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**THE ORDER OF STUDY OF VOWEL SOUNDS IN INTRODUCTORY
AND PHONETIC COURSES IN THE GERMAN LANGUAGE
(ON THE MATERIAL OF STATISTICAL AND DIACHRONIC STUDIES)**

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Abstract. *Most ancient vowels in the period of the birth of the German language are revealed. The phonetic structure of a single-root German word in the Old High German and Middle High German periods of the development of the German language is described. The statistical frequency of using vowels in the above periods has been determined.*

Keywords: *vowels and consonants, Old High German and Middle High German periods, frequency of use*

Proper selection of exercises and the order of its presentation is important for the rapid and proper assimilation of educational language material. The frequency of occurrence of a phenomenon in the language should also be taken into account. In other words, the frequency of occurrence of a word in a language should to influence of the order of presentation of educational material. The evolutionary component of language processes must also be considered for the correct methodological presentation of educational material. The linguistic phenomenon that first originated in the language should be considered on the first pages of a textbook or a methodological guide.

Synchronous consideration of the language without regard to its history or historical study of written records without correlation with the facts of a living language does not provide a complete picture of the language. A. Zaliznyak rightly notes that “synchronic and diachronic are just different sides of the same historical process” [3, 14]. As are underlined by L.R. Zinder and T.V. Stroeva [5, 4], in order to “understand synchrony as a process, which it really is, in order to understand the forces acting in it, and thus the true connections and correlations of elements, a historical study of the language is necessary”. An integrated approach to the study of language makes it possible to reveal the tendencies of the structural and phonetic development of a word, to reconstruct its form, extrapolating the peculiarities of a word for the pre-alphabetical period.

The purpose of this study is to identify the most ancient vowel sounds in the period of the birth of the language in the structure of a monosyllabic word in Old High German (OHG) and Middle High German (MHG).

The words in an amount of more than 20,000 obtained as a result of a continuous sampling of OHG and MHG texts were as material for the study. The

main criteria for the selection of texts were the time of creation, as well as their dialectal affiliation. The material in the study was single-root. Texts were selected so that each century, starting from the Old High German period, was represented by at least one work. Poetic and prosaic sources were used.

The Old High German period is represented by the following works:

1. Hildebrandslied (770/780)
2. Althochdeutscher Isidor (um 790)
3. Althochdeutscher Tatian (um 830)
4. Muspilli (um 870)
5. Georgslied (um 880)
6. Ludwigslied (nach 881)
7. Notker Labeo (um 950 -1022)

The selection for the Middle High German period was carried out from the following works:

1. Notker von Zwiefalten (vor 1065 – nach 1090)
2. Niebelungenlied (1190 – 1200)
3. Gottfried von Strassburg (um 1210)
4. Das buoch von guoter spise (um 1350)

The complex methodology, based on, above all, descriptive and statistical research methods was applied in the process of studying the word and its components. The need for an integrated approach to the study of the history of the language was pointed out by V. Zhuravlev “A systematic approach to the history of the language, including the analysis of the space-time characteristics of the evolving system and its elements, allows us to reconstruct successive changes in the states of this language system over time. It is based on the general scientific principles of development, causality, determinism and universal connection” [4, 15].

The probabilistic-statistical method was used to analyze the frequency of occurrence of the structural elements of words - sounds and their combinations, selected from the texts of the Old and Middle High German language [2]. Statistical processing of the initial data was carried out with the aim of identifying the most characteristic linguistic phenomena in the whole variety of continuously changing linguistic forms.

Within the word, sounds and sound combinations in different positions have a certain probability distribution, which is unknown in advance. Therefore, in this work, the empirical distribution of these elements was investigated as a manifestation of a certain random variable. It is usually assumed that this distribution obeys the normal law. When analyzing individual sounds and sound combinations within a word, the arithmetic mean value and variance were calculated using well-known formulas. Due to the large sample size, the variance value was not significant; therefore, this characteristic is not given in the tables.

The estimation of the sufficiency of the sample size was carried out according to the formula:

$$N = Z_p (1 - f) / (\delta^2 f)$$

where N is the minimum sample size, f is the relative frequency of occurrence, δ is the relative error, p is reliability, Z_p is the value of the function depending on reliability (Z_p for evaluation was assumed to be 1.96) [1].

