



## Regularities of the English consonantal clusters development

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### Abstract

The paper presents the results of a complex study of consonantal phonemes' syntagmatics, registered at the beginning, in the middle and at the end of the word throughout the historical development of the English language. The analysis of frequencies of consonantal clusters' actualization allowed the author to characterize the regularities of their occurring within the word structure as well as describe dynamics of their changes during the history of English. The following issues common for different languages are the main aspects for consideration of the problem elaborated in the paper: the emergence of new phonemic sequences (combinability), the occurrence of phonemic changes at the beginning, in the middle and at the end of the word, the emergence of new phonemes and phonologization processes of the already existing ones, new functional load of phonemes and their ability to combine, the suitability of consonants to join new clusters, the study of the phenomenon of phonemic borrowing, substitution processes, the study of the consonantal clusters' structures as well as frequencies of their occurrence. The research methodology is based on the classification of linguistic features of consonantal clusters as well as envisages their description in correlation with the historical period of the feature manifestation, the position of the cluster in the word, the number of phonemes in a cluster, the ratio of voice and noise, the place and manner of consonant articulation.

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## 1. Introduction

In present-day linguistics, the problems of consonantal phonemes' syntagmatics continues to be in the focus of Indo-European and Germanic languages studies (Gamkrelidze & Ivanov, 1995; Grønnum, 2005; Haugen, 1950; Hyman, & Plank, 2018; Moradi & Chen, 2018; Park, 2020; Perebyjnis, 1970; Plotkin, 1967, 2006, 2008; Prokosh, 1954; Raevskii, 1962; Sigurd, 1965; Vasko, 2006; Wiese, 2000; Ulbrich, Werth, & Wiese, 2018), whose results and the acquired knowledge open up new prospects of further diachronic research in phonology and phonotactics of different types of languages.

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### *1.1. Literature review*

It is absolutely necessary to point here that in the course of research of consonantal phonemes' syntagmatics, the scholars dealt with various issues of this problem having elaborated them to various degrees. In particular, the representatives of different linguistic schools and circles explained the combinability of phonemes, their possible sequences and number in clusters (Prague Linguistics Circle); the position of the phoneme in a word and its interaction with adjacent phonemes (Copenhagen School of Linguistics); classification of consonants according to their localization in the syllable (Fischer-Jørgensen, 1995); the role of sound environment and the reasons of phonemic changes in syntagmatics (Rask, 1830); combination of phonemes in ancient Indo-European languages and Proto-Indo-European (The School of Neogrammarians); segmentation of the utterance into sounds being the embodiment of phonemes, defining their distribution and the language modeling on the basis of sound sequences and their position in a word (The School of Descriptive Linguistics); combination of stressed and unstressed vowels with consonants in the language (The Moscow Phonological School); distribution of vowel and consonant phonemes in related and non-related languages (The Petersburg (Leningrad) Phonological School); actualization of bi-phonemic clusters in modern Ukrainian (Muravytska, 1966).

The results of these issues consideration have shown that the regularities of phoneme syntagmatics are extremely diverse and specific to the languages of the world and largely depend on typological characteristics of each language.

Thus, the topicality of the undertaken study is conditioned not only by the demands of linguistics to define universal articulatory-and-perceptive regularities of phonemic compatibility, their changes and factors that influenced the English language development, but also by the present-day tendency to deepen phonological research of the problems of consonantal phonemes' syntagmatics at various stages of the English language historical development. In view of this, the objective of the present research is to define and characterize consonantal phonemes' syntagmatics in Old, Middle and Modern English periods of the development of the English language.

### *1.2. Research questions*

To achieve the objectives stated in the paper, it was necessary to study, in the first place, different scientific ideas on the linguistic status of the phoneme as an object of linguistic research viewed from the stand point of its interaction with other phonemes located at the beginning, in the middle and at the end of the word, as well as taking into account the ability of the human psyche to generalize the anthropophonic properties of the known invariant of the word.

Following the interpretation of the phoneme and the synthesis of theoretical ideas and scientific notions on relation between the sound and its meaning, given by Kalyta (Kalyta, 2001, pp. 46-48), as well as using the method of matrix analysis of the content of existing interpretations of the "phoneme", its definition necessary for structuring the procedures of our further experimental research was offered.

Thus, in the research the phoneme is viewed as a minimal linguistic unit that accumulates in itself speech sounds manifestations and acquires within a word an unambiguous content integrity due to the joint influence of semantic features. These features, emerging as a result of the phoneme interaction with other phonemes located at the beginning, in the middle and at the end of the word, and due to the ability of the human psyche to generalize the anthropophonic properties of the known invariant part of the word, provide the speaker with the ability to adequately produce and the recipient to correctly decode definite variants of its content actualization.

The elaboration of theoretical grounds for the study of consonantal syntagmatics in English proves the expediency of its considering within three traditional periods of the language development, namely Old

English, Middle English and Modern English. The research results presented below are structured according to the localization of consonantal clusters in the word in correlation with the historical period of their functioning. Besides, the consonantal clusters typical of each period and their combinability are described taking into account the influence of leading complexes of various factors. The lingual factors, in particular, include structural (changes in the paradigmatic system of phonemes, and, as a result, changes in phonemic oppositions), functional (increase in the number of linguistic units – morphemes and lexemes, whose sound forms adopted new phonemes) and anthropophonic (the ability of the articulatory-and-perceptive apparatus of a person to produce newly formed phonemes) factors. A set of extra lingual factors considered in the paper comprise geographical, political, military, migratory, regional, economic, religious, ethnic, socio-legal, cultural, international, technological and other factors, etc., that caused the changes in the English language in general and in its phonological system in particular.

## 2. Methodological background of the research

### 2.1. *An overview of scientific ideas on the consonantal phonemes' syntagmatics*

The carried out analysis shows that with the lapse of time as a result of the gradual deepening of theoretical knowledge regarding a number of phonological phenomena, the paradigmatic analysis of various scientific directions and approaches became of particular importance. Thus, syntagmatics as a branch of linguistics was clearly separated from paradigmatics (Panov, 2004, pp. 17-29; Saussure, 1959, pp. 124-127). In view of this, it was accepted (Yartseva, 1990, p. 447; Selivanova, 2006, p. 650) to consider syntagmatics as one of the aspects of the language system study and as the analysis of successive units in their direct combination in the speech flow or in the text. It is also conventional to oppose syntagmatic aspect of studying the language to paradigmatics.

Linguists, as a rule, specify that syntagmatics is not that often defined as a study of syntagms. It is rather viewed as the study of syntagmatic types of relations, i.e., the "horizontal" relations between the units of language (as opposed to paradigmatic or "vertical" relations, studied by paradigmatics).

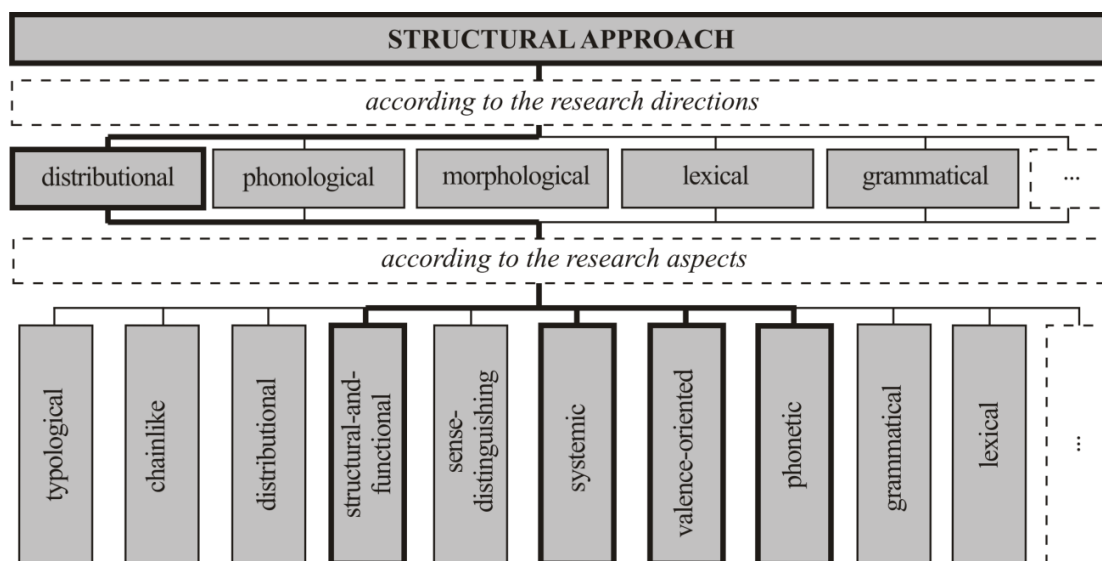
According to Saussure (Saussure, 1959, pp. 123-127), the system of language in real circumstances of its existence can be characterized by two types of relations: syntagmatic and associative or paradigmatic ones. He considered syntagmatic relations suitable for examining the language since they rely on a linear nature of the language with its continuity, unidirectional flow and consistency.

The elements of language and speech form, as is known, a certain chain, whose successive elements build up the syntagm. It is within the syntagm that its elements enter into syntagmatic relations, i.e., the relations that characterize the connection of adjacent units, and are defined by their contrast, opposed to the previous or following element within the syntagm or to both of them at the same time.

It is the distribution that reflects syntagmatic relations between linguistic units. Distribution allows the scholar to identify the language elements, determine their belonging to certain taxonomic classes and reveal the regularities of their combinability typical of each language (Vasko, 2004, p. 42).

