

## Artículo de investigación

## A comparative typological description of Russian and Japanese syllables

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## Abstract

The purpose of the study is to describe the nature of Russian and Japanese syllables in terms of comparative typology and characterise manifestations of Russian-Japanese interference at the level of syllabic division. The main research methods involved are the comparative typological method, empirical method, observation method, auditory analysis method, instrumental methods, and generalisation of the obtained results.

The study yielded results at the theoretical level and at the practical level. The results of the study can contribute to solving theoretical problems of general, particular and comparative linguistics, common problems of phonetic interference as well as practical tasks of helping Japanese speakers to eliminate a foreign accent by arranging educational materials and developing effective methods to overcome phonetic interference.

**Keywords:** Comparative typology of languages, phonetics, mora, syllable, syllabic division.

## Introduction

Among linguists there is no generally accepted definition of a syllable as a unit of the sound system. The criteria, by which a sound is identified as belonging to a particular syllable, are also very diverse. The only thing that is common in all definitions is the understanding of **a syllable** as such a unit that contains a vowel (V) usually called 'syllabic peak' and a consonant (C) which can precede or follow the vowel (Bondarko, 1998).

In order to describe the syllable nature and make a further analysis, it is very important to clearly understand to what type of languages belong Russian and Japanese at this phonetic level. According to the literature on phonological typology, languages are classified as **syllabic and non-syllabic (phonemic)** ones.

V.B. Kasevich (Kasevich, 1983) indicates that the phonological specificity of **syllabic languages** is the lack of a complete analogue of the phoneme in non-syllabic languages (modern Indo-European, Turkic, Finno-Ugric, Semitic, etc.). Instead, there are units of two phonological

levels here, i.e., on the one hand, syllables and, on the other hand, their components: initials and finals. For example, in Chinese, there are syllable-level units: /pʲə̀n/, /xʷaŋ/, /la/ and initial/final-level units: /p/, /x/, /l/ and /iə̀n/, /ʷaŋ/, /a/, respectively.

According to M.V. Gordina (Gordina, 1981), linear division in **phonemic languages** has only one level: all sounding units can immediately be represented as sequences of phonemes-sounds, for example, in Russian, the word *коллективный* 'collective' can be divided into the following phonemes [къл'икт'ивный]. Further division is possible at the non-linear, structural level: it will consist in identifying the differential features of the phoneme, which is also associated with certain morphological relationships (in particular, alternations). Phonemic languages include modern Slavic, Germanic, and Romance languages. In our work, we hold to the opinion that Russian belongs to phonemic languages, while Japanese in its development is only approaching these languages.

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The next point to be considered is that a **syllable is a segmental and suprasegmental unit. In a syllable as a suprasegmental unit**, one sound is **syllabic** (or **syllable-building**), it is the syllabic peak, while the other sounds in the syllable are non-syllabic (non-syllable-building). Considering a syllable in terms of syllable formation, we can find out which sounds in different syllables can be syllabic, how they relate to non-syllabic sounds, by what parameters the syllable wave grows and weakens, that is, what are the laws of syllable formation.

A **syllable as a segmental unit** is a certain segment of the speech chain. Considering a syllable from this point of view, it is possible to determine the laws of dividing the speech chain into syllables as well as to find out the place of syllable boundaries within a word and at the word boundary (Kasatkin, 2014).

At first glance, it might seem that it is not worthwhile to dwell on these theoretical (well-known) positions and there are necessary boundaries for distinguishing between the first and second tiers; however, in Japanese, *the concepts of 'syllable' and 'mora'* are constantly and closely intertwined at the segmental and suprasegmental levels, and neither is described without the other at both levels in Japanese linguistic literature. In our opinion, this mixing makes it difficult to consider a syllable as a segmental unit.

### Literature review

In Russian linguistics, syllable issues were considered in the works of L.V. Shcherba (1957), L.R. Zinder (1979), L.V. Bondarko (1977, 1998), M.I. Matusевич (1976), R.I. Avanesov (1956), L.L. Bulavin (1970), L.L. Kasatkin (2014) and other representatives of the Leningrad and Moscow phonological schools.

