are seen as supporting the existence of a trochaic foot type in Russian as illustrated in (10):

(10) *secondary trochaic stress*

(a)	(foto)gra(vjúra)	'photogravure'
(b)	(moto)pe(xóta)	'motorized infantry'
(c)	(revo)l'u(ciónnyj)	'revolutionary'

Additionally, it is argued that vowel reduction in rapid speech indicates a trochaic metrical organization of Russian. Revithiadou (1999: 131) presents examples by Barinova (1971:101) and Kenman (1975:55) that demonstrate extreme vowel reduction in rapid speech: for instance, one of the pronunciations of the verb *napisát'* 'to write' is [nʌpsát']. It is assumed that the initial vowel is preserved because it is the head of the secondary foot: (*napi*)(*sát'*). The word *universitét* [universitét] 'university' may be pronounced as [unirstét], arguably consisting of two feet: (*unir*)(*stét*). Stress placement in acronyms is also argued to signify the trochaic foot structure: e.g., variants of the pronunciation of the SSSR 'USSR' are [èsəsesér] or [èsəsəsér]. Unreduced vowel and secondary stress on the initial syllable are considered to imply a trochaic foot. Thus, in this approach, vowel reduction provides evidence in favor of trochaicity and exhausitivty in footing.

Indeed, it is often the case that vowel elision occurs after the stressed syllable and the initial vowel is not prone to deletion. However, vowel deletion in fast speech is also conditioned by neighboring consonants. Vowels between homorganic consonants are likely to delete irrespective of stress location in a

word (underlined vowels may be deleted): e.g., *filologíčeskij* ‘philological’, *desjatí* (gen.) ‘ten’. Vowel reduction or deletion of the second pre-stressed or a post-tonic vowel may also occur when it is surrounded by not homorganic consonants: e.g., *potomú čto* ‘because’, *púgovica* ‘button’ (Knjazev & Požarickaja 2012). In general, vowel deletion should induce some compensatory processes in order to preserve the rhythmic structure of a word. For this reason, this issue certainly requires an additional experimental investigation with a careful control of consonant quality as vowel elision can be constrained by ‘illegal’ consonant clusters that emerge due to this process.

With respect to the special status of the pre-tonic syllable discussed in the previous sections, Revithiadou (1999) presents the following explanation connected with the pitch movement. According to Odé (1989), pitch movements in pre-stressed syllables affect the perception of stress. The pre-stressed syllable is characterized by a rising pitch movement followed by a fall from the vowel onset of the stressed syllable. Such a rising movement serves to increase the salience of the stressed syllable. Pitch falls immediately after the accent and is completed at the end of the word. A rising pitch needs time to be perceptually realized so that the pre-stressed vowel that carries the pitch requires more vocalic content to fulfil this task (Revithiadou 1999: 161). It is concluded that pitch protects pre-stressed vowels from total reduction.

In fact, the results of Nikolaeva's (1977) study on phrasal intonation of Slavic languages demonstrated that the pitch movement played a significant role in Russian word prosody. The pitch movement in the pre-stressed syllable proved to be important for differentiating intonation patterns. In declarative sentences, for example, it was usually higher than the pitch of the stressed syllable. Pitch movement in the stressed syllable, however, turned out to be irrelevant. Furthermore, according to Bethin (2006), the lengthening of pre-tonic vowels in East Slavic dialects is accounted by the fixed tonal contour LHL over the pre-tonic and tonic syllables. Thus, the pre-tonic syllable is lengthened as it is argued to be assigned a lexical high tone.

5.3 Summary

The previous hypotheses about the foot type in Russian are based on completely different phonological and phonetic processes. Melvold (1990), following Halle & Vergnaud (1987), puts forward the following argument for an iambic foot type in Russian: when a stressed vowel is deleted, stress is transferred to the nearest stressable element to the left suggesting that constituents in Russian are grouped in right-headed feet. It has been shown, however, that stress shifts not only to the left but also to the right. Furthermore, this process is the result of the historical changes in the jers. When jers developed 'strong' and 'weak' variants (Havlik's Law), stress was retracted from weak jers to the preceding syllable giving rise to the neo-acute. Before a non-jer vowel, a jer was 'weak' and was lost. These changes in the jers account for the existing vowel-zero alternations in Russian (e.g., *kusók – kuská* 'piece').

Alderete (1995) and Crosswhite (2000) argue for a disyllabic iamb in Russian which is made up of a tonic and pre-tonic syllables based on vowel reduction patterns. Footed syllables are considered to be moraic whereas syllables outside the foot boundaries are considered to be non-moraic. As shown above, however, vowel reduction patterns cannot serve as evidence for any kind of foot in Russian either. The existing vowel reduction patterns can be regarded as remnants of historical phonological processes. More specifically, in Late Common Slavic (LCS), accented stems had high (acute) tone which could occur anywhere on a long vowel in the word, but only non-initially on a short vowel because the acute was defined over two moras. For this reason, the pretonic vowel was critical for distribution reasons. Two changes in LCS, namely shortening of final vowels and the retention of length in the pretonic position led to a new strong-weak metrical relationship between a pretonic and tonic syllables. Thus, accented final vowels were shortened so that the pretonic syllable became more prominent than other unaccented syllables (Bethin 1998). Furthermore, studies on the synchronic intonational patterns in Russian have demonstrated that the pre-

tonic syllable is important for the distribution of pitch movements which affect the perception of stress (e.g., Odé 1989).

Experimental investigation of stress in non-words may reveal more information about metrical structure of a language as they are normally expressed in terms of feet. In the next chapter, I provide an overview of some previous experimental research on the Russian default stress pattern and elucidate the need and motivation for the current investigation. In the remainder of the thesis, I present the experimental design and the results of the three production studies which explore stress assignment by Russian native speakers in *non-words* that lacked morphological information. Experiments 1 and 2 investigate stress patterns in indeclinable words which are accounted for by way of a metrical foot construction. Production Experiment 3 explores whether the foot type that arguably underlies the metrical organization of Russian arises in secondary stress alternations. My analysis provides a unified account of default stress in Russian and demonstrates the relationship between the default stress pattern, secondary stress and and their connection to metrical foot type.

Chapter 6 Russian noun stress

I have so far demonstrated that the theoretical research on Russian stress assignment has yielded diverging approaches with contradictory findings. Moreover, studies do not always set apart the contribution of various morphological (e.g., derivational complexity, declinability, etc.) and phonological factors (e.g., syllable structure, word length) to stress placement. Experimental approaches using non-words may provide an objective ground to resolve theoretical controversies and reveal the unmarked stress pattern of a language if that pattern persistently emerges in an array of forms devoid of lexical pre-specification. The purpose of this chapter is to set the present study in the context of the previous *experimental* research on Russian default stress. Therefore, it first provides a critical overview of some previous experimental studies investigating the default stress placement in Russian and demonstrates why they have not yielded unequivocal evidence for the phonological default stress pattern in Russian. Next, I introduce the present experimental investigation and discuss how it extends the previous experimental research.

6.1 Theoretical and empirical motivation

6.1.1 Nikolaeva (1971), Crosswhite et al. (2003), Fainleib (2008)

Experimental research provides a more appropriate methodology for determining the phonological default since non-words have no lexical entry, and thus are unmarked for stress. Following this assumption, Nikolaeva (1971), Crosswhite et al. (2003), Fainleib (2008) investigated stress placement in unknown words to find out which phonetic and phonological factors govern stress placement in Russian.

Nikolaeva (1971) conducted an experiment with Russian native speakers to investigate stress placement in unknown borrowed words and to find out whether the place of stress is governed by any purely *phonetic* principles of word

organization[9]. It was observed that stress appeared predominantely on the final and pre-final syllables. In particular, vowel-final words received stress predominantly on the penultimate syllable. Trisyllabic words ending in a consonant were likely to have final stress, while bisyllabic consonant-final words were likely to have stress on the final as well as prefinal syllables. The next criterion to check was if vowels in hiatus attracted stress. There were the following instances of hiatus: heterosyllabic *ea*, *ua*, *ai*, *oa*, *eo*, *io*, *ae*, *au*, *iu*, *ou*, *ai*. It was observed that hiatus occuring more than 2-3 syllables from the end of the word had no influence on stress placement. Sequence of *au*, *ou* formed a special group with a tendency to have the stress on the first part of the sequence (e.g., *ráut*, *gáuss* 'rout', 'gauss'). The other vowel sequences showed no effect on stress assignment.

Consonant clusters in various positions in a word as well as palatalization/non-palatalization of a word-final consonant were found not to contribute to stress assignment. Interestingly, vowel quality turned out to play a role in stress placement in Nikolaeva's experiment. Front (F) and non-front (N) vowels were used in the penultimate and final syllables conforming to the following patterns: N-N, F-F, N-F, and F-N[10]. For two-, three- and four-syllable words ending in a consonant, N vowels generally seemed to attract stress more strongly than F vowels. In consonant-final words with the F-N combination, final stress placement was predominant whereas in consonant-final words with the N-F combination, there was an equal distribution of stress between the final and penultimate syllables, with predominant final stress in trisyllabic words. It should be noted that the effect of vowel quality in Nikolaeva's study is questionable since no statistical tests were used to show the significance of differences. Moreover, the vowel /*a*/ was grouped with the non-front vowels, which posed a problem

[9] Words for the experiment were selected from the *Slovar' inostrannyx slov* (Dictionary of borrowed words) (Lexin & Petrov 1954), for example, *preambula* 'preamble', *tandem* 'tandem', *sinopsis* 'synopsis'.

[10] For example, *turgor* (N-N) 'turgor', *interim* (F-F) 'interim', *domen* (N-F) 'domain', *redan* (F-N) 'redan'.

since there is no corresponding low front vowel in Russian. For this reason, the effect of vowel frontness/ backness could not be reliably established in Nikolaeva's study.

Crosswhite et al. (2003) assumed that stress responses in Nikolaeva's (1971) experiment were probably influenced by the morphological status of the stimuli: vowel-final items were possibly interpreted as inflected stems, and consonant-final items as bare stems, thus stress placement was on the last syllable of the stem. To test this hypothesis, they conducted a nonce-word study to deduce the default location of stress in Russian and to determine whether morphological properites of words could play a role in the mental grammar of native speakers. Experimental items were of the CVCVC pattern (where C stands for a consonant and V denotes a vowel) constructed according to the Russian phonotactics. The CVCVC items ended in one or two syllable sequences which were either morphemic, i.e. homophonous with existing nominal case endings (e.g., *-om*, Instr.sg.) or non-mophemic (e.g., *-on*). The stimuli were presented in three contexts: the *Suffixed/Morphemic* context favored the interpretation of an ending sequence (ES) as an inflection; the *Bare/Morphemic* context did not contribute to interpretation of an ES as a case ending; and in the *Ambiguous/Morphemic* context, an ES could be interpreted as a case suffix or not. The Bare and Ambiguous contexts also had non-morphemic conditions. The results of the experiment showed that in the *Suffixed/Morphemic* condition, about 70% of responses were stem-final, i.e. stress fell on the syllable preceding an ES. In the *Bare/Non-mophemic* condition, 90% of responses were word-final. In the *Bare/Morphemic* condition, where an ending was phonetically identical to a case ending but sentential context supported the interpretation of a word as a bare stem, the rate of stem-final stress, i.e. stress fell on the syllable preceding an ES, was 65%. In the *Ambiguous/Morphemic* condition, about 80% of responses were stem-final, and in the *Ambiguous/Non-morphemic* condition, where an ES was not phonetically identical to case suffixes, the rate of word-final responses was slightly higher than 90%. The overwhelming responses in all conditions were

stem-final (80%). Crosswhite et al. (2003) concluded that the default position for stress in Russian is the right edge of the stem and it showed an influence of morphology on phonology: 'the assignment of stress depends crucially on the position of the right stem boundary' (Crosswhite et al. 2003: 160).

Crosswhite et al. (2003) considered two possible explanations for the preference of stem-final stress. The first one was Phonetically Mediated Analogy which maintained that the treatment of novel words could be influenced by phonetically similar familiar words. They claimed that this approach could not fully explain the results of the experiment as phonetically identical items behaved differently in the *Suffixed/Morphemic* and in the *Bare/Morphemic* conditions, where different stress patterns were observed. The second alternative was based on Lexical Frequency which might influence the linguistic behaviour with respect to novel words. According to Crosswhite et al. (2003), lexicon-based frequency statistics could not account for stress responses either. They showed, on the basis of Tornow (1984), that stem-final stress occurred in only 30% of most common nouns in Russian in comparison with 80-90% experimental rate. The authors provided an analysis of their results within the framework of Optimality Theory, where the morphology-phonology interaction was captured by way of an interface constraint, ALIGNRIGHT that requires that the right edge of the stem coincides with the right edge of a foot. With the assumption that Russian has iambic feet (following Halle & Vergnaud 1987), this constraint ensures that inputs with no lexical stress get stem-final stress.

The results of Fainleib's (2008) experimental study were mostly consistent with those of Crosswhite et al. (2003). In an unpublished MA thesis, Fainleib examined whether there was a uniform tendency in stress responses of Russian native speakers and whether stress was modulated by any morphological or prosodic factors affecting it. The stimuli of the experiment consisted of two- and three-syllable vowel- and consonant-final novel words presented as nouns, whose endings either corresponded to existing nominal suffixes or not. The penultimate syllable was either closed or open in all structures as well as the initial syllable in

three-syllable words, yielding six vowel-final structures and six consonant-final structures. Nine vowel-final words ended in a vowel which could not be a suffix in Russian (represented in the orthography by э (è)); twenty-seven words ended in either *-а (a)*, *-о (o)* or *-у (u)*. Consonant-final words ended either in valid nominal suffixes *-ах (ax)*, *-ом (om)*, *-ан (an)* or in some other sequences.

The stimuli were presented to Russian native speakers first as bare stems when their task was just to read out a sentence, and then as inflected forms when they were asked to put an item in the accusative or dative case according to the context. The results showed that in the *bare stem* context, vowel-final words got final stress in about 68% of the cases whereas consonant-final words were finally stressed in 93% of the cases. In vowel-final words, if the final vowel was a non-existing suffix *(э),* final stress was predominant (88%); if the final vowel corresponded to an existing suffix, stress was placed on the final syllable in 61% of the cases. In an *inflected* context, vowel-final words got mostly penultimate stress while consonant-final words were inflected and got stem-final stress in about 88% of the cases. Phonological factors like the number of the syllables in the word and the syllable structure turned out to play no role in stress placement. Fainleib concluded that the default stress is stem-final in Russian as stems with the final vowels that could be valid suffixes attracted penultimate stress stronger than stems ending in some other segment.

6.1.2 Stem-final default: analysis of the experimental data

In contrast to theoretical studies, experimental research is able to provide insight into the unmarked stress pattern of a language. However, if we want to determine the *phonological* default, the construction of experimental stimuli requires us to take into account a number of important issues. First of all, we need to use non-words as words of foreign origin, even if they are unknown to the speakers, may either contain some typical Greek, Latin or other ending sequences, or they may sound familiar to known loanwords which may in turn influence stress placement. Second, non-words should have no internal morphological structure, i.e. they

should contain neither derivational nor inflectional suffixes, in other words, they have to be presented as bare stems.

In both Crosswhite et al.'s (2003) and Fainleib's (2008) studies, stimuli were presented in the inflected and bare contexts. In the inflected context, the final vowel of vowel-final stimuli was interpreted as an inflection by the participants. The bare context contributed to the realization of the final vowel as part of the stem, i.e. the stimuli were not inflected. However, stress placement in vowel-final stimuli presented as bare stems is not conclusive in these studies. In Crosswhite et al.'s (2003) study, consonant- and vowel-final stimuli are grouped together in the presentation of the results so that we cannot say how stress was distributed between the syllables in vowel-final stimuli in morphemic and non-morphemic conditions. In Fainleib's (2008) study, final stress occurred in about 68% of cases in vowel-final items presented as bare stems. However, we have to take into consideration two issues when we consider stress placement in vowel-final stems. The first issue concerns words ending in a non-morphemic ending sequence, i.e. in a vowel that cannot be an existing suffix. In both studies, it was the vowel э *(è)*. It is important to note, however, that there are very few nouns ending in э in Russian, all of them are of foreign origin and, if it is not the second vowel in the hiatus, these words bear final stress. Thus, the experimental items ending in э must be finally stressed by analogy.

The next issue concerns vowel-final stimuli presented as bare stems with a morphemic ending sequence, i.e. a vowel that could be a possible inflection (*a,o,u,i*). It should be noted here that there are no common nouns of Russian origin ending in *-i* and *-u* in the nominative singular. Thus, when these words were presented in an uninflected context in the nominative case, i.e. they were presented as bare stems, they were likely to be understood as borrowed indeclinables by the participants. For example, there are only 13 indeclinable nouns ending in *-u* in Russian, eight of which bear stress on the last syllable (Superanskaja 2010: 22). In both studies, vowel-final stimuli presented in the bare (uninflected) context were likely to be interpreted as indeclinable common nouns

and all indeclinable common names in Russian are borrowed, most of them bear final stress so that it is very difficult to avoid stress assignment by analogy.

Nikolaeva's (1971) study, besides investigating the influence of final segment on the location of stress, also aimed to control for the effect of vowel frontness/backness, number of syllables in a word and the effect of consonant clusters on stress assignment. As already mentioned in the previous section, the vowel effect could not be determined for the lack of statistical tests as well as grouping of the vowel /*a*/ with non-front vowels. Crosswhite excluded words with the vowel /*a*/ from Nikolaeva's results and controlled for the effect of vowel frontness/backness and vowel height on stress placement. The results included only consonant-final words as there were very few vowel-final words without the vowel /*a*/. Statistical results demonstrated a weak effect of vowel backness/frontness: there were silghtly more responses on the final syllable with a final back vowel and a penultimate front vowel. However, the hypothesis that back vowels attract stress more strongly was not supported in the pattern N-F with a front vowel in the final syllable and a back vowel in the penultimate syllable. Crosswhite assumed different reasons for such a tendency, e.g., many items with a front-back vowel combination in the final two syllables had Greek or Latinate ending sequences (e.g., -*um*) which might have influenced stress placement.

Consonant clusters within a word turned out to play no role for stress assignment in Nikolaeva's (1971) study. However, it was not specified in the description of the study what types of consonant clusters (obstruent-obstruent, sonorant-obstruent, etc.) the words contained. As mentioned in Section 2.1.2.1, syllable boundaries are not phonologically clear in Russian so that one word may be syllabified differently by different speakers. As a result, some speakers could have syllabified words of the syllabic structure CVCCV as CV.CCV whereas others could have preferred the syllabification pattern CVC.CV which makes it difficult to reliably establish the effect of consonant clusters on stress placement.

Thus, the influence of the phonetic factors like vowel quality and consonant clusters for stress assignment remains unclear. However, a consistent pattern emerges from the above described studies: final stress in consonant-final and penultimate stress in vowel-final words. Crucially, however, these studies did not set apart the contribution of morphological information from phonological factors due to the fact that they employed *declinable* words. Since consonant-final words that are presented as bare stems arguably carry null inflections as the same forms would be declined through inflectional endings in other grammatical cases, all the experimental stimuli in the study can be analyzed as consisting of a root and an inflection. Stress in vowel-final stimuli presented as bare stems, however, is controversial for reasons mentioned earlier in this section, namely many indeclinable vowel-final common nouns in Russian are finally stressed borrowed words so that final stress in the experimental stimuli must have been assigned by analogy.

To sum up, the previous experimental studies do not present sufficient evidence for establishing a phonological default due to the possible confound of morphological factors. Moreover, if the experimental items resemble real words, stress patterns may be accounted for by analogical transfer. The next section introduces the present approach to the investigation of the Russian default stress and metrical organization, and presents word groups that may serve as a source of the default stress in Russian.

6.1.3 Present experimental approach to default stress in Russian

To determine the phonological default stress pattern, we need non-words containing neither derivational nor inflectional affixes. They should not sound similar to existing Russian words and they should not include ending sequences that would influence stress placement. Furthermore, they should be presented in such a way so that speakers would interpret them as unknown words of Russian origin. For example, there are no Russian words with the endings *-è* (orthographic *э)* and *-u (*orthographic *y)* in the nominative case. Unknown words presented as

common names and ending in *-e* (orthographic *e* in Russian) would be understood as being those of French origin by Russian speakers and would be stressed word-finally. Since the previous research has not taken these issues into consideration it is difficult to test the phonological default stress location in Russian. Only if we manage to avoid morphological and analogical influence, can we investigate the role of phonology in stress assignment. Which phonological rules would then assign stress in a word? If speakers cannot retrieve stress pattern from the lexicon and stress is not assigned by analogy, some phonological mechanism must be activated to assign a 'prosodic head'.

As such, the present study expands on the previous experimental research on default stress pattern in Russian by investigating stress placement in non-words that are devoid of morphological factors, i.e. it aims to establish the phonological default. To do this, stress patterns in indeclinable novel words that lack internal morphological structure, namely the stimuli presented as vowel-final place names and acronyms, will be tested. These word groups, as opposed to other indeclinable nouns, may be of Russian origin as well. The next section addresses the status of indeclinable words as it is essential for understanding the construction of the experimental materials, followed by the description of the main stress tendencies in this word group.

6.1.4 Indeclinable words as a source of the phonological default

6.1.4.1 Indeclinable words in Russian

Indeclinable words belong to the null declension paradigm, which consists of homonymous forms with no inflections so that they have only one form for *all* case-number combinations. The null declension is characteristic of the following groups of words (Russkaja Grammatika 1980: 506):

(1) (a) Words of foreign origin ending in vowels denoting inanimate objects, males and animals: e.g., *pal'to* (‘coat’), *kino* (‘film’), *boa* (‘boa’), *kenguru* (‘kangoroo’), *kakao* (‘cocoa’).

(b) Loan words denoting females: e.g., *ledi* (‘lady’), *miss* (‘miss’), *madam* (‘madam’).

(c) Geographical names ending in vowels (except *-a (a)* and *-ы (y)*): e.g., *Baku* (‘Baku’), *Peru* (‘Peru’), *Bordo* (‘Bordeaux’), *Oslo* (‘Oslo’), *Kale* (‘Calais’).

(d) Foreign male names and surnames ending in vowels with the exceptions of nouns ending in an unstressed vowel *-a (a)*: e.g., *Gjugo* (‘Hugo’), *Bruno* (‘Bruno’).

(e) Foreign female names and surnames ending in a non-palatalized consonant: e.g., *Karmen* (‘Carmen’), *Elen* (‘Helen’), *Sagan* (‘Sagan’).

(f) Names of periodicals: e.g., ‘*Tajms’* (‘The Times’).

(g) Russian and Ukranian surnames ending in *-o (o)*, *-ux (ix)*, *-ых (yx)*: e.g., *Durnovo*, *Polskix*, *Sedyx*.

(h) Acromyms containing only initial letters ending in vowels: e.g., *ROSTA*, *GAI*, *GAU*.

(i) Acronyms containing initial letters and syllables ending in vowels: e.g., *GORONO*.

(j) Initialisms: e.g., *SSSR*, *VDNH*.