Proceeding from a well-known paradigmatic scheme of the analysis of linguistic scientific approaches (Kalyta, 2001, pp. 18-24) the following stipulations were made. Firstly, according to the present-day linguistic terminology, a so-called formal approach can be denominated as a "structural" one. In accordance with the methodological requirements of the above-mentioned work, all other approaches should be subdivided into certain directions and aspects of the research carried out within the framework of the designated structural approach. Secondly, just like in other areas of scientific knowledge, the use of the elements of the functional analysis should inevitably be reflected in the names of definite directions and aspects of the syntagmatic research.

In view of the stated above, a fragment of the scheme was formed (Fig. 1). It presents various directions and aspects for carrying out the research in the field of syntagmatics, whose boundaries are restrained by the paradigm of a structural approach (Burka, 2015, pp. 576-580).



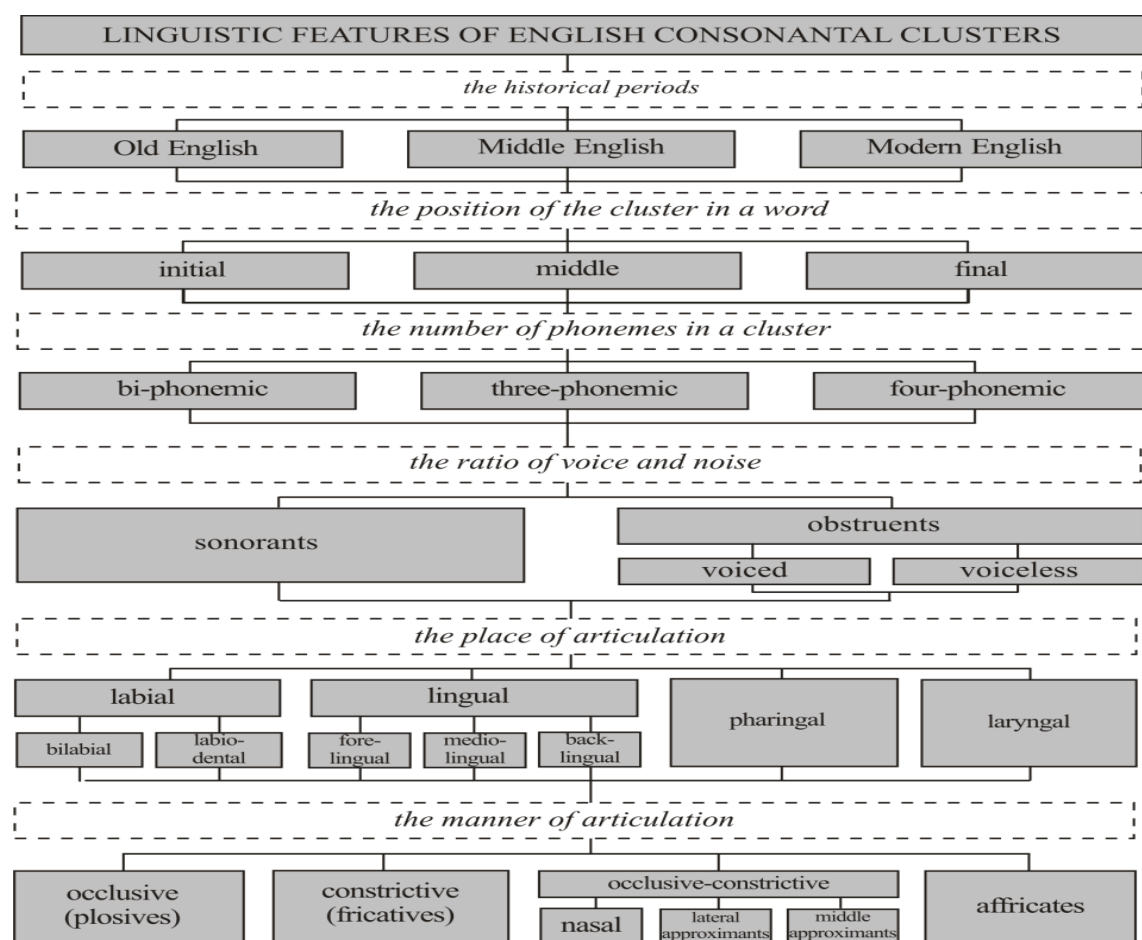
**Figure 1.** A fragment of the scheme of directions and aspects of conducting syntagmatic studies within the framework of a general scientific structural approach

As it is seen from the figure, the rational minimum of the aspects necessary for a systematic scientific consideration of the consonantal phonemes' syntagmatics in English comprises systematic, structural-and-functional, valence-oriented and phonetic aspects of the distributive direction of the structural approach.

## *2.2. Methodological tools for studying the consonantal phonemes' syntagmatics*

The next step of the study presupposed the substantiation of a step-by-step logic of carrying out all the scientific procedures. This algorithm allowed us to empirically identify the inventory of consonantal phonemes, described according to their position in the word (initial, middle, final) and in correlation with the historical period of the English language development (Old English, Middle English and Modern English periods).

Then the classification of linguistic features of consonantal phonemic clusters was built up (Fig. 2). It served as a theoretical and methodological tool for performing a clear structuring and an adequate terminological description of the results of the study of syntagmatic changes within the subsystem of English consonants (Burka, 2017, pp. 28-31).



**Figure 2.** Classification of linguistic features of consonantal clusters applied in the study of their changes in the course of the English language development

It is believed that the outlined methodological grounds, research procedures and given classification of linguistic features of consonantal clusters can serve as a reliable theoretical tool for studying consonantal phonemes' syntagmatics throughout the development of the English language as well as may be applied in similar research of other languages.

### 3. Results of the analysis of consonantal phonemes' syntagmatics in English

In the course of the empirical study it has been found out that throughout its history syntagmatics of the English language did not remain unchanged, but just like the system of phonemes, it underwent a number of transformation processes. Since the regularities of consonants interaction within the clusters differ from their interaction with other elements of the word, they have been given special scrutiny within our study. Therefore, the inventory of consonantal clusters in their initial, middle and final word positions was analyzed.

The ability of phonemes to vary depending on their position and phonemic context made us also consider the regularities of their syntagmatics due to the reasons causing the possibility or impossibility of their compatibility on the basis of a traditional analysis of the phoneme articulatory characteristics. To make an objective evaluation of the study results, a known assumption was made that combinatorial restrictions are dependent to some extent on physical capabilities of the organs of articulation, since it is impossible to pronounce an unlimited number of consonant phonemes not being divided by vowels. To describe the structure of clusters, first of all, the place of each phoneme in these clusters was determined, considering the position of the consonant in relation to the vowel.

According to the research, the position of consonantal clusters at the beginning of the word turned to be the most stable one and uncomplicated either by syllabic or morphemic boundaries. Besides, the initial clusters function as a marker that distinguishes words boundaries.

### *3.1. Consonantal phonemes' syntagmatics typical of the Old English period*

The results of studying quantitative and qualitative characteristics of consonantal clusters in the Old English period make it possible to generalize the regularities of the changes in their syntagmatics that took place during that historical stage of the language development.

According to (ASD), the Old English period was characterized by 19 initial clusters /bl, br, fr, gl, gr, hl, hr, hw, sk, sl, sm, st, sp, sw, tr, tw, wr, θr, θw/. The analysis of these clusters' functioning (Burka, 2018, pp. 77-80) allows us to state that throughout the Old English period the consonant /b/ easily combines with the sonorants /l/ and /r/, though /br/ is twice as frequent. It is also worth noting that the cluster /br/ was mentioned in 1653 by J. Wallis as a frequent one due to its associative meaning of abrupt and, as a rule, loud or unpleasant breakage or splitting into pieces, e.g., break, breach, brook.

Thus, it is worth pointing out that throughout the Old English period, the combination of an obstruent consonant /b/ with sonorants /l/ and /r/ at the beginning of the word remains as the most frequent one with the predominant use of /br/ unlike other historical periods. Similarly, the obstruent consonant /f/ is registered to cluster with the sonorant /r/, while /g/ has a better ability to combine with the sonorant /l/ rather than with /r/.

The study of the functional specificity of the clusters /hl/, /hr/ and /hw/ revealed the highest frequency of the combinability of /h/ with the sonorant /r/. In view of this, there was the assumption (Chubrykova, 1967, pp. 28-29) according to which each letter in the Old English period was represented by a certain phoneme. Besides, Ya. Fissak did not include these clusters into the chart of Old English initial clusters, referring to their monophonemic interpretation by J. Vachek (Vachek, 1964, p. 29).

It is also known that in the language system there develops a class of voiceless sonorants which, unlike their voiced correlates, does not cluster with other phonemes. Besides, the phoneme /m/ turns out not to have its voiceless correlate. Considering that voiceless sonorants might be in their nature a consonantal cluster of a voiced sonorant with /h/, it becomes clear why /m/ has no voiceless pair. It can be explained by its ability not to combine with any consonant but /s/ at the beginning of the word. In their turn, the phonemes /r/, /l/, /n/ cluster with /k/ and /g/.

Considering the mentioned above, it makes sense to emphasize that, first of all, in modern English sonorants do not have a division into voiced and voiceless, since in their production voice prevails over noise. Secondly, it becomes clear that from the articulatory point of view the sonorants are the consonants, while according to their acoustic characteristics they are closer to the vowels.

The results of our further analysis reveal that in the Old English period the fricative /s/ has the best ability to clusters at the beginning of the word (/sk, sl, sm, st, sp and sw/) with a predominance of /st/ and /sw/. Generally, in the Old English period, there were two types of combinations with the fricative /s/: fricative + plosive: /sk/, /st/, /sp/ and fricative + sonant: /sl/, /sm/, /sw/. In addition, at the beginning of the Old English word, the plosive /t/ can combine with the sonorants /r/ and /w/ with the predominance of the cluster /tr/.