The phonetic system and articulation base of the Japanese language are described in the studies of Russian scientists: M.V. Alpatov, I.F. Vardul, S.A. Starostin (2000), V.V. Rybin (2011); Japanese scientists: H. Kubozono *et al.* (2015), H. Otaka (2009); American scientist T.J. Vance (2008) and others. In these works, to one degree or another, only CV or CVC sequences are directly or indirectly described; besides, many works are concerned with the issue of mora in the Japanese language; however, in our opinion, there are still questions to be clarified in describing the nature of Japanese syllables as segmental units.

In comparison with the Japanese language, syllable problems in the aspect of Russian-Japanese interference are presented in the works of Russian scientists I.M. Loginova (2014) and V.V. Cherepko (2018).

We believe that the topic stated in this paper is still insufficiently developed.

### Methodology

The experiment conducted by us in 2015–2017 in Moscow involved 51 Japanese informants: 28 men and 23 women aged 19 to 32 years. All of them were native Japanese speakers of different dialect groups with different levels of English or other foreign language proficiency. 96% of them were students of Japanese universities and, at the time of the experiment, they were having language training at Russian universities.

The participants were asked to read two texts (one known and one unknown to them) and answer related questions. The texts belonged to different functional styles of the Russian language. Depending on the level of language proficiency, the text size ranged from 40 to 360 words. As a result, we recorded over 100 audio materials. We analysed the audio recordings of the Japanese informants using Speech Analyzer 3.1, a computer program for acoustic analysis of speech sounds, which makes it possible to work with spectrograms and oscillograms.

Other research methods included the comparative typological method, structural method, descriptive method, distribution analysis method, empirical method, observation method, auditory analysis method, instrumental methods, prognostic method (modelling method), and generalisation of the analytical results in order to detect phonetic interference.

### Theoretical framework

#### The concept of 'syllable' in Russian

In Russian, a **syllable** is a minimal pronunciation unit, i.e. the shortest segment that can be distinguished in the analysis of articulatory movements during speech (Bondarko, 1977).

In a syllable of the CV type (consonant + vowel), *the maximum pronouncing association of the consonant with the vowel* is observed: the consonant is pronounced in such a way of the speech path, which is necessary for articulating the following vowel; the pronunciation of the vowel, in turn, is highly dependent on which

consonant precedes it. In a syllable of the VC type, *both the vowel and the consonant are more independent from each other*: the vowel is articulated in much the same way as the isolated one, only a slight change is observed during the transition to the consonant articulation. The consonant also has more vowel-independent characteristics (Bondarko, 1998).

### The concepts of 'syllable' and 'mora' in Japanese

In Japanese, **syllables** are the basic units of speech production and perception, but there is no satisfactory definition of syllable articulation in Japanese phonetics (Vance, 2008).

This is due to the fact that Japanese statements are traditionally analysed as consisting of *moras* (onsetsu), *each of them consisting of a consonant and a vowel or only a vowel, or 'syllabic nasal', or 'syllabic obstruent'*. The concept of 'syllable' as a unit close in meaning to mora with a long vowel or a vowel + a 'syllabic consonant' is rarely used among Japanese linguists in descriptions of the Japanese language.

Nevertheless, the distinction between the mora and the syllable is crucial in Japanese phonetics and phonology. In native words, they coincide in most cases, for example, [na.go.ja] 'Nagoya' and [to.jo.ta] 'Toyota' consist of three syllables and three moras: each mora corresponds to a syllable. However, these two phonological units often do not coincide in many Sino-Japanese words and loanwords: the words [n'ip.pon] 'Japan' and [dʒya.pan] 'Japan' both consist of two syllables but contain four and three mora, respectively (Kubozono, 2015; Hattori 1960; Otaka, 2009).

The discrepancy between the mora and the syllable arises because *some moras cannot form syllables by themselves*. In other words, moras are divided into two types: those that can represent a syllable by themselves and those that always attach to another mora to build a syllable (Kubozono, 2015).

According to Japanese linguistic literature, both mora and syllable are important for studying Japanese phonetics; however, to understand Japanese phonology, it is important to determine the relative meaning or importance of both units rather than to make a choice between them (Otaka, 2009).

