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## Definitions, patterns and history of the study of vowel harmony in the Kazakh language

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### Abstract

**Relevance.** Since phonological changes at the junction of morphemes, in particular in the consonantism system, have not been sufficiently studied. The formation of an idea of synharmonic processes is relevant in modern linguistic science.

**Purpose.** The research purpose was to study the sound parameters, phonological features and synharmonism on the example of the Kazakh, Turkish and English languages.

**Methodology.** The following methods were used to achieve the research purpose: comparative, structural, phonetic, analytical and synthetic.

**Results.** This article presents definitions, patterns and four stages in the history of the study of vowel harmony in the Kazakh language. To determine the level of labial harmony of Kazakh vowels, a table of comparison with other Turkic languages was presented. In this paper, the main phonological changes at the junction of the root and affixal morphemes and their expression in the sound plane were noted, the influence of phonetics on other language levels was assessed. The idea of four main timbres in the Kazakh language has been formed: soft, hard, rounded and unrounded, the features of vocal and consonant synharmonism. Methods for improving the identification of sound parameters and the formation of phonetic speech patterns using machine technologies are considered.

**Conclusions.** The study concludes that while Kazakh and Turkish share similarities in vowel harmony patterns, they differ in application, and English exhibits a largely disharmonious sound structure with some exceptions in borrowed words.

**Keywords:** vowels and consonants; phoneme; sound system; affix; morphemic junction.

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## **Introduction**

Synharmonism plays a key role for the Turkic languages in phonetic terms, since a system of affixal morphemes is built on the basis of root morphemes, i.e., the patterns of sound organization of the speech flow directly affect the word-formation processes in the language. The study of phonetic rules in the Turkic languages is relevant, since on their basis speech patterns are formed, which are used to build syntactic structures, phrasal units and coherent text. Synharmonic root morphemes, as a rule, are common to many Turkic languages, which illustrates the preservation of a close connection between them. Despite the intensification of phonological research, the process of vowel harmony in the Kazakh language is often illustrated in modern science using old methods, which leads to a misunderstanding of vocalism and consonantism. The phonology of the Kazakh language is built upon synharmonic patterns; therefore, it is important to introduce new study methods in order to determine more accurate sound parameters, study the processes of sound organization of speech and its violations, form an idea of phonetic, word-formation, morphological and syntactic models. Understanding of close relationship between different language levels in the context of vowel harmony plays an important role in modern linguistic science, as it helps to track and establish relationships between phonetic processes and other language levels.

The stages of the history of the study of synharmonism are considered and analyzed in the paper of K. Kenzhigozhina et al. [1]. The study reveals the nature of the patterns of harmony in the Kazakh language. The authors note that there is not only synharmonism of vowels, but also that of consonants, to which special attention is paid. The role of developing new synharmonic and synharmonophonological theories is also noted. The study of prosody in the lexemes of the Turkic language is the subject of research by U.T. Dzhusupova [2]. The basis of the lexical structure of the Kazakh language is a monosyllabic word represented by a root that contains a meaning. By adding suffixes and inflections to it, the law of synharmonism is observed. A synharmophoneme as part of a word can only be combined with synharmophonemes of the same synharmotimbre. In the Turkic languages, the phenomenon of synharmonism covers even polysyllabic words, which is also reflected in word-formation processes.

S. Guven and N. Friedmann [3] note that vowel harmony is a key feature of Turkish phonology. The study of dyslexia when reading Turkish showed that the synharmonic structure in the speech of the respondents was preserved. Mistakes were more common in non-words than in words, i.e., the deficiency was fixed when processing vowels in the sublexical path. No errors were observed within the suffixes, i.e., they were converted as separate phonetic (word-forming) units. Linguist A.M. Shende [4] points out the importance of perceiving the phonetic structure of the English language for performing a communicative function through the transformation of sounds into words, and then into structural units of speech. For language learning, it is important to develop the manipulation of the language system, including phonetic patterns. On the example of historical texts written in

Turkish, one can consider many phonetic events, the foundations and patterns of which cannot always be explained. S. Eratalay [5] evaluates the historical modifications of the sounds "g" to "v", and "y" to "v".