The calculation of the relative frequency of occurrence of various structures of a monosyllabic word, as well as the frequency of phoneme combinations in various positions, was carried out by us using a specially developed computer program.

As showing by R.G. Piotrovsky, K.B. Bektaev and Piotrovskaya A.A. [1], the relative error of 20% ($\delta = 0.2$) for phonetic, phonological and grammatical studies is acceptable. The minimum relative frequency of occurrence of the main structures of the word was 0.01. In this case, the required selection size for the analysis of such structures using the above formula is 9,500 words. The latter number is smaller than the selection size used in this study. We used in each of the periods of the German language a selection of more than 10,000 words, which is sufficient to achieve the goal of the study.

In order to track the most ancient vowels, let's go to our statistical material and use the tables, which indicate the frequency of vowels in monosyllabic words in the texts of the Old High German period. In this case, the symbol C means consonant, and the symbol V - vowel.

Table 1.
Vowels in monosyllabic words in the texts of the OHG period

structure	A	i	e	o	u	ei	ou	ia	eo	iu	uo	Total:
V	1,15	1,50	1,06	1,15	1,41	0,09	0,09	1,94	1,32	1,59	1,15	12,33
CVC	10,66	8,81	6,61	3,96	2,03	1,41	0,26	2,73	1,67	1,15	3,17	42,47
CVCC	4,67	3,26	2,64	1,94	1,32	0,44	-	1,94	0,44	0,09	0,88	17,62
CVCCC	0,09	0,09	0,35	0,09	0,53	-	-	0,09	-	-	-	1,23
VC	0,88	1,94	0,53	0,62	1,06	0,26	0,26	0,18	0,18	0,18	0,35	6,34
CCVC	2,38	1,06	1,50	1,06	0,62	0,62	-	0,09	0,35	0,35	1,50	9,52
CCCVC	0,18	0,18	0,26	-	-	0,18	-	-	-	-	-	0,79
V	-	-	-	-	-	-	0,09	0,18	0,26	0,35	0,18	1,06
CCV	0,35	0,44	0,09	0,09	0,09	0,09	-	0,35	0,62	-	0,26	2,29
CCCV	-	-	-	-	-	-	-	-	-	0,09	-	0,09
VCC	0,26	0,35	0,26	0,26	0,70	-	-	0,18	-	-	-	1,94
CCVCC	0,88	0,62	0,70	0,26	0,79	0,09	-	0,44	-	0,26	0,26	4,23
CCCVC	0,18	-	-	-	-	-	-	-	-	-	-	0,18
C												
CCVCC	0,09	-	-	-	-	-	-	-	-	-	-	0,09

C														
Total:	21,67	18,24	13,92	9,34	8,37	3,17	0,70	8,11	4,76	4,05	8,02	100		

The most common sound in Old High German is a (21.67%). The second place in the frequency of occurrence is i (18.24%). Then follows vowel e with 13.92%. The vowels o and u occupy the 4th and 5th positions (9.34% and 8.37%), respectively. The number of appearance of the remaining sounds is much less.

Table 2.