(k) Borrowed abbreviations ending in a hard consonant: e.g., *MAN* (automobile company).

(l) Place names ending in *-ово (ovo)*, *-ево (jevo)*, *- ино (ino)*, *-ыно (yno)*: e.g., *Tušino*, *Vnukovo*, *Poronino*.

Indeclinable words are assigned to a special grammatical class. Unlike inflected forms, indeclinable words do not express a grammatical category such as case, number or gender so that they form a class distinguished not by the presence of some grammatical features but by their absence. Gender and number of such

nouns are determined not morphologically but through their lexico-grammatical meaning. Indeclinable borrowed nouns denoting inanimate objects are mostly assigned to the neuter gender: e.g., *alibi* (‘alibi’), *amplua* (‘role’), *kakao* (‘cocoa’), while some of them are of the feminine gender, e.g., *avenju* (‘avenue’), *kol'rabi* (‘kohlrabi’) which is obviously influenced by grammatical gender of the corresponding declinable Russian words *ulica* (‘street’, fem.), *kapusta* (‘cabbage’, fem.). Indeclinable nouns denoting animate objects have either the masculine or the feminine gender. Words denoting females (e.g., *Elen*, *Meri*, *miss*, *ledi*) are assigned to the feminine gender while words denoting males according to social position or profession are masculine: e.g., *attaše* (‘attaché’), *port'je* (‘receptionist’). Indeclinable nouns denoting animals and birds are mostly masculine: e.g., *poni* (‘pony’), *šimpanze* (‘chimpanzee’), *kakadu* (‘cockatoo’), *kenguru* (‘kangaroo’). There are nouns which can be used in both masculine and feminine genders: e.g., *vizavi* (‘vis-á-vis’), *inkognito* (‘incognito’), *hippi* (‘hippie’).

Indeclinable words are a relatively new phenomenon in Russian. Mostly of foreign origin, they started entering the Russian vocabulary in the 18th century (Priorova 2008). These words resisted assimilation to native words and to the system of Russian word formation. Borrowings ending in a vowel formed a subsystem within the traditional system and created their own rules (Miloslavskij 1981). Nowadays, the use of indeclinable words is also expanding to other areas. They comprise not only borrowed words, but also Russian words like consonant- and vowel-final abbreviations, some compounds, proper and place names ending in certain segments. Thus, indeclinable words in Modern Russian include both borrowed words and the ones of Russian origin. According to Kolesnikov's (1994) dictionary of indeclinable words, there are approximately 1800 indeclinables in Modern Russian, 1675 of which are nouns. It should be noted that some fully assimilated indeclinables like *pal'to* ‘coat’, *metro* ‘subway’, *radio* ‘radio’ might be occasionally declined in vernacular varieties. Thus, for these speakers, the words have changed their paradigm and become adapted to the Russian

declension system. In general, however, we observe the development of indeclinable words in the opposite direction. For example, while surnames ending in *-ko* could be declined a century ago, this is not the case anymore (Priorova 2008). It is assumed that this tendency speaks in favor of the development of analytical constructions in Russian. The group of indeclinable words is constantly on the rise without being included into the Russian morphological paradigms.

Word forms without inflections should be distinguished from those with the null inflection. Words with the null inflection are included into the paradigm whose forms have surface inflections in other cases: e.g., *gorod* (nom.sg.) – *gorod<u>a</u>* (nom.pl.) 'city'. An inflection is a meaningful part of a word which differentiates different forms of a single lexeme and connects words in a sentence. Indeclinable words are realized as stem morphemes not typical of Russian, for this reason they are not included into any of the existing morphological paradigms (Priorova 2008).

6.1.4.2 Stress placement in Russian indeclinable words

The previous sections have demonstrated that most indeclinable common nouns in Russian are loanwords. The fact that stress may fall on any syllable in a word in Russian suggests that indeclinable words of foreign origin would be pronounced with their original stress pattern in the source language. However, this is not always the case. Rather, we typically observe a right-edge oriented stress shift. Among indeclinable loanwords ending in vowels in Russian, Superanskaja (2010: 22) observes the following stress patterns: 130 words have final stress, 113 have penultimate stress and only 16 words are characterized by the antepenultimate stress pattern. The same trend is seen regarding stress position in borrowed declinable and indeclinable place names: there is a general tendency towards the right word-edge. Thus, when stress patterns of these words do not reflect stress patterns of the source language, they must be adapted to the Russian norms.

It has been shown for other languages that repair strategies in the host language can be attributed to metrical rules in the native phonology, i.e. they

reflect the most unmarked stress position. Roca (2005) observes for Spanish, for example, that stress shifts in loanwords indicate accommodation into native speakers' grammar. Stress shift in loanwords to the most common native pattern is also observed in Hungarian (Fenyvesi & Zsigri 2006), French (Peperkamp & Dupoux 2003), and Japanese (Shinohara 2004).

Acronyms show variation in stress placement, which may be either final or pre-final, although the predominant number of abbreviations and acronyms is pronounced with final stress (Krivnova 1999). In an unpublished MA thesis, Andreev (2004) examines stress placement in Russian abbreviations, clipped compounds and acronyms. In his study, he divides acronyms into acronym words (which are pronounced as words) and "letter-by-letter acronyms" (which are pronounced as a string of letters). Based on Alekseev (1966) he states that the majority of acronyms (both acronym words and acronyms pronounced letter-by-letter) have final stress. He follows Alekseev (1966) in explaining stress patterns in letter-by-letter acronyms: they have transparent compound structure with stress on the rightmost component. Andreev (2004) notes, however, that final stress in vowel-final acronyms is not expected as vowel-final nonce words tend to have penultimate stress.[11] It should be noted that the above-mentioned theoretical studies on acronyms were based on pronunciation prescribed by dictionaries and although there are some tendencies in stress placement of abbreviated words, it remains to be tested if these hold when native speakers are asked to produce them.

This section has outlined the main tendencies of stress placement in Russian indeclinable words which, however, do not give us unequivocal evidence in favor of a particular default mechanism. In particular, indeclinable loanwords including place name may exhibit stress patterns of the source language or they

[11] It should be noted that Alekseev (2009: 259) does not differentiate between clipped compounds, letter-by-letter abbreviations and acronyms. He specifies, however, that there are some groups of abbreviations that tend to have non-final stress: the first group includes acronyms pronounced as words which end in a non-palatalized consonant or vowels *-a* and *-o;* abbreviations ending in vowel sequences *-ao, -au, -eo, -iu* constitute the second group. He assumes that non-final stress in these acronyms might be explained by analogy with real words in some cases. Alekseev also makes a suggestion that these tendencies may be accounted for by the fact that some Russian accentual generalizations are extended to acronyms.

may experience stress shift. Stress placement in Russian acronyms does not follow a uniform pattern. To determine the phonological default stress pattern of Russian, it is essential to present native speakers with novel indeclinable words which could be realized as words of Russian origin. In this case, the assumption is that the emergent stress pattern will reflect native metrical rules on purely phonological grounds.

Chapter 7 Experimental investigation of default stress in Russian

7.1 Research design

In contrast to Nikolaeva's (1971) study, where real unknown foreign words were used, the current study employs non-words since foreign words may be familiar to the subjects or they may have some typical Greek, Latin or other endings, which may in turn influence stress placement. Instead, the items are presented as *place names* (Experiment 1) and *acronyms* (Experiment 2), as these word groups may be either of foreign, or of Russian origin.

Furthermore, such factors as word length, vowel quality and the effect of consonant clusters on stress placement are systematically explored in the current study. Crosswhite et al. (2003) used only one structure CVCVC plus an ending sequence. Nikolaeva (1971) used two-, three- and four-syllable words, which were unevenly distributed with respect to syllable structure. Also, in consonant-final words, back vowels generally seemed to affect stress more than front vowels. However, as mentioned in the previous chapter, the vowel /*a*/ was grouped together with back vowels /*u*/ and /*o*/ which posed a problem since the distribution between front and back vowels was not balanced (/*a*/ has no corresponding low front vowel). Furthermore, the distribution of words ending in different vowels was unequal in Nikolaeva's (1971) experiment: there were 34 words ending in -*a*, 14 words ending in -*o*, 7 words ending in -*i*, 3 words ending in -*u*, and 3 words ending in -*e*. Therefore, in order to carefully control for the effect of vowel frontness/backness, only the front vowels /*i*/, /*e*/ and the back vowels /*u*/, /*o*/ are used in the experimental stimuli.

The effect of syllable type on stress placement (open vs. closed) also needs further investigation. Nikolaeva (1971) found that consonant clusters at the end of a word as well as between the final and penultimate syllables did not influence stress placement. This suggests that openness/closedness of a syllable inside a

word is not a factor in stress assignment in Russian, i.e. Russian does not seem to behave as a quantity-sensitive system. Nikolaeva, however, does not make it explicit as to what type of consonant clusters were used in her experiment. As mentioned in Section 2.1.2.1, there is no well-defined syllabification algorithm of consonant clusters in Russian so that VCCV may be syllabified as V.CCV or VC.CV depedning on the speaker. However, many accounts (e.g., Avanesov 1972, Ščerba 1953) unanimously agree that a sequence of a sonorant followed by an obstruent is divided by a syllabic boundary because a non-initial syllable is constructed according to the sonority rising principle, which is also in line with native speakers' intuitions. So, in the construction of the stimuli, it is important to consider the distribution of sonorants and obstruents into these clusters as the sonority of consonants may influence the syllabification process. In the present study, a sequence of a sonorant followed by an obstruent between the penultimate and final syllables was used to investigate the effect of closed syllables on stress placement. Furthermore, in contrast to the previous experiments, the consonant-final stimuli were constructed in such a way so that the final sequence (VC) did not look like an existing suffix (e.g., *–in*, *-or*, *-un*, etc.), which could affect stress placement because of their inherent accentual properties.

In summary, the primary aim in the present study is to investigate the phonological default stress pattern in Russian in a production test, where two distinct types of *indeclinable* words, place names (Experiment 1), and acronyms (Experiment 2) were used. The second research objective is to understand the contribution of various phonetic and phonological factors to stress assignment: Is default stress placement sensitive to the nature of the final segment (consonant vs. vowel)? Do such factors as type of the penultimate syllable (open vs. closed), vowel quality (back vs. front) play a role in the default assignment of stress in Russian? While the contribution of these factors that were unsystematically explored in the previous studies remain to be seen in both experiments, there is one clear prediction: If the default stress is stem-final in Russian, as is claimed by Crosswhite et al. (2003), both consonant- and vowel-final place names and

acronyms are expected to exhibit an overwhelming tendency for final stress since the right edge of the items crucially coincides with the stem end in both cases.

7.2 Experiment 1: Stress placement in indeclinable place names

7.2.1 Materials

Two- and three-syllable non-words of the syllabic structures given in (1) were used to control for the hitherto underexplored factors such as word length and the effect of consonant clusters on stress placement in Russian.

(1) *Syllabic structures used in the stimuli*

CV-CV	CV-CV-CV
CVC-CV	CV-CVC-CV
CV-CVC	CV-CVC-CVC[12]

As mentioned earlier in this dissertation, place names ending in vowels except /*a*/ and /*ɨ*/ are indeclinable in Russian. The stimuli in this study end in /*i*/ and /*o*/ since place names ending in /*e*/ and /*u*/ may sound foreign to the speakers. In the pre-final syllable, however, both back vowels /*o*/, /*u*/ and front vowels /*i*/, /*e*/ were used. For consistency, the same vowels were used in the final and pre-final syllables in consonant-final words. Vowel quality was varied in both syllables in two-syllable words. In three-syllable words, the vowel quality was varied only in the penultimate and final syllables as the previous studies have shown that it is generally the right word-edge that attracts stress in unknown words.

Given typological observations on stress-placement rules being sensitive to the nature of the syllable onset (Davis 1985, Everett & Everett 1984), sonorant

[12] The main objective of the present study is to explore stress assigning mechanisms in indeclinable vowel-final words because these words are devoid of morphological factors and reveal the default stress. However, previous research demonstrated that Russian speakers are sensitive to the nature of the final segment (vowel vs. consonant). To check this, 2 consonant-final structures were additionally employed, which constitute declinable words.

consonants and voiceless obstruents (i.e., consonants with the highest and lowest sonority) were equally distributed in the onsets for every syllabic structure.

Counterbalancing the vowel criteria described above in every syllabic structure, four subgroups for each syllabic structure were constructed (with 8 items for each subgroup).

(2) *Vowel quality in the pre-final and final syllables*

back-front	**front-front**	**back-back**	**front-back**
o,u - i	***i,e - i***	***o,u - o***	***i, e - o***

For a complete list of the items used in the experiment, see Appendix B.

7.2.2 Procedure

Because of the large number of stimuli (192), Experiment 1 was divided into two parts: (i) a map description task, and (ii) a schedule description task. In the map description task, the participants were presented with four maps where the stimuli were represented as unknown place names (24 on each map) connected by arrows. Their task was to describe the route using the transport signs represented near each place name (e.g., a train, a bus, a plane, etc.), yielding a description such as *We arrive in ___ by train. In ___ we take a plane and we leave for___*. In the schedule description task, the participants were presented with four time schedules where the stimuli (24 in each schedule) were represented as departure and destination points. The schedules contained information about the date, time of departure and arrival, means of travel, platform and comments. The task was again to describe the route by using only the information indicated in blue. Both tasks were designed in such a way that every place name was pronounced at least twice and that the participants embedded the stimuli in natural speech. For both tasks, the participants were specifically instructed not to replace the place names with adverbs like *up to that place, up to here, from there, from here, there, here, where, etc.*

(3) Map description task

(4) Schedule description task

Расписание 1

Пункт отправ-я/ назначения	Дата	Отправ-е	Прибытие	Средство передвижения	Платф.	Коммент-ии
Матинпом Тилпо	01.09.10	6.30	7.30	№11	14 7	1 класс
Тилпо Вутенпи	01.09.10	9.00	11.00	CV 830		
Вутенпи Денопо	01.09.10					30 мин.
Денопо Тини	01.09.10	13.00	15.20	№34	5 10	
Тини Долунтом	01.09.10	16.05	16.30	№1	2 3	
Долунтом Пимо	01.09.10					1 час
Пимо Бероти	02.09.10	8.00	9.00	№9	3 12	
Бероти Мупо	02.09.10					40 минут
Мупо Вамонкил	02.09.10	12.15	15.23	№12	1 4	2 класс
Вамонкил Мекили	02.09.10			Трансфер		45 мин.
Мекили Келонти	02.09.10	17.00	18.39	№45	8 9	

The distribution of the stimuli in the experimental parts was done in the following way. All experimental items were equally divided into two parts so that there were 4 items of every syllabic subgroup with every consonant-vowel combination in both parts. For example, the words of the CV-CV structure with the back vowels /*o*/, /*u*/ in the penultimate and /*i*/ in the final syllables were distributed in the following way:

(5) Example distribution of the CV-CV stimuli with the back-front vowel combination to the two tasks (O stands for an obstruent onset, S for a sonorant onset):

(a) *Map description*	(b) *Schedule description*
Noti (SV-OV)	Lopi (SV-OV)
Pomi (OV-SV)	Pori (OV-SV)
Mupi (SV-OV)	Luti (SV-OV)
Tumi (OV-SV)	Pumi (OV-SV)

Each participant completed the two tasks in different orders. There were four variants for this purpose. In the first variant, the words in the map task were from the first group of words, in the schedule task from the second one, while in the second variant, it was the other way round. The same principle for stimuli randomization was adopted for the rest of the variants, with the order of the

stimuli being different from the first two variants. In this way, all the stimuli were equally presented in both experimental parts.

The participants were tested individually in a quiet room. The previously randomized stimuli were presented using PowerPoint. The experiment started with instructions followed by a practice session consisting of two short map and schedule description tasks. There was no time limit set to complete the tasks. The utterances of the participants were recorded on a Tascam DR-100 digital recorder using a Sennheiser MD 421-II microphone. The participants were asked to take a short break between the two tasks.

7.2.3 Participants

Thirty adult Russian native speakers (24 females and 6 males) between the ages 19 to 30 (mean age= 24.2) were recruited in Bryansk, Russia. They were all monolingual participants such that no language other than Russian was spoken in the home during their childhood and none had long periods of stay-abroad experience. Their speech pattern did not indicate a detectable regional or vernacular variety. Half of the participants had higher education whereas the other half consisted of university students attending the Bryansk University at the time of testing. All participants were paid a small fee for their participation in the experiment.

7.2.4 Coding and analyses

The corpus consisted of 5760 responses (192 items x 30 participants) which needed to be coded for stress location. Two judges transcribed the positions of stress in the production data. The first judge (the author of this dissertation), a phonetically trained native speaker of Russian, listened to each response and coded the location of primary stress as word initial, penultimate or final. The acoustic correlates of the Russian stress are the following: duration, intensity, changes of the fundamental frequency, vowel quality (e.g., Zlatoustova 1981).

Stressed syllables are longer, louder and are characterized by the changes in *f0* and absence of vowel reduction. According to Zaliznjak (1985: 8), Russian native speakers can easily perceive stress placement in a word and repeat it with the same stress, which was also the case in the coding of the data. If a participant changed the syllabic structure of a word, the quality of a consonant (e.g., an obstruent to a sonorant) or a vowel (e.g., front to back), it was discarded as a mispronunciation. A few words where syllables were equally stressed were excluded. These exclusions amounted to a total of 20 productions altogether (0,3% of all responses). Another linguistically trained native speaker of Russian was asked to code 10% of the responses randomly chosen from the recordings for stress placement. There was a 100% agreement between the coders, yielding the highest possible inter-rater reliability.

A generalized linear mixed-effects regression model was used (e.g., Baayen 2008) to test the contribution of the following factors on stress placement: (i) the type of the final segment (vowel vs. consonant), (ii) the structure of the penultimate syllable (open vs. closed), (iii) the number of syllables in a word (two vs. three), and (iv) the effect of vowel frontness/backness in the final two syllables (back-back, back-front, front-back, front-front). Stress location was the dependent variable. For the mixed effects analysis, R and the *lme4* package were used (Bates et al. 2007).

7.2.5 Results

As expected, vowel-final words were not declined by the participants, whereas all consonant-final words were declined (i.e. an inflectional ending was added to a word when used in different grammatical cases other than nominative and accusative). Figure 7.1 shows the overall results for consonant-final and vowel-final words. Consonant-final words received final stress (if a word was declined, stress was retained on the final vowel of the stem) in nearly 79% of the cases, while vowel-final words had penultimate stress in about 85% of the cases[13].

[13] In the graphs, the y-axis represents the absolute number of stress responses.

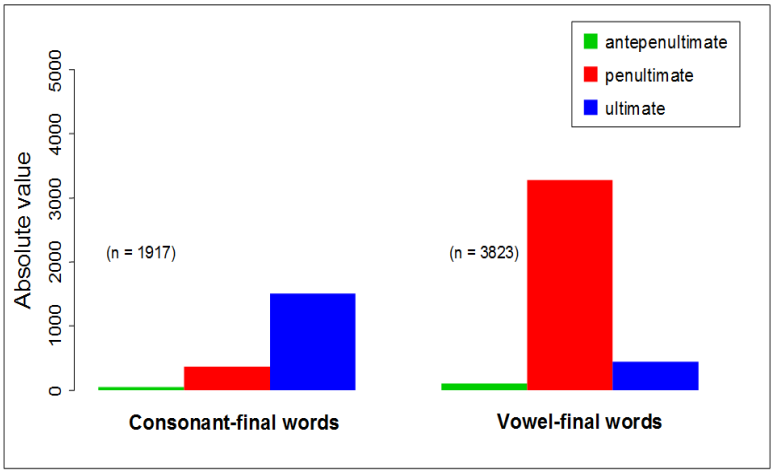


Figure 7.1: Overall results: stress placement in consonant- and vowel-final words

For the analysis of the production data, a generalized linear mixed effects model was fitted with the factors PENSYLL (i.e. 'the structure of the penultimate syllable', with the values open (o) vs. closed (c)), VOWEL (i.e. 'the type of vowel in the last two syllables' with the values back-back, back-front, front-back, front-front), SYLLABLE-NR (i.e. 'the number of syllables in a word' with the values 2 vs. 3), and FINALSEGMENT (i.e.'the type of segment in the final syllable' with the values consonant (c) vs. vowel (v)).

An analysis was conducted for final stress as a dependent variable and the above-mentioned factors as predictors. Subjects and items were included as random effects. Stress on the final syllable was coded as *yes*, stress on the penultimate syllable was coded as *no.* Since antepenultimate stress was extremely rare, those responses were excluded from the analysis. Table 7.1 presents the results of the mixed effects model.

Table 7.1: Generalized linear mixed-effects model for final stress (Exp. 1)

Random effects				
Groups	Name	Variance	Std.Dev.	
item	(Intercept)	0.3006	0.5483	
subject	(Intercept)	5.1570	2.2709	
Number of obs: 5740, groups: item, 192; subject, 30				
Fixed effects:	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	3.13811	0.46150	6.80	1.05e-11 ***
FINALSEGMENT (v)	-5.89419	0.18358	-32.11	< 2e-16 ***
PENSYLL (o)	-0.10667	0.13898	-0.77	0.44276
SYLLABLE-NR (3)	-1.18911	0.14143	-8.41	< 2e-16 ***
VOWEL (back-back)	-0.56091	0.18049	-3.11	0.00188 **
VOWEL (back-front)	-0.01012	0.17657	-0.06	0.95429
VOWEL (front-front)	-0.06942	0.17812	-0.39	0.69673

Negative coefficients indicate a decrease in the likelihood of the final syllable being stressed. The model demonstrates main effects for FINALSEGMENT, SYLLABLE-NR and VOWEL (back-back). In particular, the type of final segment shows the strongest effect such that in vowel-final words, the chances of final stress placement decrease considerably. This decrease is also the case with words whose final two syllables contain back-back vowel sequences although this predictor is not as strong as the type of final segment. Finally, the model shows that the structure of the penultimate syllable does not predict final stress placement. When

the interactions of these predictors were examined, a significant interaction emerged between PENSYLL (o) and SYLLABLE-NR (3) (Estimate= -1.38273, SE= 0.31159, z= -4.438, p<0.001), suggesting that three-syllable words were more likely to be stressed on the open penult than bisyllabic words. The interactions between SYLLABLE-NR and FINALSEGMENT, as well as SYLLABLE-NR and VOWEL were not significant (*p*s>0.05).

In sum, the strongest predictor is the type of final segment. More specifically, stress in words ending in consonants is overwhelmingly final whereas in those ending in vowels, it is penultimate. Figures 7.2 and 7.3 below demonstrate the tendency for penultimate syllables to attract slightly more stress with the back-back vowel sequence than with the other vowel sequences. Irrespective of the type of the vowel in the last two syllables, however, penultimate stress is predominant in vowel-final words while final stress emerges in consonant-final words.

