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SPEECH RHYTHM AS AN ELUSIVE PHENOMENON IN RELATION TO ITS SHAPE AND FUNCTION[1]

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Govorni ritam je fenomen koji prožima celokupan jezički kod i koji se može sagledati kao hijerarhijski ustrojen sistem koji vrši organizaciju jezika i govora. Rad se bavi nizom teoretskih i istoriografskih pitanja koja se tiču opisivanja govornog ritma i njegovog mesta u jezičkom sistemu. Uvodni deo je posvećen multidisciplinarnoj prirodi fonetike, kao i verbalnoj ritmologiji i govornom ritmu. Naredni deo se bavi metodološkim okvirom rada i istraživačkim zadacima. Glavni deo rada ukratko opisuje neke od problema koji se tiču mesta ritma govora u fonetskom sistemu, međusobnom uticaju prozodije i intonacije i hijerarhiji ritmičkih jedinica. U zaključku se ističu mogući pravci daljeg istraživanja.

> [...] the use of phonetic information in the linguistic description of language is one of the prerequisites for progress in linguistics.
> *Liya V. Bondarko (1981)*

> [...] rhythm is a universal peculiarity of matter self-movement, and, in addition, it is the result of the unity and struggle of opposites that is the source of its self-movement; it is characterised by alternating dominance of each opposing sides by means of which qualitative stability of some physical objects is achieved. Consequently, rhythm is intrinsic to movement and it is not imposed on it by any external forces
> *Boris S. Alyakrinskij, Svetlana I. Stepanova (1985)*

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1. INTRODUCTION

1.1. PHONETIC SCIENCE AS A MULTIFACETED DISCIPLINE

At present, traditional boundaries between myriad branches of a science, that is, phonetic science or linguistics tend to be levelled out. The multidisciplinary methods, as it is stated in many works, make all traditional boundaries between fields of knowledge *purely conventional*. The multidisciplinary approach does not simply mean the accumulation, synthesis and summation of knowledge from various branches of a science, but essentially the synthesis of a new integrative type of knowledge that is embodied in new fields of science (see Koerner 1979, 1993; Svetozarova 1982; Vishnevskaya 1993; Potapova/Potapov 2000; Kibrik 2008; Chernigovskaya 2022, etc.).

Phonetic science has been delineated as a discipline following up speech sounds from articulation, acoustics, perception[4], and phonology viewpoints for years (see, for instance, Jones 1922; Cruttenden 2014; The Cambridge Handbook of Phonetics 2021, etc.). Nevertheless, for the time being, contemporary phonetic theory concerns all sounding material which is represented in all human (natural) languages, i.e., all sounding properties of language in all their manifestations in speech and functions, as well as a range of theoretical, experimental, and applied facets of investigating oral speech (see, for instance, Zinder 1979; Ladefoged/Johnson 2015, etc.).

From a historiographical standpoint, phonetic science itself genetically possesses a complementary foundation that is explicitly expressed in its object, methodology, experimental methods, and techniques. The intermediate position of phonetics between the humanities and the natural sciences influences its methodology that incorporates both of them. Different phonetic schools in the world have paid attention to various perspectives on sound speech (spoken language), resulting in the dominance of the humanitarian or the natural-science thinking and exploiting various scientific methods. The "poly-aspectual nature" (multidisciplinary)[5] of phonetics brings together plenty of linguistic and non-linguistic disciplines, for instance, *linguistics* (morphology, syntax, semantics, stylistics, sociolinguistics, psycholinguistics, neurolinguistics, language acquisition, etc.), *biology* (neurophysiology, bioacoustics, evolutionary biology, etc.), *anthropology, psychology* (neuropsychology, cognitive psychology, experimental psychology, etc.), *physics* (acoustics), *musicology, medicine* (speech therapy, clinical phonetics, etc.), *forensic science, cybernetics, artificial intelligence (AI)*, etc.[6] Phoneticians are still unanimous in the opinion that the final settlement upon the multidimensional nature of the sound speech will be solely attained by means of scientists' joint efforts. The multidisciplinary nature of phonetics is vividly reflected in its history and historiography[7]. Bronstein and Raphael (1979: 13) asserted that:

4 Lija V. Bondarko (1981) stressed the point that this aspect emerged much later than the above-mentioned ones, but the linguistic problem of speech perception makes it necessary to distinguish the perceptual aspect of phonetic analysis as a special one.

5 The terms *multidisciplinary, interdisciplinary, multifaceted discipline* are synonyms in the current study.

6 Interestingly, in the 1970s, the new terms *speechology,* or *neo-macro-phonetics* (*Masao Onishi*), have arisen of the necessity not to separate other facets of language from phonetics (see Akhmanova/Minajeva 1977; Onishi 1981).