Vowels in monosyllabic words in texts of the Middle High German period

structure	u	e	o	i	a	ü	ö	iu	ei	ie	ou	uo	ua	ou	Total:
CV	0,32	0,48	0,48	0,56	0,48	0,08	-	0,40	0,32	0,40	0,08	0,32	-	0,08	3,94
CVC	1,69	4,34	4,74	6,18	9,08	0,88	0,08	0,72	3,13	2,25	1,45	1,45	0,56	0,96	37,43
CVCC	3,13	4,18	2,33	4,74	6,59	0,08	0,24	0,16	1,20	1,61	0,16	0,64	0,08	0,32	25,38
CVCCC	0,32	0,64	0,08	0,56	0,32	0,08	-	-	0,08	0,08	0,08	-	-	-	2,25
CVCCCC	-	0,08	-	-	-	-	-	-	-	-	-	-	-	-	0,08
VC	0,40	0,40	0,08	1,04	0,96	0,24	-	0,24	0,40	0,16	0,48	-	-	0,16	4,50
CCVC	0,88	1,85	1,12	1,77	2,81	0,16	0,08	0,16	1,85	0,88	0,32	1,04	0,08	0,16	13,09
CCVC	0,16	-	-	0,40	0,24	-	-	-	-	-	-	-	-	-	0,80
V	-	-	-	-	-	-	-	0,08	0,08	0,08	-	-	-	-	0,24
CCCVCC	-	-	-	-	0,16	-	-	-	-	-	-	-	-	-	0,16
CCCV	-	-	0,08	-	-	-	-	-	-	-	-	-	-	-	0,08
CCVCCC	0,08	-	-	0,08	-	-	-	-	-	-	-	-	-	-	0,16
VCCC	-	0,16	-	-	0,16	-	-	-	-	-	-	-	-	-	0,32
CCVCC	0,72	0,88	0,48	0,96	1,85	-	-	0,16	0,16	-	-	0,32	-	0,08	5,54
VCC	0,40	0,72	0,16	1,04	0,56	-	-	-	-	-	-	0,32	-	-	3,13
CCV	0,08	0,32	0,48	0,40	0,40	-	-	0,16	0,32	0,48	0,08	0,16	0,08	-	2,89
Total:	8,11	13,98	9,96	17,67	23,61	1,53	0,40	2,09	7,55	5,86	2,65	4,18	0,80	1,77	100

The table shows that the most common vowel sound is a (23.61%). The next in frequency is i (17.67%). In third place in terms of numbers comes e (13.98%). As for the labialized vowels o and u, the sound o is more common, although the difference between them is insignificant and amounts to slightly more than 1%. All diphthongs are significantly inferior to monophthongs (in each case not more than 8%). Umlauts represent the smallest group compared to the other vowel sounds and in each case do not exceed 2%.

It should be noted that secondary umlauts appear in the German language only in the Middle High German period. This means they are the youngest. This is confirmed by the numerical data of our study.

Basing on the triangle of German vowels (Fig. 1), one can suggest that the vowel of the lower lifting appears. Over time, the vowel of the upper lifting appears. The further development of variability leads to the action of the average lifting and the appearance of sound e. All other sounds, according to our calculations, appear much later.

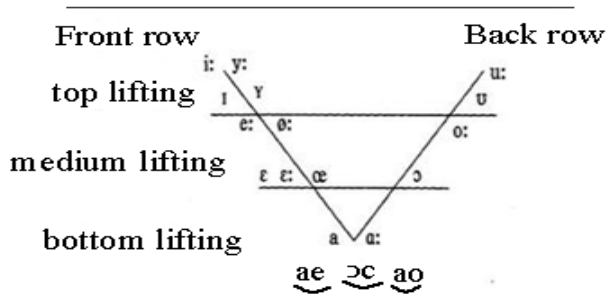


Figure 1: Triangle of German Vowels

Conclusions

1. More frequency vowel sounds have appeared In the German language earlier than others vowel. In order of the primacy of their origin, these sounds can be arranged in the following order: 1. a; 2. i; 3. e; 4. o; 5. u; 6. diphthongs; 7. umlauts.

2. Since the first sounds are always the ones that are more convenient to pronounce, we conclude that during the occurrence of speech it was most convenient for a person to pronounce vowels of low lifting. Later, the vowels of low lifting are contrasted with the vowels of the upper lifting. Vowels of the medium-high lifting appear at a later stage of language development.

3. Since diphthongs have more complicated articulation than monophthongs, the time of their occurrence can be attributed to a later period, which is confirmed by our corresponding statistical data.

4. The youngest among all the sounds are umlauts that appeared in the Middle High German period of language development. Our statistical analysis confirms this fact.

5. The frequency of occurrence of sound, although it does not give an accurate picture of the time of its occurrence, is, however, an essential tool for a comparative analysis of the age of the objects analyzed.

6. In introductory and phonetic courses of German, vowel sounds should appear in the following order: 1. a; 2. i; 3. e; 4. o; 5. u; 6. diphthongs; 7. umlauts.

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