The subject of research in the paper was the lexemes of the Kazakh, Turkish and English languages, which were considered from the viewpoint of synharmonism and phonetic features.

The purpose of this research was to consider the synharmonic structure of the Kazakh language in comparison with the Turkish and English languages, the patterns of synharmonism, as well as the formation of an idea about the main stages in the development of synharmonology.

The following tasks were set based on the purpose: to trace the phonological processes at the junction of morphemes in the Kazakh, Turkish and English languages; to determine the main similarities and differences between languages with a synharmonic and disharmonic system; note the influence of phonetic processes on morphological and word-formation.

## **Materials and Methods**

The theoretical base of the research was based on the papers of modern Kazakh, Turkish, English linguists who studied phonetic processes and phonological changes during word-formation and morphological processes. In these papers, the nature and patterns of the synharmonic structure of the Turkic languages were also considered, and comparative and experimental studies were carried out in terms of the sound parameters of speech and the technical side of their improvement. The papers of Kazakh scientists [6-10] were considered in the context of studying the stages of synharmonic studies, i.e., their role was evaluated from the viewpoint of the historical periods of the development of synharmonology. Particular attention was paid to the modern study of synharmonic processes at the M. Auezov South Kazakhstan University and M.Kh. Dulaty Taraz Regional University [6; 9; 10], as well as the achievements of linguists at this historical stage.

The analytical-synthetic research method was used when considering the papers of modern linguists, assessing the sound parameters of the studied languages (Kazakh, Turkish and English) in the context of phonological changes. The main stages of the study of vowel harmony in Kazakhstan, from the 19th century to the 21st century, were described with its help. The information was collected from various scientific sources, evaluated in terms of scientific relevance and described in the paradigm of the synharmonic system. A comparative method was used to compare different phonetic systems. With the help of it, similar and distinctive features of the language systems of the synharmonic and disharmonious system were evaluated. The sound parameters and characteristics of the Kazakh, Turkish and English languages were assessed. Particular attention was paid to the comparison of two synharmonic systems of Turkic nature: Kazakh and Turkish. Thus, certain structural models of vocal and consonant synharmonism were built in the Turkic languages.

Structural analysis was used in the segmentation of lexemes into root and affixal morphemes, considering the

selection of suffixes from two to four suffix morphemes, depending on the phonetic nature of the root morpheme. Attention was also paid to the syllabic structure of the word as the minimum unit of speech. The phonetic system of the Kazakh, Turkish and English languages was also studied, i.e., the parameters of sound division into vowels and consonants, monophthongs and diphthongs were considered. Phonetic (articulation) analysis was used in the analysis of the articulation base of the languages under consideration, since the task of studying phonetics is, first of all, to determine the basis (articulation base) of the organs of speech, which is inherent to a particular language. Phonetic analysis was used to determine the articulation of sounds in terms of acoustic parameters and auditory perception. Elements of phonetic analysis were used in determining the timbres (soft, hard, rounded, not rounded) in the Kazakh language.

Thus, the methodological base of this research was based on the analytical and synthetic processing of information in modern scientific papers, the study of theoretical aspects of the construction of sound systems on the structural analysis of lexical units, their decomposition into structural elements (phonetic, morphemic) within the context of synharmonism, on the phonetic analysis of articulatory the basics of each language, on a comparative analysis and interpretation of the results.

## Results

Synharmonism is a morphophonetic phenomenon that provides for the process of assimilation of vowel affixes to the vowel sounds of the root and is a distinctive feature of the Turkic languages. The terminological apparatus comprises the following concepts: synharmonology, segmentology, syngema, allosingema. The smallest particle that changes the meaning of a Kazakh word is called a singharmonic phoneme (syngeme). Variants of a synharmonic phoneme are called a synharmonic allophone or an allosingharmonic phoneme (allosyngeme). Since the syngeme is the minimum segmental unit of the Kazakh language, it is studied in the context of synharmonology and segmentology [8].