### The status of syllable and mora in Japanese

This topic is very important for understanding the issue of syllabic division in Japanese. More detailed related information can be found in the works of V.M. Alpatov, I.F. Vardul, S.A. Starostin (Alpatov, Vardul, Starostin, 2000), H. Kubozono (Kubozono, 2015), H. Otaka (Otaka, 2009).

### Syllable structure in Russian

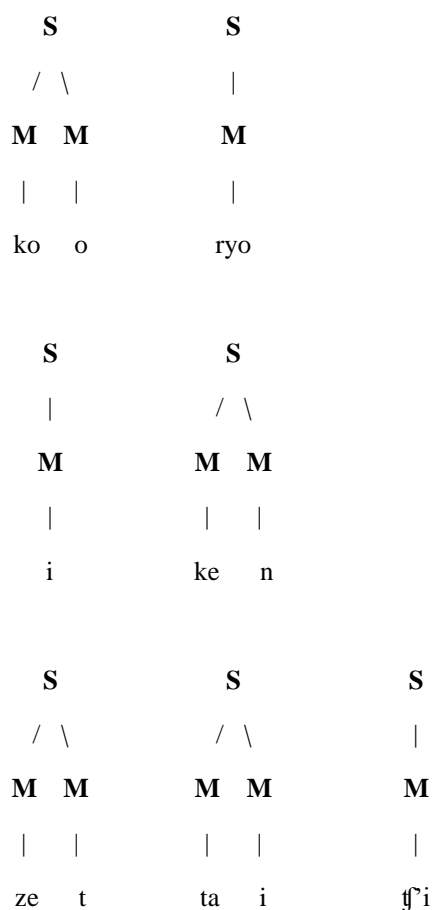
As a rule, each language has various **syllable structure types**, and sets of these types in different languages usually do not coincide, although the simplest of them — CVC and especially CV — can be considered as universals (Zinder, 1979). Thus, for example, **monosyllabic words can have the following structure**: (1) only a vowel (V): *u* 'and', *a* 'but', *y* 'at'; (2) consonant + vowel (CV): *ma* 'that one (about females)', *мы* 'we'; (3) two or more consonants + vowel (CCV): *сто* 'hundred', *вне* 'out(side)'; (4) vowel + consonant (VC): *ад* 'hell', *ил* 'silt'; and (5) vowel + two or more consonants (VCC): *иск* 'lawsuit', *акр* 'acre'. **Various combinations** are also possible: (1) consonant + vowel + consonant (CVC): *мом* 'that one (about males)', *нам* '(to) us'; (2) two or more consonants + vowel + consonant (CCCVC): *вздох* 'sigh', *срой* 'range'; or (3) consonant + vowel + two or more consonants (CVCC): *ночм* 'position', *уифр* 'cipher', etc. The above examples of monosyllabic words are convenient in that, as it seems at first glance, there is no problem in determining the place of a syllable boundary: a syllable begins with the beginning of a word and ends with its end (Bondarko, 1977).

### Syllable structure in Japanese

T.J. Vance thinks that the Japanese Tokyo language has **short and long syllables** (Vance, 2008). A short syllable consists of one mora while a long syllable consists of two moras. A Japanese short syllable must contain a short vowel and syllables that are composed of a short vowel. Words such as *e* 'picture' and *u* 'cormorant' are examples of such minimal syllables. Other short syllables consist of one consonant followed by a short vowel, as in *ha* 'tooth', or they include a consonant with a subsequent short vowel [y], as in *kyo* 'unpreparedness'. Thus, it can be said that each Japanese short syllable corresponds to the pattern: **C(y)V**. The brackets in the pattern **(y)** mean that the enclosed element is optional (not mandatory); **(y)** also shows the softness of the previous consonant (/ya/ or [j]).

A Japanese **long syllable** begins as a short syllable and ends with another vowel (*[kai]* ‘meeting’), or with a double vowel (“long vowel”) (*[hoo]* ‘way’), or with a nasal mora *[n]* (*[sen]* ‘line’), or with a mora + an obstruent (as in the first syllable *[buk]* from *[bukka]* ‘prices’). In Figure 1, as examples of short one-mora and long two-mora syllables, let us consider the

words *[kooʳo]* ‘consideration’, *[iken]* ‘opinion’, *[zettaiʳi]* ‘absolute value’ to illustrate the general way of representing the Japanese syllable and the mora structure. In the figure, each **S** denotes a syllable, each **M** denotes a mora, and lines show which moras include each syllable and which segments are included in each mora.



