

## 5.2. SYLLABIC THEORIES

The first attempt to examine syllables was made before our era by ancient Greeks, who got interested in syllabic structure of utterances in connection with the problems of rhetoric, public speeches and the art of versification.

The first reform of Russian versification – result of scientific investigations in the field of syllabic theory, was published in 1735 (Trediakovsky V.K., Lomonosov M.V.).

For a long time rare investigations of syllable were related to rhetoric and versification. Linguistic investigations of the problems of nature of the syllable, the questions of syllable structure and division of words into syllables were not studied and even neglected.

At the beginning of the 20th century the outstanding representatives of physiological experimental phonetics G. Panconcelli and E.W. Scripture wrote that the syllable was a fiction created by linguists and psychologists, that all the attempts to understand and represent it phonetically were and would remain fruitless (Panconcelli-Caltzia G., 1924)

The same point of view was expressed at that time by E.K. Kyrilovich who stated that the boundaries between the words really exist, but the boundaries between the syllables are a pure scientific obstruction.

Criticizing the points of view on a syllable as a fiction L.R. Zinder has written that the syllable, as a unity with a vowel as its nucleus, is a reality for the speakers (Zinder L.R., 1979).

At the end of the 19th and at the beginning of the 20th century the first laboratories of experimental phonetics appeared in France (Rousselot P.) and in the following Russian cities: Kasan (Bandoine de Kourtenau), St. Petersburg (Shcherba L.V.), Moscow (Artemov V.A.), Odessa (Tomson A.I.).

Syllables began to be studied with the help of electroacoustic devices and apparatuses – electric kymographs, oscillographs, spectrographs, etc. In the 1940s after the World War II new laboratories of experimental phonetics were opened in different cities of the former USSR – Minsk, Kiev, Erevan, Tbilisi, Novosibirsk and

others. Besides physiologic investigations of articulation, tension and bioactivity of the muscles participating in producing speech; acoustic peculiarities of speech units were examined, the problems of syllables began to be investigated by scientists in the former USSR and abroad. Various theories of syllable production and the division of words into syllables appeared.

One of the first theories brought up for discussion was the so-called **expiratory** syllabic theory (Sievers E.). According to expiratory theory each syllable is accompanied by an independent uninterrupted act of exhalation push. The number of syllables and the number of exhalations are equal. At the same time E. Sievers didn't reject the effect of the variations in degree of sonority.

Expiratory theory was often criticized by different scientists. It was mentioned the number of syllables and the number of expiratory pushes may coincide, but not obligatory. Experimental data proved that there were many cases when two or more syllables were pronounced within one act of exhalation.

Rather widespread, especially abroad was **sonority** theory of syllable production and syllable division. According to this theory the main characteristic feature of the syllable is sonority (Espersen A.). The most sonorous sound in the syllable forms the peak of sonority, while the other sounds in the syllable have minimum of sonority.

The theory of sonority was rather popular as it made it possible to distinguish syllables in a word. But it is to be taken into consideration that the degree of sonority of vowels varies in the different positions in the word and this theory does not help to define the boundary between the syllables in a word.

The theory of muscular tension was universally acknowledged and supported by many scientists (Fushe P., Roudet L., Shcherba L.V., Grammont M. and others).

The core of the theory of **muscular tension** was the affirmation of the leading role of pronouncing effort in the formation of a syllable. This theory was completed and logically set forth by L.V. Shcherba (1948).

According to L.V. Shcherba sounds in connected speech are pronounced with alternative intensification and slackening of muscular tension. Each peak of

intensification with the following slackening of tension forms a syllable. Sounds that are pronounced with intensification of muscular tension are termed pitch sounds.

According to L.V. Shcherba an articulatory syllable is an arc of tension. The pitch sound is the centre of the syllable and of the arc of tension. The tension in this arc is gradually increasing from the beginning to the centre of the syllable and then is gradually decreasing to its end.

It was possible to assume that sounds might have different functions in fusing a syllable into a solid, complete speech unit and in dividing words into syllables.

The base of the solution of the syllable division problem was the assumption that in defining the boundaries between the syllables in a word it was necessary to pay attention to the structure of initial and final sounds of the syllables.

L.V. Shcherba's concept of the three forms of the syllables helped to solve the problem of syllable division.

According to L.V. Shcherba's concept there exist three forms of the consonants:

- a. the strong-end consonants;
- b. the strong-beginning consonants;
- c. the strong-end/strong-beginning consonants.