Patterns of vowel harmony in the Kazakh language. The Kazakh language has 37 sounds: 12 vowels and 25 consonants, forming 75 synharmonic sounds (9 synharmonic vowels + 66 synharmonic consonants). Each word has its own timbre of pronunciation, and the peculiarity of the timbre of a word is a sign of the prosodic classification of the language. The phenomenon of synharmonism lies in the fact that a word or syllable contains all the vowels and consonants of the same timbre. General synharmonicity arises when four timbres are mixed (hard, soft, rounded, unrounded). To designate a harmonic timbre, special international diacritics are used (placed in the upper right corner of the letter). A hard rounded timbre is indicated in square brackets without diacritics – [], a soft rounded timbre is indicated by a stroke – [˘], a hard rounded timbre is marked with a circle – [°], a soft rounded timbre is indicated by a combination of a stroke and a circle – [˘°]. The vowels of a hard timbre include the sounds "a", "o", "ы", "ү", "ә", "y", and the vowels of a soft timbre are "ә", "ө", "i", "ı", "e", "и". The vowels of the rounded timbre are represented by "o", "ө",

"y", "ү", "ı", and unrounded timbre includes "a", "ә", "e", "ә", "ы", "i" and "и".

The structure of synharmonic units (at the level of words, syllables and sounds) can be single, double, nine-, twelve-syllable. The vowels "ы", "ı", "ү", "ı" make it possible to cover all four timbres: the hard rounded vowel "ы" has a synharmonic pair – the soft rounded vowel "ı", the hard rounded vowel "ү" has a soft rounded vowel "ı", the soft rounded vowel "ı" has a hard rounded vowel "ы", and the hard rounded "ү" has a soft rounded vowel "ı". The rest of the sounds do not have such a characteristic: the vowel sound "a" has only one soft timbre pair "ә", but does not have a rounded pair, the vowel "o" has a soft timbre pair "ө", but does not have a rounded pair, the vowel sound "e" has neither hard nor soft pairs.

The synharmonic monophthongs "жас" (age), "мәз" (there is no), "сop" (saline), "мөp" (stamp) do not have paired units, but there are also those that form pairs or rows: "тыс" (outside), "тіс" (tooth), "түс" (point), "түс" (color). On the example of the paronyms "тыс", "тіс", "түс", "түс", one can trace the synharmonic characteristics in the Kazakh language. In the word "тыс": the sound "т" is unrounded hard, "ы" is unrounded hard, "с" is unrounded hard. In the word "тіс" all three sounds are soft unrounded, in the word "түс" all sounds are hard unrounded, and in the word "түс" all sounds are hard rounded. The law of vowel harmony in the Kazakh language can be formulated as follows: if the last vowels in the root of the word are hard "a", "o", "ү", "ы", then solid affixes are added to them: "қарындаш+тар" (pencil+narrow), "бас+шы" (head). If the last vowels in the root of the word are soft "e", "e", "y", "ı", then in subsequent affixes soft vowels are also used: "сөздік+тер" (vocabulary), "күзет+ші" (security) [8].

The law of vowel harmony in Turkish and English. There are two main types of vowel harmony in Turkish, i-type and e-type, each with its own rules. The e-type harmony is built on the choice of the suffix "ler" or "lar" depending on the final vowel of the root. If the last vowel in the root is "a", "ı", "o", "u", then the suffix "lar" is used, if the last vowel in the root is "e", "ı", "ö", "ü", then the suffix "ler" is added: "anne+ler" (mom's), "eller" (hands), "kediler" (cats), "kadınlar" (women), "kuşlar" (birds), "telefonlar" (phones). With i-type vowel harmony, depending on the final vowel of the root morpheme, one suffix out of four is added, "ı", "ı", "u" or "ü". If the final vowel in the root is "e" or "ı", the form with the suffix "im" is used: "öğretmen+im" (my teacher). If the final vowel is "a" or "ı", the form with the suffix "ım" is used: "avukat+ım" (my lawyer). If the final vowel in the root is "o" or "y", the suffix "yım" is used: "öğrenci+yım" (i am a student). If the final vowel is "ö" or "ü", the suffix "üm" is used: "doktor+üm" (my doctor) [11].