A special attention should be paid to the status of the cluster /wr/. Assuming that in /wr/ the phoneme /w/ is a semi-vowel, then in the Old English period there was such a model of the phonemic combination as "semi-vowel + sonant". However, this model was supposed to be unstable or inconsistent since it did not fit the entire system of consonantal clusters. This inconsistency is confirmed by the disappearance of the cluster /wr/ at the word initial position in the 17th century. This fact substantiates the stated above

assumption that in the Old English period each letter corresponded to a single phoneme, except for the assimilated  $sk > \int$ .

Among the word initial three-phonemic consonantal clusters (/skr, spr, str/) the combination of /skr/ was registered as a prevailing one in the Old English period.

The phonemes /s/ and /r/ do not cluster with each other, while having high combinability potential with other phonemes. It is an interesting fact that in the present-day English there is still a limited clustering of /r/ with /s/, which can be explained by the articulatory similarity of these phonemes, which, according to the Werner's law, resulted in the shift of  $s > z > r$  in the West Germanic and North Germanic languages.

The Old English period is characterized by the word initial functioning of the graphic representation <schr> of a bi-phonemic /ʃr/ cluster. For a better understanding of these phonemes syntagmatics, one must take into account certain historical processes occurring in the language. For instance, while referring to the history of the language, the ability of the phonemes /ʃ/ and /r/ to combine can be explained by the fact of the phoneme /ʃ/ emergence from the cluster /sk/. Due to this, /ʃ/ could be combined only with the phoneme /r/ being the only one capable of joining the three-phonemic cluster as its third element, provided the second element was /k/. It is also not difficult to justify why /sk/ clustered only with /r/, since the phoneme /k/ in the bi-phonemic clusters was registered only in combinations with /n/, /l/ and /r/.

As to the phonotactic possibilities of Old English consonants, the lateral /l/ and medial /r/ approximants were qualified as the ones having the highest combinability with other phonemes, unlike nasal sonorants /m/, /n/. However, the phonotactic possibilities of /l, r/ and /m, n/ practically equals when /k/, /g/, /h/ drop out before /n/ in the Old English period.

In the mid position of the Old English words the plosives /b/, /d/ and /p/ have a greater ability to cluster with the sonorants than with other fricative or plosive consonants. In their turn, the obstruent consonants /f/, /k/ and /g/ are quite active in combinability with both obstruent and sonorant phonemes, while the obstruent consonant /h/ can cluster with the sonorant /l/ and the obstruent consonants /g/ and /t/.

For instance, the lateral approximant /l/ combines with the plosive constrictive /t/, fricative /s/ and the nasal sonorants /n/ and /m/; the nasal sonorant /m/ tends to a better combinability with /n, l, r/ (/mn, ml, mr/), while the nasal /n/ clusters with other sonorants: /nl, nr, nw/ as well as with the obstruent consonants: /nk, nd, ns, nt/. Similarly, the sonorant /r/ may combine with other sonorant phonemes /rl, rm, rn and rw/ and with the obstruent consonants (/rk, rd, rf, rg, rh, rp, rð, rs, rt/), while the sonorant /w/ clusters with /l, /n/, /r/ and with the obstruent consonants /d/ and /s/.

The fricative phoneme /s/ has the best ability to combine in the mid word position, while the consonant /t/ better combines with the sonorants (/tl, tn, tr, tw/) than with other obstruent phonemes (/tf, ts/). The fricative phoneme /ð/ has a high frequency of combining with the sonorants /ðn, ðm, ðr, ðl/ as well as with some obstruent phonemes /ðg, ðs/.

The Old English period is characterized by the largest number of three- and four-phonemic consonantal clusters in the middle of the word: /fsk, gst, gsw, htn, ldr, ldt, lsp, lst, ltr, mbr, mpd, mpr, mst, nkg, ndf, ndl, ndn, ndr, nsp, nst, nsw, ntl, ntr, rdl, rdn, rft, rgd, rhl, rht, rðl, rðr, rsc, rst, rtn, rwn, spr, stl, stm, stn, str, wtr, wtl/ /lstr/, /ndbr/, /ndwr/, /rgsk/, /rgst/, /rhtn/, /stsk/. The combinations of /ndl/ and /str/ were also registered as the most frequent three-phonemic consonantal clusters.

Both at the end and at the beginning of the Old English word the phoneme /r/ has the highest combinatory potential. The phoneme /l/ expands its combinatory abilities due to clustering with the alveolar constrictive plosives /t/ and /d/. However, among the word final consonantal bi-phonemic clusters, /kn/, /ht/, /ng/ /nd/, /ld/, /st/ are registered as the dominant ones.

In the course of the analysis of the consonant phonemes' syntagmatics typical of the Old English period, there were also registered some cases of the usage of digraphs, i.e., two consonant letters representing one sound, as well as pointed at the inconsistencies or some difficulties in interpretation of the graphical correlation between the consonant and its sound (see the Table 1).

**Table 1.** Graphic presentation of some Old English consonants in writing

Phonemes	Graphemes and digraphs	Examples
/k/	<c>, <ch>	Cearcern (a prison); Ceastra (cities); Cent (the country of Kent); Ceorfan (to carve, cut, engrave) (ASD, 301); Chor(dance) (ASD, 302); Cynemæresford (Kempsford); Cyningdom (A kingdom) (ASD, 311);
/θ/	<þ>	Brylen (Three threads) (ASD, 741); Þry, Þryæ (three); Þeowrigende (Threatening) (ASD, 731);
/g/	<g>, <cg> to indicate /gg/	Gleam (a gleam, splendour) (ASD, 386); Hræge (a doe, goat); Hrægel (Clothes) (ASD, 416); Sceaced (Full of hair, shaggy) (ASD, 531); Secgan, Seggan (to say, relate, tell) (ASD, 548);
/j/	<g>, <i>	Geong (young) (ASD, 369); lunga (a young man, a youth) (ASD, 432);
/w/	<w>, <u>	Hwæcca (A hutch, chest) (ASD, 416); Cuellan, Cwellan (to kill) (ASD, 308).

It is apparent that in the Old English period, the phoneme /k/ was represented in writing by <c> or a digraph <ch>. The consonant /g/ had a similar graphical presentation: either by the grapheme <g> or by the digraph <cg>. The medial approximants /j/ and /w/ also had the two variants of their graphical representation, i.e., by the graphemes <g> and <i> and <w> and <u>, correspondingly.

The analysis of consonantal syntagmatics proves that, unlike the general linguistic belief that final consonantal clusters are the mirror reflection of the word initial clusters, a so-called mirror effect extends only to the manner of the clusters' articulation but not to the place of their articulation.

Thus, the immediate changes of the Old English consonantal system comprise: the splitting of the guttural consonants into the velar and the palatal ones; dropping of /j/ in the middle of the word after all the consonants except for /r/, providing the previous syllable is long; dropping of the intervocalic /h/ after the consonant before the vowel as well as after the vowel before the voiced consonants, namely /l/, /r/, /m/, /n/. The major extralinguistic factors that influenced the changes in the consonant phonemes' syntagmatics in the Old English period include the invasion of the Celtic settlements by the Germans as well as the introduction of Christianity in Britain, which led to the increase of Latin borrowings in the Old English language.

In summary, the calculations of the frequency of consonantal clusters functioning in all word classes of the Old English indicate the following percentage of their usage in different word positions: 25.7% at the beginning of the word, 50.5% in the middle of the word and 23.8% in the word final position.

Within the subgroup of bi-phonemic clusters that functioned during the Old English period the following quantitative distribution of their varieties were registered: 10.8% are typical of the beginning of the word, 62.5% – of the middle of the word and 26.7% characterize the word final position. The study of the possible number of consonants in their clusters shows that in the Old English period the two-phonemic clusters comprised 86.9%, the three-phonemic clusters covered 11.9%, while the four-phonemic clusters were the least frequent (1.2%).



In general, the Old English period should be considered as the beginning of the syncope (fallout) process in the word endings, which is the result of the stress fixation on the first (root) syllable yet in the pre-writing period, so the clusters with the inflections attached after the syncope cannot be considered as the stable ones. Due to irregularity of the process of vowels reduction after the stressed syllable, it has been observed that in the first place the long vowels were reduced to the short ones (the quantitative reduction); short vowels were reduced to /ə/ or /ɪ/ (the qualitative partial reduction) or they were completely reduced, i.e., they dropped out (the full reduction). The end of the root is often singled out by a syllable boundary, which leads to a higher possibility for the phoneme combinability as compared with their position at the end of a word. As a result, the final root consonants acquired diversity. Consequently, the changes in the consonant subsystem started at the end of the Old English period and continued in Middle English only after the paradigm of the vocalic subsystem expanded to its maximum (24 vowel phonemes).

A qualitative picture of the consonant clusters functioning in the Old English period shows that the most common combinations at the beginning of the word were the following: /br/, /gl/, /hl/, /hr/, /hw/, /sk/, /sp/, /st/ and /sw/ as well as a three-phonemic cluster /skr/. Among the bi-phonemic consonant clusters, which were the most recurrent in the middle of the word, the following ones: /dn/, /ht/, /ld/, /nd/, /nt/, /rg/, /rn/, /rw/, /sk/, /ts/ were distinguished; among the three-phonemic clusters, the combination of /ndl/ and /str/ dominated. Bi-phonemic clusters /ld/, /nd/ and /st/ were the most frequent at the end of the word.

### *3.2. Consonantal phonemes' syntagmatics typical of the Middle English period*

The study of the actualization of the clusters starting with /f/ has revealed that the Middle English language is characterized by an increase in the number of its clusters. Among the registered clusters /fr/ and /fl/ the last one was not typical of the previous period of the English language development. The equal frequency of /fr/ and /fl/ occurrence at the word initial position in Middle English indicates their equal value in the English phoneme system.

The analysis of bi-phonemic clusters beginning with the obstruent consonant /k/ enabled us to register an equal proportion of /kl/ and /kr/ clusters. In addition, the <ch> digraph, which was absent in the Old English period, started to be widely used at the word initial position in the Middle English period.