At the beginning of initial consonant of a syllable the tension is weak and grows gradually up to its peak at the boundary with the syllabic vowel. Such consonants are called strong-end consonants. In final consonants of a syllable the beginning of a consonant at the boundary with the syllabic vowel is strong and the tension gradually decreases up to the very end of the syllable. Such consonants are called strong-beginning consonants (fig. 5.2).

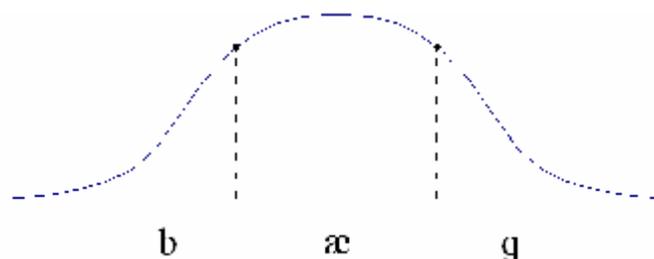


Fig. 5.2. The scheme of a syllable of the English word "bag"

At the boundary of two similar sounds a strong-end/strong-beginning or a two-peak consonant appears. The end and the beginning of such consonants are strong, a slackening of tension is observed in the middle of the syllable (fig. 5.3).

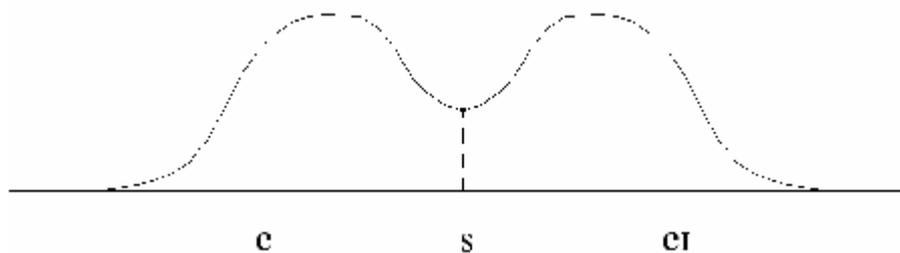


Fig. 5.3. The scheme of a syllable of the English word “essay”

One of the latest theories of syllable formation is the **energetic** theory. The concept of a syllable as an impulse of energy was taken as a foundation of this theory. N.I. Finkin was one of the first who supported the theory of syllabic energy and defined a syllable as a single portion of energy separated from another portion of energy (Finkin N.I., 1953). The syllable was defined by U.S. Stepanov as a minimal portion of energy.

The energy increases sharply at the beginning of the syllable up to its peaks and then gradually falls to the end of the syllable. Syllables are separated from other syllable by the minimal amount of energy of the end of the preceding syllable and at the very weak beginning of the following syllable.

The energetic syllabic theory is rather widespread and supported by numerous linguists (Аванесов Р.И., Торсуев Г.П., Бондаренко Л.В., Прокопова Л.И., Скалзуб Л.Г., Багмут А.Й., Бровченко Т.А., Таранец В.Г.) and many others.

The energetic theory does not deny the theory of muscular tension. There exists a direct connection between the muscle tension of the speech organs in the process of speech and the impulses of the acoustic energy.

Scientists assert that any nerve and muscular process causes energetic process. Any impulse of energy is characterised by a rising – falling structure with the peak of energy between the rising and the falling parts (Окс М., 1969; Бабий А.П., 1970; Прокопова Л.И., 1973; Борисюк И.Б., 1973; Скалзуб Л.Г., 1979, и др.).

The theory of muscular tension was universally acknowledged. The theory of muscular tension proclaimed the leading role of pronouncing effort, the alternative intensification and slackening of muscular tension. L.V. Shcherba's theory of muscular tension and the teaching of the three forms of the consonants – strong-end consonants, strong-beginning consonants and strong-end/strong-beginning consonants were very popular and made it possible to divide the words into syllables in speech.

The **energetic** syllabic theory, defining a syllable as an impulse of energy, was supported by a number of scientists. The theory of syllabic energy solved the problem of the nature of the syllable and was a reliable basis of syllable division.

But still the nature of the syllabic impulse was not quite clear and required further investigations.

In the second half of the 20th century phonetic experimental investigations applying electronic apparatuses and special computer programmes made it possible to affirm that syllables are created by a complex impulse of acoustic energy – a coordinated action of two acoustic components of intensity and duration, i.e. intensity over time (Бровченко Т.А., 1971, 1976).

$W_{tot} = A \cdot t$  (conventional units) where:

$W_{tot}$  – total acoustic energy (conventional units);

$A$  – intensity (conventional units);

$t$  – duration (m. sec).

Any of the two components of the total acoustic energy can change the volume of the energy.