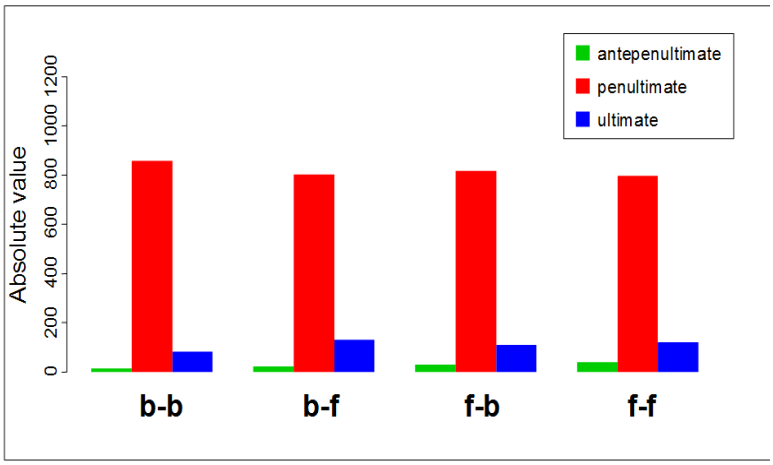


Figure 7.2: Vowel quality (back vs. front) and stress placement in vowel-final words

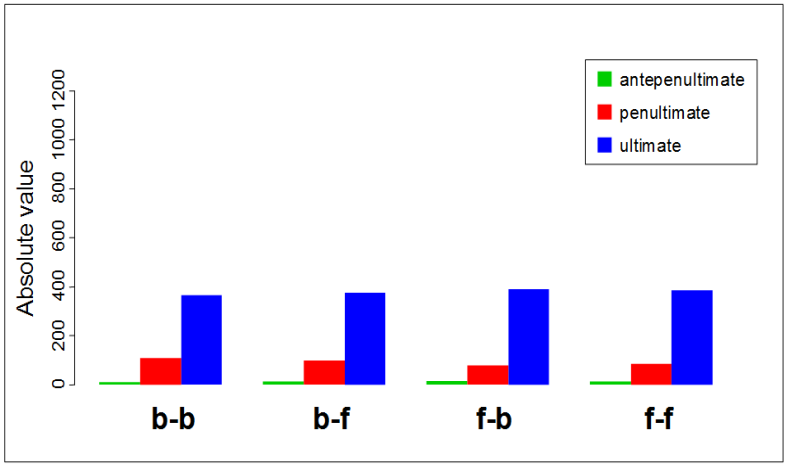


Figure 7.3: Vowel quality (back vs. front) and stress placement in consonant-final words

Crucially, stimuli ending in vowels in the experiments were not declined by the participants thus being uniformly processed as indeclinable words demonstrating, contra Crosswhite et al. (2003), that stress cannot be stem-final. Furthermore, neither vowel quality nor the number of syllables significantly contributed to stress placement. Neither did the type of penultimate syllable influence stress placement, suggesting that word-internal syllable weight plays no significant role in Russian stress. Since in both vowel- and consonant-final words, antepenultimate stress is strongly disfavored, it can be concluded that the default stress is aligned to the right word-edge in Russian.

It could be suggested that place names have special phonological properties across the languages of the world. For example, some place names are known to constitute exceptions to the regular word-final stress pattern in Turkish (e.g., Kabak & Vogel 2001, 2011), which in some theoretical accounts are subsumed in a co-phonology specifically reserved for place names (e.g., Inkelas et al. 1996). Furthermore, as unfamiliar place names ending in /e/ and /u/ may sound foreign to Russian native speakers, vowel-final place names in this study only

ended in /o/ and /i/, hence the appearance of primary stress on the penultimate syllable in such words could be an artifact of these vowels. Altogether, these facts may question the generalizability of these findings beyond place names to other word types in Russian. Therefore, Experiment 2 investigates stress patterns in another set of indeclinable words, acronyms, which allow for a larger array of vowel types in the final syllable than place names.

7.3 Experiment 2: Stress placement in acronyms

7.3.1 Materials

Sixteen non-words presented as acronyms were created to test default stress placement. The experimental items had the following syllabic structures: CV-CV and CVC-CV. Only two-syllable structures were used as three-syllable acronyms are rather rare in Russian. Since all vowels are common in native acronyms word-finally, the vowels /o, u, i, e/ were used at the end of the experimental items to control for the effect of vowel quality. For every structure, two acronyms were created for all four sets of vowel combinations ending in each of the 4 vowels, yielding a total of 16 novel acronyms. To counterbalance the effect of the vowel in the penultimate syllable, both back (*o*,*u*) and front (*i*,*e*) vowels were used.

(6) *Vowel combinations used in the acronym study*

back-front	**front-front**	**back-back**	**front-back**
o,u – i	***i,e - i***	***o,u - o***	***i, e - o***
o,u - e	***i,e - e***	***o,u - u***	***i, e - u***

For a complete list of novel acronyms used in the experiment, see Appendix C.

7.3.2 Participants, procedure, coding, and analyses

The same 30 Russian native speakers participated in the experiment. The participants were presented with a phrase that decoded an acronym followed by the corresponding acronym, e.g. *Britanskaja akademija naučnogo jestestvoznanija – BANE* ("The British Academy of Natural Sciences – BANE"). This enabled the participant to be aware that what they read is a meaningful acronym. They were subsequently asked to read another sentence that contained a gap at the end and fill in the gap using the previously described acronym, e.g., *Today an interesting seminar is taking place in* ____. Although the second sentence was redundant, it was important to control for word declinability and to elicit two pronunciations of an acronym. There were 16 pairs of sentences. This yielded a total of 480 stimuli. The same two judges analyzed the responses by coding stress on the initial or final syllable. The same procedure as in Experiment 1 was applied in the transcription of the production data.

7.3.3 Results

As can be seen in Figure 7.4, the acronyms were penultimately stressed in about 78% of cases.

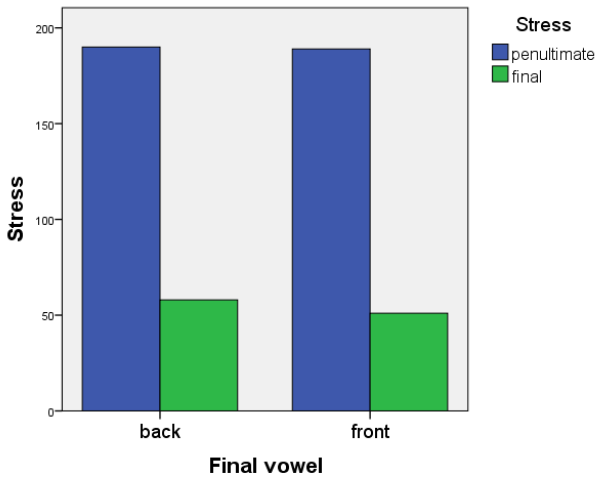


Figure 7.4: Quality of the final vowel and stress placement

A generalized linear mixed effects model was fitted with the fixed factors PENSYLL (i.e. 'the structure of the penultimate syllable', with the values open (o) vs. closed (c)) and VOWEL (i.e. 'the type of vowel in the last two syllables' with the values back-back, back-front, front-back, front-front) and final stress as a dependent variable. Subjects and items were included as random effects. P-values were obtained by the likelihood ratio tests of the full model, which is presented in Table 7.2.

Table 7.2: Generalized linear mixed-effects model for final stress (Exp. 2)

Random effects				
Groups	Name	Variance	Std.Dev.	
item	(Intercept)	0.1235	0.3514	
subject	(Intercept)	12.9490	3.5985	
Number of obs: 480, groups: subject, 30; item, 16				
Fixed effects:	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-4.18047	0.89857	-4.652	3.28e-06 ***
PENSYLL (o)	-0.41330	0.72762	-0.568	0.5700
VOWEL (front-back)	0.38380	0.70945	0.541	0.5885
VOWEL (front-front)	-0.43987	0.72921	-0.603	0.5464
VOWEL (back-front)	-0.01366	0.71690	-0.019	0.9848
PENSYLL (o):VOWEL (front-back)	2.27602	1.03552	2.198	0.0280 *
PENSYLL (o):VOWEL (front-front)	1.99137	1.03226	1.929	0.0537 .
PENSYLL (o):VOWEL (back-front)	1.00361	1.01798	0.986	0.3242

Negative coefficients indicate a decrease in the likelihood of the final syllable being stressed. Neither vowel quality nor the type of penultimate syllable is a significant predictor. The model, however, shows an interaction of open penults and *front-back* vowel combination, i.e. there are more final stress responses in items with an open penult and a vowel combination *front-back* as compared to the items with a closed penult. Figure 7.5 demonstrates stress distribution in the stimuli depending on the quality of the vowel.

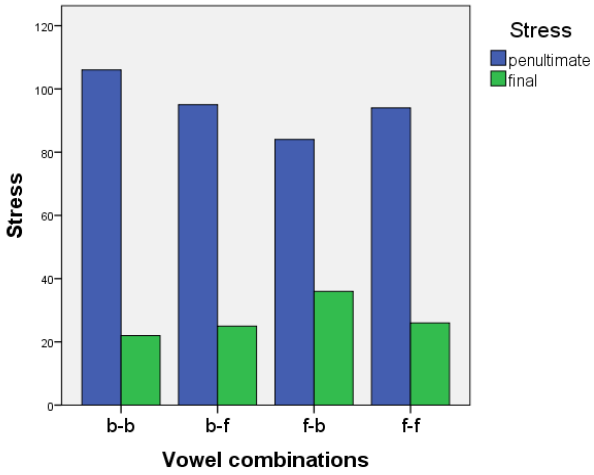


Figure 7.5: Different vowel combinations and stress placement

On a par with the results of Experiment 1, the findings of the acronym study indicate that back vowels attract stress stronger than front vowels. However, unlike in Experiment 1 where the penultimate syllable attracted more stress in the combination *back-back* in comparison to other vowel sequences, the VOWEL predictor in Experiment 2 interacted with the type of the penultimate syllable: penultimate stress is more likely if the penultimate syllable is open and contains a back vowel that is followed by a front vowel.

To summarize, although there is significant, albeit negligible, interaction of the type of the penultimate syllable with vowel quality, stress placement is

robustly penultimate in acronyms (about 80% of cases). The results are in agreement with Experiment 1, where vowel-final place names also received predominantly penultimate stress. As such, the preference for penultimate stress emerges in two different types of indeclinable words in Russian.

7.4 Discussion

The two production experiments consistently revealed the following stress pattern in Russian: final stress in consonant-final words, penultimate stress in vowel-final words. In both experiments, back vowels attracted stress more often than front vowels. The type of the penultimate syllable (open/closed) also showed effect on stress placement in interaction with syllable number (Experiment 1) and vowel quality (Experiment 2). This section provides answers to various questions that the findings of this study raise, and discuss the consequences of the experimental results for the metrical structure of Russian and the potential sources of the default stress pattern.

Let us first account for the effect of vowel quality. Back vowels seemed to attract stress more often in the penultimate syllable than front vowels which is likely to be explained by their phonetic characteristics. Nikolaeva (1971) observes, for instance, that the vowels [a, o, u] are longer in absolute duration than [i, e] in Russian, and notes that vowel duration is the most important correlate of Russian stress. If back vowels generally attracted stress more often in all items, it could be explained by the phonetic properties of such vowels: long vowels are typologically known to attract stress. However, back vowels attracted stress only in certain combinations (e.g., back-back in Experiment 1) or in interaction with another variable (i.e. there were more final stresses in items with a front-back sequences where the penultimate was an open syllable). Moreover, although significant, the estimate value of *back-back* does not make such an important contribution to the statistical model in comparison to other predictors. This suggests that statistical significance may just be due to less variability in the responses for this category.

The effect of penultimate syllable (open vs. closed) turned out to play a role only in combination with syllable number (Experiment 1) and vowel quality (Experiment 2). However, this effect cannot be attributed to syllable weight: *open* penultimate syllables attracted slightly more stress in three-syllable words than in two-syllable words in Experiment 1, which is insufficient to argue for weight-sensitive stress assignment. Furthermore, in Experiment 2, there were more final stress responses when the penultimate syllable was open (which also interacted with vowel quality). There are no phonological or typological accounts that can provide a sensible explanation for these patterns.

What does the discrepancy in stress placement between consonant- and vowel-final words in the present study imply for the metrical structure of Russian? Contra to the predictions of Crosswhite et al. (2003), who claim that the default is stem-final in Russian, vowel-final words in this study received penultimate stress with no overt suffixes attached to them while consonant-final words received stress on the last syllable. Unlike vowel-final words, consonant-final ones were inflected with the stress consistently falling on the last syllable of the *stem*. Hence, the default stress in Russian cannot be stem-final, as we observe both penultimate and ultimate stress in stems.

The question is whether these two patterns can be captured by a single phonological mechanism. The current study assumes that when stress patterns cannot be lexically retrieved, the formation of foot structure is responsible for the two resulting stress patterns. Chapter 5 has demonstrated why the previous accounts of the Russian metrical structure do not provide unequivocal evidence in favor of a particular foot type in Russian. Neither stress shifts in a word, nor vowel reduction patterns may indicate the construction of a specific foot. Based on the present experimental findings, this dissertation suggests that the default stress pattern is a *trochee* built at the right word-edge for both consonant- and vowel-final words. If syllabic trochees are assumed for Russian, what appears to be consonant-final on the surface can be said to contain an abstract vowel word-finally, which surfaces in other grammatical cases (e.g., *dom* (nom.sg.) - *doma*

(gen.sg.) ‘house’). Although unexpressed on the surface, this abstract vowel can stand in for a null inflection since it carries a specific grammatical function (gender, number, and case). More specifically, the abstract element in Russian is morphophonemically represented as it is the marker for either nominative or accusative. Furthermore, recall that according to Bondarko (1969, 1977), Russian has a tendency for open syllables. She claims that even if a word ends in a consonant and is followed by a pause, an open final syllable appears. Final stops get aspiration, which has the functional role of a vowel so that the word /*kot*/ ‘cat’ is interpreted as [ko-tə]. Accordingly, the stress pattern in consonant-final words can straightforwardly be characterized as penultimate, matching with the stress properties of vowel-final stems. This account is on a par with existing phonological models that assume underlying vowels to allow for a unified approach towards stress assignment. For example, Harris (1995) postulates an abstract vowel at the end of Spanish consonant-final words in order to account for the regular stress pattern of Spanish with a final trochaic foot.

One can also postulate *moraic* trochees, which would then account for final stress in consonant-final words without having to assume underlying vowels. Coda consonants are underlyingly non-moraic in Russian, as was confirmed in Experiment 1. In order for the analysis to work, CVC syllables would have to be assumed to become moraic by means of Weight-by-Position: an underlyingly non-moraic consonant surfaces as moraic when syllabified in the coda position (Hayes 1989). To account for *final* stress, however, Weight-by-Position would have to be combined with context-dependent weight (Kager 1989, Hayes 1994, 1995, Alber 1997, Rosenthall & van der Hulst 1999, Morén 2000). Coda consonants would then surface as moraic only word-finally and would not add weight to word-internal syllables. Any mora-based analysis should be based on some other independent evidence within the phonological system of the language. Crucially, elements and phonological processes of such a system should be dominated by moras (weight), i.e. mora-based stress assignment, minimal word requirements (McCarthy and Prince 1986, 1995), different weight-sensitive processes, etc. No

such evidence, however, exists in Russian. First, accentuation in Russian is not governed by syllable weight, which was systematically confirmed in the two experiments. If we assume quantity-sensitivity in the language, it would make the prediction that all monosyllabic *content* words should contain at least two morae (i.e., a heavy syllable) in order for them to carry word stress. However, there are several monosyllabic content words in Russian that are monomoraic, and they are stressed just like any other content words (e.g., *šči* 'cabbage soup'), suggesting that Russian stress system selects the syllable, and not the mora, as the stress-bearing unit. What is more, the moraic theory predicts the correlation between duration and phonological weight. However, there is no phonological opposition between long and short vowels in Russian, i.e. there are no pairs where length distinction is phonological. In sum, there are several grounds on which one may dispense with a moraic analysis in Russian, hence also with moraic trochees. Assuming syllabic trochees, on the other hand, presupposes that consonant-final nouns actually end in an abstract vowel.

The remainder of the dissertation explores whether the lexical stress system of Russian may be involved in the metrical analysis proposed in this section, i.e. whether a foot structure, presumably a trochee, plays a role in the system. It examines secondary stress (SS) placement in Russian compounds and its connection to foot type. The next chapter starts with the presentation of SS as a source of metrical grouping. It has been shown that crosslinguistically, SS assignment often reflects rhythmic patterns so that it involves the process of foot construction. It is followed by the presentation of different types of compounds in Russian and the description of factors determining the appearance of SS. Special emphasis is given to the investigation of rhythmic secondary stress in Russian as it results from metrical foot construction and not from lexical stress assignment. Furthermore, it presents some problems connected with the phonological status of Russian compounds. Chapter 9 introduces the current method of investigating the metrical organization of Russian compounds and presents the experimental study on Russian compound stress.

Chapter 8 Rhythmic secondary stress

8.1 Secondary stress as a source of a metrical grouping

The central claim of the metrical stress theory is that stress is the linguistic manifestation of rhythm, i.e. stress is represented as a hierarchically organized rhythmic structure by using the metrical grid. There are two main approaches as to how these rhythmic structures are constructed, namely in a *bottom-up* vs. *top-down* manner. According to the bottom-up approach (e.g., Hayes 1985, 1995, Halle & Vergnaud 1987), a foot construction precedes primary stress assignment, i.e. first grid marks are assigned to all potentially stress-bearing units on line 0, certain language rules apply to project line 1 grids and parse a word into feet, line 2 representations contain heads of line 1, one of which receives primary stress. Within this approach, primary and secondary stresses are considered to be assigned by the same algorithm, the difference between them lies in the prominence relationship among the feet.

In a top-down theory (e.g., Roca 1986, van der Hulst 1996, 1999), primary and secondary stresses are argued to be assigned by two independent algorithms. Primary stress is assigned before secondary stresses and is considered to be independent of rhythm, i.e. it is not the result of exhaustive footing. For instance, van der Hulst (1996) provides evidence that primary and non-primary stresses are not assigned at the same level. In some languages, primary stress is sensitive to syllable weight whereas secondary stresses are not and vice versa. Furthermore, primary stress may have exceptions and subregularities while secondary stress location is characterized by such post-lexical properties as optionality and lack of arbitrary exceptions (van der Hulst 1999: 72). The direction of footing provides another piece of evidence that primary and secondary stresses are presented on different planes. In many cases, secondary stresses are calculated from the opposite edge of a word, i.e. the rhythm ‘echos away’ from the primary stress (van der Hulst 1996: 22). For example, in Polish, primary stress falls on the

penultimate syllable and secondary stresses are assigned from the left word edge. Thus, van der Hulst makes a distinction between primary or 'lexical' stress assignment and non-primary or rhythmic structure assignment. Roca (1986) also regards non-primary stress assignment as rhythmic and post-lexical. He argues that secondary stress (SS) assignment in Spanish follows primary stress assignment being assigned on alternate syllables leftward of the primary stress (Roca 1986: 352). Likewise, in Brazilian Portuguese, SS assignment is claimed to be predictable and to result from the construction of binary metrical feet (e.g., Frota & Vigário 2000, Sandalo et al. 2006, Sandalo & Abaurre 2007). In this language, SS placement seem to represent the default rhythmic organization of prosodic words.

In Russian words, as was shown in Chapter 4, primary stress is part of the lexical information. The question is whether SS assignment is also lexical in nature, or whether it is the result of a post-lexical process such as eurhythmy. It may also be the case that in some words, SS surfaces on a lexically accented vowel, in some other words, however, it is attributed to rhythmic units. English, for example, is characterized by both rhythmic and lexical SS, i.e. primary stress may be preserved as SS (e.g., accrédit - accrèditátion), or not (e.g., phonétic – phònetícian) (Pater 2000). Thus, there are words which demonstrate lexical SS as well as those with iterative foot construction.

The nature of SS in Russian as well as the conditions under which it surfaces remain controversial issues in the literature. In Russian, SS may appear in compound words, in words with certain prefixes as well as in long words of a simplex structure. The factors determining the absence or presence of SS in a word are argued to be the rhythmic and syllabic structure of words, the accentual type of the left-hand stem of a compound, the type of a syntactic connection between the components of a compound, the frequency of word use, etc. The phonology of Russian compounds raises many further questions:

(1) What are the acoustic parameters of SS?
(2) Should SS be attributed to word-prosodic or phrase-prosodic effects?
(3) Can the position of SS point to default stress location?
(4) Is there a connection between secondary stresses and language rhythmic patterns?
(5) Is there a prosodic word boundary between compound components?

The last question also raises a controversial issue concerning the status of the phonological word (PW) in Russian. This chapter approaches these issues both theoretically and experimentally. I will investigate the phonological properties of compounds in Russian, the conditions under which SS surfaces in a word, the relationship between secondary stress and rhythm. In addition, I will discuss previous accounts on the phonological status of compounds in Russian and analyze various phonological phenomena which are considered to define the PW boundaries in Russian. Following van der Hulst (1997), who argues that language rhythmic structure results from the assignment of secondary stresses, organized in metrical feet, I will investigate the assignment of secondary stress in Russian as an implementation of a rhythmic structure and foot type.

8.2 Secondary stress in Russian compounds

8.2.1 Types of Russian compounds

In Russian, a compound consists of at least two stems that are combined with a linking vowel (an interfix) in most cases. The linking vowel carries no meaning of its own and has solely a combining function. The most commonly used linking vowel is *o*, e.g., *xleb-o-zavod* 'bread baking plant' (*xleb* 'bread', *zavod* 'plant'). After soft consonants and the unpaired hard consonants *ž*, *š* and *c,* the linking vowel is pronounced as *e*, e.g., *peš-e-hod* 'pedestrian' (*pešij* 'pedestrian', *hodit'* 'to walk'), *otc-e-ubijca* 'patricide' (*otec* 'father', *ubijca* 'murderer'). Constituents combined without an interfix are linked by a hyphen in orthography. The second

constituent of a compound is the head component and always carries primary stress. It serves as the morphological head of the compound and determines its grammatical category (gender, number, case). As such, inflectional suffixes occur only word-finally. A compound acts as a single entity as the position of the constituents is fixed, i.e. they may not interchange.

In Russian, there are two main types of compounds: subordinating and coordinating. *Subordinating* compounds have a subordinative relationship between the stems where the main constituent, the rightmost stem, is modified by the first constituent. They may be formed either by pure compounding with (1a) or without a linking vowel (1b), i.e. when both constituents may occur independently in the language, or by compounding with the second bound constituent, i.e. when the second member may not occur independently in the language (1c) (Russkaja Grammatika 1980: § 550 - § 584):

(1)	(a)	*ptic-e-fabrika*	'poultry farm'
	(b)	*car'- puška*	'the Tsar Cannon'
	(c)	*mor-e-plavatel'*	'navigator'

There is a group of subordinating compounds where the first constituent (2a) or both constituents (2b) are truncated and they are combined with each other without a linking vowel:

(2)	(a)	*gos/bank*	'the State Bank'
	(b)	*prod/mag*	'grocery store'

In (2a), *gosbank* stands for *gosudarstvennyj bank* 'the State Bank' and in (2b), *prodmag* stands for *prodovol'stvennyj magazin* 'grocery store'. It should be noted that the truncated parts (*gos*, *prod*, *mag*) do not coincide with the noun stems of the base words (*gosudarstv-*, *prodovol'stv-*, *magazin*).