There are 20 vowels in English, which, according to the stability of pronunciation, are distributed into 12 monophthongs: "i:", "ı", "e", "æ", "u", "u:", "o:", "o", "a:", "a", "e:", "ә", from which 2 diphthongoids are distinguished: "i:" and "u:", as well as 8 diphthongs: "ei", "ai", "oi", "au", "əu", "iə", "eə", "uə". Vowel combinations in English can represent one sound and one syllable, one syllable and one sound or two syllables, while diphthongs can form two syllables. In English, there is no clear division into soft and hard sounds. Rounded (labialized) are the sounds "o:", "ö", "u:", "v", and unrounded (non-

labialized) are the sounds "ɪ", "i:", "e", "æ", "a:", "ə:", "ə", "ʌ". In English, the laws of vowel harmony are not observed: in the lexeme "bathroom" [ˈbɑ:θru:m], [a:] (non-labialized timbre) and [u:] (labialized timbre) are used, and in the word "point" [pɔɪnt], labialized "ɔ" and non-labialized "ɪ" sounds are used. But there are also lexemes, in which vowel harmony according to labialization is observed: "village" [ˈvɪlɪdʒ] (two sounds of non-labialized [ɪ]), "accidental" [æksɪ'dentl] (non-labialized [æ] + non-labialized [ɪ] + non-labialized [e]) [12].

Patterns of synharmonism of consonants in the Kazakh language. In oral speech, sounds are always used in accordance with the law of synharmonism. If harmony is not preserved in speech, this will be considered a pronunciation error, since the spelling does not convey it accurately. Moreover, in Kazakh writing, guided by the morphological principle, the final sound of the root often remains unchanged. For example: in the forms formed from "жан" (soul) – "жанды" (lively), "жанбады" (did not burn), "жанған" (lit) – the original position of the root is preserved, but the letter "н" denotes three different sounds in three word forms. If you pronounce the sounds "нб", "нғ" in these words in the same way they are spelled, then the law of synharmonism will be violated. According to this law, the labial sound "б" in the sound combinations "нб", "нғ" adapts/replaces the anterior lingual "н" with the labial "м", and the anterior lingual "ғ" adapts to the sound "н". As a result, the sound combination "нб" is pronounced like "мб": not "жанбады", but "жамбады", and the sound combination "нғ" is pronounced like "мғ", i.e., the sound "н" is replaced by the sound "м", and sometimes by the sound "н".

Sound swapping (alternation) is the result of a phonetic situation when sounds of different character interact with each other. Such sound changes can be combinatorial or positional. For example, the lexeme "қарағой" (pine tree) is a combination of the words "қора" and "қой", "қарағөлеңке" (blackberry) is a combination of the words "қара" and "көлеңке", "тарағы" (comb) is a combination of the stem of the word "тарақ" and the ending "ы". Swapping "к" to "ғ" and "к" to "г" is the result of phonetic transformations at the junction of two morphemes.

The synharmonic consonants "п", "б", "м" have a solid unbroken timbre, "п", "б", "м" have a soft unbroken timbre, "п", "б", "м", "у" have a solid unbroken timbre, "п", "б", "м", "у" have a soft unbroken timbre. The synharmonic consonants "т", "д", "н" represent a solid unbroken timbre, "т", "д", "н" represent a soft unbroken timbre, "т", "д", "н" represent a soft unbroken timbre.

The harmony of consonants in the Kazakh language is as follows: if the final sound of the base or root is deaf ("п", "т", "к", "қ", "с", "ф", "ш"), then the affix will begin with a dull sound: "дос+та" (friend), "күрек+тер" (spades). If at the end of the stem of the word there is a voiced ("б", "в", "г", "ғ", "д", "ж", "з") or a sonorant ("м", "н", "ң", "п", "р", "а") vowel sound, then the affixes will also begin with a sonorous or voiced sound: "бөлме+лер" (rooms), "қаз+дар" (geese).