**Fig. 1.** Japanese syllable and mora structure (Vance, 2008)

### Syllable weight in Japanese

This topic is very important for understanding the issue of syllabic division in Japanese. More detailed related information can be found in the works of H. Otaka, H. Kubozono (Otaka, 2009; Kubozono, 2015).

### Open and closed syllables in Russian and Japanese

In modern phonemic languages, a syllable can be represented as a separate sound or consisting of

only consonants. A syllable in different languages can have a different structure, i.e. the number and arrangement of consonants in relation to the vowel. Since syllable formation is a complex issue, the syllable structure is usually determined by monosyllabic words.

In Russian, it is customary to distinguish between **open syllables** ending with a vowel (*ты* ‘you’, *для* ‘for’, *сну* ‘sleep!’, *тьма* ‘darkness’) and **closed syllables**, ending with a consonant (*ум* ‘intellect’, *нuck* ‘squeak’, *холм* ‘hill’), while the number of consonants can be different.

Depending on the beginning, there are **uncovered syllables** that begin with a vowel (*yc* 'moustache', *акт* 'act', *узр* 'of games') and **covered syllables** that begin with one or more consonants (*мы* 'we', *страх* 'fear', *как* 'how'). It follows from this definition that a syllable consisting of one vowel is both open and uncovered (Zinder, 1979; Bondarko, 1998).

Many living languages do not allow any syllables other than **open ones** (for example, Japanese); for many languages this situation was characteristic at certain periods of their history. This is exactly what happened in the history of the Russian language, where open syllables had been obligatory until **the fall of reduced vowels**. In modern Russian, the syllable of the CV type is also the most convenient for pronunciation (Bondarko, 1998).

In Japanese, a syllable without a final consonant is called **open** (*hi* 'opinion', *ki* 'key', *ni* 'two') and a syllable with a final consonant is called **closed** (*hon* 'book', *san* 'seven', *kon* 'then', [*tai*] 'sea bream') (Vance, 2008). Examples of **uncovered syllables** can be *oto* 'sound', *iru* 'be needed', *asa* 'morning'; examples of **covered syllables** are *kan* 'intuition', *rei* 'example', *bin* 'letter'.

The presence of an open syllable in the Japanese language is explained by the fact that Japanese belongs to the languages of the vocal type, which are characterised by the preservation of the law of open syllables, whereas the Russian language is classified among the languages of the consonant type, where a consonant blend is possible.

## Results and discusión

In the flow of colloquial speech, words are usually not divided into syllables, there are no boundaries between syllables, adjacent sounds both inside and between syllables are pronounced without interruption as if "flowing" one into another. It is impossible to detect these boundaries using any instruments; therefore, we cannot talk about syllable boundaries in the flow of ordinary colloquial speech. Assimilation, accommodation, co-articulation of adjacent sounds are carried out in ordinary speech regardless of where syllables will be divided under different pronunciation conditions (Kasatkin, 2014). This raises a number of questions related to syllabic division.

In Russian scientific literature, representatives of different phonological schools proposed and reviewed many scientific theories related to

syllabic division and conducted scientific experiments. L.V. Bondarko in her experimental work (Bondarko, 1998) examined these traditional syllabic division theories, which suggested dividing words into syllables according to the following criteria: (1) the duration of syllable elements in open and closed syllables (*на́на* and *на́нка*); (2) the appearance of closed syllables from the standpoint of the theory of muscular tension (*ли́пка*) and from the standpoint of the theory of rising sonority (*ды́мка*); (3) the formation of a closed syllable after the first vowel due to its stress (*на́цмы*) or the sonority of the first consonant (*ма́рку*, *озерку́*); and (4) the presence of morphemic and inter-syllabic boundaries (*ды́мок* 'thread of smoke', *ды́мка* 'mist', *ды́м камина* 'chimney smoke'). During the experiment, it turned out that all of the above syllabic division criteria that had been relevant to that period were not relevant for the current state of the Russian language. But then, which are the relevant criteria of syllabic division?