7 In accordance with Michael Ashby (2016), these two terms may be viewed as synonyms or be differentiated.

Phoneticians increasingly rely, it seems, on the work of, collaborate with, sociologists, psychologists, biologists, poets, physicists, anthropologists, neurologists, and others. And a look at the history of phonetics reveals that this seemingly recent trend has deep roots. Earlier phoneticians seemed no less prone to incorporate into their work the ideas and findings from other areas of investigation or other disciplines. It is possible, in fact, to draw parallels between the nature and direction of interdisciplinary influences on the work done by those we identify as contributors to phonetics both in current scene as well as in earlier scenes.

1.2. VERBAL RHYTHMOLOGY AND SPEECH RHYTHM

The aforementioned "poly-aspectual" nature of phonetic science is also typical for all sub-disciplines of phonetics. The present work attempts to describe a range of theoretical and historiographical issues in the field of verbal rhythmology and its object – speech rhythm.[8]

There is no doubt that speech rhythm, being part of universal rhythm and general rhythmology, is a phenomenon *sui generis*. Verbal rhythmology follows up the whole rhythmic system of language and speech, that is, a wide range of rhythm-forming factors and their hierarchies. In addition, it considers some universal, typological and specific mechanisms, pertaining to speech rhythm.

That is a well-known fact that any system is an interconnected and interdependent set of phenomena, forming a sustainable unity. It is a dynamic and holistic entity, being composed of several subsystems and correlating with each other. Everything that takes place in one part of it is also reflected in other parts. *The rhythmic system of language and speech*, or *the system of rhythm-forming factors*, from a phonetic viewpoint encompasses a number of strata: *rhythm-forming levels* (segmental, syllabic, accentual, prosodic, intonational), *rhythm-forming units* (see below) and *rhythm-forming functions* (organising, segmenting, semantic, emphatic, aesthetic, stylistic, etc.). These aforesaid strata, in turn, possess their own components (subsystems) which can also be regarded as self-dependent systems. Recent papers in this field (see, for instance, Potapov 2016) have shown that the rhythmic organisation of sound speech is mediated by the grammatical structure of language (formal-morphological and syntactic aspects), whilst stylistic factors have the least influence on speech rhythm. Extralinguistic factors (e.g., a psychophysiological state of the speaker, individual characteristics of the voice, speaker's

The *history of phonetics* as an integral part of studying phonetics focuses upon documenting all phoneticians' views on phonetic science, or in other words, it deals with the segmental and prosodic systems and their phenomena from the viewpoint of retrospection, the state of the art, and the forecasts for the future. The *historiography of phonetics* explores the analytical and critical study of phonetics *histories*. It has to be said that Koerner (1993) consolidates the two terms *Histor(iograph)y of phonetics*.

8 Verbal rhythmology (and speech rhythm) can be regarded as part of *general rhythmology* (including existential, or universal, rhythm of living and non-living matter). General rhythmology consists of *verbal rhythmology* (including speech rhythm) itself and *non-verbal rhythmology* (including mechanical, biological, social, and artistic rhythms) (Antipova 1980, 1984). Verbal rhythmology can also be divided into *general verbal rhythmology* (i.e., general mechanisms of shaping speech rhythm) and *special verbal rhythmology* (i.e., studying rhythm of a concrete language (English, German, Spanish, etc.)).

temperament, gender, etc.) affect the rhythmic system as well (see, for instance, Kohler 2009). However, these issues require a special and detailed consideration.

2. METHODOLOGY

The study of verbal rhythmology and speech rhythm has continually been in the focus of phonetic research (see, for example, Steele 1775; Sievers 1912; Classe 1939; Lloyd 1940; Pike 1945; Abercrombie 1967; Lehiste 1977; Adams 1979; Antipova 1980, 1984, 1986, 1987, 1990; Zlatoustova 1981, 1983; Roach 1982; Dauer 1983, 1987; Bolton 1894; Miller 1984; Vishnevskaya 1993; Krivnova 1996, 2007; Ramus *et al.* 1999; Potapova/Potapov 2000; Grabe/Low 2002; Arvaniti 2009, 2012; Kohler 2009; Brik 2012; Potapova/Potapov 2012; Potapov 2016; Ravignani/Madison 2017; Post/Payne 2018; Gibbon 2021; Vishnevskaya/Zverev 2022, etc.). However, some cardinal issues of contemporaneous verbal rhythmology have so far been neglected. The present work aims at concentrating upon a number of theoretical and historiographical issues in the field of verbal rhythmology mostly from a systematic viewpoint.

The research tasks can be described as follows: a) examining the place of speech rhythm in a language from a retrospective (historiographical) standpoint (in comparison with prosodic phonetics and intonology[9]); b) delineating the interaction between speech rhythm, prosody, intonation; c) determining the hierarchical character of the rhythm-forming units; d) describing some issues of the rhythm-forming factors of the segmental system; e) establishing the necessity of investigating speech rhythm as a fundamental hierarchically structured system that organises language as a whole. The main research methods are *theoretical* (descriptive, analytical, comparative) and *historiographical* (the analytical study of the researchers' views on verbal rhythmology and speech rhythm).