Coordinating compounds are characterized by an equal relationship between the stems, i.e. they equally contribute to the meaning of a compound (3a,b):

(3) (a) *želez-o-beton* ‘reinforced concrete’
(b) *sever-o-zapad* ‘northwest’

There is a category of coordinating compounds where both members may be inflected (4a,b). For this reason, they are considered to be word combinations instead of compounds (Russkaja Grammatika 1980: § 585).

(4) (a) *kovjor-samoljot* (nom.sg.) ‘flying carpet’
(b) *kovr<u>a</u>-samoljot<u>a</u>* (gen.sg.)

The phonological status of some groups of compounds is not straightforward and will be discussed in detail in subsequent sections.

8.2.2 Secondary stress placement in Russian compounds

In compounds, main stress always falls on the head component that also determines the accentual property of the whole compound construction. Secondary stress (SS) surfaces on the first component and its precise location depends on many factors such as: the distance between primary and secondary stresses, accentual type of the first compound member, frequency of a compound, etc. (Avanesov 1964, Bondarko 1977, Yoo 1992, Gouskova & Roon 2008, 2013).

SS is optional and appears on the first component if it has a fixed stem stress (5a) or a mobile stress pattern (5b) when used as an independent word (Russkaja grammatika 1980: §586):

(5) (a) *vagón* (nom.sg.) ‘carriage’
vagónu (dat.sg.)
vagòn-o-strojénije (nom.sg.) ‘rail carriage building’

(b)	*zemljá*	(nom.sg.)	‘land’
	zémli	(nom.pl.)	
	zèml-e-ustrójstvo	(nom.sg.)	‘land utilization’

If the first component has a fixed stress on the inflection, SS is not likely to appear (Russkaja grammatika 1980: §586):

(6)	*tepló*	(nom.sg.)	‘heat, warmth’
	tepl-o-otdáča	(nom.sg.)	‘heat emission’

Gouskova & Roon’s (2013) rating study demonstrated that speakers generally preferred compounds without SS if the left-head stem had a mobile stress pattern or a fixed inflection stress, whereas SS was optional for fixed stress stems. Gouskova (2010) puts forward the following explanation: fixed stress stems are underlyingly specified for stress location, while stems with mobile or final stress patterns are not stressed underlyingly. Furthermore, it was observed that the farther SS and main stress were apart, the better the ratings of compound pronunciations with SS were.

The phenomenon of SS in Russian is however far from resolved. Questions arise as to whether it is characteristic of the word or phrase prosody and what the acoustic parameters of SS are. With regard to the phonetic correlates of SS, some authors regard the absence of vowel reduction as an indication of SS in Russian words (e.g., Loginova 1977, Avanesov 1956). Kalenčuk & Kasatkina (1993) suggest that absence or presence of vowel reduction relates to the level of word prosody, while secondary stress is characteristic of phrase prosody. Initial compound components as well as prefixes are lexically more independent than other word parts and absence of vowel reduction in these components is considered to indicate their independence. Unreduced unstressed vowels in the initial compound components are argued to behave like unstressed but unreduced vowels in prepositions, pronouns, conjunctions and particles within a phrase: e.g.,

vdol' [vdolʲ] úlicy ‘along the street’, *moj [moj] brát* ‘my brother’, *no [no] já* ‘but I’. Thus, proclitics and first components of a compound are assumed to have the same status. In a phrase, SS is assumed to appear under the following conditions in these structures: first, the distance of 3-4 syllables between primary stress and the syllable with an unreduced vowel may cause secondary stress, e.g., *vysòkoproizvodítel'nyj* ‘highly productive’, *mòj odnoklássnik* ‘my classmate’. Second, SS in compounds tends to appear when the compound occurs at the end of a phrase (rheme). Finally, proclitics and first components of a compound may get emphatic stress. It should be noted that secondary emphatic stress may also appear in words of a simplex structure, e.g., *Zàmečátel'no!* ‘It is wonderful!’ To sum up, first components of some compounds, certain prefixes and proclitics may have unreduced vowels in an unstressed position. It is argued that they may also receive SS under certain conditions within a phrase (Kalenčuk & Kasatkina 1993).

Kuznetsova (2006a) notes, however, that there are compound words which always bear SS irrespective of the phrase position, for example, when primary stress is more than three syllables away from the initial syllable: e.g., *latìnoamerikánskij* ‘Latin American’, *elèktroprovódka* ‘electric wiring’. Furthermore, there are compounds that are never pronounced with SS such as three- and four-syllable high-frequency compounds: e.g., *parovóz* ‘steam-engine’, *samoljót* ‘airplane’. If a word may not be pronounced with SS, then not only the presence, but also the absence of SS should be an important characteristic of the word, and not phrase prosody. To that end, Kuznetsova differentiates between *Rhythmic Secondary Stress* (RSS) and *Semantic Secondary Stress* (SSS) in Russian words. Appearance of RSS is argued to be optional and connected with speech rhythm. If a word is multi-syllabic (more than five syllables), then it may get a RSS on the first syllable due to the demands of the Russian speech rhythm. SSS is a property of a word as a dictionary unit and may fall on any syllable of the first component. It has a morphological function: it marks the components of a compound leading to the facilitation of their pronunciation and perception, e.g., *gìdroelèktrostáncija* ‘hydroelectric power plant’. Another function is to create

semantic contrasts, e.g., *[gós]stroj* 'State Committee for Costruction' — *[gas]stroj* 'Gas Committee'.

It is assumed that if there is a stress shift to the beginning of a word, we deal with RSS, not with SSS. The standard pronunciation of a compound would be with SS on the syllable of the initial component where it falls when the word is used independently. For rhythmic reasons, however, there may be a stress shift from the "historical" syllable onto the first syllable, i.e. SSS is substituted with RSS. This is considered to be a rhythmic stress shift as it occurs for metrical and not morphological, phonetic or semantic reasons.

In order to ascribe SS in compounds to the word- or phrase-level prominence in Russian, we first need to clarify whether compounds constitute a single *Phonological Word* (PW), a phrase or they have some other phonological status. The next section introduces the phonological criteria that define a PW in Russian. It presents and analyzes the phonological phenomena that are argued to take place within the boundaries of a PW in Russian. This is followed by the presentation of the existing accounts on the phonological status of compounds.

8.2.3 Previous accounts of the phonological status of compounds

8.2.3.1 Phonological word in Russian

There are segmental (e.g., vowel harmony, sandhi phenomena such as palatalization, voicing assimilation, etc.) as well as suprasegmental (word stress, syllabification) phonological rules that apply within the domain of a PW. In Turkish (e.g., Kabak & Vogel 2001) and Hungarian (e.g., Booij 1984, Nespor & Vogel 1986), for instance, vowels must agree with respect to frontness or backness. In Italian (Nespor & Vogel 1986), an intervocalic *s* is voiced within, but not across phonological words. In Germanic languages, syllabification is constrained by phonological word boundaries, i.e. it does not operate across phonological words (see for example Booij 1985 for Dutch, Wiese 1996 for German). It is assumed that PW is typically equivalent to the domain within

which stress is assigned (Nespor & Vogel 1986). For example, in Turkish the domain of the Main Stress Rule includes derived words, but not compounds.

In the literature, the PW in Russian is generally characterized as a speech unit with one main stress: the PW is an independent word with adjacent unstressed function words (Axmanova 1966); the main criterion of combining words into a single PW is one main stress (Bogdanova 1988); the main function of word stress is one of unification, whereby the elements of a word are combined into a whole (Bondarko 1998); the PW usually consists of a content word plus clitics which functionally (or, in any case, semantically) are close to inflections (Kasevič et al. 1990); the PW is either a single word with one stress or a combination of a stressed word with adjacent unstressed forms (proclitics and enclitics) (Russkaja Grammatika 1980: § 137). These definitions imply that in Russian, the PW cannot contain more than one content word and clitics are always stressless. However, it has been observed that in spontaneous speech, there is a tendency to stress function words, and a PW may contain more than one lexical word, i.e. when one word may lose its stress (Bogdanova 1988). Furthermore, the study by Apuškina et al. (2008) has revealed that a sequence of a proclitic and a lexical word may be separated by a pause in speech, which signifies a boundary between these units. Thus, the definition of a PW as a combination of a word and a clitic may be not that straightforward.

Another phonological phenomenon many linguists refer to in order to define the domain of a PW is voicing assimilation. The phenomenon of voicing assimilation in Russian has been well described (Avanesov 1956, Jakobson 1956, Halle 1959, Hayes 1984, Padgett 2002, etc.). Obstruents are known to devoice word-finally (7):

(7) *sad* [sat] ‘garden’

Voicing assimilation (regressive) occurs within a morpheme (8a), across morphemic boundaries (8b) and across the boundary between a proclitic and a content word (8c):

(8)	(a)	*pros'ba*	[zb]	'request'
	(b)	*pod-pisat'*	[tp]	'to sign'
	(c)	*ot babuški*	[db]	'from grandma'

It is generally assumed that a sequence of a proclitic followed by a lexical word constitutes a single PW. Indeed, there is always a voicing assimilation between the two components and one stress per unit. A sequence of a lexical word followed by an enclitic is also characterized by a single stress, although voicing assimilation is restricted in this case. In particular, it does not occur before sonorants (9a) but before obstruents (9b):

(9)	(a)	*brat li*	[brat] [li]	'brother' (interr.)
	(b)	*brat že*	[brad] [ʒe]	'brother' (emph.)

It is not quite clear whether enclitics belong to the PW. Padgett (2002:4) posits a *Clitic group* (CG) as a domain of phonological voicing assimilation which encompasses a PW and enclitics:

(10)	*iz kart že*	$\{[\text{is kard}]_{\text{Pwd}}[\text{ʒe}]_{\text{Pwd}}\}_{\text{CG}}$	'from the maps' (emph.)

It should be noted, however, that the same voicing assimilation processes are observed between lexical words as demonstrated below in (11). Final devoicing applies if the following word begins with a sonorant (11a,b). If the following word begins with an obstruent, the regressive assimilation takes place so that consonants agree in voicing (11c,d) (e.g., Knjazev 2006). However, lexical words

retain their idiosyncratic stress patterns thus being unanimously classified as *Phonological Phrases* (PPhs). Enclitics, on the other hand, are always stressless.

(11)	(a)	*gorod Omsk*	[górət̲] [ómsk]	'the city of Omsk'
	(b)	*dub upal*	[dúp̲] [upál]	'the oak tree fell'
	(c)	*gorod Brjansk*	[górəd̲] [brjánsk]	'the city of Bryansk'
	(d)	*luk dokosili*	[lúg̲] [dəkʌsíli]	'the meadow was mowed'

Here, the question arises as to what the domain of voicing assimilation in Russian is. As has been demonstrated above, it applies across syllable and morphemic boundaries, across the boundary between a proclitic and a content word. As the examples in (11) demonstrate, voicing assimilation across word boundaries occurs when the second word starts with an obstruent. In fact, here we observe the same assimilation processes as at the boundary between a word followed by an enclitic (9). The only difference is that a CG contains one stressed syllable whereas in a phrase both words are stressed. Thus, the issue of voicing assimilation alone cannot define the phonological word boundaries in Russian.

As mentioned at the beginning of the section, word stress is an important criterion to define the domain of a PW. It is generally assumed that there is a one-to-one correspondence between the number of primarily stressed syllables and the number of phonological words. It is also claimed that that a PW may not contain more than one lexical word. However, there are speech perception experiments that demonstrate that the stressed syllable may not always be unambiguously categorized as being stressed or unstressed which raises doubt about the assertion that the number of stresses coincides with the number of PWs.

Kasevič & Jagunova (2003) presented experimental evidence that the opposition between a PW and a PPh may be neutralized as a result of the so-called 'stress reduction'. They conducted a perceptual study where participants were presented with pairs of stimuli corresponding to either one PW or a phrase consisting of two content words. A PW had the same phonemic make-up as the

first word in a phrase and had stress on the same syllable as the second word in a phrase, for example:

(12) (a) *gimnázii* 'gymnasia' (nom.pl.) – *gímn Ázii* 'Asia's hymn'
(b) *barbarísa* 'barberry' (gen.sg.) – *bár Borísa* 'Boris's bar'

The stimuli were embedded in two contexts: in a neutral sentence context (which allowed both interpretations) and in an unambigous context. They were randomly arranged in a table that was read out by a phonetically trained linguist. In the perceptual study, the stimuli were presented to the participants in isolation (extracted from phrases) and in phrases with a neutral context. The task of the participants was to choose a variant presented in the questionnaire. It turned out to be quite difficult for the participants to differentiate the pairs of stimuli (for some stimuli the error rate was 78%). In general, the presence of a phrasal context (even the neutral one) made it easier for the participants to make the correct choice.

The other group of stimuli was analyzed acoustically. One member of a pair consisted either of one content word or of a proclitic and a content word (which, as has been demonstrated above, is traditionally interpreted as a PW), the other one contained two PWs, for example:

(13) (a) *povarjóška* 'ladle' – *pápa Ljóška* 'daddy Ljoshka'
(b) *na diváne* 'on the sofa' – *djádja Vánja* 'uncle Vanja'

The results have shown that in a phrase final position, there is no opposition with respect to vowel duration of initial unstressed and stressed syllables (e.g., */po/* vs. */pá/* in (13a)). To sum up, it seems that there is no one-to-one correspondence between a stressed unit and a PW: */pápa Ljóška/* is a phrase consisting of two primarily stressed words where one stress, however, may be reduced. So, the presence of one stress as a cue for a PW domain does not always turn out to be a reliable feature.

Furthermore, due to the unpredictability of Russian stress, speakers cannot always determine the boundary between two PWs. It may not be clear in some cases (e.g., *sobákuvídel* includes two PWs though it may be difficult to determine the boundary between them (*sobáku* 'dog' (N.acc.sg.) *vídel* 'see' (V. 3d pers.sg.masc.past tense) vs. *sobák* 'dog' (N.acc.pl.) *uvídel* 'see' (V. 3d pers.sg.masc.perfect tense). In this case, this is a potential boundary which may be phonetically realized when the speaker separates words by a pause or a glottal stop before an initial vowel.

To summarize, in the previous analyses of the PW in Russian, the PW is defined as a unit with one stress and a domain of voicing assimilation. It has been shown, however, that resyllabification takes place within a phrase, voicing assimilation may apply across word boundaries if the second word starts with an obstruent, and the opposition between a PW and PPh is not unequivocal with respect to stress. Thus, the common definition of a PW as consisting of a content word plus adjacent clitics remains to be a stipulation. The isomorphism between the number of PWs and the number of stresses as well as the presence of PW boundaries are controversial. Last but not least, the study by Apuškina et al. (2008) demonstrated that a proclitic must not necessarily lose its stress within a PW and it may be separated from its host by a pause, suggesting that clitics must not always form part of a PW.

8.2.3.2 Problems with the phonology of Russian compounds

In general, compounds are said to be examples of the non-isomorphism between morphological and phonological structure (Booij et al. 2000). In some languages, compound constituents are considered to be different phonological words if the second compound constituent in a coordinate structure can delete. In German, for example, if the second compound part can be omitted (e.g., *Tief- und Hochebenen* 'high plains and low plains'), it is considered to be a separate phonological word (Wiese 1996). Hall (1999: 106) argues that the part that can be deleted (a compound entity or an affix) must satisfy the 'Minimal Word Requirement': The

PW in German is minimally bimoraic. Do Russian compounds constitute a single phonological unit or both compound members are separate phonological words?

Some authors refer to the phonology of boundaries in Russian when trying to determine the status of compound words. For example, Gouskova (2010) argues that subordinating compounds with a linking vowel constitute a single PW in Russian. She discusses the issues of word-final devoicing, consonant assimilation and vowel reduction patterns in Russian. She argues that assimilation in obstruent-obstruent clusters always applies inside the PW (14a) and final devoicing always applies at the end of prosodic words (14b):

(14) (a) *ot-bit'* [ʌd.b'ít'] 'to fight off'
(b) *gaz* [gas] 'gas'

It is suggested that compounds behave as if they do not have a PW boundary between the final consonant of the left-hand stem and the linking vowel:

(15) *vod-o-napor* [və.də.nʌ.pór] 'water pressure tower'

It is also argued that vowel reduction patterns pertain to prosodic edges in Russian. Taking into consideration two degrees of vowel reduction, a vowel followed by a prosodic word boundary cannot be [ʌ]. The word-final vowel reduces as unstressed and not pretonic. According to this, the linking vowel in a compound must be reduced to [ʌ] and not to [ə] in front of primary stress in order to support a single prosodic word hypothesis (Gouskova 2010: 426):

(16)

Single prosodic word	Two prosodic words	
[(m'ità)(lʌr'és)kə]	[(m'ità)lə][(r'és)kə]	*metalorezka* 'a metal cutting tool'

The results of Gouskova's (2010) experiment demonstrated that the linking vowel was longer in pretonic position regardless of the presence of secondary stress. If there is a PW boundary between the linking vowel and the following stressed

vowel, it should not lengthen. She thus concluded that the pattern of vowel reduction at the boundary between the stems suggests that there is no prosodic boundary there.

However, phenomena such as vowel reduction as well as that of voicing assimilation should not be straightforwardly used in an attempt to determine the PW boundaries in Russian. In fact, previous research suggested that the domain of these very phonological processes is not the PW, but the *syntagm*, a unit of speech characterized by a particular intonation exhibiting syntactic, semantic and phonetic coherence (Novikov 1999, Knjazev 2006). Knjazev (2006) shows that vowel reduction patterns within a phrase between two PWs (17a,b) are similar to those found within a single PW. In (17a), an unstressed final vowel of the first word has a longer duration being in the immediate pretonic position than the same vowel in (17b):

(17)	(a)	*bank<u>a</u> kofe*	[bánk<u>ʌ</u> kófe]	'jar of coffee'
	(b)	*bank<u>a</u> kakao*	[bánk<u>ə</u> kʌkáo]	'jar of cocoa'

Thus, although both words in (17) bear primary stress, vowel reduction patterns within these examples are characteristic of a single PW. Knjazev (2006) compares the frequency values and duration of vowels in absolute initial position (18a), after a consonant within a PW (18b) and after a consonant of a preceding PW (18c):

(18)	(a) *<u>o</u>gorod*	[<u>ʌ</u>gʌrót]	'vegetable garden'
	(b) *iz <u>o</u>goroda*	[iz<u>ə</u>gəródə]	'from a vegetable garden'
	(c) *vskopal <u>o</u>gorody*	[vskʌpál <u>ə</u>gəródy]	'dig up a vegetable garden' (3d pers.sg., masc.,perf.)

In the positions after the preposition (18b) and after a PW (18c), the vowel has approximately the same frequency and durational characteristics which supports the hypothesis that resyllabification is not limited to the boundaries of a PW.

Another piece of evidence for Gouskova's (2010) claim that subordinating compounds constitute a single prosodic word comes from the absence of final consonant devoicing of the first constituent, e.g., *bom<u>b</u>-o-ubežiš̌če* is pronounced as [bòm<u>b</u>əubéʒɨʃʃə] 'bomb shelter', which indicates that the linking vowel is syllabified together with the preceding consonant. However, the question remains as to whether there is a prosodic word boundary after the linking vowel. Would a representation such as [bòmbə]$_{\text{Pwd}}$ [ubéʒɨʃʃə]$_{\text{Pwd}}$ be possible? Gouskova (2010) assumes that such a structure would be inconsistent with vowel reduction. The study by Knjazev (2006) mentioned above, however, demonstrates that vowel reduction patterns within a PW and within a phrase are similar since resyllabification takes place within a syntagm, and not within a PW.

Compounds with bound (truncated) constituents do not have an unequivocal status either. It remains controversial whether the first component is a morpheme or a PW. These constructions are also called analytical compounds because the modifier is an adjective in its full form, e.g., *gosbank* stands for *gosudarstvennyj bank* 'the State bank'. According to Zemskaja (1997), in these constructions, the first components have SS and may be separated from the following component by a pause whereas the vowel does not undergo reduction. She regards these constructions as phrases as these features indicate the phonological independence of these units. According to Skačedubova (2008), the semantic independence of the first component may be manifested not only prosodically by means of stress, but also segmentally. The last consonant of the first constituent may not undergo regressive voicing assimilation even if the first compound element is pronounced without SS, e.g., *go<u>s</u>bank* [g^<u>s</u>bánk] 'State bank'. This pronunciation would suggest that the first component is not incorporated into the PW of the second member. Pronunciations like [g^<u>z</u>bánk], on the other hand, indicate the absence of a PW boundary within the domain. Thus, one and the same compound with truncated constituents (e.g., *gosbank*) may constitute one PW for some speakers ([g^<u>z</u>bánk]) whereas for others it consists of two PWs [g^<u>s</u>bánk]. In general, there is a tendency to pronounce such

compounds as one word, i.e. consonant sequences between stems agree in voicing.

The second group of analytical compounds contains such foreign elements as *avia-*, *avto-*, *bio-*, *geo-*, *moto-, foto-*, *energo-*, etc-. Panov (1968) regards these elements as morphemes in the constructions like *motodróm* 'motor cycle racing rack', *avianósec* 'aircraft carrier', and as PWs in the constructions where they may bear SS, e.g., *mòtogónki* 'motor cycle races', à*viasvjáz'* 'air communication'.

Thus, according to Panov (1968), the presence of SS may indicate the independence of the first component in analytical compounds. However, it is controversial as to how SS is realized acoustically and whether it is confined to the level of the PW or the PPh. The acoustic correlates of Russian stress are the following: duration, intensity, changes of the fundamental frequency, vowel quality. The question arises as to which phonetic characteristics a vowel under SS has. In the literature, SS is defined as a weaker, subsidiary stress (Avanesov 1956, Bondarko 1998). As mentioned earlier in this chapter, the absence of vowel reduction in compounds may be regarded as an indication of SS (e.g., Avanesov 1956). Some authors point out, however, that in both Russian simplex and compound words, unstressed vowels may be pronounced without vowel reduction, e.g., *bo̲á [o]* 'boa', *ge̲nštáb [e]* 'General Staff', *te̲leperedáča [e]* 'television programme' (Alekseev 1979, Kuroxtina 1983, Glovinskaya et al. 1971, Kalakuckaya 1991). Kuznetsova (2006b) argues that the main characteristic of vowels under SS is vowel duration. Following Kalenčuk & Kasatkina (1993), she suggests that the absence/presence of SS belongs to the level of phrasal prosody, whereas the absence/presence of vowel reduction belongs to the level of word prosody.

The auditory analysis by Arxipova (2002) revealed that main characteristics of a vowel under secondary stress were duration and quality. For the vowels /o/, /a/, /e/, the main characteristic of SS was vowel quality. For the vowels /i/, /u/, /i/, the main characteristic of SS was vowel duration which could

be equal to the duration of vowel under primary stress. Secondary stress might surface in a word irrespective of its length.