As for the combinatory potential of the consonant /g/ at the beginning of the word, it is claimed its better ability to cluster with the sonorant /l/ rather than with /r/ in the Old English period. In Middle English, the maximum proportion in the usage of these bi-phonemic clusters is accounted for /gr/, whose frequency increases threefold as compared to the Old English period. Besides, it started to be used in those words that denote a general meaning of something "unpleasant", "large" or "cruel".

In the Middle English period, the frequency of /hl/ and /hw/ is considerably reduced in comparison with the Old English period, while one of its most frequent clusters /hr/ was not registered in the Middle English period at all. It is noteworthy that only in Middle English there appeared the cluster /pr/ and the grapheme <qv>, which in the Modern English period was transformed into a <qu> digraph, used as a cluster /kw/.

The number of initial clusters beginning with /s/ varies in the ascending direction from six in Old English (/sk, sl, sm, sp, st, sw/) to seven in Middle English (/sk, sl, sm, sn, sp, st, sw/). It is also worth noting here that the Middle English period is characterized by the appearance of an obstruent consonant /ʃ/, demarcated in lexicographic sources (MED) by the digraph <sh>.

The cluster /wr/ also presents a particular interest. In the Old English period it was qualified as the unstable one, since the structure of the sound /w/ is made up of a semi-vowel. This inconsistency is proved by its disappearance in the 17th century. On the other hand, the Middle English period is

characterized by the entrance of the cluster /vr/ into English under the influence of a great number of French words.

Having contrasted the consonantal clusters in the word middle position in the two periods of the English language development, we can make a conclusion that, despite the increase in the total number of two-phonemic clusters in Middle English, their variability decreased except for the clusters beginning with /l/ and /r/, whose number grew to 12 and 18 varieties respectively. Unlike the Old English period, the /bl/ cluster remains predominant in Middle English.

The comparison of the two-member Middle English clusters /kl/, /kn/, /kr/, /kt/ and /kw/ with the corresponding clusters of the Old English period indicates the appearance of /kt/ and /kw/ in Middle English and the drop out of /kg/ and /kp/ clusters. It is also noteworthy that in the Middle English period the /kl/ cluster started to be used in the middle of the word six times more frequent as compared to the Old English period.

The study of the specificity of /dl/, /dm/, /dn/, /dr/ use in the two historical periods shows a 2.5 increase in the functioning of the cluster /dr/, a two-fold decrease in the recurrence of /dn/, a complete disappearance of /df/, /dq/ and /dw/ as well as coming into use of a bi-phonemic cluster /dm/ in the Middle English period.

Like in the Old English period, in the subgroup of bi-phonemic consonantal clusters /fk/, /fd/, /fl/, /fn/ and /fr/ there was the dominance of /fl/, whose actualization frequency doubled in the Middle English period. The sub-system of clusters typical of the word middle position included /fk/ and /fn/, while the clusters /fð/ and /ft/ came out of use in the Middle English period.

The general picture of the bi-phonemic clusters actualization in the Middle English period demonstrates that there was a significant decrease in the number of mid-word combinations in the subgroup beginning with /g/ (from eight in Old English to four in Middle English). The use of /gn/ and /gr/ in the Middle English period remains stable as compared to the Old English period, while the frequency of /gl/ increases tenfold. In addition, this subgroup of clusters is enriched by /gb/.

The dynamics of changes in the frequency of /ht/, /hθ/, /hð/ and /hw/ reflects a significant decrease (in four times) in the recurrence of /ht/, a complete disappearance of the clusters /hg/ and /hl/ being active in the Old English period and the appearance of /hw/, /hΔ/ and /hθ/.

As a result of the comparison of the /lk/, /ld/, /lf/, /lm/, /lp/, /ls/, /lt/ clusters' actualization during the two periods of the English language development, we have found out that Middle English is characterized by an increase in the number of consonantal cluster that start with /l/ up to their 11 varieties. A qualitative characteristic of this subgroup functioning reveals the appearance of /lp/, /lv/, /lw/, /lΔ/ as well as disappearance of /lf/ and /lg/. The other consonant clusters, namely /ld/, /ln/, /ls/ and /lt/ have the equal frequency of their use in both periods under contrast.

Any significant deviations in the actualization of /mb/, /mf/, /ml/, /mn/, /mp/, /mr/, /ms/ within both periods of the language development have not been registered. However, the frequency of /mp/ in the word middle position increases in seven times.

The comparison of the frequency of functioning of the clusters /nk/, /nd/, /nf/, /nl/, /ns/, /nt/, /nv/ in Old and Middle English allows us to state their practical identity with the predominance of /nd/ and /nt/ in both historical periods. However, unlike the Old English period, Middle English is characterized by the use of /nf/, /nk/ and /nv/ in the word middle position as well as disappearance of /nr/ and /nw/ clusters.

It is also significant that in the Middle English period some new clusters came into use (/pk/ and /pr/) while a cluster /pn/ typical of Old English dropped out of the system. In quantitative terms, the frequency of the cluster /pl/ being identical for both periods is four times smaller in the Middle English as compared to the Old English period.

Looking at the frequency of /f/, /t/, /l/, /r/, /w/ clusters' functioning in both periods, it becomes evident that the use of /r/ and /l/ increases over the Middle English historical period, while the cluster /ts/ disappears. During this period the occurrence of /f/, /t/ and /w/ remains practically unchanged.

Thus, it can be stated that in the Middle English period there appeared a number of consonant clusters, namely: /dm/, /fk/, /fn/, /gb/, /hw/, /hΔ/, /hθ/, /kl/, /kt/, /kw/, /lk/, /lp/, /lv/, /lw/, /lΔ/, /mf/, /nf/, /nk/, /nv/ and /mbl/, which can be qualified as specific markers of the Middle English period of the language development.

The number of three-phonemic clusters' varieties was reduced by half in Middle English, /ndr/ being the most frequent cluster.

In the word final position, the functioning of clusters was not active during the Middle English period and the number of their varieties decreased. Besides, /nt/ and /st/ clusters were registered as the predominant ones among all the final bi-phonemic clusters typical of Middle English. The study has revealed that word-final clusters of this period were significantly different from Old English, in particular, a number of consonantal combinations came out of use (/fΔ/, /hl/, /ln/, /nl/, /rk/, /rf/, /rh/, /rl/, /rΔ/ /rg/, /pn/, /ps/, /wn/, /wt/, /wΔ/ and /sl/), while some clusters appeared (/mb/, /mp/, /lk/, /lp/ and /nk/). However, the clusters /ft/, /ht/, /ld/, /nd/, /rd/, /rt/, /rs/, /rp/, /rn/, /rm/ and /st/ remained equally active both in the Old and Middle English periods.

The study of the consonant phonemes' syntagmatics also allowed us to come up with the digraphs typical of the Middle English period as well as register other cases of graphic presentation of consonants being different from their sounding (see Table 2).

**Table 2.** Graphic presentation of some Middle English consonants in writing

Phonemes	Graphemes and digraphs	Examples
/b/	<b>, <bb>	Blee ( <i>colour, complexion</i> ) (MED, 76); Abbodie ( <i>abbacy</i> ) (MED, 25);
/d/	<d>, <dd>	Drī ( <i>wizard</i> ) (MED, 176); Budde ( <i>bud, gemma</i> ) (MED, 96);
/k/	<c>, <k>, <kk>, <ck>, <q>	Claw ( <i>claw</i> ) (MED, 121); Cnīf ( <i>knife</i> ) (MED, 126); Kindlen ( <i>kindle, set fire to</i> ) (MED, 376); Chikkin ( <i>produce chickens</i> ) (MED, 116); Qverne, cwerne (MED, 513);
/f/	<f>, <ff>, in borrowings with the help of <ph>	Flees ( <i>fleece</i> ); Fleen ( <i>flay, skin</i> ) (MED, 226); Frette ( <i>release</i> ) (MED, 251); Buffet ( <i>blow with the hand</i> ); Buffen ( <i>stutter</i> ); Buffe ( <i>blow, buffet</i> ) (MED, 96); Philosophe, Phisike (MED, 497);
/h/	<h>, <hh>, <gh>, <g>, <ch>	Hlāf ( <i>loaf, bread</i> ); Hlāfdiȝ ( <i>lady</i> ) (MED, 381); Hlot ( <i>lot</i> ); Hlūde ( <i>March</i> ); Hlūde ( <i>sound, noise</i> ) (MED, 406); Hlahhen, Lahhen, Laghen, Lahen ( <i>laugh</i> ) (MED, 405); Rigt, Right, Riht, Richt ( <i>right</i> ) (MED, 529);
/g/	<g>, <gg>	Glæs ( <i>glass</i> ); Glas ( <i>ice</i> ); Glēbe ( <i>glebe</i> ) (MED, 296); Graffe ( <i>graft</i> ); Gragge ( <i>throat</i> ); Grain ( <i>socket</i> ); Gramerci ( <i>many thanks</i> ); (MED, 306)
/m/	<m>, <mm>	Hemmin ( <i>hem</i> ) (MED, 336); Mæcche ( <i>match, mate</i> ) (MED, 411); Maister ( <i>master</i> ); Maistresse ( <i>mistress</i> ); Majestē ( <i>majesty</i> ) (MED, 416); Marble ( <i>marble</i> ); Marmoset ( <i>some ape</i> ); Maske ( <i>mask</i> ); Maskel ( <i>spot, flaw</i> ) (MED, 421); Mercuri ( <i>Mercury</i> ); Merdale ( <i>camp followers</i> ); Merke ( <i>mark</i> ); (MED, 426)
/n/	<n>, <nn>	Fannien ( <i>winnow</i> ) (MED, 211); Gannok ( <i>banner</i> ) (MED, 261); Hwonne ( <i>when</i> ) (MED, 361); Næfre ( <i>never</i> ) (MED, 466);
/ð/	<th>, <þ>, <ð>	Brēthin ( <i>breathe, smell</i> ) (MED, 91); Sniðen ( <i>derive</i> ) (MED, 561);
/l/	<l>, <ll>	Largesse ( <i>largess, bounly</i> ); Larke ( <i>lark</i> ) (MED, 386); Leinten ( <i>spring, season</i> ); Lende ( <i>loin</i> ) (MED, 391); Lincolne ( <i>Lincoln</i> ); Linde ( <i>lime-tree</i> ) (MED, 401);