3. RESULTS AND DISCUSSION

3.1. THE PLACE OF SPEECH RHYTHM IN A LINGUISTIC CODE

The place of speech rhythm in a language has changed dramatically over the last century. In previous papers (Vishnevskaya/Zverev 2022; Zverev 2022), *eight conceptions* in the field of verbal rhythmology (paralinguistic, unsystematic, accentual, durational, melodic, prosodic, intonational, systematic) were picked out (Figure 1). These conceptions provide some understanding of the place of speech rhythm in a linguistic code, and they can be represented in the form of a feature tree: every "no" signifies a negative answer to the main question, whilst an affirmative answer means "yes" to the question in brackets. All negative answers are speech-rhythm-place conceptions, denoted by Arabic numerals. Such a method was employed in the book "Sentence Intonation in the Slavic Languages" (1977) (for more details see below).

9 *Syntactic phonetics* (Shcherba 1963) is another term for exploring the intonational level of a language.

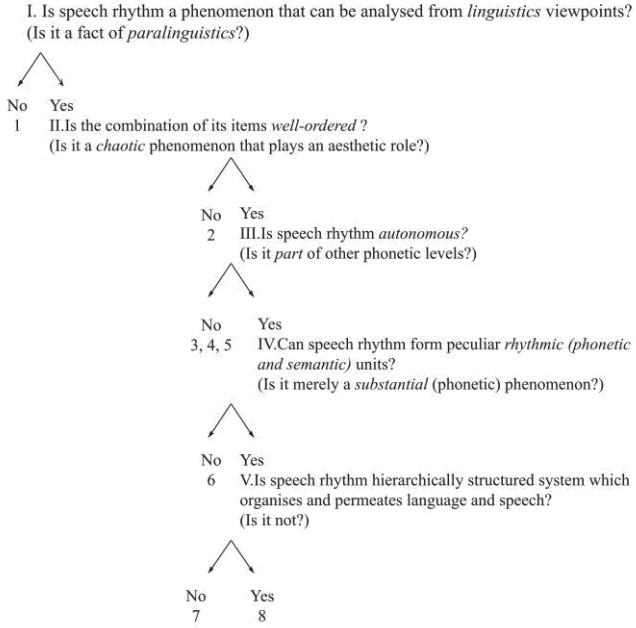

Figure 1. The place of speech rhythm in a linguistic code

According to the *first* conception (paralinguistic) speech rhythm is a non-verbal fact that implicitly correlates with language and speech. Verbal rhythm is viewed as a paralinguistic phenomenon along with gestures, facial expressions, postures, visual contact, etc. (Savov 2012, etc.).

According to the *second* conception (unsystematic (eurhythmics)), speech rhythm is a non-discrete and chaotic structure, carrying out exclusively one of the harmonisation functions and manifesting itself in a euphonic characteristic of speech reception (Dionysius of Halicarnassus 1978, etc.).

According to the *third* conception (melodic, tonal), speech rhythm becomes apparent through quasi-periodicity of melodic contours, mainly consisting of pre-head, head, nuclear tone, and tail (Tomashevskij 1928; Skorikova 1982; Burnakova 1986; Cheremisina-Enikolopova 2013, etc.)

According to the *fourth* conception (quantitative, durational, temporal, the "time" theory), speech rhythm is not an autonomous level of the phonetic system, but only a part of the temporal component of prosody and intonation along with tempo. Verbal rhythm is determined by a regular repetition of stressed syllables (*"interstress intervals"*), viz., their periodicity in time, as well as "symmetry" of time intervals between selected stressed (prominent) syllables (Classe 1939; Pike 1945; Vassilyev 1970; Dellwo 2006, etc.).

According to the *fifth* conception (dynamic, accentual, the "accent" theory), speech rhythm is not an autonomous level of the phonetic system, but only a part of the dynamic component of prosody and intonation. The verbal rhythm is defined through the phenomenon of prominence and it results in alternating stressed and unstressed

syllables in the sound speech flow (Torsuev 1950; Adams 1979; Zinder 1979; Zadoenko 1980, etc.). It has to be said that the last two conceptions (quantitative and accentual) are the most widespread in phonetic science. Other definitions which consider verbal rhythm from both aforesaid viewpoints also exist (see Patel *et al.* 2006; Gibbon 2021).

According to the *sixth* conception (prosodic), speech rhythm is an autonomous component of prosody that is coupled with its parameters (in the acoustic aspect): fundamental frequency, intensity, duration, timbre. They constitute its rhythm-forming layer (Zlatoustova 1981, 1983; Potapov 2016, etc.).

According to the *seventh* conception (intonational), speech rhythm is an autonomous component of intonation which is associated with its other components (in the perceptual aspect): speech melody, accent, tempo, pause and timbre (Torsuev 1950; Artemov 1971; Davydov/Rubinova 1997, etc.). The discussion of the terms "prosody" and "intonation" and the interaction between speech rhythm and the prosodic and intonational systems is given below.