Skačedubova (2008) assumes that SS may be realized by the absence of vowel reduction, by longer vowel duration or both. Her study on the realization of vowel phonemes in the first compound components yielded the following results. First, pronunciations of unreduced vowels increased when moved further from the primary stress. Second, in a 'strong' phrase position, an unreduced vowel surfaced more often in the initial component. Third, SS appeared when there were many syllables between the primary stress and the potential SS. Finally, commonly used compounds tended to be pronounced as a single word, i.e. unstressed vowels were reduced.

To summarize, the acoustic realization of SS placement constitutes the first problem with respect to Russian compounds. The second problem is their ambiguous phonological status. Vowel reduction patterns within a prosodic word are comparable with those between two prosodic words as resyllabification processes apply across word boundaries. Voicing assimilation applies within a compound with a linking vowel, it may or may not apply between stem boundaries of compounds with a truncated first component. Thus, neither the process of vowel reduction nor the process of voicing assimilation alone can provide enough evidence in favor of the phonological status of compounds as single PWs. If we consider the most common assumption that the main function of stress is to define a word phonologically, then we could suggest that compounds with SS consist of two PWs. However, neither semantically nor morpho-syntactically do compounds behave as phrases.

This dissertation aims to investigate rhythmic secondary stress alternations in Russian compounds in order to establish the default stress pattern. However, first, it is relevant to know within which domain SS alternations take place. If a compound word is a phrase, then we should speak about phrasal stress. If, on the other hand, compounds constitute single PWs, we may speak about SS as an indicator of the default only if SS is rhythmic, i.e. not determined lexically. As

mentioned at the beginning of this chapter, it has been assumed that if initial compound components have unaccented stems (i.e. if they belong to the mobile paradigm), SS is likely to appear at the beginning of the words which could indicate the initial default stress location. However, in existing compounds, it may be problematic to differentiate between initial rhythmic SS and emphatic stress which refers to the increase of the effort of expression. To get the rhythmic and not lexical stress alternation, it is crucial to test SS placement in novel compounds whose first components are inherently stressless as only in the absence of lexical stress, SS assignment will result from metrical foot construction.

The next question arises as to how we establish the presence of SS. It has been demonstrated that the appearance of SS is thought to depend on many factors: accentual pattern of the first component, the number of syllables between the primary and secondary stresses, position of a compound in a phrase, etc. SS is deemed to be manifested through the absence of vowel reduction (e.g., Avanesov 1956), or through the absence of vowel reduction and longer vowel duration (Skačedubova 2008). The others (Kalenčuk & Kasatkina 1993) assume, however, that SS has the same properties as primary stress and it is more likely to appear at the end of a phrase. In the analysis of the production data, should we pay attention to the absence of vowel reduction, duration, intensity measures or all the properties together? The subsequent acoustic analysis should reveal the acoustic properties of the vowels that have been perceived as secondarily stressed. To determine whether SS surfaces only phrase-finally as claimed by Kalenčuk & Kasatkina (1993), we first need to explore acoustic properties of Russian vowels in different word and phrase positions. The next section presents the effect of rhythm and phrasal position on the acoustic features of stressed and unstressed vowels in Russian. This provides the necessary background to the present experimental approach to SS and investigation of its acoustic correlates presented in the next chapter. Thus, the current study on Russian compound stress not only investigates rhythmic secondary stress assignment and its connection to metrical

foot type but also the acoustic features of vowels perceived as secondarily stressed.

8.3 Effect of phrasal position on the acoustic features of vowels

Vowel duration and intensity measures differ considerably depending on the position of a PW within the phrase, stress location in the PW, syllable structure (open vs. closed), quality of the preceding and following consonants. Duration is the most stable acoustic property of word stress in Russian. However, this feature is also influenced by phrasal conditions. If an unstressed vowel is in a 'strong' position (under phrasal stress in the word-final syllable), it may be as long as a stressed vowel or even longer (Novikov 1999).

Describing duration and intensity measures of stressed and unstressed vowels, Zlatoustova (1981) refers to the domains of a 'rhythmic structure' (corresponds to a PW) and a 'syntagm' as a semantic-syntactic unit. She determined that phrase-initially, vowels were pronounced with shorter duration whereas phrase-finally, they were characterized by longer duration which was valid not only for stressed, but also for pre- and post-tonic vowels. She also compared duration of stressed and post-tonic vowels in the same phrase position: in an open final syllable at the end of a non-final syntagm. Duration of vowels under stress (110-165ms) turned out to be more or less equal to the duration of post-tonic vowels (100-143ms) in this position. According to Zlatoustova (1981), vowel lengthening at the end of a rhythmic group marks the syntagm boundary.

Concerning the intensity, in Russian as well as in many other languages, it decreases gradually from the beginning towards the end of a phrase. Consequently, even unstressed syllables phrase-initially may be more intense than a stressed vowel phrase-finally. Thus, the phrase-initial position is characterized by greater intensity in Russian whereas phrase-final position is distinguished by longer vowel duration.

Realization of vowel phonemes (stressed and unstressed) also depends on their position within a phrase. In different phrasal positions, realizations of one

and the same phoneme will be different. Previous studies (e.g., Bryzgunova 1984, Kasatkina 1990) have shown that the phrase-final position under phrasal stress has the most distinctive power for vowel phonemes which applies to the whole word, i.e. to stressed and unstressed syllables. At the beginning and in the middle of a phrase, unstressed vowels are realized in a fewer number of allophones.

Nikolaeva (1977) examined the interaction of these acoustic features with pitch movements in different intonation domains in Russian. The extent to which the phrasal prosody influenced the word prosody in different phrase positions was investigated. In declarative sentences, the pitch of the pre-tonic syllable, which was usually higher than the pitch of the tonic syllable, turned out to be important. The melodic beginning of a phrase or a syntagm was represented by a rising tone whereas intensity was declining in all cases. With respect to vowel duration within a word, duration of the first pre-tonic syllable made up about 40-60% of the vowel duration of the tonic syllable, duration of the second pre-tonic syllable – about 30-40%. The duration of post-tonic syllables displayed most discrepancies with 25-120% of the duration of the stressed vowel. Prosody of isolated words demonstrated the following vowel measurements. In both di- and trisyllabic words with different stress location, the most intense point was the beginning of a word. Duration always characterized a stressed syllable – in about 80% of cases, however, in a phrase, these propotions might be shifted.

8.4 Interim summary

To find out what determines rhythmic secondary stress placement, under which conditions it arises and how it is manifested, all the issues discussed above should be taken into consideration. The next chapter is devoted to the investigation of Russian metrical organization and its connection to foot construction. It introduces the present approach to Russian compound stress and presents the methods and results of the current experiment investigating rhythmic alternations in Russian. The next issue under investigation is the phonological status of compounds. It has been argued (Gouskova 2010) that subordinating compounds with a linking vowel

constitute a single prosodic word in Russian. This claim is based on the processes of vowel reduction patterns and voicing assimilation as indicators of prosodic word edges in Russian. However, this chapter has demonstrated that voicing assimilation applies across word boundaries and vowel reduction patterns within a word may be similar to those found within a phrase. Compounds with truncated components without a linking vowel also pose a problem with respect to their phonological status: the vowel in the initial component may or may not undergo vowel reduction, phonological rules of voicing assimilation may be violated so that compound constituents may behave as being within a PW as well as being between two PWs. This issue is further complicated by the problem of boundary markings of a PW in Russian. This dissertation makes use of rhythmic structures in order to establish the phonological status of subordinating compounds.

Chapter 9 Experiment 3: Investigation of Russian compound stress

9.1 Present experimental approach to Russian compound stress

The previous chapter has demonstrated that since Russian words do not allow a long string of unstressed syllables, secondary stress (SS) is likely to appear. Normally, if the first component of a compound has a fixed stem stress, SS surfaces on that vowel unless it is few syllables away from the primary stress. If the first component has an unaccented stem (a mobile stress pattern or a fixed inflectional stress), SS is not likely to appear or appears closer to the beginning of a word. For stems with these accentual patterns, there is no lexically stressed syllable so that secondary stress placement is considered to be determined by clash avoidance (Gouskova & Roon 2013). Let us examine the mobile stress stem *korabl'-* 'ship' and the final stress stem *jestestv-* 'nature'. The former one is characterized by stress on the inflection or the last syllable of the stem if the inflection is null (1):

(1) *korábl'* (nom.sg.) 'ship'
korabl'-á (gen.sg.)

The latter one is characterized by a fixed inflectional stress in all forms (2):

(2) *jestestvó* (nom.sg.) 'nature'
jestestvá (gen.sg.)

For the compounds *korabl-e-nósec* 'ship carrier' and *jestestv-o-védenije* 'natural science', ratings got better with interstress distance. The current study assumes, however, that secondary stresses in such compounds may also be lexically conditioned. The syllable */ra/* in the word *korábl'* 'ship' is stressed in the nominative and accusative cases so that it might be the reason for good ratings of

pronunciations with SS on that syllable. Even if a word has a final stress as the word *jestestvó,* its derivatives may bear stress on other syllables, e.g., *jést'* 'exists' or *jestéstvennyj* 'natural'.

Thus, if the first compound constituent has a fixed stem stress and SS surfaces on this syllable, then we speak about lexical secondary stress. However, if the first constituents have mobile or final stress patterns (unaccented stems), SS assignment may also be lexically pre-specified because related word forms of these constituents may have different accentual patterns and bear stress on other syllables, which may influence SS placement. In this case, these alternation patterns will not reveal information about rhythmic regularities and we may not draw conclusions about the default position of stress in Russian.

As mentioned by Kuznecova (2006a), when SS shifts to the initial syllable of the first component, we deal with rhythmic secondary stress. She gives examples of the first components which usually undergo this shift (mostly two- and three-syllables ones). However, she does not speak about word length and how many syllables are allowed between the primary stress and the potential initial secondary stress. If the distance between the initial syllable and the syllable carrying primary stress is more than 3 syllables, would SS still surface word-initially? The second question is whether it would be rhythmic or lexically conditioned.

To get the rhythmic and not lexical alternation, we need to test SS placement in compounds whose first components are inherently stressless. To ensure this, the first compound members must be vowel-final words with fixed stress on the final vowel and have no related word forms with stress on the other syllables. This final vowel becomes the linking vowel in a compound and linking vowels are not stressed in Russian (exceptions are compounds with vowelless initial components). In such formations, secondary stress alternations would reveal information about the rhythmic regularities in Russian because the first members are devoid of lexical pre-specification.

9.2 Materials

To test rhythmic stress alternations, novel compounds with initial stressless constituents were created. To do this, three- and four-syllable vowel-final indeclinable words with fixed final stress were used as the first components. The finally stressed vowel becomes a linking vowel in a compound so that the first component becomes underlyingly stressless. In order to test whether word length influences SS appearance, the distance between the initial syllable and the syllable with primary stress was varied. The second constituents were words with stress on the initial or the second syllables also used as base components in existing Russian compounds. Thus, three groups of compounds with three, four and five pre-stressed syllables were constructed. There were four stimuli for every structure as presented in (3) (the linking vowels are in bold). All of these compounds are novel compounds with a transparent meaning.

(3) (a) σσ-**σ**-΄σσ (3 pre-stressed syllables)

*muli-**e**-prjád*	'color threads spinner'
*kanap-**e**-rézka*	'canapé cutter'
*božol-**e**-délije*	'beaujolais making'
*konsom-**e**-várka*	'consomé cooker'

(b) σσ-**σ**-σ΄σ (4 pre-stressed syllables)

*burim-**e**-pisánije*	'bouts-rimés writing'
*macram-**e**-pleténije*	'macrame making'
*boler-**o**-vjazánije*	'bolero knitting'
*domin-**o**-stroénije*	'domino building'

(c) σσσ-**σ**-σό (5 pre-stressed syllables)

*kommjunik-**e**-pisánije*	'communiqué writing'
*faksimil-**e**-tvorénije*	'facsimile writing'
*vereten-**o**-prjadénije*	'spindle spinning'
*aligot-**e**-xranénije*	'Aligoté storage'

9.3 Procedure

To test the assumption made by Kalenchuk & Kasatkina (1993) that absence or presence of vowel reduction relates to the level of word prosody, while secondary stress belongs to the level of phrase prosody and it tends to appear at the end of a sentence (rheme), the stimuli were presented in two communicative positions, rheme and theme. In addition, it was investigated whether the prosodic structure of a preceding word might play a role in secondary stress realization by varying the number of syllables between the two main stresses in a phrase. Some previous studies have shown that the number of unstressed syllables between a prefixed word and a stressed syllable of a preceding PW may influence the acoustic realization of the vowel in the prefix: if the prefix was preceded by some unstressed syllables, the vowel was prosodically more salient than when it was preceded by a stressed syllable. In the current study, the distance between two primary stresses was varied to investigate whether it would affect SS placement and whether there would be stress shift in compounds of the same syllabic structures if they were preceded by unstressed syllables.

Thus, we end up with four carrier sentences presented in (4). One word stimulus was presented in four different conditions: at the end (rheme) and at the beginning (theme) of a sentence, with no preceding unstressed syllables (4a,b) and with three preceding unstressed syllables (4c,d):

(4) (a) *Ja napisal(a) odno iz novyx slóv* ____ .
I have written a new word ____.

(b) ____ *stoit v slovare neologizmov.*
____ is in the dictionary of neologisms.

(c) *Ja napisal(a) odno iz novyx zaímstvovanij* ____.
I have written one of the new borrowings ____.

(d) *Odno iz novyx zaímstvovanij* ____ *stoit v slovare neologizmov.*
One of the new borrowings ____ is in the dictionary of neologisms.

The participants were presented with the sentences and their task was to read them out. There were four different variants of presentation so that one compound was presented once for each participant. The participants were allowed to repeat a sentence if they wanted to correct their pronunciation. They were tested individually and their utterances were recorded in a sound-attenuated cabin at the University of Konstanz.

9.4 Participants

Fourteen native speakers of Russian (10 females and 4 males) between the ages 20 to 28 (mean age = 20) participated in the experiment. All participants could speak German and had basic knowledge of English. None of the participants reported speaking a non-standard dialect of Russian. They were all students recruited at the University of Konstanz, Germany where they were participating in the Erasmus Exchange Programme.

9.5 Coding and Analyses

The production data were analyzed both acoustically and perceptually. Two native speakers of Russian (one is the author of this dissertation) listened to the pronunciations and analyzed them for secondary stress placement. The results of the interrater agreement are Kappa=.709 with $p < 0.001$. The disputed test items were labelled as NA for the analysis.

9.6 Results

9.6.1 Perceptual analysis

The results of the perceptual analysis are presented in Figure 9.1 which demonstrates which syllables were perceived as bearing SS. In some cases, SS was perceived on the linking vowel which was often accompanied by a pause

between the stems which suggests that such compound formations were realized as phrases by the participants.

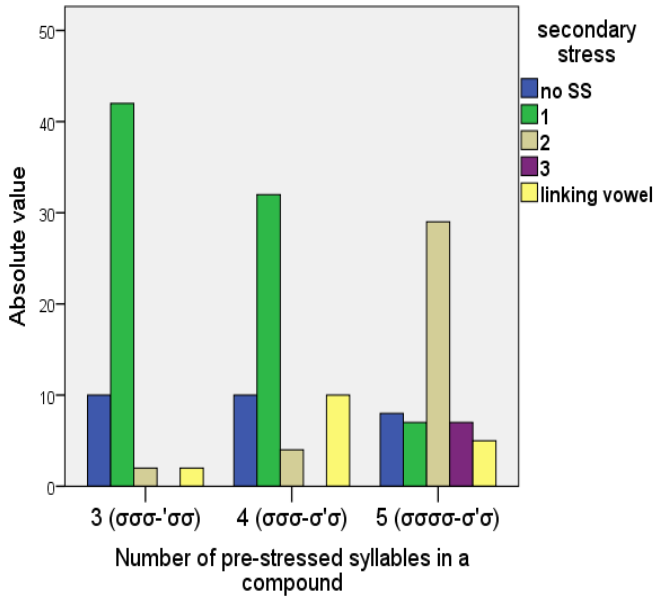


Figure 9.1: Secondary stress placement in novel compounds

Fig.9.1 clearly demonstrates that in compounds with three and four pre-stressed syllables, the number of word-initial SSs prevails. In compounds with five pre-stressed syllables, however, the predominant number of SSs falls on the second syllable. A generalized linear mixed-effects analysis was performed on initial SS placement as a dependent variable with the values *yes* vs. *no*. The effects of participant and item were treated as random, and the fixed effects in the model were NPRESTR.SYLL (i.e. 'number of prestressed syllables in a compound', with the values three, four and five), PHRASEPOSITION (i.e. 'position of a compound in a phrase', with the values theme (T) vs. rheme (R)), UNSTR.SYLL.BEFORECOMP. (i.e. 'number of unstressed syllables before a compound', with the values zero vs. three). The analysis yielded no significant relationship between initial SS placement, PHRASEPOSITION and UNSTR.SYLL.BEFORECOMP. However, the number

of prestressed syllables in a compound turned out to be significant for the initial SS placement. Table 9.1 presents the summary of the model.

Table 9.1: Generalized linear mixed-effects model for initial SS (Exp. 3)

Random effects				
Groups	Name	Variance	Std.Dev.	
subject	(Intercept)	0.7543	0.8685	
item	(Intercept)	0.1309	0.3618	
Number of obs: 151, groups: subject, 14; item, 12				
Fixed effects:	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-2.2899	0.6261	-3.657	0.000255 ***
NPRESTR.SYLLfour	3.0853	0.6234	4.949	7.45e-07 ***
NPRESTR.SYLLthree	3.6390	0.6326	5.753	8.77e-09 ***
UNSTR.SYLL.BEFORECOMP. zero	0.5953	0.4372	1.362	(4) 0.173336
PHRASEPOSITIONT	-0.2664	0.4277	-0.623	0.533283

Additional analyses revealed that the first two groups of compounds (with three and four pre-stressed syllables) did not differ significantly from each other with respect to the number of initial secondary stresses vs. no secondary stresses ($\chi2(1)=.291$, $p>0.05$) as well as with respect to the stresses on the first and second syllables ($\chi2(1)=1.230$, $p>0.05$). However, the number of stresses on the initial and second syllables in compounds with five pre-stressed syllables differed significantly from the other two groups ($\chi2(2)=63.298$, $p<0.001$): the

preponderance of SS on the second syllable in compounds with five pre-stressed syllables is clearly illustrated in Figure 9.1. Numbers of no secondary stresses and secondary stresses on the linking vowel did not differ significantly across all the groups ($\chi 2(2)=3.549$, $p>0.05$). Thus, compounds with three and four pre-stressed syllables mostly surfaced either without SS or with SS on the word-initial syllable whereas compounds with five pre-stressed syllables got SS predominantly on the second syllable. The position of a compound in phrase (theme vs. rheme) as well as the number of unstressed syllables before a compound turned out to play no role for SS assignment.

The next section investigates the acoustic correlates that contributed to perceived SS. As already discussed in this dissertation, it is generally assumed that the acoustic correlates of Russian stress are duration, intensity, changes of the fundamental frequency and vowel quality. Stressed syllables are longer, louder and are characterized by the changes in F0 and absence of vowel reduction. Previous accounts on the acoustic characteristics of SS in Russian have been presented in the previous chapter. In general, SS is characterized by the same acoustic correlates as primary stress. It may be weaker, equally strong and even stronger than primary stress (Kasatkin 2008). The vowels perceived as bearing SS and as bearing no SS in the initial compound components were analyzed for duration and intensity. Furthermore, F0 movements were also investigated to check whether SS was cued by a pitch accent only at the end of a phrase as suggested by Kalenčuk & Kasatkina (1993).

9.6.2 Acoustic analyses

To measure vowel *duration*, vowel segments were manually marked in Praat (Boersma & Weenink 2007) on the basis of both the waveform and spectrogram by the author. The formant transitions were used to locate vowel boundaries. Since SS tended to emerge word-initially in the first two compound groups, *F0 movements* were investigated at the beginning of these compounds. Syllabic boundaries of the initial two syllables were manually marked yielding three

marks: one mark at the beginning of the first syllable, one mark between the first and the second syllable, and the last one at the end of the second syllable. Then the F0 values in Hz at each marked point were extracted. Since in compounds with five pre-stressed syllables, the predominant number of SSs was perceived on the second syllable, syllabic boundaries of the second, third and fourth syllables were marked: one mark at the beginning of the second syllable, one mark between the second and the third syllables, and one mark between the third and the fourth syllables. *Intensity* of the vowels was measured in the following way. As the distance to the microphone was not held constant, the intensity was normalized by comparing adjacent syllables[14]. For the first two compound groups, the overall intensity in dBs of the first vowel was subtracted from the overall intensity of the following vowel in compounds with and without initial SS, which made it possible to compare the intensity measures of the initial vowels perceived as secondarily stressed and as bearing no SS. For the third compound group with five pre-stressed syllables, as the predominant number of SSs was on the second syllable, the overall intensity of the second vowel was subtracted from the overall intensity of the following vowel for compounds with and without SS on the second syllable.

9.6.2.1 Compounds with three pre-stressed syllables

9.6.2.1.1 Duration

Figure 9.2 presents vowel durations (in seconds) in initial syllables which were perceived as bearing SS and which were perceived as unstressed. Figure 9.3 illustrates vowel duration measures of initial and second syllables for compounds with initial secondary stress. It demonstrates that vowels under SS are characterized by longer vowel duration as compared to the vowels in the following syllable.

[14] The recordings were conducted using a standing microphone, i.e. the distance between the microphone and the speaker was not fixed.

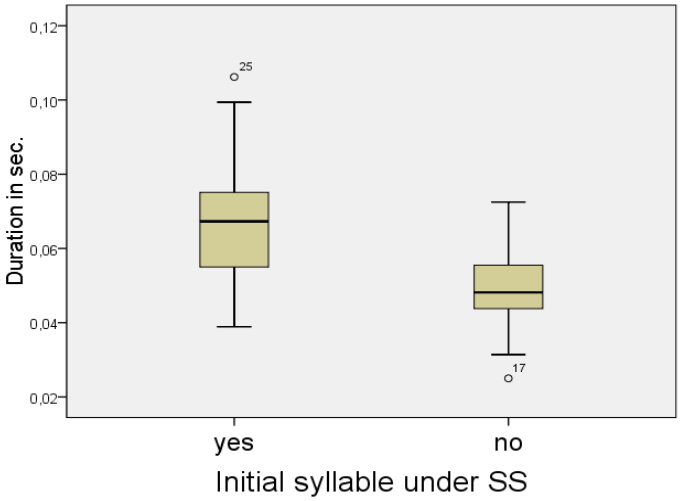


Figure 9.2: Vowel durations in the initial syllable in compounds with three pre-stressed syllables

Figure 9.3: Vowel durations in the first two syllables in initially stressed compounds with three pre-stressed syllables

The figures demonstrate that stressed syllables are somewhat longer than the unstressed ones. A one-way ANOVA was conducted on the duration of the initial vowel with PHRASEPOSITION (theme vs. rheme), UNSTR.SYLL.BEFORECOMP. (zero vs. three) treated as fixed effects and SSINITIALSYLL (i.e. 'secondary stress on the

initial syllable' with the values yes vs. no) as a covariate. The analysis revealed that there was neither a significant effect of PHRASEPOSITION (F(6,49)=1.334, p=.254) nor UNSTR.SYLL.BEFORECOMP. (F (6,49)=.695, p=.409). Likewise, there was neither a significant interaction between SSINITIALSYLL and PHRASEPOSITION (F(6,49)=.586, p=.448) nor between SSINITIALSYLL and UNSTR.SYLL.BEFORECOMP. (F(6,49)=.561, p=.457). However, it revealed a significant effect of SSINITIALSYLL (F(6,49)=10.673, p=.002): vowels perceived as bearing SS differed significantly with respect to duration from vowels perceived as unstressed.