The law of synharmonism in the Kazakh language does not apply to: borrowed words ("кітап" (book), "қазір" (now), "қажет" (is necessary), "мұғалім" (teacher)); complex words, which are proper names or toponymic names ("Темірхан" (Temirkhan), "Әмірхан" (Amirkhan),

"Күнсұлу" (Kunsulu), "Екібастұз" (Ekibastuz), "Шымкент" (Shymkent)); lexemes with borrowed word-forming affixes: suffixes "-хана" ("емхана" (clinic), "дәріхана" (pharmacy)), "-кер" ("жұмыскер" (employee), "айтыскер" (argumentative)), "-қор" ("жемқор" (corrupt)), "-изм" ("популизм" (populism)), "-ист" ("коммунист" (communist)), suffixes "-ов", "-ев", "-ин" ("Әуезов" (Auezov), "Өсербаев" (Userbayev), "Байғарин" (Baigarin)), suffixes "-мен", "-пен", "-бен" ("атамен" (with grandfather), "оқулықпен" (with a textbook), "қағазбен" (with paper)), belonging to suffixes "-дікі/-тікі", "-нікі/": "ата-нікі" (father's), "қыз-дікі" (a girl), "Мұраттікі" (Murat's), with the prefix "бей (би)" ("бейшара" (poor thing), "бейтаныс" (stranger)) [8].

Patterns of synharmonism of consonants in Turkish and English. Two types of consonant harmony are distinguished in Turkish: modifications when a suffixal morpheme is added; modification of the form of a word. First: if you add the suffix "c" or "d" to the root morpheme ending in a hard consonant, then "c" will change to "ç", and "d" to "t": "İngiliz" – "İngilizce" (English), "Türk" – "Türkçe" (Turkish), "Bakkal" – "Bakkalda" (grocery store – at the grocery store), "Park" – "Parkta" (park – in the park). The following sounds are solid consonants: "f", "s", "t", "k", "ç", "ş", "h", "p" ("fıstıkcı Şahap" (peanut shop)). The second type of consonant vowel harmony indicates that words cannot end with certain sounds, therefore they are modified ("c", "d", "b" and "ğ"), as a result of which "c" becomes "ç", "d" – "t", "b" – "p", and "ğ" – "k". Such transformations are morphological in nature, changing the grammatical forms of words: "ağaç" (tree) – "ağaca" (to the tree), "dert" (problem) – "derdimiz" (our problem), "terlik" (slippers) – "terliği" (his or her slippers) [13].

The English language does not provide for the division into hard and soft consonants. 23 consonants are divided into voiced: "b", "v", "g", "d", "z", "l", "m", "n", "r" and voiceless: "k", "p", "s", "t", "f", "tʃ", "ʃ", "θ", "h". There are 8 consonants among voiced ones: "m", "n", "l", "ŋ", "h", "j", "r", "w". Vowel harmony is not observed in English: for example, in the word "friend+ship" [ˈfrendʃɪps] the suffix "ship" with a dull sound "ʃ" is added to the root morpheme ending in a voiced "d". Here are some examples of words with disharmonic tuning in English: "dark+ness" [ˈdɑ:knis] (voiceless "k" + sonorous "n"), "count+less" [ˈkaunt+ləs] (voiceless "t" + sonorous "l"), "sugar+free" [ˈʃʊgərfri:] (sonor "r" + voiceless "f"). It should be noted that vowel harmony is still found in English in the combination "root morpheme to sonorant or voiced" + "suffixal morpheme to sonorant or voiced": "wis+dom" [ˈwɪzdəm] (voiced "z" + voiced "d"), "other+wise" [ˈʌðərwaɪz] (sonor "r" + sonor "w"). Most suffixes begin with vowels: "-ity"; "-ance", "-ence", "-ancy", "-ency"; "-ion", "-tion", "-sion", "-ism", "-ure", "-able" [12].