According to the *eighth* (systematic, integrated, complex, structural-functional) conception, speech rhythm is a fundamental hierarchically structured system which organises language and speech. It is shaped by *all linguistic strata* (graphic, phonetic, morphophonological, morphological, syntactical, lexical, semantic, stylistic, pragmatic) and all their units. In keeping with this conception, the salient characteristic of universal rhythm is its *quasi-periodical repetition* (some other rhythm features, see in Bondi 1977).[10] Consequently, verbal rhythm is a quasi-periodical repetition of *qualitatively similar* and *subjectively isochronous* speech phenomena. The hierarchical nature of structuring the speech rhythm system implies the existence of certain rhythm-forming units and their own *hierarchy*. Nearly all speech segments can perform the function of a rhythmic unit (speech sound, syllable, rhythmic group, syntagma/phonetic-phonological phrase/ sense-group/tone-group, phrase, supraphrasal unit/ phonopassage). The system of the rhythm-forming units is correlated in a certain way with semantic and syntactic levels of language and speech (Antipova 1980, 1984, 1986, 1987, 1990).[11] The similarity in character of the rhythm-forming units is mainly determined by *melodic and accentual* components of prosody and intonation, while subjective isochrony is constructed by their *durational* constituent (Buraya 1982; Antipova 1984, 1987). Therefore, speech rhythm is formed by all phonetic factors (especially, prosody and intonation). The authors of the present study support this outlook.

It has to be said that the afore-mentioned conceptions are strongly coupled with a number of historiographical investigations in the field of prosodic phonetics and intonology (i.e., a discipline of phonetic science which focuses upon the study of

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10 It is clear that that the absence of isochrony (duration and (quasi-)regular intervals) is not the same as the absence of speech rhythm (see, for example, Patel *et al.* 2006), since isochrony is approximately equal to duration (one of the components of prosody and intonation). *Hence (quasi-)periodicity is one of the main characteristics of speech rhythm*. It coincides with a number of moot points upon the rhythmic typology (the so-called hypothesis of "Pike-Abercrombie" (Pike 1945; Abercrombie 1967)) (see, for instance, Arvaniti 2009, 2012, etc.). Furthermore, Scott, Isard, and Boysson-Bardies (1985) have shown that the perceptual tendency towards isochrony of stressed syllables (rhythmic groups) is specific neither to stress-timed (stress-based) languages nor to language itself.

11 It should be mentioned that Professor Antonina M. Antipova was one of the initiators of the systematic conception in the field of verbal rhythmology and speech rhythm.

intonation). Professor Tatyana M. Nikolayeva in her excellent book "Sentence Intonation of the Slavic Languages" (1977) threw light on the main conceptions, pertaining to prosodic phonetics and intonology, and scrutinised them from a historiographical viewpoint (Figure 2).

In keeping with the *first* conception, intonation is a paralinguistic phenomenon, and does not belong to "real" linguistics.

In keeping with the *second* conception, intonation is a fact of linguistics, but it cannot be presented in the form of an ordered system.

In keeping with the *third* conception, intonation is a fact of linguistics which possesses ordered structures. However, it is not an autonomous level, but a part of other linguistic levels (for example, phonology or syntax).

In keeping with the *fourth* conception, intonation is an autonomous ordered set of linguistic elements, but it is an insignificant level in the sense that the level of language is described as a set of phenomena, consisting not only of formal means, but also of semantic units which are unique to that level.

In keeping with the *fifth* conception, intonation has its own formal and semantic specific units. Its structure is well-ordered, and the task of a linguist is to find its place in the linguistic system.

In keeping with the *sixth* conception, intonation structure is established and possesses its formal and semantic units. Nonetheless, it is a phenomenon that falls out of the general hierarchy of language tiers and it has no place in a linguistic code.

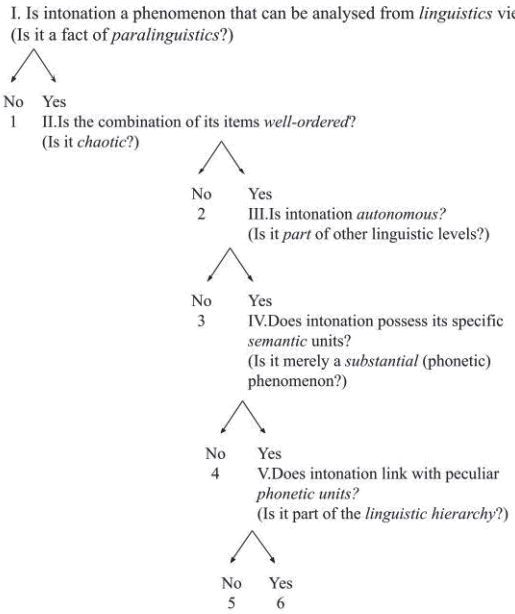

Figure 2. The place of intonation in a linguistic code (Nikolayeva 1977)

3.2. THE INTERACTION BETWEEN SPEECH RHYTHM, PROSODY, INTONATION: AUTONOMY VS INTERSECTION VS IMPOSITION

Historically, prosody has been associated with the study of verse and this term relates to Ancient Greek Grammar that deals with the laws of versification, that is to say, a part of verse that focuses upon syllables and their characteristics – stress, lengthening, or pitch.