To sum up, Figure 9.4 presents vowel durations in the first components (initial vowel, second vowel, linking vowel) with and without SS on the initial syllable as compared to vowel durations under primary stress in the head components.

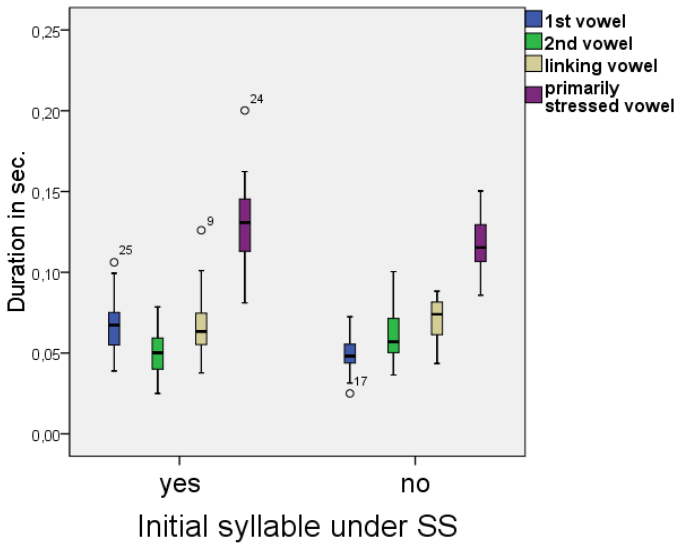


Figure 9.4: Vowel durations in the first compound components and duration of primarily stressed vowels (compounds with three pre-stressed syllables)

The figure clearly demonstrates differences in vowel duration between the syllables. In compounds where the initial syllable was perceived as bearing SS, the initial vowel (the blue bar) is longer than the following one. The duration of

the linking vowel in the syllable before the primary stress is longer than that of the other unstressed syllables and it is more or less the same irrespective of the presence or absence of SS. As has been previously demonstrated in this dissertation, the special status of the pre-tonic syllable is accounted for by the rising pitch movement which affects the perception of stress.

9.6.2.1.2 Pitch accents

Figure 9.5 demonstrates the F0 movements in the first two syllables in initially stressed compounds depending on the phrase position: rheme vs. theme. Figure 9.6 displays the pitch movements in the first two syllables in the compounds whose initial syllable was not perceived as secondarily stressed. As the results of the statistical analysis presented below did not reveal the effect of gender on pitch accents[15], the graphs show the pitch movements for both male and female speakers.

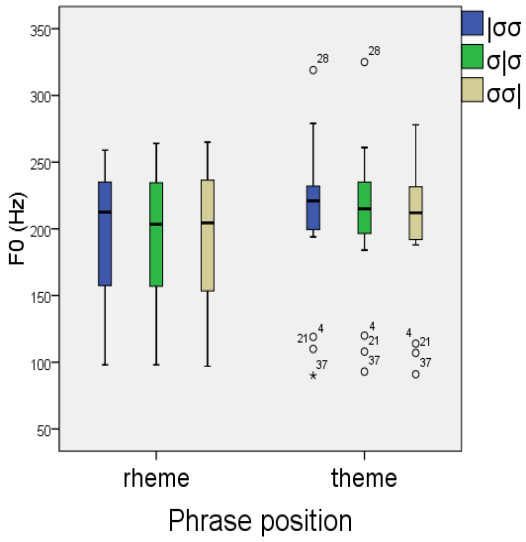


Figure 9.5: Pitch accents in the first two syllables in compounds with initial SS depending on phrase position (compounds with three pre-stressed syllables)

[15] Box plot outliers represent male responses.

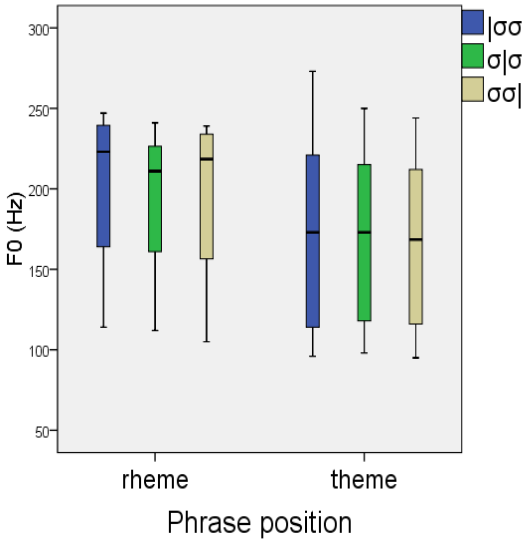


Figure 9.6: Pitch accents in the first two syllables in compounds without initial SS depending on phrase position (compounds with three pre-stressed syllables)

It is clear from the graphs that the pitch accents are very similar in compounds with and without initial SS in both rheme and theme positions. A repeated measures ANOVA with the between-subject factors of PHRASEPOSITION, UNSTR.SYLL.BEFORECOMP., GENDER and SSINITIALSYLL (yes vs. no) as a covariate was performed on the F0 values. The interaction 'pitch*PHRASEPOSITION' gave no significant results (F(2,94)= 1.053, p= .353) as well as the interactions 'pitch*SSINITIALSYLL' (F(2,94)=1.092, p=.340), 'pitch*UNSTR.SYLL.BEFORECOMP.' (F(2,94)=.318, p=.728), and 'pitch*GENDER' (F(2,94)=1.274, p=.284).

9.6.2.1.3 Intensity

Figure 9.7 demonstrates that there are no differences in the overall intensity (dB) between initial vowels perceived as stressed or unstressed.

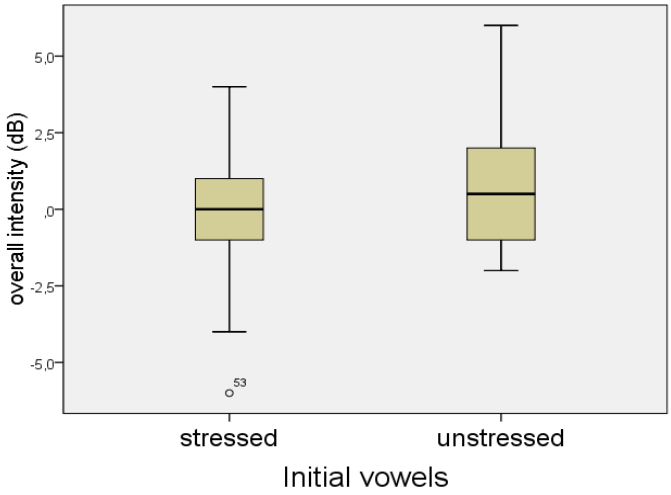


Figure 9.7: Overall intensity differences between initial vowels under SS and without SS (compounds with three pre-stressed syllables)

There is no significant difference between the two groups: t(54)=1.827, p=.073. Thus, the intensity measures did not make a significant contribution to perceiving the initial vowel as secondarily stressed.

9.6.2.2 Compounds with four pre-stressed syllables

9.6.2.2.1 Duration

Figure 9.8 presents vowel durations (in seconds) in initial syllables in compounds with four pre-stressed syllables which were perceived as either bearing SS or not. Figure 9.9 demonstrates vowel durations in initial and second syllables in this group of compounds with initial SS.

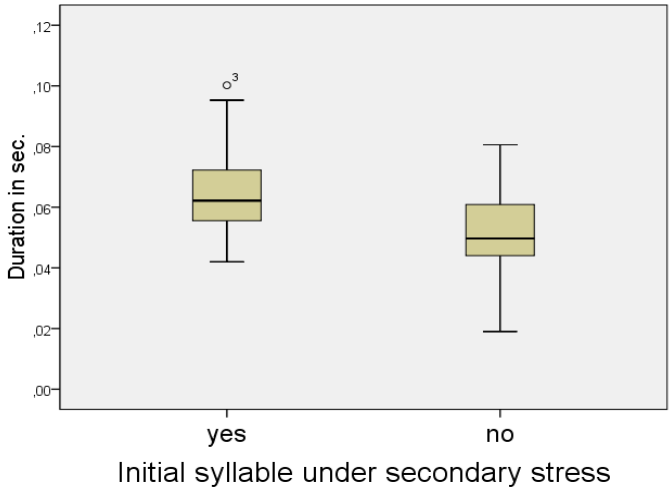


Figure 9.8: Vowel durations in the initial syllable in compounds with four pre-stressed syllables

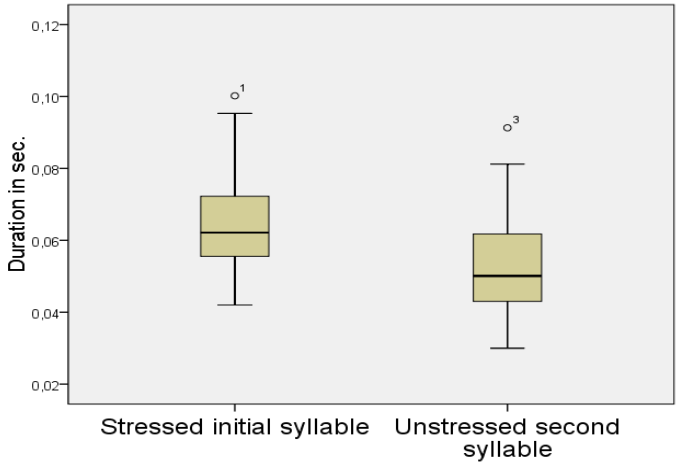


Figure 9.9: Vowel durations in the first two syllables in initially stressed compounds with four pre-stressed syllables

A one-way ANOVA on the duration of the initial vowel revealed a significant effect of SSINITIALSYLL ($F(6,49)=11.748$, $p=.001$): vowels under SS differed significantly in duration from the unstressed vowels. The analysis revealed that there was neither a significant effect of PHRASEPOSITION ($F(6,49)=.815$, $p=.371$) nor UNSTR.SYLL.BEFORECOMP. ($F(6,49)=.000$, $p=.989$). As in the case with the

previous group of compounds, there was neither a significant interaction between SSINITIALSYLL and PHRASEPOSITION (F(6,49)=3.312, p=.075) nor between SSINITIALSYLL and UNSTR.SYLL.BEFORECOMP. (F(6,49)=.175, p=.678).

Figure 9.10 presents vowel durations in the first components (initial vowel, second vowel, linking vowel) with and without SS on the initial syllable and duration of pre-tonic and primarily stressed vowels in the head components.

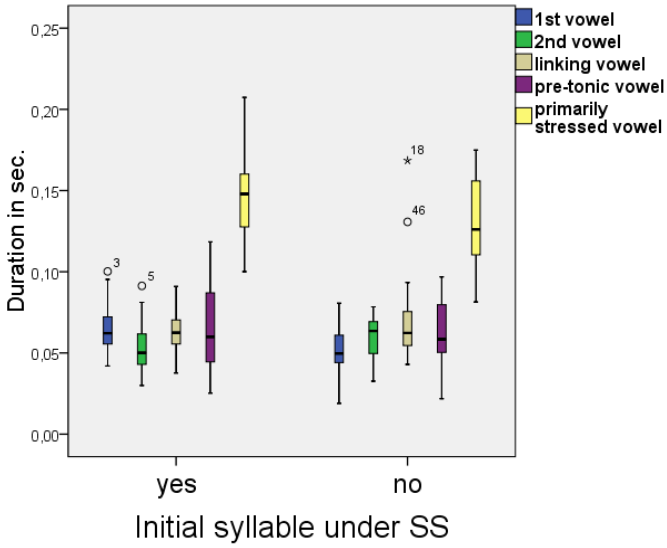


Figure 9.10: Vowel durations in the first compound components and duration of pre-tonic and primarily stressed vowels (compounds with four pre-stressed syllables)

Similar to the compounds with three pre-stressed syllables, the initial vowel perceived as non-primarily stressed was longer than the following one. The vowel in the primarily stressed syllable is characterized by the longest duration.

9.6.2.2.2 Pitch accents

Figures 9.11 and 9.12 demonstrate the pitch movements in the first two syllables in compounds with four pre-stressed syllables in different phrase positions.

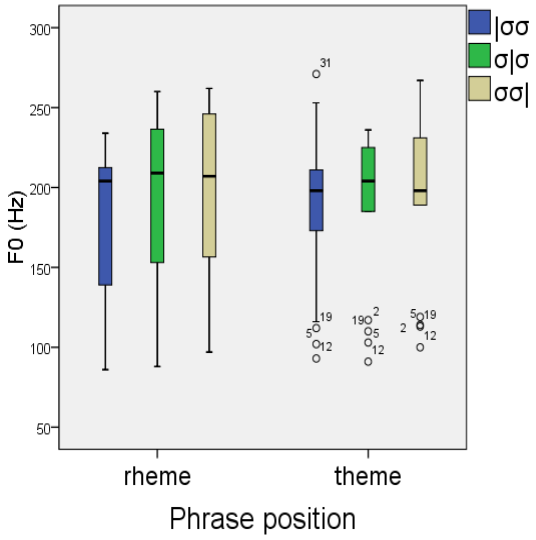


Figure 9.11: Pitch accents in compounds with initial SS depending on phrase position (compounds with four pre-stressed syllables)

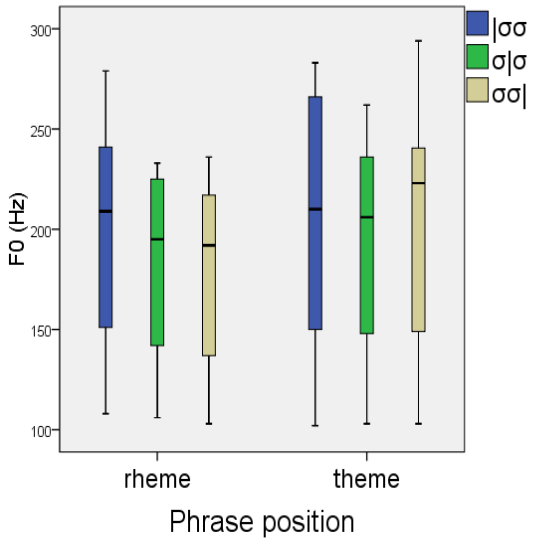


Figure 9.12: Pitch accents in compounds without initial SS depending on phrase position (compounds with four pre-stressed syllables)

A repeated measures ANOVA with the between-subject factors of PHRASEPOSITION, UNSTR.SYLL.BEFORECOMP., GENDER and SSINITIALSYLL (yes vs. no) as a covariate was performed on the F0 values. The interaction 'pitch*PHRASEPOSITION' revealed no significant results (F(2,94)=.217, p=.805) as well as the interactions 'pitch*UNSTR.SYLL.BEFORECOMP.' (F(2,94)=1.573, p=.213) and 'pitch*GENDER' (F(2,94)=.224, p=.800). There was, however, a significant result for the interaction 'pitch*SSINITIALSYLL' (F(2,94)=11.060, p<.0001). As the graphs in Figures 9.11 and 9.12 show, in compounds with initial SS, the pitch starts rising slightly; in compounds without a secondarily stressed vowel, the pitch is falling. Nikolaeva (1977), describing pitch movements of words with different stress patterns notes that, in initially stressed words phrase-initially, the first syllable is usually characterized by a rising tone which would explain the stress patterns in the theme. In the rheme, however, we would expect a falling tone. It should be taken into consideration that, since the participants read novel words, their speech was not especially fluent with regard to intonation and, if they needed time to pronounce a new word phrase-finally, this could have influenced their pronunciation.

9.6.2.2.3 Intensity

Figure 9.13 shows that the difference in overall intensity (dB) between initial stressed and unstressed vowels is almost imperceptible.

Figure 9.13: Overall intensity differences between initial vowels under SS and without initial SS (compounds with four pre-stressed syllables)

There is no significant difference between the groups: t(54)=.607, p=.546. Similar to the previous group of compounds, intensity did not contribute to secondary stress perception.

9.6.2.3 Compounds with five pre-stressed syllables

9.6.2.3.1 Duration

The results of the perceptual analysis have demonstrated that in compounds with five pre-stressed syllables, in about 54% of the cases, SS fell on the second syllable of the initial constituent. The remaining cases of SS were approximately equally distributed between the first syllables, third syllables and cases with no SS. Figure 9.14 presents vowel durations (in seconds) in second syllables which were perceived as bearing SS or not. Figure 9.15 presents vowel durations in initial and second syllables in compounds with SS on the second syllable.

Figure 9.14: Vowel durations in the second syllable in compounds with five pre-stressed syllables

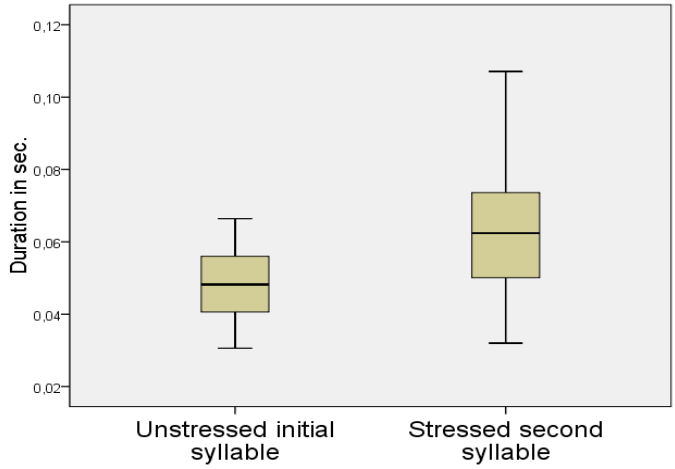


Figure 9.15: Vowel durations in the first two syllables in compounds with five pre-stressed syllables with SS on the second vowel

A one-way ANOVA was conducted on the duration of the second vowel with PHRASEPOSITION (theme vs. rheme), UNSTR.SYLL.BEFORECOMP. (zero vs. three) treated as fixed effects and SSSECONDSYLL (i.e. 'secondary stress on the second syllable' with the values yes vs. no) as a covariate. The results of the analysis for

compounds with five pre-stressed syllables replicate the results for compounds with three and four pre-stressed syllables. No significant effect was found for the following predictors: PHRASEPOSITION (F(6,49)=.204, p=.653), UNSTR.SYLL.BEFORECOMP. (F(6,49)=.020, p=.889), PHRASEPOSITION*SSSECONDSYLL interaction (F(6,49)=.189, p=.666), UNSTR.SYLL.BEFORECOMP.*SSSECONDSYLL (F(6,49)=.239, p=.627). A significant effect was found for SSSECONDSYLL (F(6,49)=6.034, p=.018). As in the other conditions, vowels under SS differed significantly in duration from unstressed vowels.

Figure 9.16 demonstrates vowel durations in the initial compound constituents with and without SS on the second syllable as compared to vowel durations under primary stress.

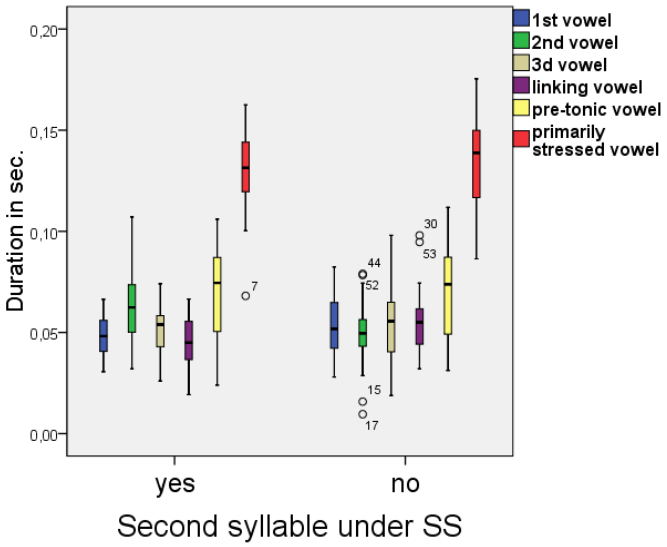


Figure 9.16: Vowel durations in the first compound components and duration of pre-tonic and primarily stressed syllables (compounds with five pre-stressed syllables)

As is clear from the graph, the second vowel perceived as bearing SS is characterized by a longer duration than other vowels. To sum up, in all groups of

compounds, vowels under SS turned out to be longer than vowels in other syllables of the initial compound members. In all the cases, the durations of the primarily stressed vowels were significantly longer.

9.6.2.3.2 Pitch accents

Figures 9.17 and 9.18 demonstrate the pitch accents in the second and third syllables in compounds with five pre-stressed syllables with and without SS on the second syllable.

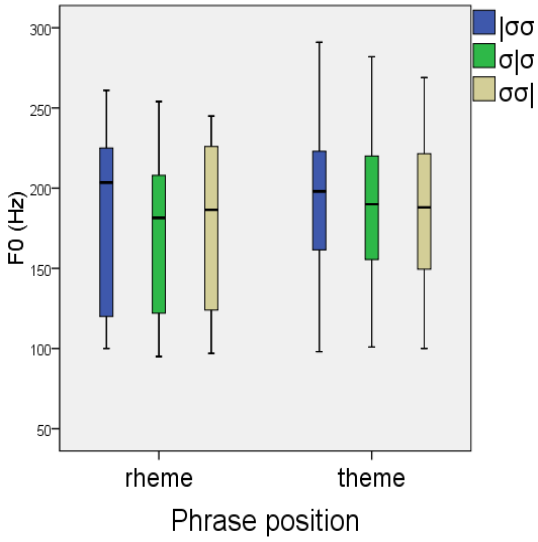


Figure 9.17: Pitch accents in the second and third syllables in compounds with SS on the second syllable depending on phrase position (compounds with five pre-stressed syllables)

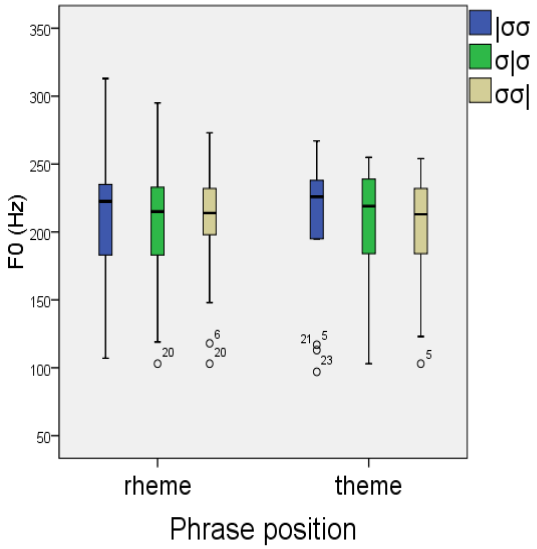


Figure 9.18: Pitch accents in the second and third syllables in compounds without SS on the second syllable depending on phrase position (compounds with five pre-stressed syllables)

A repeated measures ANOVA with the between-subject factors of PHRASEPOSITION, UNSTR.SYLL.BEFORECOMP., GENDER and SSSECONDSYLL (yes vs. no) as a covariate was performed on the pitch movements. The interaction 'pitch*PHRASEPOSITION' revealed no significant results (F (2,94)=1.077, p=.345) as well as the interactions 'pitch*UNSTR.SYLL.BEFORECOMP.' (F (2,94)=.335, p=.716) and 'pitch*GENDER' (F(2,94)=2.628, p=.078). The interaction 'pitch*SSSECONDSYLL' also proved insignificant (F(2,94)=.415, p=.661). Thus, the pitch movements did not differ significantly in different phrase positions.