An increase or a decrease in the volume of the total acoustic energy of the syllable may be achieved by means of:

- a. the changes in the intensity of a syllable;
- b. the changes in the duration of the syllable;
- c. the changes in the two components of the total acoustic energy.

Each peak of intensification of the total acoustic energy, preceded by the increase of energy and followed by its decrease, is a syllable.

To make the process of the formation of syllables more clear let us compare two syllables of equal amount of acoustic energy to two equal in weight bricks.

The intensity of the first syllable is two times as big as that of the second syllable but the duration of the first syllable is smaller than that of the second syllable, it is two times as big as that of the first syllable.

In spite of the above mentioned difference as a result of cooperation of intensity and duration the first and the second syllables become equal in the volume of the total acoustic energy (fig. 5.4).

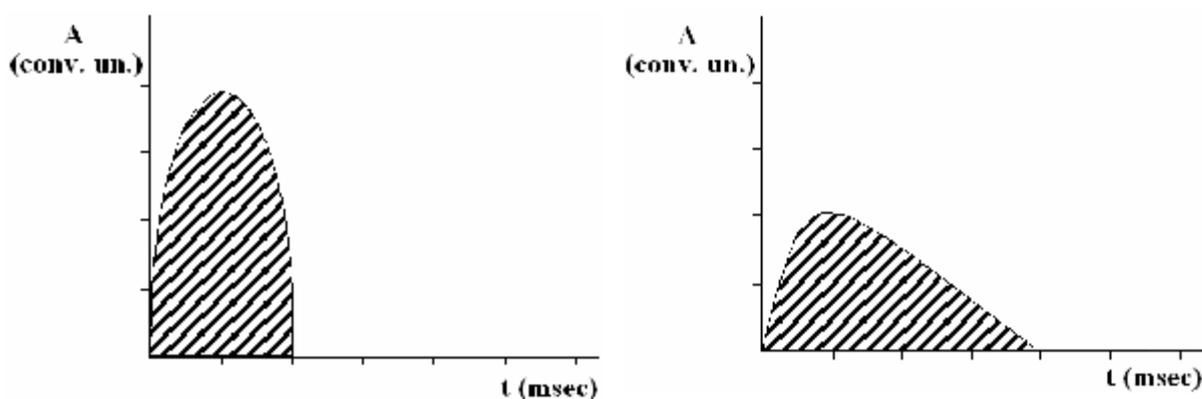


Fig. 5.4. The impulses of the total acoustic energy of the two syllables of equal total energy

The height of the first brick, which is standing upright, is two times as big as that of the second brick, which is lying straight. But the length of the second syllable is two times as big as the duration of the first syllable and consequently these two bricks are equal in weight (fig. 5.5).

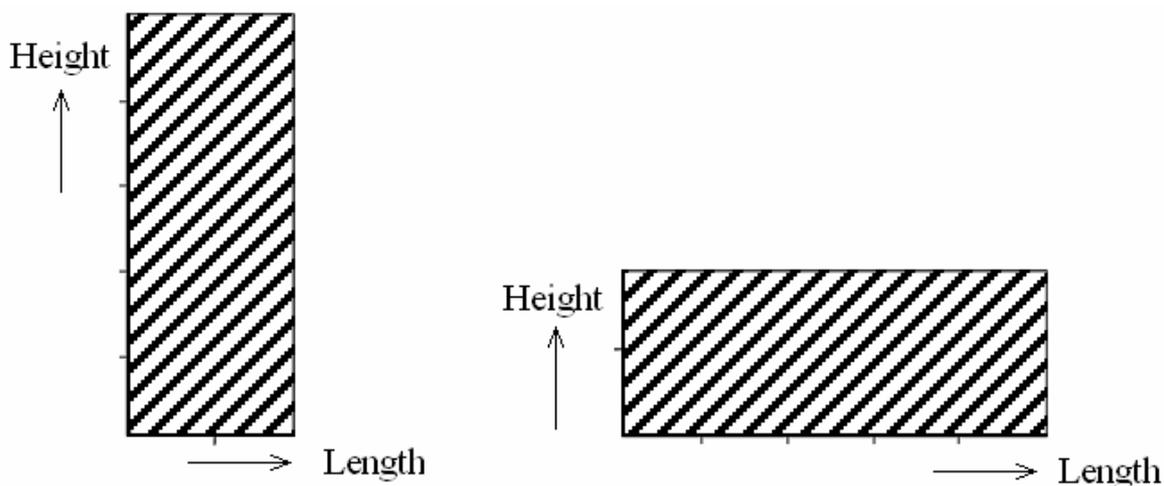


Fig. 5.5. Two bricks of equal weight in different positions (upright and lying straight)

Syllables are purely energetic speech units deprived of frequency characteristics except the inherited individual characteristics of syllabic vowels.