Nikolai S. Trubetzkoy (1890–1938) in his classical work "*Principles of Phonology*" (1971: 207) already underscores the difference between prosody as a substantive phenomenon and intonation as a bilateral (substantive and semantic) one:

> [...] the same phonic properties that furnish prosodic correlations for the differentiation of words are also employed to differentiate sentences, the means used for differentiating sentences are basically different not only from the prosodic phonological properties, but also from all other means used to differentiate words. This fundamental difference probably lies in the fact that phonemes and prosodic properties that differentiate words are never *linguistic signs* in themselves, but only *parts of linguistic signs*.

Contemporary phonetic theory contains at least two clearly expressed and exact antipodes of opinion in understanding the terms "prosody" and "intonation". On the one hand, prosody and intonation are interchangeable terms if intonation is regarded as a multicomplex and polyfunctional phenomenon, encompassing its following perceptual correlates: speech melody, accent, tempo, pausation, and timbre (acoustic correlates: fundamental frequency, intensity, duration, spectrum) (i.e., prosody = intonation) (see, for instance, Fry 1968; Crystal 1969; Krivnova 2007; Potapova/Potapov 2012, etc.). However, intonation is often associated with the notions of speech melody and changing voice pitch (i.e. melody = intonation; prosody ≠ intonation) (see, for instance, Thompson 1981; Wells 2006, etc.).[12]

On the other hand, the terms "prosody" and "intonation" are intertwined and their functioning scope is different (prosody ≠ intonation). Prosody stands for a substantive (phonetic) phenomenon which is an exponent of oral speech and it is represented in all unit strata (syllable, rhythmic group, syntagma[13], phrase, supraphrasal unit, discourse and text). Not only does intonation include substantive properties, but also semantic characteristics. Its functioning scope commences on the syntagmatic level (syntagma, phrase, supraphrasal unit, discourse and text). The authors of the present article concur with this very viewpoint. The term *prosodica* that is closely connected with "prosody" can also signify the system of phonetic means, characterising a syllable. These ideas can be in part summarised in *"broad" and "narrow" conception of prosody*. From a "broad" viewpoint, it embodies all the suprasegmental system of language and speech, i.e.,

12 A number of studies in the field of intonology extremely often speak about the so-called "narrow" and "broad" interpretations of intonation, but solely with reference to its components. However, this approach can also be transferred to intonation in general, viz. its units, functions, etc. (see Svetozarova 1982; Vishnevskaya 1993).

13 According to Lev V. Shcherba (1937).

prosody in a narrow sense and intonation in a wide one. From a "narrow" viewpoint, prosody studies only substantive properties of a linguistic code.

Professor Natalya D. Svetozarova (2013) proposes discriminating *prosodica 1* and *prosodica 2* (the term "prosodica" is equal to "prosody" in the case). Prosodica 1 binds up with phonology and explores syllabic structures, while prosodica 2 follows up suprasegmental features of sound speech, that is, word stress (word prosody), syllable tones (syllable prosody), and sentence intonation (phrasal prosody).

Professor Rodmonga K. Potapova (1986, 2012) makes use of the three terms *prosody*, *prosodica*, and *prosodemica*. Prosody operates with substantive structures, referring to acoustic parameters (fundamental frequency, intensity, duration and sometimes timbre). The above-mentioned features are characteristic of the substantive sphere of a language, and they can be reflected in the following functions: constitutive, recognitive, delimitative, culminative, distinctive, emotive, emotive-modal, etc. The functional sphere of the phenomenon manifests itself in using the terms "prosodica" and "prosodemica". Both prosodica and prosodemica are formed through prosody – one of the universal means of sound speech realisation. The clear distinction between these terms corresponds to semiotic relevance (Figure 3). Metaphorically speaking, prosody is the building material, prosodica is the method and the realisation of the construction of the intended, prosodemica is the social purpose of the construction and, in addition, how it differs from the other constructions.