9.6.2.3.3 Intensity

Figure 9.19 demonstrates the overall intensity (dB) differences between the second vowel perceived as secondarily stressed and the second vowel bearing no SS.

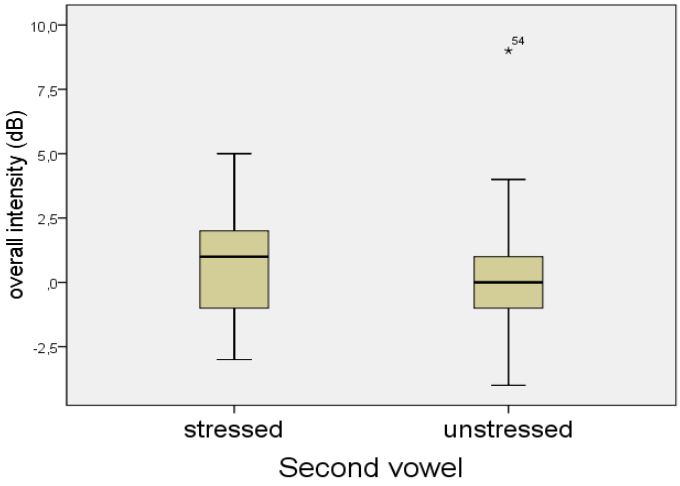


Figure 9.19: Overall intensity differences between second vowels under SS and without SS (compounds with five pre-stressed syllables)

The graph in Figure 9.19 clearly demonstrates that there are no differences in intensity between secondarily stressed vowels and unstressed ones (t(54)=.473, p=.638).

9.7 Discussion

9.7.1 Acoustic cues to perception of secondary stress

The most important finding of the present study is that the number of syllables before the primary stress in the head component played a significant role in the position of secondary stress (SS). Compounds with three and four pre-stressed syllables were mostly characterized by the initial SS or absence of secondarily stressed vowels. Compounds with five pre-stressed syllables showed more variability in SS placement with predominant SS on the second syllable.

Duration turned out to be the most robust acoustic cue for stressed vowel perception. In all cases in which a vowel was perceived as bearing SS, statistical tests showed a significant durational difference as compared to vowels perceived

as unstressed in the same position. The number of pre-stressed syllables before a compound (zero vs. three) as well as phrase position (theme vs. rheme) turned out to play no role in the realization of SS. In both phrase positions, a secondarily stressed vowel was longer than the other vowels. Pitch movements as well as the overall intensity measurements did not turn out to be consistent acoustic correlates of SS. In the discussion of the phonetic correlates of SS, however, the nature of the stimuli (uncommon long words) should be taken into consideration. Furthermore, the participants produced the items under experimental conditions. In naturally produced speech, without defined conditions common compounds might be pronounced with a different pitch contour. As predicted by the previous accounts discussed in Chapter 8, intensity did not make a significant contribution to the perception of secondarily stressed vowels. In Russian, vowel intensity is always greater phrase-initially irrespective of whether a word starts with a stressed or an unstressed syllable gradually falling towards the end of the phrase.

Thus, the assertion by Kalenčuk & Kasatkina (1993) that SS surfaces only phrase-finally (rheme) is not borne out by the present data. They assume that SS is characterized by the same acoustic properties as primary stress, i.e. duration, intensity and pitch in the phrase-final position whereas phrase-initially vowels in the initial components are characterized only by the absence of vowel reduction without SS. The present study has demonstrated that secondarily stressed vowels are characterized by a greater vowel duration both phrase-initially and phrase-finally.

As mentioned earlier in this dissertation, phrase-initially, Russian vowels are generally pronounced with more intensity but shorter duration. Vowel duration always gets longer and intensity falls towards the end of a phrase for both stressed and unstressed vowels. Moreover, phrase-final position under phrasal stress has the most distinctive power for vowel phonemes which also applies to stressed and unstressed syllables (e.g., Bryzgunova 1984, Kasatkina 2008). Thus, phrase-final position as the strongest position, generally contributes to vowel legthening. For this reason, secondarily stressed vowels in compounds

may also tend to be pronounced longer phrase-finally. This tendency has nothing to do with a special status of compounds, however, but it is characteristic of all Russian words as in accordance with the Russian intonation. In the present study, the vowel duration of secondarily stressed syllables did not differ significantly in different phrase positions.

9.7.2 Secondary stress as the result of metrical feet construction

The factors determining the appearance of SS in Russian such as frequency of a compound, accentual type of the initial constituent, etc. have been presented in Chapter 8. As to the location of SS, the lexical stress pattern of the initial constituent has been shown to play a role: if left-hand stems had fixed stress, movement of stress from its lexical position was rated as least acceptable by the native speakers; if left-hand stems had mobile stress, the ratings got better, the farther apart the stresses were from each other (Gouskova & Roon 2013). According to Kuznetsova (2006a), rhythmic secondary stress surfaces word-initially in Russian. However, these studies did not take into consideration the syllabic structure of initial compound components. If the first compound components are mono-, bi- or trisyllabic, SS is likely to surface at the beginning of a word. However, it has not been specified whether SS shifts to the initial syllable if the primarily stressed syllable is preceded by a larger number of syllables. If not, which principles govern SS placement on syllables other than the initial one? There are not many existing compound words with four and more pre-stressed syllables in Russian as, for instance, in the word *korablekrušénije* 'shipwreck'. As the noun *korábl'* 'ship' has a mobile stress pattern, its stem is considered to be unaccented so that SS placement in *korablekrušénije* could be assumed to reflect the default stress. In this example, however, SS may fall on the initial as well as the second syllable. As mentioned at the beginning of this chapter, pronunciations in these types of compounds might be lexically specified, i.e. SS may be placed by analogy with other word forms or with related words. In multisyllabic initial constituents with a fixed stem stress, SS surfaces on the

lexically accented vowel in a compound, e.g., *bibliotèkovédenie* ‘library science’, *polotèncederžátel'* ‘towel holder’. Thus, the existing words cannot provide enough evidence in favor of a particular default stress pattern.

The current study is the first to present rhythmic stress alternations in Russian. The results demonstrate that the number of pre-stressed syllables is relevant for prominence relations. The compounds are characterized by consistent rhythmic patterns: compounds with three- and four pre-stressed syllables received SS predominantly on the initial syllable whereas compounds with five pre-stressed syllables had a different SS distribution: the preferred position of stress was the second syllable, the other cases were divided between the first syllables, third syllables and pronunciations without SS. I argue that these SS alternations reveal the default rhythmic organization of words as the initial compound members lack lexical pre-specification.

As SS is directly connected to rhythm in this study, SS assignment is argued to result from the construction of metrical feet. The emerging stress patterns look as follows (underlined syllables contain linking vowels):

(5) `σσ -σ̲-´σσ
`σσ -σ̲- σ´σσ
σ`σσ -σ̲- σ´σσ

There may be only one possible foot type in the words of the first two structures: initial stress prominence indicates a trochaic foot building. The questions arise as to in what direction the foot construction proceeds and which algorithm of secondary stress assignment is applied.

It should be noted that primary stress is lexical in a compound, i.e. it is not defined by a metrical rule being part of the lexical information of the word. SS never falls on the head constituent no matter how long it is. The linking vowel is never stressed so that it must be transparent for a metrical foot construction. Stress placement in the third structure is crucial in determining the direction of a foot construction: with the linking vowel being ignored a trochaic foot is built

from right to left. The analyzed data seem to support the hypothesis that Russian favors the construction of binary trochaic feet, which constitute the basis for rhythmic organization in the language.

To summarize, main stress is part of the lexical representation of the word. Secondary stress prominence in existing words may also be lexically pre-specified so that we cannot determine the relationship between secondary stress and rhythm. The present data reveal rhythmic prominences as secondary stress placement may not be assigned in the lexicon (there is no underlying accent within the root) so that a phonological mechanism assigns default stress. I suggest that rhythmic secondary stress is assigned by means of left-headed metrical feet constructed from right to left starting from the linking vowel.

On the basis of the findings of the three sets of studies presented in this dissertation, I argue that the trochaic foot underlies Russian metrical structure and emerges in both default stress assignment and rhythmic stress alternations. The next chapter discusses the implications of the present findings for the linguistic analysis of Russian stress.

Chapter 10 Implications of the present findings for Russian prosody

10.1 Phonological status of compounds. A new approach

The third experiment of this dissertation has presented evidence in favor of a rhythmic accentual stress pattern in Russian compounds. Compounds with three and four pre-stressed syllables are characterized by initial *Secondary Stress* (SS) whereas compounds with five pre-stressed syllables have SS predominantly on the second syllable. I argue that these rhythmic alternations reflect the construction of a syllabic trochee starting from the linking vowel that is transparent for metrical feet construction. What is the domain of SS assignment in these items? Do initial compound members form an independent *Phonological Word* (PW) or they are part of a single PW? As discussed in Chapter 8, it is generally assumed that a PW in Russian is a prosodic domain formed by a content word and adjacent clitics characterized by one main stress. This can be taken to suggest that compound words pronounced without SS constitute a single PW. The question is whether compound constituents with SS are incorporated within the PW or they have some special status.

It has been claimed that there is no PW boundary within subordinating compounds with or without SS (Gouskova 2010). Accordingly, the absence of final consonant devoicing in the initial constituent has been taken to indicate that there is no PW boundary before the linking vowel. Vowel reduction patterns at the boundary between the stems suggest that there is no PW boundary between the linking vowel and the following syllable. It should be noted, however, that there is no word-final consonant devoicing at the end of the initial member as it is syllabified with the following vowel. Furthermore, as mentioned in Chapter 8, vowel reduction patterns within a syntagm are similar to those found within a PW (Knjazev 2006). Thus, such segmental processes as vowel reduction patterns and

voicing assimilation cannot provide unequivocal evidence in favor of a single word status of compounds.

A PW is generally considered to be the domain of stress assignment rules. Can suprasegmental processes like SS assignment provide a clue to the phonological status of compounds? In compounds, SS surfaces in the initial member whereas the right-head stem always bears primary stress. The previous chapter has presented the conditions that contribute to the appearance of SS and its location. If the first component has a fixed stem stress, SS is likely to surface on that syllable in a compound. If it has a mobile or a final stress pattern, pronunciations without SS are mostly preferred. The closer SSs surface to the beginning of the word, the more acceptable the SS productions are, whereas adjacent stressed syllables (SS and the primary stress on the right-hand stem) are clearly not preferred. That is, adjacent stresses are only possible in Russian compounds when secondary stress falls on the linking vowel. Here it should be noted that stress may fall on the linking vowel only in one case: when the first constituent is a vowelless stem (of the form CC): [l'n-^-vót] 'linen grower'.

These facts suggest that compounds are characterized by special rhythmic phenomena, i.e. adjacent secondary and primary stresses are not accepted by Russian speakers; secondary stresses are preferred closer to the beginning of a compound (provided the left-hand constituent is not a fixed stress stem, whereby SS would inevitably surface on the lexically stressed syllable). In contrast, in *Phonological Phrases* (PPhs), there seem to be no such constraint on stress placement: main stresses may be adjacent which is impossible for compounds, for e.g., *[[sestrá]$_{PW}$[závtrakaet]$_{PW}$]$_{PPh}$* 'sister is having breakfast', *[dóm]$_{PW}$[drúga]$_{PW}$]$_{PPh}$* 'a friend's house'. Furthermore, stress shift does not take place within a PPh no matter to which accentual type (fixed or mobile stress patterns) its constituents belong. I take this to suggest that subordinating compounds do not constitute PPhs in Russian.

Can compounds be parsed as clitic groups? Under Nespor & Vogel's (1986) analysis, compounds would either be incorporated into a PPh or would

consititute a *Clitic Group* (CG). For example, they regard a sequence of a word plus enclitic in Greek as a CG as it respects a well-formedness condition on the location of stress. If there are more than two unstressed syllables to the right of the primary stress, SS is assigned on the second syllable to the right of the originally stressed one, e.g., [ðyávase] 'read' – [ðyávasèto] 'read it'. A compound word is considered to form one PW in Greek as primary stress falls on one of the last three syllables, e.g., [kuklóspito] 'doll's house' < [kúkla] 'doll' [spíti] 'house'. The example demonstrates that primary stress may shift to another syllable in a compound which never occurs in the CG. Kabak & Revithiadou (2009b), however, regard clitic+host and compound constructions as an "extended" constituent of PW, namely a recursive phonological word (PW_{Rec}). A PW_{Rec} inherits the properties of the head PW but, being a new entity, it may develop properties of its own. It is argued to be a domain where special rhythmic re-adjustment processes take place. For instance, Turkish compounds are characterized by leftmost prominence whereas corresponding phrases display rightmost prominence. Likewise, in Greek, primary stress in compounds is different from stress in comparable syntactic phrases: There is rightmost stress prominence in compounds but not in phrases.

I have demonstrated that Russian compounds do not constitute PPhs since truly syntactic phrases do not allow stress shifts within their domain. The question is whether compounds are different from PWs. In Russian, SS may also surface in words of a simplex structure or in prefixed words. In this case, SS is emphatic and appears word-initially, e.g., *Vèlikolépno*! 'Splendid!' Even in longer words with five pre-stressed syllables like è*voljucionístskij* 'evolutionistic', SS surfaces on the initial syllable. Thus, a compound has unique properties of its own, i.e. different from that of a PW and a PPh. On the one hand, compounds acquire the properties of the right-hand component. On the other hand, the domain of a compound also induces special rhythmic phenomena: when the initial component is unspecified for accent, SS is assigned by way of building a trochee from the linking vowel

which serves as a boundary. These phonological phenomena suggest that Russian compounds with a linking vowel pronounced with SS constitute a recursive PW.

Additional evidence for a boundary within a compound comes from native speakers' intuitions. For example, Kacevič et al. (1990) conducted an experiment designed to investigate the perception of words with two main stresses and of words bearing no stress. The stimuli were trisyllabic nonce words with the following stress patterns: 'CV-CV-CV, CV-'CV-CV, 'CV-'CV-CV and CV-CV-CV that were presented in the phrase-final and phrase-nonfinal positions. In some cases, the items were perceived as consisting of two words, which was typically found in words with two stressed syllables (about 73% of mistakes). In about 27% of cases, the same phenomenon was observed with unstressed words in the phrase-medial position. Although this cannot be used as a direct piece of evidence to corroborate my claim about the status of compound words, these results demonstrate that speakers generally follow the principle: The number of stresses corresponds to the number of PWs. A subordinating compound has the properties of PW in Russian, i.e. this constituent has the same segmental rules as the PW. However, the rhythmic algorithm, namely the building of a trochaic foot from the linking vowel, can arguably serve as evidence that there is a prosodic word boundary between the stems. Accordingly, I conclude that a subordinating compound with SS constitutes PW_{Rec}.

In the following sections, I present additional evidence for trochaic grouping in Russian and demonstrate that a lexical stress language like Russian has an underlying metrical structure that arises in different areas of phonology. Furthermore, I discuss whether the unmarked stress pattern in the Russian lexicon matches with the stress patterns obtained in the current study.

10.2 Trochaic grouping in Russian

The first two production experiments of this dissertation investigating stress placement in novel place names and acronyms revealed the following robust stress pattern in Russian: final stress in consonant-final words, penultimate stress in

vowel-final words. As vowel-final stems received predominantly penultimate stress, the default cannot be stem-final as claimed by Crosswhite et al. (2003). Chapter 7 demonstrated that postulating quantity-insensitive trochaic feet built at the right word-edge for both consonant- and vowel-final stems provides a unified account for the resulting stress patterns. The assumption that Russian is quantity insensitive and that it employs trochaic feet as the default pattern meets the predictions of previous typological observations in the literature. For instance, Kiparsky (1991) predicts that quantity-insensitive systems with final stress should have sub-minimal words, which Russian has (e.g., *t'ma* 'darkness'). Furthermore, Hayes (1985, 1995) assumes that quantity-insensitive systems should have a strong preference to be trochaic. Furthermore, the presence of sub-minimal words in a language is the main indication for catalexis (Kiparsky 1991, Kager 1995). Taken together, these observations indicate that final stress in Russian might be due to final syllable catalexis, which allows final stress to emerge by building a trochee.

The trochaic analysis finds further support from both historical and dialectal evidence. Previous studies by Almuxamedova & Kul'šaripova (1980) and Paufošima (1983) have shown that some northern Russian dialects are characterized by a 'wave' prosodic contour on the basis of the fact that there is an increased duration of vowels in syllables removed by one from the stressed syllable (the second pre-stressed vowel has a longer duration than the first pre-stressed vowel, and the second post-stressed syllable has a longer duration than the first post-stressed syllable). Likewise, Avanesov (1949), Avanesov & Orlova (1965) characterize the Russian dialects that exhibit 'dissimilative akanje' (where the quality of the pre-tonic vowel depends on the quality of the stressed vowel) and 'okanje' (with a distinct pronunciation of unstressed /o/ and /a/) as having the following rhythmical pattern: the first pre-stressed syllable with a reduced vowel is weaker than the second pre-stressed syllable. These patterns speak in favor of a trochaic grouping in Russian, at least valid for some dialects.

Historically, we also find tendencies that are indicative of a trochaic rhythm. As discussed in Chapter 3 of this dissertation, the strong-weak bisyllabic relationship was typical of all dialects in Late Common Slavic (LCS). It has been suggested that the changes in the syllable structure in Common Slavic (CS) were related to the expression of word prominence, and the metrical organization tended to be a strong-weak trochaic grouping (Bethin 1998). For example, changes in the jers took place throughout Late Common Slavic involving a bisyllabic domain: jers were subject to either strengthening or weakening depending on the position in the word thus conforming to a strong-weak bisyllabic relationship. In sequences of three or more jers, the pattern was alternating weak-strong-weak-strong-weak from the end of the word. Bethin (1998) claims that the loss of weak jers and the occurrence of newly closed syllables were not due to the restructuring of Slavic syllable structure as was claimed before (Lunt 1956, Bernštein 1961, Bräuer 1961), but was rather the result of the evolving metrical strong-weak pattern of Slavic. She also explores many other changes of syllable structure in CS, which further corroborate a trochaic metrical grouping (the reader is referred to Bethin 1998 for more details). Furthermore, secondary stress (SS) alternations in Late Old Russian were determined by a certain rhythm: SS fell on the next but one syllable to the right of the main stress thus corresponding to a trochaic grouping (Zaliznjak 1985).

Synchronically, the default stress assigned by way of building a trochee emerges in words with no lexical stress marking as consistently confirmed by the results of the present experimental studies. Is there a general bias towards this rhythmic grouping among native speakers? For example, do listeners employ a certain rhythmic pattern in word perception? Kasevič et al. (1990) conducted a series of experiments on the perception of stressed and unstressed syllables in Russian. The experimental items were nonce words of the syllabic structure CV-CV with four different stress patterns: 'CV-'CV, CV-'CV, 'CV-CV and CV-CV. In one experiment, the participants had to listen to the stimuli and write down what they had perceived. Interestingly, the subjects were likely to add additional

consonants to the syllable onset rather than at the end of the syllable. Furthermore, in cases when the stimuli were interpreted as meaningful words with stress on the second syllable, they were often perceived as consonant-final words, i.e. *hava* was perceived as *krovát'* 'bed'. In an additional experiment, the subjects were asked to assign stress in bisyllabic nonce words. In the sequences of two stressed syllables, stress distribution was more or less equal between the syllables. In the sequences of two unstressed syllable, stress on the initial syllable was perceived in 70% of cases.

Since in Russian there are neither words with two consecutive stressed syllables nor words with no stressed syllables, the participants have to choose one syllable as more prominent. We have seen that there is a certain metrical strategy in spoken-word perception which speaks in favor of a trochaic grouping, i.e. the listeners have some expectations with regard to where salient syllables are likely to occur. There is a general tendency for open syllables with stress on the initial syllable. If words were perceived as finally stressed, they were interpreted either as existing vowel-final words with final stress or as consonant-final words.

Additional evidence for the underlying metrical foot in Russian comes from the study by Mołczanow et al. (2013), which investigated the effects of stress shifts in Russian disyllabic words. The results of their study employing event-related potentials (ERPs) supported the idea of the existence of lexically specified and unspecified Russian stem types. Furthermore, strong evidence for a trochee to be a default foot type in Russian was found, which was shown by the correlation of the distribution of the ERP components and differences in the stress shift direction. Namely, a correlation was found between the patterning of ERP components and the direction of stress shift: an enhanced positivity effect appeared with rightward stress shifts. Thus, lexical processing was impeded if the expectation to hear an initially stressed word was violated. The results are interpreted to indicate that foot-initial (trochaic) stress is less costly in prosodic processing than foot-final stress (iamb).

The metrical strategy that favors trochaic grouping is also applied in the processes of truncation and loanword adaptation in Russian. The prosodic structure of truncated forms and loanwords tends to conform to a left-headed foot as presented in the following section.

10.3 The source of the default and foot-sensitive processes in Russian

When we speak about stress placement in words with no inherent lexical accent, the question arises as to which rules speakers apply when they have to pronounce an unknown word. More specifically, where did the default come from in the present study? In this respect the question arises as to whether default stress patterns can be inferred on the basis of non-linguistic factors, such as the frequency of existing stress patterns in the lexicon. Previous studies looking into this issue have yielded variable results. In Spanish, for example, most vowel-final words have penultimate stress. Since this category of words constitutes the largest one, there is a general agreement in the literature that the unmarked stress pattern in Spanish nouns is trochaic (Harris 1983, 1992, 1995, Roca 1988, 1991, Prieto 1992, Lipski 1995, Colina 1996, Piñeros 2000, etc.). In Italian, the most frequent stress pattern is also penultimate although it is disputed whether the penultimate stress pattern really constitutes the default. Krämer (2009) has experimental evidence that shows that lexical frequency does not seem to play a significant role in Italian speakers' realizations of stress in non-words. For example, in trisyllabic words containing light syllables only, stress was distributed equally between antepenultimate and penultimate syllables. Furthermore, it has been shown for Greek (Apostolouda et al. 2012) that the speakers' stress productions of novel words do not always reflect lexical frequencies. The stress patterns revealed preference for a less marked penultimate stress pattern (in terms of foot structure) over the statistically favorite antepenultimate stress. When we approach Russian stress assignment from the perspective of frequency, no clear picture emerges. If the participants were indifferent to whether the final vowel was an inflection or part of the stem, and they analogized at the word level, we would expect to see the

emergent stress patterns to approximately mirror the frequency of the same stress patterns in the lexicon, i.e. 30% fixed stem-final stress, 11% stress on the initial syllable, etc., as discussed in Section 6.1.1. This is, however, not the case. Thus, the frequency of stress patterns found in *declinable* nouns cannot explain the findings of the present study.