The impulses sent from the cortex cause alternative tension and relaxation of the speech organs: muscles, which in their turn cause the corresponding alterations in the acoustic energy, which is perceived by a human being as speech.

Taking into consideration close connection between the tension of the muscles and the acoustic energy which appear due to the tension of the articulation of the muscles during the process of speaking, it is possible to state that there is no principle difference between the mechanism of syllable division according to the theory of muscular tension and to the acoustic energetic theory. The boundary of syllable division is at the point of the weakest muscular tension and at the smallest degree of acoustic energy.

Thus, the point of syllable division between the first and the second syllables of a four syllable word of the structure CV|CV is between the glide of the first syllabic vowel and the beginning of the following consonant, e.g.

English: *better* [be | tq];  
Ukrainian: *calo* [CA | JIO].

In a two-syllable word there may be two consonants between the vowels (CVC|CV). Syllable division is at the point between the weak end of the consonant, preceding the syllabic vowel of the first syllable, and the following weak beginning of the consonant of the second syllable.

The syllable division may occur between two vowels: CV|VC. In this case it is between a weak glide out of the proceeding vowel of the first syllable and a weak glide of the second vowel.

The main principle of syllable division is universal and does not differ in different languages. But the rules of syllable division depend upon the phonetic structure of the language and therefore they may vary in different languages, in English and Ukrainian as well.

A general rising-falling form of the acoustic energetic impulse with a 200 rising part and considerably longer falling part becomes somewhat modified in

different speech units due to the positions of the word stress in a phonetic word, due to the place of emphatic or emotional sentence stress in a sense-group or a phrase, etc.

At present the problems of syllabic theory continue to be elaborated.

Experimental investigations with the help of special computer programmes made it possible to examine the nature of syllables more thoroughly, to reveal the essence of cooperation of duration and intensity – components of the main acoustic feature of the syllable – the total acoustic energy.

Experimental data received on a vast statistically reliable material of oral speech on a number of Germanic languages proved that the syllable is realised in different spheres: phonological, physiological (articulating, auditory) and acoustic.

Articulatory and acoustic characteristics of a syllable ensure its perception in oral speech.

Syllable in perception is a minimal undividable perceptual unit over time. The results of the perceptual analysis, taking into consideration the time of reaction, connected with the perception of a syllable and its parts, made it possible to assert the units of primary perception on sensory level are not phonemes but their combinations – syllables.

Elaboration of syllabic models with the support of visual and auditory aspect made it possible to control and correct the pronunciation of the learners on the level of syllables.

Elaboration of dynamic models of syllabic structures was necessary for the training of syllables and the succession of syllables with the help of technical means of education.

Linguists have long observed that many phonematic and phonetic phenomena are sensitive to the inherent weight – some syllables are treated as heavier in weight than others (Jacobson R., 1931; Allen F., 1973 and others).

Thus, in many languages closed syllables (CVC) and the syllables containing long vowels (CV:) as well as syllables with many marginal consonants in its structure

(CCVCC) are perceived as heavier than open syllables with short vowels, than syllables having one or two marginal consonants.

M. Gordon argued against the standard assertion that phonetic weight criteria varied from language to language. Survey of weight-sensitive phenomena showed the very opposite. Weight criteria are often universal for different languages and non-universal for different processes in a given language. For example, there exists a difference between weight-sensitive phenomena of English stress system and tone system. Several examples given in recent literature, showed that peculiarities of syllable and tone weight are the same in many languages.

A rather widespread idea that the phonetic weight is specific in different languages and is not linked to a definite phonetic process proved to be wrong. As a result of extensive typological survey of syllabics of approximately four hundred languages made M. Gordon to suggest that weight is not changed from language to language, as it was predicted in most contemporary theories.

Weight is more closely linked to the particular phonetic process in different languages.

Phonology and phonetics play a role in cross-linguistic variations in weight criteria.

The nature of weight is connected with the syllable auditory loudness, which in its turn is an acoustic stimulus of intensity over time, i.e. total energy, which is the main acoustic characteristic feature of a syllable.

The survey of some theories of syllable production and division given in the book is not exhaustive. Though many theories exist not all the problems of syllabic theory are solved.

Having examined various theories of syllable formation and production R.K. Potapova came to the conclusion that all the diversity of conceptions might be divided into two main types. The explorers of the first group define the syllable in the terms “part” – “a single whole” or “element” – “structure”. They analyze syllables from the sounds they consist of to the syllable as a whole, as a structured unit of speech, i.e. from bottom to top. The representatives of the second group analyze