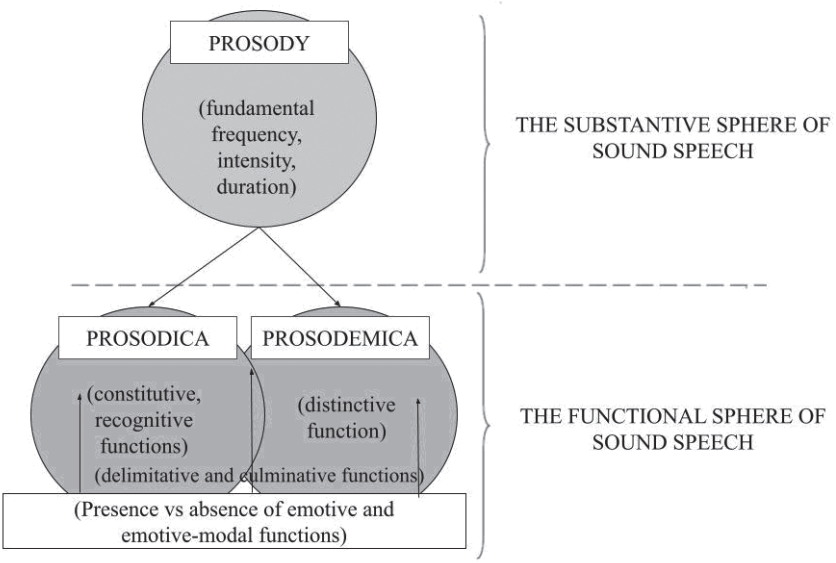

Figure 3. The conventional distinction between prosody, prosodica, prosodemica (Potapova 1986; Potapova/Potapov 2012)

There are also some other theories that make use of different terms (for example, suprasegmentals, non-segmentals, etc.) and also feature the possible interactions and connections between prosody and intonation. It is not in the scope of this article to dwell

on all of them (for greater detail, see Crystal 1969; Artemov 1971; Trubetzkoy 1971; Zinder 1979; Torsueva 1979; Svetozarova 1982; Zlatoustova 1983; Antipova 1984, 1986; Vishnevskaya 1993; Zhinkin 1998; Krivnova 2007, etc.). It has to be said that a theoretical attempt to connect speech rhythm, prosody and intonation with a single phonetic model is presented in the autosegmental metrical theory (Selkirk 1984).

As mentioned above, the systematic conception in the field of verbal rhythmology and speech rhythm came into being around the 1930s (see, for example, Peshkovsky 1927, 1928; Tomashevskij 1928, 1959; Zhirmunskij 1966; and some contemporary works: Dauer 1983, 1987; Nespor/Vogel 1983; Rhythm in Psychological, Linguistic and Musical Processes 1986; Patel *et al.* 2006; Barry 2007; Kohler 2009; Zhang *et al.* 2010; Gussenhoven 2015; Baltazani 2017; Langus *et al.* 2017; Post/Payne 2018, etc.).

Considering the role of prosody in forming speech rhythm and its place in prosody and intonation, Professor Antonina M. Antipova concluded that (1984: 52–53):

> [...] the study of rhythm should be conducted through the study of prosody, since prosody largely shapes the periodic phenomenon itself, determining its specificity. This is where the rhythm-forming function of prosody manifests itself. If this is so, then rhythm, in its turn, can be interpreted as a prosodic phenomenon and a certain functional layer of prosody which is formed by all its components. This does not signify that rhythm absorbs the whole complex of prosodic means. Rhythm selects and employs those elements that are necessary to structure (quasi-)periodic phenomena. The prosodic aspect of rhythm is only part of the complex rhythmic system.

Some scholars face an analogous problem while looking at timbre and its place in phonetic (prosodic) system. Timbre, being part of prosody, is a component of special order, as it is always present in speech and, such as speech rhythm, it overlaps the entire linguistic code. However, the difference between speech rhythm and timbre lies at least in the extralinguistic nature of the latter (see Siertsema 1962, etc.). It should be noted that speech rhythm itself is characteristic of a *quasi-periodical repetition* of speech elements and a process of structuring it *by means of all language systems* (prosodic, lexical, syntactic, etc.).

It is significant to mention that the phonetician carried out a wide range of phonetic experiments (Antipova 1980, 1984, 1987) so as to clarify the interplay matter, referring to speech rhythm and suprasegmental components of language. The phonetician analysed the following acoustic parameters of prosody and intonation: *fundamental frequency*, *F0* (the direction of F0 in a terminal part of phrase, the velocity of F0 modification, its interval, its diapason, the direction of F0 in a pre-terminal part of phrase, intervals of F0 modification, the medium level of a phrase and line), *intensity* (intensity in stressed syllables), *duration* (pause-and-phonation durations), *timbre*. She claimed (1984: 99–100) that: "[...] a variation (e.g. strengthening) in any component of prosody must lead to similar changes in the others, as well as in speech rhythm, that is to say, the strengthening of any aforementioned components must lead to similar prosodic patterns".

The researcher also offers two principles of classifying suprasegmental phenomena. The first one signifies the classification according to the line of singling out prosody and

intonation components, while the second one means the line of indicating their functional layers (Figure 4). In this interpretation, prosody and intonation are suprasegmental structures in which two interdependent subsystems can be distinguished.