One can also attribute the default accentuation pattern to a statistical pattern in existing indeclinable nouns in Russian, which then gets applied to novel stimuli by way of analogy. As discussed in Section 6.1.4.2, stress placement in vowel-final *indeclinable words* of foreign origin is more or less equally distributed between final and pre-final syllables. Another possibility is that stress is assigned by way of analogy with existing *indeclinable place names*. Although there is no corpus study restricted to stress patterns in indeclinable Russian place names, there is a general tendency towards the right word-edge in consonant- and vowel-final place names, as highlighted in earlier chapters of this dissertation. I conducted a search with 150 indeclinable vowel-final place names from the online database *Onlinedics.ru,* which includes both widespread and uncommon place names. The analysis for stress placement in this word group have brought the following results: only 74 (49%) of these place names have penultimate stress, 48 (32%) exhibiting final stress, and 28 (19%) having stress on other syllables, mostly the antepenultimate one. Two-sample tests with equality of propotions with continuity correction in R was run using the number of stress responses in Experiment 1 and the number of place names in the dictionary study for (i) antepenultimate, (ii) penultimate, and (iii) ultimate syllables, separately. All tests showed that the proportions are not equal (all ps < 0.001), suggesting that frequencies in the lexicon and the behavioral results do not match. That is, although penultimate stress is common, it is not the overwhelming majority in the lexicon.

The predominant number of abbreviations and acronyms is considered to be pronounced with final stress (Krivnova 1999, Andreev 2004), which also does not match with the findings of the current study characterized by an

overwhelming number of penultimate stress instances. Overall, frequency alone neither fully accounts for the magnitude of the pattern found for both types of words in the first two experiments (86% in vowel-final place names, and 78% in acronyms), nor provides an adequate explanation for its origin. Furthermore, the replication of the results in another class of words, namely acronyms, suggests that the observed pattern cannot be attributed to a special class of lexical items or a specific task type such as map reading. Therefore, the default position of stress in Russian cannot be ascribed to a specific set of lexical items.

If knowledge about stress patterns is not directly projected from the lexicon, which factors other than frequency may be responsible for the resulting pronunciations in the present studies? Notions such as markedness and universals are often used in the literature to account for such emergent patterns. While it is beyond the scope of this dissertation to build a full-fledged account based on markedness (such an account would indeed prove to be invalid given the unpredictability and lexical nature of Russian word-level stress), there is nevertheless some robust evidence that suggests that the alleged default pattern, trochaic foot, also emerges in other phonological processes in Russian, which suggests that the trochaic foot is the unmarked metrical structure that underlies Russian prosody. To that end, one piece of such evidence comes from truncated forms. Spanish truncated forms, for example, are deemed to be parsed into trochaic feet: e.g., *Béto* < *Albérto, Fíco* < *Federíco*, *Tére* < *Terésa*, etc. (Prieto 1992, Lipski 1995, Colina 1996). Likewise, in Russian, truncated names are also bisyllabic and mostly conform to a trochaic pattern: *Vánja* < *Iván*, *Róma* < *Román*, *Nástja* < *Anastasíja*, *Léna* < *Eléna,* etc. Another part of the grammar where we observe trochaic tendencies is loanword adaptations. In particular, stress patterns in loanwords that are different from the original stress patterns are of special interest here. Superanskaya (2010) postulates that stress vacillations in this group of words provide evidence that these words may be undergoing a process of adaptation to some Russian accentual norms. However, what these norms are has never been specified. As mentioned in Section 6.1.4.2, there is a general tendency

towards right-edge oriented stress shift in borrowings including place names. Although foreign place names are more likely to retain the original stress pattern in two-syllable words and, more rarely, in three- and multi-syllabic words,[16] which reveal most stress vacillations, we often observe stress shifts. For example, main stress appears on the penultimate or ultimate syllables in some Lettish place names, which originally bear stress on the initial syllable (e.g., *Daugáva*, *Valdemarpíls*). The same is observed with Czech place names (e.g., *Igláva*, *Ostráva*), which bear initial stress in Czech. Stress on the last two syllables in Turkic, Polish and French brings forth an easier adaptation of these words into the Russian language, where the original stress placement is maintained. Place names from Italian are usually stressed on the penultimate or the antepenultimate syllable. When they are adapted to Russian, along with the traditional *Bríndizi*, *Rímini,* pronunciations with penultimate stress are common (*Brindízi*, *Rimíni*). The same tendency is observed with the personal names: whereas penultimately stressed words are borrowed into Russian with this stress pattern (*Gvído*, *Džordáno*, *Leonárdo*, etc.), Italian names with the stress on the antepenultimate syllable are most often produced with the penultimate stress in Russian: *Čézare* vs. *Čezáre*, *Doménika* vs. *Domeníka*, *Brídžida* vs. *Bridžída.*

Altogether, the tendency to favor penultimate stress in truncations and loan adaptations accords with the default stress pattern obtained in all three production studies presented in this dissertation, i.e. a trochaic foot built at the right word-edge.

10.4 Default stress in the broader context of lexical stress systems

This section aims to demonstrate that the issue of phonological default in lexical stress languages results in a great deal of confusion if one attempts to infer it from both lexical words and speakers' productions as the most unmarked stress pattern.

[16] In longer words, secondary stress is likely to appear (e.g., in Hungarian *Tàtabánja*, *Dùnajvárosh*, or in Finnish *Sèjnaóki*, *Sùoláxti,* see Superanskaja 2010: 221 for details).

For example, it has been suggested for the lexical stress system of Hebrew that it has an iambic foot (Bat-El 1993), a trochaic foot (Graf 1999, Becker 2003), or that it does not employ a particular foot type, i.e. it can be either iambic or trochaic (Graf & Ussishkin 2002). Graf (1999) assumes that when a word contains no accentually marked morphemes, a general stress rule is activated that assigns the final phonological default stress in Hebrew. The iambic analysis is ruled out since quantity-insensitive right-dominant feet are not predicted by the universal foot inventory (e.g., Hayes 1995). Under the assumption of catalexis, Graf (1999) analyzes Modern Hebrew as a syllabic trochee system. Likewise, Becker (2003) analyzes Hebrew as a trochaic language. He examines the distribution of High tones at the phrasal level and demonstrates that it is best understood in terms of a trochaic foot structure: a High tone is pronounced at the right edge of each trochaic foot.

Graf & Ussishkin (2002) make a distinction between the regular and irregular stress assignment in Hebrew. The regular, the phonological stress mechanism, is defined as word-final or right-headed stress. Morphemes with accentual marking explain deviating stress pattern. They argue that Modern Hebrew does not make an explicit reference to particular foot types. In their approach, iambic feet account for the unmarked pattern of final stress in nouns and verbs, while trochees account for the pattern of rhythmically alternating secondary stress.

Bat-El (2005) shows, however, that hypocoristics reflects the emergence of the unmarked binary trochaic foot in Hebrew. Moreover, there is a trochaic bias in children's early speech, which could not be attributed to frequency (Galit & Bat-El 2009). Thus, hypocoristics and children's speech reflect the emergence of the unmarked trochaic foot in Hebrew whereas lexical words are argued to display either a trochee or an iamb.

In Greek, the phonological default stipulated for existing words is also not the preferred stress pattern in speakers' productions. Malikouti-Drachman & Drachman (1989), Revithiadou (1999) argue for the antepenultimate phonological

default stress pattern in Greek. Experimental studies using pseudowords, however, brought about different results as far as the most unmarked pattern was concerned. More specifically, different stress patterns are observed in different kinds of stimuli. Revithiadou et al. (forthcoming) conducted two production experiments designed to investigate stress placement in novel vowel- and consonant-final acronyms. The results revealed that consonant-final acronyms demonstrated a preference for final stress whereas vowel-final acronyms showed more variety in stress distribution. The type of final vowel and word length turned out to play a role. In particular, final stress was the most preferred stress pattern for consonant-final stimuli, *e*-final and trisyllabic consonant- and vowel-final acronyms. Disyllabic and quadrisyllabic acronyms ending in –*a*, however, were stressed mostly on the penultimate syllable, whereas trisyllabic ones got final stress. There was also a low percentage of antepenultimate stress productions, i.e. the phonological default was not reflected in speakers' productions.

Revithiadou and colleagues take these results to suggest that stress has a morphological effect in Greek. Namely, the groups of items where mostly final stress was found (C-final, *e*-final, and trisyllabic acronyms) were possibly realized as stems by the participants. Penultimate stress in vowel-final acronyms ending in -*a*, -*o* and -*i* could be attributed to stress frequencies from the lexicon triggered by the interpretation of the final vowel as a morphological class marker. Accordingly, they argue that there is a difference between the *elsewhere* stress that is the predictable aspect of the stress system commonly known as the *phonological* default, and the pattern that arises as the most preferred choice in speakers' productions, what they call the *dynamic* default. Thus, stem-final stress is considered to be the dynamic default for Greek acronyms. The difference between the phonological default and the dynamic default is suggested to be the following: the *dynamic* default represents a productive stress pattern that is applied to non-native and non-frequent words. The *phonological* default is confined to native inflected words.

The results of two *perception* experiments conducted to investigate speakers' bias for specific stress patterns in Greek also demonstrated the effect of morphological classes (Revithiadou & Lengeris (forthcoming)). It was determined that stress preferences (antepenultimate, penultimate or ultimate) were related to noun classes. It is assumed that the underlying metrical representation is also activated given subjects' general preference for penultimate stresses over the ultimate ones.

Thus, in Greek, as opposed to Russian, the speakers resorted to analogy in specific environments. However, all of these findings demonstrate that when morphology plays no role or its effect is marginal, some underlying metrical representation takes over stress assignment. Interestingly, when feet are not pre-specified for a specific accent, for example, in Hebrew, the unmarked trochaic foot emerges. Altogether, it can be concluded that lexical stress languages possess a rhythmic default stress pattern that is explicable by phonological rules. In light of this discussion, let us revisit the current findings: the present study carefully examined the influence of lexical frequency as well as the contribution of segments to stress assignment in novel Russian words. In particular, the results cannot be explained by the frequencies in the lexicon. Neither the type of final vowel nor the word length turned out to play a role in the experiments presented in this dissertation. The phonological default for Russian is argued to be a syllabic trochee built from the right word-edge.

This dissertation does not aim to investigate the question of whether it is possible to determine the default based on the stress patterns from the lexicon in unpredictable stress languages such as, for example, Hebrew and Greek. It argues, however, that in Russian, stress patterns in lexical words cannot provide unequivocal evidence in favour of a particular phonological default. It has been demonstrated that only when words are lexically not specified for stress and are devoid of morphological structure, the phonological mechanism of default stress assignment is activated that also arises in other areas of Russian phonology.

Chapter 11 Conclusions and issues for future research

This dissertation focused on the investigation of non-lexical stress placement in Russian, i.e. the default stress placement, metrical foot type and rhythmic alternations. These issues have been explored from theoretical, experimental and historical perspectives so that this research offers a broad, systematic, and unified account of these highly disputable issues in Russian prosody.

In the first part of the dissertation, I presented the evolution of the Russian accentual stress system. I showed the significant role of syllable structure for the development of the synchronic prosodic system of Russian and presented evidence that the metrical organization of Late Common Slavic was the syllabic trochee. One of the most important processes in the prosodic development of Russian was accentual leveling of words of the same morphological structure, i.e. derivational suffixes started developing dominant accentual properties. Stress placement in a derivative became determined by its morphological category and not by the stress pattern of the base word. Theoretical accounts of Russian stress use this phenomenon for the analysis of the relationship between stress and affixation. More specifically, it is argued that dominant derivational suffixes determine stress placement in Russian derivatives whereas dominant unaccented suffixes bring about the default stress pattern. I demonstrated that the accentual properties of derivational suffixes cannot reveal information about the default pattern in Russian, as different dominant unaccented suffixes bring about different stress patterns. They cause not only word-initial or post-stem stress, but they may also be pre-accenting, i.e. inducing accent on the preceding syllable.

I argued that stress is assigned morphologically and the initial 'historical' default has become lexical in Modern Russian. Initial ~ desinential stress alternation in underived words is used as a morphological means to mark a singular-plural opposition. Furthermore, I analyzed the existing accounts of the metrical structure of Russian and showed why such phenomena as vowel reduction patterns and stress shifts cannot provide evidence in favor of a particular

foot type in Russian. It was demonstrated that experimental investigation of stress placement in non-words was the only way to reveal information about the metrical structure of the language.

The second part of this dissertation presented the current experimental approach to the investigation of the Russian default stress pattern. It was shown that the previous experimental research did not tease apart the contribution of morphological information from purely phonological grounds. I presented the methodology and results of the two production studies designed to investigate stress realization by Russian native speakers in novel words that crucially lacked morphological information. In Study 1, a group of indeclinable novel place names was used in a map reading and a schedule description task. Study 2 was intended to extend the findings to another set of indeclinable words, novel acronyms, in a reading task. The classes of words used in these two studies made it possible to control for the confounding effects of morphology, a serious problem in previous experimental studies on Russian stress (e.g., Crosswhite 2000). The results from the experiments showed that in the absence of morphological factors, vowel-final words have predominantly penultimate stress, largely independent of phonetic and phonological composition of the word (as determined by factors such as vowel quality, syllable structure, or the number of syllables). These findings yielded evidence against Crosswhite et al.'s (2003) account, which argues that the default stress is stem-final. The following default patterns robustly emerged from these two studies: final stress in consonant-final words, and penultimate stress in vowel-final words. I argue that the default stress pattern in Russian is best characterized by a quantity-insensitive metrical system that employs syllabic trochees built at the right word-edge. Since consonant-final words must receive a vowel when inflected, my analysis provides a unified account of default stress in both consonant- and vowel-final words.

In the third part of this dissertation, I extended my analysis to the discussion of secondary stress assignment in Russian. In particular, I discussed the issues of rhythmic stress assignment as it may arguably give insight into the

metrical organization of Russian. Furthermore, I analyzed the previous approaches to the phonological status of compounds in Russian and acoustic properties of secondary stress (SS). It was demonstrated how rhythmic structures in novel compounds could provide information about the phonological status of subordinating compounds. Experiment 3 investigated whether stress regularities observed in the first two experiments go along with such phonological process as SS placement in Russian. SS surfaced on the initial syllable of the compound indicating a trochaic footing when there were 3 and 4 syllables before the primary stress. When there were 5 pre-stressed syllables, however, SS emerged predominantly on the second syllable of the compound which indicates a right-to-left directional orientation. The results of the acoustic analyses suggest that vowel duration is the main phonetic correlate of SS in Russian. The findings of the third experiment on rhythmic alternations in Russian compounds corroborated the results of Experiments 1 and 2. It demonstrated that trochaic feet were constructed in the implementation of SS. I argue that both default primary stress (stress in place names and acronyms) and rhythmic secondary stress in compounds arise from the single mechanism: trochaic foot built from the right edge.

In the discussion part, I showed that the trochaic grouping I suggest for Russian has wide empirical and theoretical coverage. In particular, it is on a par with diachronic and dialectal facts, and accords with other prosodic phenomena in Russian such as truncations and loanword adaptations. Furthermore, I demonstrated that the default stress pattern did not straightforwardly correspond to a pattern in the lexicon. Instead, I argue that the default is best accounted for by way of a trochee built at the right word-edge for both consonant-final and vowel-final words, which offers a unified account of what appear to be different stress patterns.

Thus, this dissertation claims that in the absence of morphological factors the mechanism of foot structure comes into effect and there is a certain metrical strategy that is applied when a word has no lexically stressed morphemes. The present study not only points to the phonological default stress pattern in Russian,

but also explains why the default looks like this and how it is connected with the overall metrical structure of the language.

I hope the findings of this dissertation suggest directions for future investigations on this or related topics in Russian phonology. It would be interesting to continue research in this area and to investigate the domains for various phonological generalizations in Russian. For instance, speech segmentation strategies may be relevant with respect to rhythmic patterns and word boundaries. The results of an experiment where speakers locate items in continuous speech would provide additional information about the structure of the PW in Russian. It could also be of interest to investigate which acoustic parameters affect rhythmic grouping and whether they generally play a role. One could vary the acoustic parameters to see what speakers perceive as being stressed. Furthermore, the influence of speech rate on rhythmic patterns presents an interesting topic for future investigations. The question is whether a higher speech rate leads to adjustment of phonological structure. Further research is also necessary to explore the phonological properties of subordinating compounds and of compounds with truncated components. I hope this dissertation is a relevant contribution in this area of research and it will raise more discussion leading to future study.

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Appendix A Romanization of Russian Cyrillic (Timberlake 2004)

Cyrillic	Linguistic
а	a
б	b
в	v
г	g
д	d
е	e
ё	ë
ж	ž
з	z
и	i
й	j
к	k
л	l
м	m
н	n
о	o
п	p
р	r
с	s
т	t
у	u
ф	f
х	x
ц	c
ч	č
ш	š
щ	šč
ъ	"
ы	y

ь	'
э	è
ю	ju
я	ja

Appendix B Stimuli used in Experiment 1

CV-CV

(1) o,u – i		(2) i,e – i		(3) o,u – o		(4) i,e – o	
noti	luti	riti	reti	mopo	ruto	ripo	neko
lopi	mupi	lipi	nepi	noko	mupo	nito	mepo
pomi	puni	pini	peri	poro	tuno	tino	kepo
pori	tumi	tini	kemi	tolo	pulo	pimo	temo

CVC-CV

(1) o,u – i		(2) i,e – i		(3) o,u – o		(4) i,e – o	
norpi	rumti	mirpi	lerti	nolpo	multo	minpo	merto
lompi	munpi	linti	menpi	ronpo	numpo	lirto	relpo
torpi	kulpi	kilpi	tenpi	norpo	kunko	tilpo	pempo
polti	punti	pirti	kemti	tonto	pumto	kimto	kerpo

CV-CVC

(1) o,u – i		(2) i,e – i		(3) o,u – o		(4) i,e – o	
mokil	nutil	nitil	retim	nokom	lutom	lipom	netom
notim	lutim	likim	nekil	ropom	nupom	mitom	mekom
ponil	turil	tiril	kenim	ponom	kunom	tinom	kerom
torim	punim	pinim	tenil	torom	tulom	pilom	tenom

CV-CV-CV

(1) o,u – i		(2) i,e – i		(3) o,u – o		(4) i,e – o	
tamopi	lemupi	samipi	vameti	panoto	kaluto	belipo	poneto
beroti	daluti	poniti	zenepi	denopo	tonupo	pumito	lumepo
vetoli	sapuli	vetim	kiteri	retomo	vetulo	kitiro	vipelo
tukori	kituri	mekili	dokemi	lutolo	rapumo	mapilo	tokero

CV-CVC-CV

(1) o,u – i		(2) i,e – i		(3) o,u – o		(4) i,e – o	
vunorti	bilurti	velirpi	romerti	numolpo	ronulto	zolinpo	lurento
kelonti	terumpi	taminti	talenpi	fenorto	balunpo	demirto	farelpo
sotolpi	zatulpi	katilpi	mekenti	takolpo	vekunto	vetilko	repento
mikorti	lakunpi	lekirti	vutenpi	mekonto	motunpo	tukimto	koterpo

CV-CVC-CVC

(1) o,u – i		(2) i,e – i		(3) o,u – o		(4) i,e – o	
menoltim	derunpil	zanirpil	bolertim	vanortom	doluntom	tulinpom	kalentom
vamonkil	toluntim	terinpim	tamenpil	benoltom	marunpom	zelirtom	verenpom
retomkil	vapulkim	vetilkim	mukentim	fetolpom	setulpom	sakiltom	liperkom
litortim	kanumtil	lokintil	lekenpil	sakortom	ripultom	matinpom	sutelpom

Appendix C Stimuli used in Experiment 2

CV-CV

1. VAKA is a military artillery command academy. My father used to study at _____.
2. MOGA is an international civil aviation organization. Lately, the management of _____ has taken an important decision about the strengthening of security measures.
3. MEFA is an international aikido federation. I am reading an article about the founder of _____.
4. VAKI is an All-Russian association of cognitive research. I am a member of _____.
5. POTI is a new project «Information text processing». I have submitted an application to participate in the project of _____.
6. BIHI is a Belgorod chemical research institute. I have already been trying to get a job in _____ for several years.
7. MABO is an international association of biological oceanography. This year I am going to attend a conference of _____ .
8. MOZO is a Moscow regional land department. A new manager has been elected in _____.
9. GIFO is a state institute of physiatrics and orthopedics. Much scientific research is conducted in _____.
10. BANE is a British natural science academy. Today an interesting seminar is going to take place in _____.
11. MOBE is a municipal Ekaterinburg library association. A new literary project is financed by _____.
12. SEPE is the council of the episcopal conferences of Europe. This week the speakers of _____ are going to have a regular assembly meeting.
13. TASU is territorial automated control system. There are a number of requirements to _____.

14. TORU is a Pacific regional directorate. The activities of _____ are regulated by government.
15. MITU is a Minsk engineering technician college. My father used to study at _____.

CVC-CV

1. RAMTA is a Russian association of travel agency managers. More than one thousand agencies are a part of _____.
2. RONKA is a Russian national aviation committee. Today at the meeting of _____, new regulations were adopted.
3. FEMBA is a federal medical biological agency. I need to get in contact with _____ urgently.
4. RANTI is a Russian association of scientific technical publishers. Yesterday I spoke with the chairman of _____ on the phone.
5. MOMKI is an international association of meteorological and climatic information. Our aim is collaboration with _____.
6. NILKI is a research laboratory of clinical immunology. I have worked in _____ for many years.
7. MANBO is a maneuver combat detachment. Many sub-units form a part of _____.
8. GUMTO is the main administration of materials and equipment supply. The scientific basis of _____ is the science about planning and controlling logistics.
9. NIMTO is a research methodological associaion. The activities of _____ are directed at teachers psychologists.
10. MAMDE is mathematical models of natural science. Now I am attending lectures about_____.
11. MORBE is an international organization of safety in Europe. A new summit of _____ is planned for October.

12. LINGE is a Lipeck Institute of Geology. New management is going to be elected in _____.
13. RARPU is a Russian arctic regional frontier directorate. My acquiantance works in _____.
14. TORPU is a pacific regional frontier directorate. I am just speaking with _____ on the phone.
15. RILTU is Riga flight college. My father used to study at _____.