		Chapelle ( <i>chapel</i> ) (MED, 111); Chibolle ( <i>small onion</i> ); Chillin ( <i>chill, be cold</i> ) (MED, 116);
/θ/	<þ>, <þþ>, <ð>, <ðð>, <th>	Þrang ( <i>throng, crowd</i> ) Þræst ( <i>crowd, host</i> ); Þrāze ( <i>space of time</i> ) (MED, 636); Þwang ( <i>thong</i> ) (MED, 641); Hēlðe ( <i>health</i> ) (MED, 636);
/ʃ/	<ch>, <cch>	Richesse ( <i>richness</i> ) (MED, 506); Chapelle ( <i>chapel</i> ) (MED, 111); Chevissance ( <i>agreement, bargain</i> ); Chibolle ( <i>small onion</i> ); Chikkin ( <i>produce chickens</i> ); Chillin ( <i>chill, be cold</i> ) (MED, 116); Ricchen ( <i>rule, direct reach</i> ) (MED, 506); Mæcchen ( <i>match</i> ) (MED, 411); Flecchen ( <i>bend, flatter</i> ) (MED, 226);
/dʒ/	<gg> in the intervocal position, <g> in combination with <r>, <l>, <n> and the front vowels, <j>, <g> in the initial position	Daggen ( <i>tear into rags</i> ); Dagger ( <i>dagger</i> ); Dagged ( <i>wearing a dagger</i> ) (MED, 151); Largesse ( <i>largess, bounly</i> ) (MED, 386); Gaile, Jaile ( <i>jail</i> ) (MED, 282);
/r/	<r>, <rr>	Bi-cherren ( <i>seduce, decieve</i> ) (MED, 56); Rasse ( <i>raised mound</i> ); Ratten ( <i>lacerate, tear</i> ); Ratte ( <i>rat</i> ) (MED, 496); Rekke ( <i>fetters</i> ) (MED, 501); Ribben ( <i>dress with a rib</i> ); Richesse ( <i>richness</i> ) (MED, 506);
/v/	<v>, <f>	Discover ( <i>uncovered</i> ) (MED, 166); Javellen ( <i>wrangle</i> ) (MED, 371); Avancement ( <i>advancement</i> ) (MED, 36); Aveiment ( <i>instruction</i> ) (MED, 36);
/w/	<w>, <v>, <u>	Wassail ( <i>was</i> ) (MED, 671); Wemmen ( <i>stain, defile</i> ) (MED, 676); Clavren ( <i>climb</i> ) (MED, 121); Anguissous ( <i>full of anguish</i> ) (MED, 26);
/z/	<s>, <z>	Lisard ( <i>lizard</i> ) (MED, 401); Cronesank ( <i>name of a plant</i> ) (MED, 141); Busard ( <i>bussard</i> ) (MED, 101); Zedeval ( <i>zedoary</i> ) (MED, 726).

The comparison of the data presented in the table with the corresponding data of the Old English period demonstrates a significant increase in variability in the graphic presentation of consonants and a threefold increase in the number of digraphs within the Middle English period.

Among the extralingual factors that lead to changes in the nomenclature of Middle English consonants was, first of all, the conquest of England by the Normans. The reasons for the changes in consonantal phonemes' syntagmatics of this period are qualified as primarily phonotactic ones, since under the influence of phonotactically conditioned rules of the French language, the structure of the French rhythm and syllable, French verses as well as an increasing role of polyphonic music, there was formed a new perception of the sounds in words. Due to the influence of a complex of these factors, the initial and final consonants of the syllable and their combinations underwent various phonological changes, like falling out of the system, voicing, reduction of some clusters with the "weak" consonants, in particular, nasal /l/, /r/ and semi-vowels.

Summarizing the results of the study, among the most important changes that took place in the system of consonant phonemes during the Middle English period can be named: the vocalization of voiced spirants in the middle and final word position; voicing of the voiceless spirants /f/, /θ/, /s/ at the word initial position; the shift of the Old English /ð/ into /d/ when preceding /m/, /n/, /l/, /r/ with its further shift in the 15th century into /ð/ after the vowel and before the syllabic /r/; the fallout of consonants under certain conditions as well as simplification of double (long) geminates.

The calculation of frequency of the consonant clusters' functioning in the Middle English period shows their following quantitative distribution at different word positions: 30.3% of the total number of clusters occupied the beginning of a word; 57.5% functioned in the middle of a word, while 12.2% were used at the word final position.

The analysis of the studied material allowed us to find out that in the Middle English period the number of consonants in the clusters was as follows: bi-phonemic clusters – 90.9%, three-phonemic clusters – 8.9%, four-phonemic – 0.2%. Within the two-phonemic clusters typical of the Middle English period the following percentage of their varieties was registered: at the word initial position – 30.7%, in the middle of a word – 56.8%, at the end of a word – 12.5%.

The carried out study as well as the analysis of frequency data of consonantal clusters' functioning enable us to state that during the Middle English historical period there took place a number of qualitative and quantitative changes in comparison with the Old English period of the language development.

Thus, at the word initial position, /br/ and /st/ have the highest recurrence among the two-phonemic clusters. The clusters beginning with the sibilant /s/ (/sk/, /sl/, /sm/, /sn/, /sp/, /st/, /sw/) are the most numerous among bi-phonemic clusters used at the word initial position. As compared with the Old English period, the frequency of the word initial clusters /gr/, /tw/ increased, while the use of /hl/ and /hw/ lessened and /hr/ completely dropped out of the consonantal system in the Middle English historical period.

The most common bi-phonemic clusters used in the middle of a word are the following: /bl/, /kl/, /nd/, /nt/, /rm/, /rt/, /st/ and /tr/. The comparison of the specificity of these consonantal clusters actualization in the two periods of the English language development shows that in the Middle English the total number of bi-phonemic (except for those beginning with /l/ and /r/) and three-phonemic clusters (whose number was twice reduced) decreased, while the four-phonemic clusters totally came out of use. During this period, a number of new consonant combinations appeared, namely: /dm/, /hΔ/, /hθ/, /hw/, /fk/, /fn/, /gb/, /kl/, /kt/, /kw/, /lk/, /lp/, /lv/, /lw/, /lΔ/, /mf/, /nf/, /nk/, /nv/ and /mbl/, which can be considered as specific markers of the Middle English period of the language development. Such clusters as /dr/, /kl/, /fl/, /gl/, /ld/, /lm/, /ln/, /ls/, /lt/, /mp/, /nd/, /nt/, /tr/, /tl/ and /ndr/ continue to steadily function within the language phonemic system. It was also found out that the varieties of three-phonemic clusters were twice reduced, the cluster /ndr/ being the most frequent one. As to the functioning of the word-final clusters, the analysis revealed the reduction of their total number with the prevalence of /nt/ and /st/ clusters.

A review of the functional regularities of the word-initial bi-phonemic clusters suggests that some of them started to acquire the status of phonostemes, in particular /br/, /fl/, /fr/ and /tr/ clusters that were frequently used in the lexical units having common semes or associative meanings.

### *3.3. Consonantal phonemes' syntagmatics of the Modern English period*

It is known, as a result of the final falling-off of inflexions in the Modern English period, English transforms into the analytical type of language with the minimal role of inflexions in expressing grammatical information. This, in turn, leads to the simplification of the phonemic structure of its consonantal system.

The leading extralinguistic factors that caused the changes in consonantal syntagmatics of the Modern English period are the intensive technological development of Great Britain accompanied by the coinage of new lexical units, as well as the expansion of trade and cultural relations which resulted in borrowings primarily from Italian, Spanish and Dutch.

The carried out analysis demonstrates that throughout the history of the English language, the obstruent consonant /b/ could cluster with the sonorants /l/ and /r/ at the word initial position. In particular, /br/ is characterized by a rise-falling regularity of its actualization: at first, there was an increase in the frequency of its usage at the beginning of a word in the Middle English period followed by the drop in its frequency in the Modern English period. On the contrary, the cluster /bl/ acquires its wide usage in the Modern English period.

The study of the word initial bi-phonemic clusters starting with the obstruent consonant /k/ reveals that they are typical only of the Middle English (/kl, kn, kr/) and Modern English /kl, kr/ periods. At this time, similarly to the Middle English period, the cluster /kr/ remains to be the most recurrent one, while the usage of /kl/ dropped to one third of its Middle English frequency. As to the cluster /dr/, the regularity of its functioning in Modern English remains unchanged as compared to the Middle English period.

The <ch> digraph being absent in Old English reinforced its position in the language system of the Modern English period. Another interesting fact is that in the Modern English period the cluster /fl/ started to dominate over /fr/. The frequency of /fl/ increased in comparison with the Middle English period, while the occurrence of /fr/ significantly dropped. The /gr/ cluster is marked by a steady increase of its actualization throughout the three periods of the language development.

In the Modern English period, the previously active word initial clusters beginning with /h/ completely fell out of use. It is also noteworthy that the graphic image of <qv> which came into use in the Middle English period evolved in the Modern English period into a <qu> digraph, pronounced as the cluster /kw/.