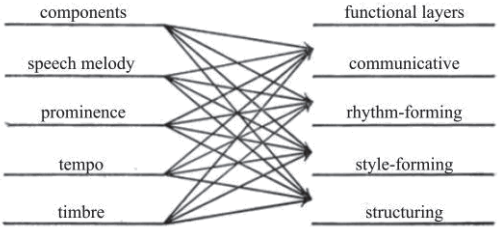

Figure 4. The two principles of classifying prosodic and intonational phenomena (Antipova 1984, 1986)

It is concluded that any utterance is characterised by the symbiosis of speech rhythm, prosody and intonation. Sčur (1967) was right when he said that the general principle of forming any system means neither their oppositions nor relations, but *connections* (!). The specific nature of speech rhythm embodies its *quasi-periodical repetition* and *forming through other language systems* (segmental, prosodic, lexical, morphological, syntactic, etc.).

3.3. Speech rhythm units and their hierarchies

The hierarchical nature of speech rhythm implies the presence of certain rhythm-forming units and their own *hierarchies*. In the beginning of the XX century Alexander M. Peshkovsky (1878 – 1933) proposed to regard the structure of speech rhythm as a hierarchical multistage formation, consisting of a number of interrelated and interdependent units (syllable – beat (rhythmic group) – phonetic sentence (syntagma) – intonational unit (supraphrasal unit)) (1928: 69):

> If we agree that the rhythm of prose fiction is more or less indifferent to syllables and concentrates all its attention upon the beats, then we have to admit the essence of its difference from verse rhythm in that it operates with larger rhythmic units. The question arises, then, whether it does not have even larger units which unite groups of phonetic sentences in the same way as the latter unite groups of beats?

The scientist also noted that phoneticians should consider all components of prosody and intonation in the study of verbal rhythm (1927: 54): "[...] speech melody is that component in which verbal rhythm, syntax, vocabulary, and all so-called "linguistic meaning" cross over [...]".

At the present stage of the development of verbal rhythmology, it has been established that the hierarchy of the rhythm-forming units is reflected both in written and oral texts. The speech rhythm analysis of written texts emphasises that practically

all speech segments can take part in structuring verbal rhythm: *sound unit (vowel, consonant), syllable, rhythmic group (RG), syntagma, line, and stanza* in *verse*; *RG, syntagma, phrase, and supra-phrasal unit* in *prose*. The aforenamed speech segments can be rhythm-forming units if they are subjectively isochronous, and qualitatively similar in character. The number of these units in the rhythmic system and their composition can vary, hinging on the illocutionary intention of the speaker (Antipova 1980; 1984; 1987; Potapov 2016, etc.). The rhythm-forming units can be divided into three groups: *small, medium, and large*. Small units include sound segments and syllables which are unilateral (one-sided) units. The medium rhythm-forming unit is a rhythmic group (RG) that is a link between the small and large rhythm-forming units. RG can be *simple* or *compound*. RG often coincides with a word or a combination of words. In such a case, RG can be described as a meaningful (bilateral, two-facet) unit. A compound RG contains two or more stressed syllables and it is usually a word or a phrase. This type of RG discriminates between the two types: a *two-row RG* (consisting of two stressed syllables) and a *multi-row RG* (consisting of more than two stressed syllables). Consequently, a compound RS is often a semantic unit. However, along with these cases there are also those where a word encompasses two or more RG. In this case, RG cannot be classified as a semantic unit. Large rhythmic units (syntagma, phrase, step, supraphrasal unit, line, stanza) are bilateral (two-sided) units and perform integrative and semantic functions (Antipova 198, 1984, 1987; Meskhishvili 1990).

As mentioned above, speech rhythm from a phonetic standpoint consists of several strata. Quasi-periodicity of speech segments are formalised by means of various units which set up certain rhythm-forming levels of verbal rhythm: *segmental, syllabic, accentual, prosodic, intonational*. The *segmental rhythm-forming level* includes changes in vowels and consonants, for instance: alternation of phonologically long and short vowels, assonance, alliteration, onomatopoeia, rhyme, etc. etc. The *syllabic rhythm-forming level* regards syllables (syllabic structures) as rhythm-forming factors. The *accentual rhythm-forming level* includes phenomena of word stress (word prosody) as one of the phonological characteristics of a word. The *suprasegmental (prosodic and intonational) rhythm-forming level* focuses upon using certain tonal, dynamic, temporal and timbral contours, that is, a quasi-periodical repetition of terminal and pre-terminal tones, accelerating speech tempo, changing from phonation (in a wide sense) to pauses, etc.

The segmental rhythm-forming level ("segmental rhythm") remains poorly investigated (especially be means of the so-called "natural discourse"). However, investigating the segmental rhythm-forming level is necessary for depicting the whole picture of production and perception of sound speech (see Dauer 1983, 1987; Antipova 1984, 1987; Portnova 1987; Ramus *et al.* 1999; Scott *et al.* 2006, etc.). From a general phonetics viewpoint, the triad of segmental units (phoneme – allophoneme (allophone) – phone (Pulgram 1961; Maslov 2005)) provides a material foundation for language without which its being and functioning is unthinkable. Nonetheless, the involvement of the *segmental system* and its role in shaping speech rhythm is far less *frequent and episodic*, whereas *prosody* as a rhythm-forming factor takes part in organising the rhythmic system in a *more systematic way*. Antonina M. Antipova (1987: 443) emphasised that "on the segmental level, vowels are opposed to consonants. This opposition is based on the presence or absence of noise. This type of alternation is characteristic of