1. In the experiment, **an open syllable of the CV type is recognised as the minimal closely articulation-associated pronunciation unit**, the consonant in which is subordinate to the main element of the syllable, i.e. the vowel. Sounds included in one syllable are more closely associated with each other than sounds belonging to different syllables. The syllable of the CV type is taken as a kind of standard for the degree of association of features. The tendency to build open syllables is recognised as characteristic of the Russian language.
2. Among **the qualitative phonetic features** that could be associated with the place of the syllable boundary, of utmost importance are **the degree of change of the vowel under the influence of the consonant and the degree of change of the consonant under the influence of the vowel**.

The study of syllables of the CCV and CCCV types showed that **the commonality of articulation** is also preserved in these cases (not only in the CV sequence): at the very beginning of pronunciation of the first consonant in the combination, the articulatory tract is set up to pronounce the vowel, i.e. the syllabic peak. Thus, if the vowel is **labialised**, the rounding and protrusion of the lips necessary for pronouncing it begins simultaneously with the articulation of



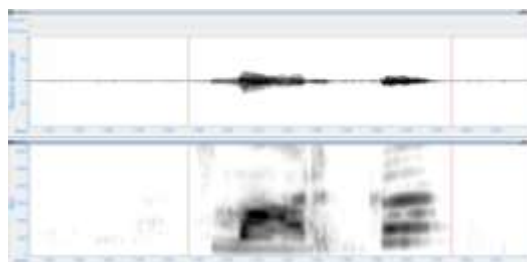
the first consonant; if the vowel is *low*, the mandible begins to lower with the beginning of the syllable, which is necessary to achieve the corresponding position of the tongue. These facts give reason to recognise that *any open syllable is a unit that is closely articulation-associated, all consonants in which are subordinate to the main element of the syllable, i.e. the vowel.*

Further in our work we would like to repeat L.V. Bondarko's experiment, relying on the basic provisions and descriptions of the experimental procedure, but not on the audio recordings of native Russian speakers used by L.V. Bondarko: instead we would make use of audio recordings of Japanese speakers studying Russian as a foreign language in order to identify areas of interference and visualise areas of deviation from the pronunciation norm of Russian speakers. The spectrograms from L.V. Bondarko's experiment on syllabic division can be found in the work of

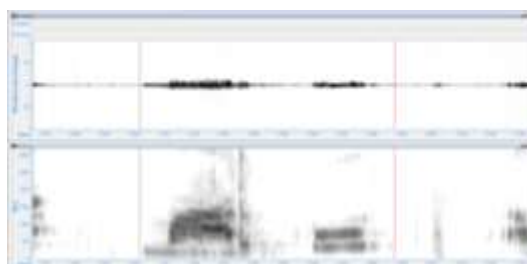
this author (Bondarko, 1998). In our work, we will consider our own examples while preserving all the requirements necessary for an experiment as to the positions of consonants and vowels.

- 2.1 In *open syllables with labialised vowels*, labialisation is characteristic of the entire syllable of the CV or CCV type, and labial articulation begins simultaneously with the articulation of the syllable. Since both consonants undergo labialisation before the labialised vowel in the CC combination, it is natural that in cases where both consonants in the VCCV sequence belong to **the last syllable containing the labialised vowel**, the effect of labialisation of both consonants — VC<sup>o</sup>C<sup>o</sup>V — will also be observed (see Fig. 2).

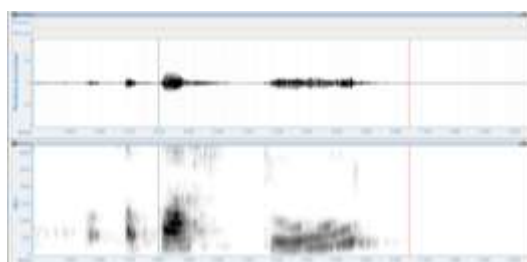
*ма́рка*



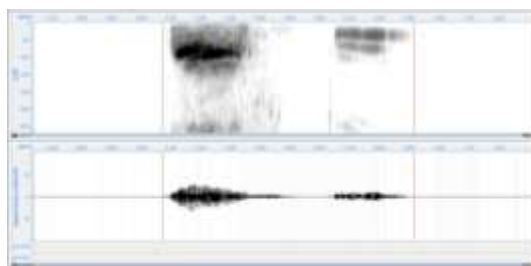
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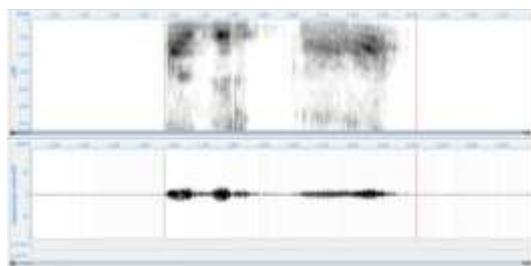
*но́сты*