Within the three stages of the language development there were no significant deviations in the occurrence of clusters beginning with the obstruent consonant /s/. This phoneme is marked by the highest valency among all the consonants. In the Modern English period, similarly to the Old and Middle English periods, /st/ continues to be the most frequently used cluster of this subgroup, occurring mainly in the words whose meaning is associated with a sudden stop or cruelty. It follows that the cluster /st/ gains the status of the phonosteme. The number of clusters beginning with /s/ that function in the middle of a word is reduced from nine in Old English (/sb, sf, sk, sl, sm, sn, st, sp, sw/) to eight in the Middle English (/sd, sk, sl, sm, sn, sp, st, sw/) and up to six in the Modern English period (/sk, sl, sm, sp, st, sw/).

The comparative analysis of qualitative and quantitative data on the clusters /tr/ and /tw/ usage within the three periods indicates their practical identity: the cluster /tr/ retains its prevalence over the cluster /tw/ (88.9% in Old English, 63.1% in Middle English and 58.6% in Modern English). The cluster /tr/ was predominantly registered in the words, whose common meaning denoted the "movement forward", which proves its status of a phonosteme.

Registered in the Old and Middle English periods, graphemes <þr> and <þw> denoting the bi-phonemic clusters /θr/ and /θw/ are no longer used in Modern English, which, however, is characterized by the appearance of the digraph <th> to indicate either voiced /ð/ or voiceless /θ/ at the beginning of the word.

The Modern English period of the language development is also marked by the introduction of the digraph <wh> at the word initial position, representing a sonorant consonant /w/ as well as the digraph <wr>, signifying a sonorant /r/.

The study of the three-phonemic initial clusters shows that, despite an increase in their number in the Middle English period, the variability of their combinations significantly decreased in the Modern English period.

The clusters /bl/, /br/, /gr/, /tr/, /sp/, /sl/, /sk/, /skr/ and /str/ remain active at the beginning of the word throughout the three periods of the English language development. The bi-phonemic word initial clusters /dr/, /fl/, /fr/, /kr/, which gained their active usage in the Middle English period, became completely fixed in the language system of Modern English, having quite a high frequency of occurrence. However, a number of three-phonemic clusters fell out of use in the Modern English period.

The comparison of the specificity of changes in consonantal syntagmatics in the middle of a word demonstrates a significant increase in the number of possible combinations with the consonant /b/,

namely: from two clusters in Middle English (/br/ and /bl/) to seven clusters in Modern English (/bd/, /bn/, /bl/, /bp/, /br/, /bs/, /bt/) with a considerable predominance of /bl/.

The obstruent /k/ continues to have a fairly high valency in the Modern English period. Similarly to the Middle English period, the clusters /kl/, /kn/, /kr/, and /kt/ remain to be frequently used. The cluster /kw/ falls out at this time of the language development. At the same time, the letter combinations <ch> and <ck> continue to function as digraphs representing the affricate /tʃ/ and the plosive /k/, respectively.

During this period, there was the total change in the qualitative nomenclature of the clusters with the consonant /d/ used in the middle of the word. In particular, the clusters /dn/ and /dl/ fell out of the language system, while the clusters /db/, /dg/, /dh/, /dv/, /dw/ came into use. In addition, there was a significant decrease in variability of clusters with the fricative /f/, namely: from six clusters in the Middle English period to two clusters (/fl/ and /ft/) in Modern English. Similarly, the number of cluster varieties with /l/ decreased from ten to five (/ld, lk, lm, lt, lv/).

During the Modern English period, the syntagmatics of the clusters with /k/ also changes: the clusters /kd/ and /kf/, which were absent in the Middle English period, begin to function in the middle of Modern English words.

The tendency to reduce the number of their varieties in the middle of Modern English words is also typical of the clusters with the nasal sonorant /m/. The clusters /mb/, /mk/, /mf/ and /mn/ remain active, while /mp/ is registered as the most frequent one.

Contrary to the general tendency to reduce the variability of consonant clusters in the Modern English period, there was recorded an increase in the number of clusters with the sonorant /n/, namely from seven in the Middle English period to eleven clusters in Modern English characterized by the appearance of /nm/, /np/, /nr/. At the same time, just like in the previous period, the cluster /nt/ is most commonly used in the middle of lexical units.

There is a similar increase in the number of their varieties within a subgroup of clusters beginning with /p/: from four in Middle English to seven clusters in the Modern English period, when /pk/ ceases to function and new clusters come into the use (/pb/, /pd/, /pn/, /ps/ and /pt/). In both periods, the cluster /pr/ is qualified as the most frequent one of this subgroup.

The subgroup of clusters starting with /r/ is registered as the one having the largest number of their varieties, although their quantity decreased from 15 varieties in the Middle English period to 12 in Modern English, when the clusters /rθ/, /rΔ/ and /rw/ dropped out of the system or became simplified.

Similarly to the two previous periods of the language development, in the middle of the Modern English word the cluster /st/ remains to be the most frequent one. However, the clusters /sd/ and /sn/ fall out, while the grapheme <sh> appears, representing the sound /ʃ/. Besides, the cluster /tn/ is no longer used in the middle of a Modern English word.

As to the changes in syntagmatics of the three-consonantal clusters in the middle of the word, the Modern English period is characterized by an increase in the complexity of their structure and in the total number of clusters (from 21 to 36). Thus, the following three-phonemic clusters come into use: /bsk/, /bst/, /lkm/, /lpr/, /mpk/, /mpl/, /nkt/, /nds/, /npl/, /nrl/, /ntb/, /ntl/, /ntm/, /ntr/, /pbr/, /pst/, /rlp/, /rlw/, /rmf/, /rpl/, /rst/, /rtm/, /rtn/, /skl/, /stb/, /stm/, /tsk/, /tsp/, /tst/, /wsp/, /wsr/.

It is noteworthy that some of the clusters are represented by a combination of a consonant and a digraph, being a bi-phonemic entity, for example, <dsh> – /dʃ/; <lph> – /lf/; <lth> – /lθ/ or /lð/; <pch> – /ptʃ/; <rsh> – /rʃ/; <shl> – /ʃl/; <tsh> – /tʃ/.

The appearance of the three, four-consonantal clusters /bstr/, /mbst/, /ndsl/ being absent in the previous periods also testifies the ongoing amplification process typical of the phonemic structure of the middle of the Modern English word.

The study of the consonants used at the end of the Modern English word reveals two digraphs functioning among them: <ck> and <ch>.

During this period, the only disappearance of the velar guttural voiceless spirant  $\chi$  or its shift to /f/ was recorded. The substitution of  $\chi$  by /f/ occurred unequally in various dialects and was not always reflected in spelling. Therefore, during the Modern English period, the phoneme /f/ continues to be used at the end of a word and is rendered in spelling by the digraph <gh>, e.g., laugh (да. hlæhhan); cough (да. cohhetten).

In comparison to other consonants, the phoneme /l/ is characterized by a better valency at the end of a word. However, considering the combinability of /l/ with voiced plosives, it will occur that it clusters only with the alveolar voiced plosive /d/. In the Modern English period, there is only one example (balb) where /l/ clusters with the voiced plosive /b/, while it is no longer combined with /g/ at the word final position.

In addition, if to consider a further development of the phoneme /l/ combinability with other consonants, there will be its dropout after the letters a, o and preceding the guttural /k/, as well as it ceased to be pronounced before the labial phonemes, as in calf, half, shalk, talk.

At the same time, according to the study results (Bruner, 2003, p. 294), the phoneme /l/ was still pronounced before the dental consonants and at the word final position (all, old, bold, malt, salt). This consonant is also present in spelling at the end of a word after /v/ in the form of could, in which /l/ was introduced by analogy with the forms of should and would (compare the Old English cūþe and the Middle English coude, shaped by analogy with the weak preterite forms). In the Early Modern English period the form could was pronounced with /l/. The vowel /v/ in the form of could was also borrowed from should and would (compare: the Middle English schōlde and wōlde were pronounced in the 18th century of the Modern English period as /ʃu:(l)d/ and /wu:(l)d/, while in their weak forms acquired the pronunciation of /ʃv(l)d/ and /wv(l)d/).

In some cases, the phoneme /l/ is pronounced in accordance with pronunciation norms of the words of Latin origin. This is due to the fact that in the national language the phoneme /l/ did not drop before dentals, while in dialects it did not appear at all. Therefore, the consonant /l/ started to be rightfully introduced into the words in which it was absent in the Middle English period, for example, assault (French assaut, Latin ad-saltus), fault (French faute, Latin falta).

In the Modern English period, the Old English geminated long consonants (i.e. represented by double letters) got simplified. This process started in the Middle English period and, as a consequence, the distribution of long and short consonants was replaced by a new one: the consonants in the stressed syllables with short vowels were pronounced as long consonants, while occurring after the stressed syllables with long vowels they turned into short consonants.

At this time the plosive /b/ is no longer pronounced after /m/, but it preserves its spelling <mb> at the end of a word: for example, climb /klaɪm/ (Old English: clīmban); lamb /læm/ (Old English: lamb).

The analysis of the functioning of clusters /nd, nk, nt/ in the Modern English period proves the prevalence of a grapheme <ng>. If <ng> occurs at the end of a word, the back lingual nasal /ŋ/ is pronounced (long /lɒŋ/), however, there is a tendency to pronounce <ng> as /ŋg/ in some dialects of central and west-southern regions.

The carried out research also shows that the Modern English period, if compared with the previous ones, is characterized by the smallest number of new digraphs (see Table 3.3).

**Table 3.** Graphic presentation of Modern English consonants in writing



Phonemes	Graphemes and digraphs	Examples
/tʃ/	<ch>	chart; charter; chauffeur (LWD, 111); chopsticks; chord; chore; chrome; chronic; church; chunk (LWD, 116); cliché (LWD, 121);
/n/	<kn>	knack (LWD, 371); knelt (LWD, 371); knew (LWD, 371); knighthood (LWD, 371); knight (LWD, 371); knife (LWD, 371);
/w/	<wh>	whip; whirlwind; whirlpool; whisky; whisper; white (LWD, 766).