languages with syllable structure CV. In English this type of alternation has infrequent occurrence. Only occasionally in poetry does a syllable become a rhythmic unit". The segmental rhythm-forming level ("segmental rhythm") is most pronounced in poetic (verse) speech; however, this stratum implicitly affects the production and perception of foreign sounding speech. All kinds of segmental transformations that are represented in the speech flow have a significant impact on forming speech rhythm. In accented speech which is marked by a distortion of all phonetic means, the system of speech rhythm is inevitably transformed. The rhythmic impulse of English speech generated by the native speaker does not coincide with a rhythmic impulse of the non-native speaker, resulting into the overall disturbed perceptual picture of sound speech (Vishnevskaya 1993). Scott *et al.* (2006: 381–382) asserted that:

> The "basic" problem of producing a simple vocal rhythm suggests that there will be problems in the generation of more complex rhythms (in expressly timed rhythms, such as poetry and song) and in the production of the 'natural' rhythm of propositional speech, where there is no "metre" or strict rhythmic timing. It is important to note that the rhythm production in the nursery rhyme task was also adversely affected by the insertion of schwas and the separation of syllables in multi-syllabic words. It is possible that, in order to maintain a degree of accuracy in the articulation of the lexical items in speech, other structural constraints (the rhythm and the intonation) are produced less accuracy. This may sound "foreign" both as a result of the unusual timing and rhythm, and due to the epenthetic schwa's disruption of the syllabic pattern.

Speech rhythm is exceedingly difficult for non-native speakers to master and it is one of the most relevant aspects in acquiring the pronunciation model of a studied language. From a systematic viewpoint, verbal rhythm is formed by all components of the linguistic (phonetic) system and, therefore, speech rhythm training of a foreign language should be based upon all linguistic (phonetic) structures that take part in forming rhythmic phenomena.

4. CONCLUSION

The present article focuses on a number of theoretical and historiographical issues based on analysing the results of experimental (instrumental) investigations. It should be pointed out that both approaches (theoretical-historiographical and experimental ones) have been used and they have proved to be fruitful. However, all these phenomena briefly described in this paper can be adequately evaluated only on the basis of a large body of factual material which must invariably underpin any general theoretical conclusions (Sčur 1967).

Hereby, universal rhythm itself plays an exceedingly pivotal role in human life and it is intrinsic to human beings. Further research of verbal rhythmology is seen as a convergence of general phonetic scientific knowledge and concrete data of different disciplines. Additionally, verbal rhythm has to be explored by considering the phonetic

system of a concrete language and its phonetic means (segmental and suprasegmental in particular).

The most significant and complex issues in the field of verbal rhythmology that can be labeled as *the nature of speech rhythm and its place in a language system* are the following:

1. The place of speech rhythm in a linguistic code;
2. The determination of rhythm-forming units, their hierarchies, and the principles of their identification;
3. The determination of speech rhythm functions (rhythm-forming functions);
4. The interaction between speech rhythm, prosody, and intonation, as well as other linguistic levels, taking part in forming speech rhythm;
5. The role of segmental means in structuring speech rhythm and rhythm-forming units;
6. The role of prosodic and intonational means in organising speech rhythm and rhythm-forming units, their prosodic and intonational design;
7. The problem of interaction between segmental and suprasegmental (prosodic and intonational) means in shaping speech rhythm.

These issues have been briefly discussed in the present paper. However, these problems require a more exhaustive theoretical and historiographical study. Further research will help to show how one should incorporate the notion of rhythm as a linguistic phenomenon into a theory of language. There is no doubt that they should be oriented towards the systematic approach to verbal rhythm, using the databases of both native and non-native oral discourse. Speech rhythm is a special linguistic phenomenon permeates the entire linguistic code. Being mainly a quasi-periodical phenomenon, it is shaped by all levels of a language and all its units.

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SUMMARY

SPEECH RHYTHM AS AN ELUSIVE PHENOMENON IN RELATION TO ITS SHAPE AND FUNCTION

Speech rhythm is a striking phenomenon that permeates the entire linguistic code and can be interpreted as a fundamental hierarchically structured system which organises language and speech. The current paper is dedicated to a range of theoretical and historiographical issues, describing the nature of speech rhythm and its place in a language system. The introduction section of the research yields to a multidisciplinary property of phonetics, as well as verbal rhythmology and speech rhythm. The next part deals with the methodological framework of the paper and its certain research tasks. A major part of the present work briefly describes some issues, concerning the place of

speech rhythm in the phonetic system, its interplay between prosody and intonation, and the hierarchies of rhythm-forming units. In conclusion, the possible trends for ongoing studies are highlighted.

KEYWORDS: sound speech, speech rhythm, verbal rhythmology, prosody, intonation, historiography of phonetics, systematic approach, history of phonetic research.

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