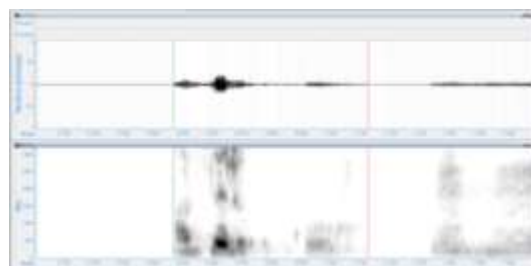
*на́сты*



озерка́



озерку́



**Fig. 2.** Labilisation of the consonant before the labialised vowel as evidence of close articulatory communication within a syllable

On the spectrograms (Fig. 2) of the words *на́смы*, *озерку́* and *ма́рку* it can be seen that the first consonant of the combination is very labialised — cf. with the spectrogram of the word *носмы*, where this labialisation is due to the strong articulatory association within the open syllable, and with the spectrogram of the words *озерка́* and *ма́рка*, where the trill sonorant is not labialised, since the next vowel is also non-labialised. Let us compare also the features of the non-labialised and labialised trill sonorant in the words *озерка́* – *озерку́*.

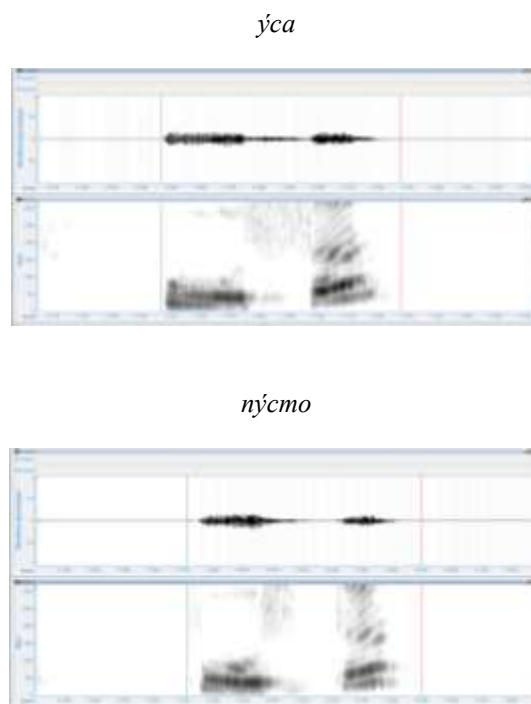
2.2 Now we shall consider cases where **the first vowel is labialised**. If in the VCCV sequence the association between the first vowel and the

2.3 consonant following it is closer, i.e. if they are in the same syllable, then the vowel labialisation should affect this consonant more than in cases where the syllabic boundary passes between the labialised vowel and the following consonant.

Let us compare the spectrograms of the two words: *yca* and *nycmo* (Fig. 3). In the first word, the consonant *[s]* indisputably belongs to the second syllable, and we can see how a gradual change in its features occurs throughout the consonant: the first third of the duration still bears some traces of the influence of the labialised vowel, and then this influence disappears. In the word *nycmo* the same picture is observed, i.e. *[s]* has the same features as the consonant from the word *yca*. Thus, we observe

a gradual delabialisation of the consonant following the labialised vowel in the words *yca* and *nycmo*, which indicates similar features of

the junction of the consonant with the preceding vowel.



**Fig. 3.** The effect of the vowel labialisation on the adjacent consonant

Thus, the position of *the labialised vowel* in relation to the combination of consonants does not affect the nature of the change, and the most powerful vowel is always the one that follows the combination of consonants, no matter whether it is labialised [y] or non-labialised [a]. Summarising all the observations, we can say that the articulatory relations of the vowel with the following consonant are always weakened, i.e. that a syllable usually ends in a vowel.