The study also demonstrates that dynamics of the digraphs appearance throughout the history of English has a tendency similar to the syntagmatics of bi-consonantal clusters: there is a significant increase in their usage in the Middle English period and their corresponding decrease in the Modern English period.

The calculation of the frequency of consonantal clusters functioning in all classes of words of the Modern English period indicates the following percentage of their usage: 20.8% at the word initial position, 55.7% in the middle of the word and 23.5% at the word final position.

Within the subgroup of two-phonemic clusters typical of the Modern English period the following proportion of their varieties was registered: at the beginning of the word – 23.6%, in the middle of the word – 52.5%, at the end of the word – 23.5%.

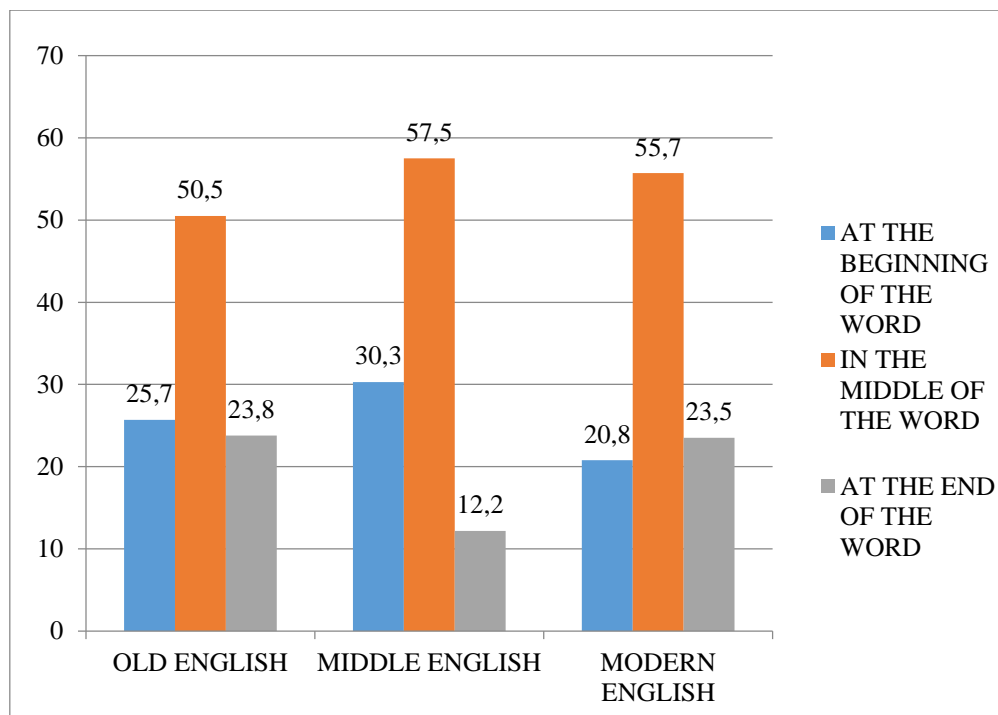
The analysis of the studied material showed that in the Modern English period there was such a variation in the number of consonants in the clusters: bi-phonemic clusters made up 86,4%, three-phonemic clusters comprised 13,0%, while four-phonemic clusters were represented only by 0,6%.

The evaluation of qualitative changes in consonantal clusters of the Modern English period proves that, similarly to the previous periods of its development, the bi-phonemic combination /st/ continues to stay as the highest recurring cluster at the word initial position, thus acquiring the status of the phonosteme. The most variable among the bi-phonemic clusters used at the word initial position are the combinations beginning with the fricative /s/: /sk/, /sl/, /sm/, /sn/, /sp/, /st/, /sw/. The clusters of /bl/, /br/, /gr/, /tr/, /sp/, /sl/, /sk/, /str/ and /skr/ remain to be frequently used at the beginning of a word throughout the three periods of the English language development.

It is worth emphasizing that the Modern English period is characterized by the high frequency of the initial two-phonemic clusters dr/, /fl/, /fr/ and /kr/ introduced in the Middle English period. The graphemes <kn>, <ch>, <wr> and <wh> are the markers of the Modern English period since they were not recorded in the previous periods of the language development.

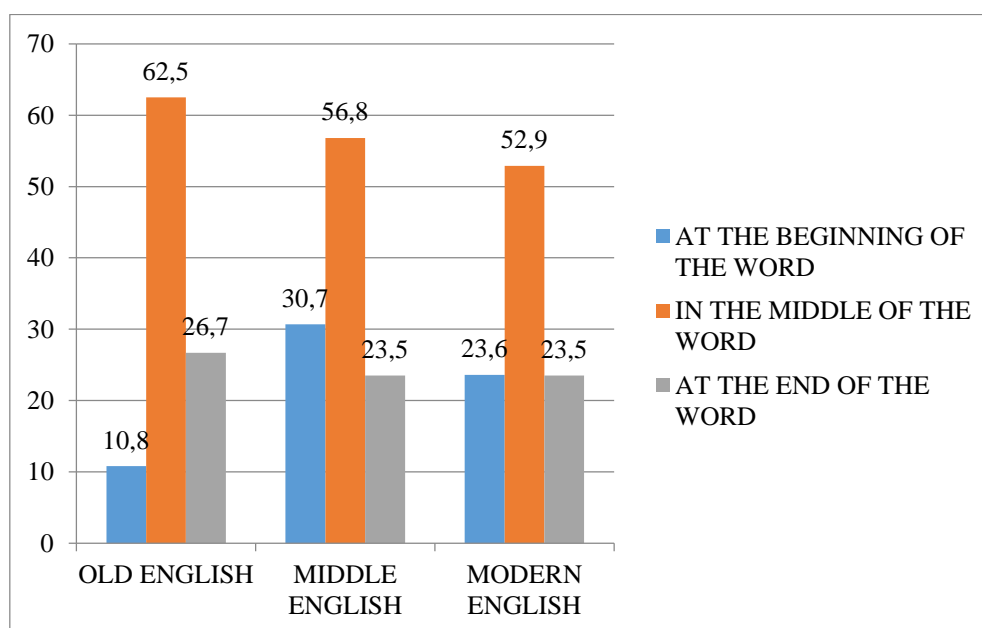
#### 4. Discussion

The summary of the analysis of quantitative indicators characterizing the changes in the consonantal phonemes' syntagmatics throughout the history of English enables us to obtain the corresponding frequency data graphically presented in Figures 3, 4, and 5.



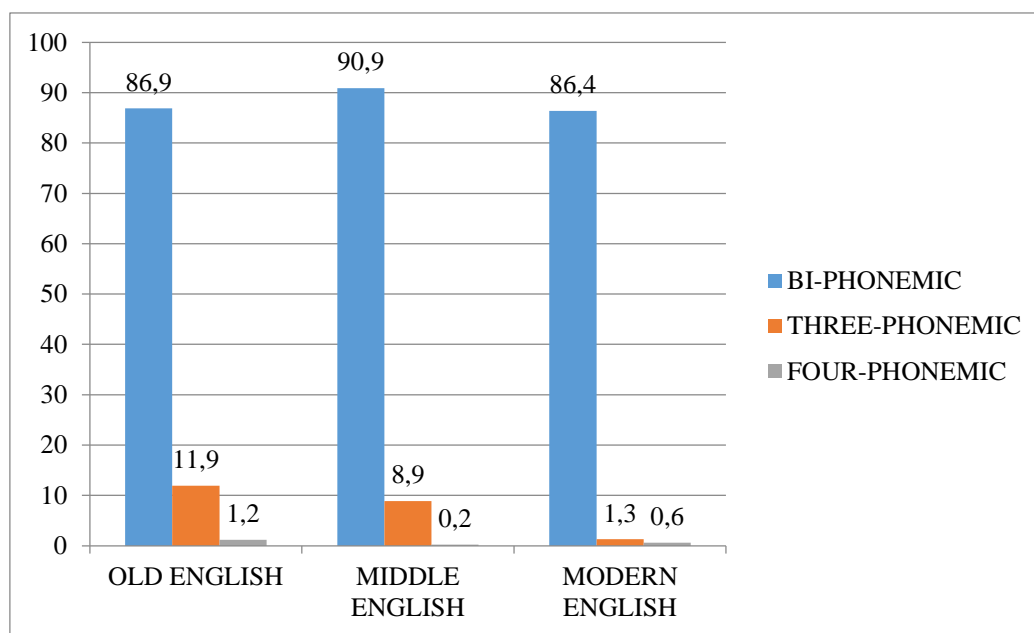
**Figure 3.** Frequency percentage of the consonant clusters functioning in different word positions throughout the history of the English language development

Figure 3 shows that in Old English there was the following frequency of consonant clusters in different positions of a word: 25.7% of clusters occurred at the word initial position, 50.5% functioned in the middle of the word and 23.8% was typical of the word final position. In the Middle English period 30.3%, 57.5% and 12.2% consonantal clusters in different word positions were registered, while in the Modern English period the beginning of the word was characterized by 20.8% of clusters, the middle of the word was marked by 55.7% of total clusters, and the end of the word – by 23.5 %.



**Figure 4.** Frequency percentages of bi-phonemic varieties of the consonant clusters functioning throughout the history of the English language development

The distribution of bi-phonemic clusters shows (Fig. 4) that in the Old English period of the English language development the following percentage was registered: at the beginning of the word – 10.8%, in the middle of the word – 62.5%, at the final word position – 26.7%; in the Middle English period: 30.7%, 56.8% and 12.5%, while in the Modern English period: 23.6%, 52.9%, 23.5%, respectively.



**Figure 5.** Frequency of the consonant clusters distribution in three periods of the English language development

The data presented in Fig. 5 show the following quantitative distribution of consonantal clusters throughout the history of English: in the Old English period 86.9% of bi-phonemic clusters, 11.9% of three-phonemic clusters and 1.2% characterized four-phonemic clusters were recorded; in the Middle English period – 90.9%, 8.9%, 0.2% and in the Modern English period – 86.4%, 13.0%, 0.6%, respectively.

The performed analysis reveals that throughout the historical development of the three periods of the English language (Old English, Middle English, Modern English) the role of consonant phonemes in the realization of distinctive (differential) and constitutive functions had been growing consistently. Among the number of reasons causing the emergence and functioning of new consonantal clusters in English the complex interaction of internal, or lingual and external, or extralingual factors can be named. In the Old English period, there was a split of guttural consonants (palatal, pharyngeal and laryngeal phonemes) into velar and palatal ones; a drop of /j/ in the word middle position after all the consonants except for /r/ provided the previous syllable is long; the drop of /h/ following the consonant and preceding the vowel as well as after the vowel before the voiced consonant phonemes, in particular before /r/, /m/, /n/.

The most commonly used consonantal clusters at the beginning of the word are the following bi-phonemic combinations: /br/, /gl/, /hl/, /hr/, /hw/, /sk/, /sp/, /st/ and /sw/ as well as the three-phonemic cluster /skr/. Among the bi-phonemic consonantal clusters recurrent in the middle of the word are the following: /dn/, /ht/, /ld/, /nd/, /nt/, /rg/, /rn/, /rw/, /sk/, /ts/; among three-phonemic clusters the combination of /ndl/ and /str/ dominated. The final word position was characterized by /ld/, /nd/ and /st/.

The most significant changes in the consonantal system in the Middle English period include the vocalization of the voiced guttural phonemes in the middle and at the end of the word; the voicing of the voiceless fricatives /f/, /θ/, /s/ at the word initial position; the shift in the early Middle English period of the Old English /ð/ in the position before /m/, /n/, /l/, /r/ into /d/, and in the 15th century the shift of

/d/ after the vowel and before the syllabic /r/ into /ð/. This period is also characterized by simplification of geminates. The consonant phonemes of the Scandinavian and French borrowings were easily represented by the English consonant phonemes.

The bi-phonemic clusters /br/, /gr/, /fl/ i /fr/, /tr/ are registered as the most recurrent in the word initial position, while /bl/, /kl/, /mp/, /nd/, /nt/, /rm/, /rt/, /tr/ and /st/ are typical of the word middle position. The comparison of the specificity of actualization of these consonant clusters in the two periods of the English language development indicates a decrease in the number of three- and bi-phonemic clusters (except for those beginning with /l/ and /r/) in the Middle English period as well as a complete disappearance of four-phonemic clusters. The number of clusters used at the end of a word was significantly reduced with the prevalence of /nt/ and /st/.

The process of turning English into an analytical type of language in the Middle English period and fixing the stress on the first syllable of the root results in reduction of inflexions and their final disappearance in the Modern England period, leading to the shortening of word length and convergence of morphemic and syllabic boundaries. This minimized the role of inflexion in the expression of grammatical information, lead to the emergence of a large layer of monosyllabic words and, accordingly, to the simplification of the number of consonant phonemes.

The word initial bi-phonemic clusters /dr/, /fl/, /fr/, /kr/ were fixed in the language system in the Modern English period, having quite a high frequency of their usage. In the middle word position there is a significant increase in the number of possible clusters with the voiced consonant /b/ (/bd/, /bn/, /bl/, /bp/, /br/, /bs/, /bt/) with a considerable predominance of the cluster /bl/. The tendency to reduce the number of cluster variants in the middle of the Modern English word characterizes the sound combinations with the nasal sonorant /m/: /mb/, /mk/, /mf/ and /mn/. The cluster /mp/ is registered as the most frequent one. It should be pointed out that /st/ cluster remains to be the most recurrent one among the subgroup of /sk/, /sl/, /sm/, /sn/, /sp/, /st/, /sw/ clusters. The study of the functional specificity of consonant clusters at the word final position in Modern English revealed the two digraphs – <ck> and <ch>. The Modern English period is also characterized by an increase in the complexity of the syntagmatic structure of three-phonemic clusters in the middle of the word: /bsk/, /bst/, /lkm/, /lpr/, /mpk/, /mpl/, /nkt/, /nds/, /npl/, /nrl/, /ntb/, /ntl/, /ntm/, /ntr/, /pbr/, /pst/, /rlp/, /rlw/, /rmf/, /rpl/, /rst/, /rtm/, /rtn/, /skl/, /stb/, /stm/, /tsk/, /tsp/, /tst/, /wsp/, /wsr/.

## 5. Conclusions

In the article on the basis of theoretical generalization of various linguistic research as well as by means of application of the distributive direction of a structural approach in the study of the consonantal phonemes' syntagmatics in the Old, Middle and Modern English periods of the English language development a comprehensive study of their diachronic characteristics was performed, taking into account the interaction of a number of lingual and extralingual factors.

The results of the study confirmed the expediency of using the methodological principle of the necessity and sufficiency of research tasks in order to achieve the research aim. According to the set tasks the effectiveness of considering the structural-and-functional, systemic, valence and phonetic aspects of consonant phonemes syntagmatics in the Old, Middle and Modern English periods of the English language development was substantiated.

Frequency data characterizing the usage of consonant clusters in the three positions in a word throughout the historical development of English indicate an increase in the proportion of their usage at the beginning, middle and end of the word in Middle English and their corresponding decrease in the Modern English period. We also registered a significant predominance of bi-phonemic clusters throughout all the historical time of the English language development as well as the downward-upward

dynamics of the three- and four-phonemic clusters functioning with a decrease in their number in the Middle English period and an increase in the Modern English period.

The carried out research also shows that the ability of consonants to combine largely depends on their phonemic characteristics, in particular, on the internal structure of the consonant phonemes. The position of the phoneme is usually conditioned by the manner of its articulation, while its distribution is influenced by the place of articulation. The distributive analysis has shown the correspondence of the phonemes combinability with their paradigmatic classification. The clusters at the beginning of the Old English word proved to be most stable ones because of the unrestricted morphological boundaries. The location of the consonant clusters at the end of the word was the least favorable for defining the patterns of their compatibility, or modeling their structure since the consonantal clusters in this position kept being in the process of their formation throughout all the periods of the language history due to the decline of the flexion system through reduction and elision of the vowel phoneme. There were also some anthropophonic factors that did not allow the occurrence of some articulatory inconvenient consonantal clusters.

The quantitative data shows that the maximum number of new consonant clusters appeared in the Middle English period, namely 27% of their total number that functioned throughout the history of the language.

The largest number of new consonant bi-phonemic clusters at the word initial position (30.7%) came into English during the Middle English period; the maximum (62.5%) of consonantal phonemes in the middle of the word belongs to the Old English period; an equal proportion of the occurrence of two-phonemic consonant clusters at the end of the word characterizes the Old and Modern English periods (26.7% and 23.5%, respectively).

## 5. Ethics Committee Approval

The authors confirm that all procedures performed in studies involving informants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments for comparable ethical standards (Date of confirmation: 22/10/2020).

## Abbreviations

[ASD] Northcote Toller, T. (Ed. and enlarged). (1997). *An Anglo-Saxon Dictionary. Based on the Manuscript Collections of Joseph Bosworth*. Oxford: Clarendon Press.

[LWD] Murphy, M. (Ed.). (2008). *Longman World Wise Dictionary* 2<sup>nd</sup> ed. Harlow: Pearson.

[MED] Stratmann, F.H. (ed.). (1967). *A Middle-English Dictionary Containing Words Used by English Writers From the 12th to 15th Century* (a new ed.; re-arranged, revised and enlarged by H. Bradley). Oxford: Oxford University Press.

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## İngilizce ünsüz kümelerinin gelişiminin düzenleri

### Öz

Makale, İngilizce tarihsel gelişmesi boyunca kelimenin başında, ortasında ve sonunda kaydedilen ünsüz ses birimlerinin sözdiziminin karmaşık bir çalışmasının sonuçlarını sunar. Sessiz harfler kümelerinin gerçekleşme frekanslarının analizi, yazarın kelime yapısı içinde meydana gelen düzenliliklerini karakter etmesine ve İngilizce tarihi boyunca değişikliklerinin dinamiklerini tanımlamasına izin vermiş. Farklı diller için ortak olan sonraki sorunlar, makalede ayrıntılı olan problemin öneminin ana yönleridir: yeni sesbirimin sırasının görünümü (uygunluk), kelimenin başında, ortasında ve sonunda sesbirimin değişikliklerinin meydana gelmesi, yeni fonemlerin ortaya çıkışı ve artık var olanların fonoloji süreçleri, yeni fonksiyonel ses birimlerinin yükü ve onların birleştirme kabiliyeti, ünsüz harflerin yeni kümelere katılmaya uygunluğu, fonemik ödünç alma olgusunun incelenmesi, ikame süreçleri, oluşum sıklıkları gibi çalışma ünsüz kümelerin yapıları. Metodolojinin araştırması, bunların tanımlarının özellik tezahürünün tarihsel dönemi ile korelasyon içinde tasavvur edilip, kümenin kelimenin içindeki konumu, kümedeki fonem sayısı, sesin ve gürültünün oranı, ünsüz eklemlenme yeri ve şekli gibi ünsüz kümelerin dilbilim özelliklerinin sınıflandırılmasına dayanır.

*Anahtar sözcükler:* fonem, ünsüz kümeler, sözdizim, karşılaştırma analizi, frekans özellikleri

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