In this regard, it is necessary to clarify the arising interfering phenomena associated with the labialisation in the Russian and Japanese languages. All Japanese consonants, except for labial ones, become slightly labialised in the position before the labial vowel [o], for example, [ko → k<sup>o</sup>o] 'child, kid', [to → t<sup>o</sup>o] 'door; road, way' (Alpatov, Vardul, Starostin, 2000). However, the sound [o] in modern Japanese is slightly labialised; therefore, it cannot give a similar tone to preceding consonants. The only vowel that could be labial is [u] ([u]), but this sound is different from the Russian [y] and cannot be labialised. The vowel [u] almost lost a labial protrusion and is pronounced without lip-rounding, although sometimes Japanese authors

note its slight labialisation. In the Russian speech of the Japanese, the absence of the differential feature of labialisation transfers the Russian [y] to another phonological space of [s] and is a meaningful factor (cf.: *рук – рык, лужа – лыжа, ту – ты*, etc.). The different phonological content (different set of differential features) of the units leads to their discrepancies and to negative interference, the appearance of a phonetic accent, which must be corrected using specially selected articulation exercises focused on the Russian vowels. Of course, the spectrograms do not show whether the Japanese correctly articulate Russian labialised vowels: for this, it is necessary to have pictures of the lips during articulation.

- 2.4 The only exceptions to this rule are sequences where the first consonant of the intervocal combination is [j], which is always more strongly associated with the preceding rather than with the following vowel. This association is so strong that it is difficult to establish the boundary between the vowel and [j] in such



words as *тайна* 'mystery', *войско* 'army', *се́мя* 'seed!', etc.

- 2.5 The experimental data confirmed the reality and strength of the tendency to build open syllables in the Russian language. The analysis of the articulation and acoustic features of more complex sound sequences containing more than two consonants between vowels shows that in these cases the whole group of consonants builds one syllable with a vowel following this group, e.g.: *по-стро-и-виши́й* (*построивший* 'he who built'), *ка-стрю-лька* (*кастрюлька* 'casserole'), *встря-хнуть* (*встряхнуть* 'shake').

### Conclusions

In conclusion, we shall summarise the results of the comparative typological description of Russian and Japanese syllables:

#### a) *Theoretical conclusions:*

The minimum pronunciation unit for both languages is the open syllable (CV). In Japanese, predominantly open syllables are observed and, in Russian, there is a tendency to maintain an open syllable. Both languages have 'covered' and 'uncovered' syllables. A significant difference is observed in the number of syllable models (CV, CVC, V, VC) between the Japanese language, where only nasal [n] and sometimes final [j] are possible as the final sound), and the Russian language, where the number of models is several times larger due to possible combinations of consonants in the initial and final positions of the syllable (up to 4 consonants) and in prepositional phrases (up to 6–9 consonants). The boundaries of moras and syllables do not always coincide in Japanese; therefore, division into syllables seems difficult;

#### b) *Practical conclusions:*

The study of articulations, when phrases and sequences of phrases were pronounced, as well as examination of spectrograms of Russian words spoken by native Japanese speakers studying Russian as a foreign language showed that syllable formation occurs according to the general principle: each consonant or group of consonants is closely related to the next vowel, forming a syllable with it, which ends when the articulation of this vowel is stopped. At the same time, neither morphemic nor inter-word

boundaries (in the absence of a pause between words) prevent this syllable formation.

We would also like to note the prospect of further research in this area. *The results of this linguistic study can contribute to solving* theoretical problems of general, particular and comparative linguistics, common problems of phonetic interference as well as practical tasks of helping Japanese speakers to eliminate a foreign accent by arranging educational materials and developing effective methods to overcome phonetic interference. In addition, these materials can be used for training labour migrants (Dolzhikova *et al.*, 2018), studying gender and ethnic factors in the assessment of oral speech (Dolzhikova *et al.*, 2016), analysing the features of special discursive genres in information technology (Dolzhikova *et al.*, 2017), and compiling a model for fostering tolerance among professional text translators as part of the development of their sociocultural competence (Telezhko *et al.*, 2017).

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