The history of the study of vowel harmony in the Kazakh language. The study and development of the sound system of Kazakh linguistics is divided into four stages. During the 19th century, oral synharmonic analysis was carried out: researchers mainly tracked the Kazakh spoken language through hearing. During this period, the sound structure of the Kazakh language was developed on the basis of auditory perception. The phonetic nature of synharmonism was defined as "sounds pronounced with the same position of the lips and tongue" [14]. This theory

is fully consistent with the modern classification features of the Kazakh language, the difference is only in terms.

There are several types of vowel harmony: full position of the oral cavity, i.e., from the lips to the larynx: "ұмтул" (umtul), "түйүк" (dead end), "түмүлдүрүк" (tumulus), "жүлүк" (sucker), "жүлдүз" (star), "сүйүк" (liquid), "мүрүндүк" (nose); compact position of the oral cavity, i.e., from the teeth to the larynx: "айқай" (scream), "қара" (see), "нақак" (really), "тақта" (board), "дайра" (circle), "сайра" (sing); partial position of the oral cavity, i.e., from the lips to the front of the tongue: "күндүз" (during the day), "түкүр" (spit), "түкүрүк" (spit), "түтүк" (pipe), "түшкүрүк" (sneeze), "сүйүктү" (beloved); semi-compact position of the oral cavity, i.e., from the teeth to the front of the tongue: "нәубәт" (in order), "кәрі" (old), "дәрі" (medicine), "кіріс" (income), "кірпік" (eyelashes), "сіңір" (sinew) [14].

From the beginning of the twentieth century to 1937, during the period of intuitive synharmonic analysis, the sound structure of the Kazakh language was described on the basis of an intuitive understanding of the law of synharmonism. The definition of vowel harmony in this period is as follows: "There are two types of words in the Kazakh language: some are hard and others are soft. In a hard word, all sounds are hard, and in a soft word, all sounds are soft", i.e., attention was focused on the similarity of sounds (vowels and consonants). The foundations of a new synharmonic alphabet and synharmonic spelling were laid [7].

In the 1940s and 1960s, during the period of asynchronous harmonic analysis, the sound system of the Kazakh language was considered on the basis of phonological concepts and terms of the theory of Indo-European linguistics. Thus, the term "vowel harmony" was excluded from the linguistic apparatus, and the term "vowel harmony" was used instead of it. The accent-phonemic theory, which traditionally explains the sound structure of the Kazakh language, is typical for this period. To determine the degree of expression of labial harmony in the Kazakh language, it was compared with other Turkic languages. Obviously, the Kyrgyz language has a strong lip harmony among all Turkic languages. Based on the four signs of synharmonism, it was proved that labial harmony occupies a stable and clear place in the system of synharmonism. Thus, from the general Turkic period, the significance of the sound structure in Turkic phonetics was shown.

Lip harmony in different Turkic languages manifests itself in different ways, it can only extend to root morphemes or to suffixes as well. In the phonetic system of the Kyrgyz, Altaic, Tuvan, Khakass and Yakut languages, labial harmony plays no less important role than linguistic harmony. Harmony in Tuvan, Khakass, Yakut and other Turkic languages is most often characteristic of short vowels, and for short and open vowels in Kyrgyz and Altaic languages (Table 1) [15].

**Table 1.** Comparison of labial harmony in the Turkic languages

Kazakh	/bütin/ бүтін	күміс /kūmis/	көмір /kōmir/	отыз /otyz/	мұрын /muryn/
Kyrgyz	/bütün/ бүтүн	/kümüş/ күмүш	/kōmür/ көмүр	/otuz/ отуз	/murun/ мурун
Altaic	/budun/ будун	/kümüş/ күмүш	/kōmür/ көмүр	/otus/ отус	/tumchuk/ тумчук
Yakut	/rüdün/ пүдүн	/kōmüs/ көмүс	/kōmör/ көмөр	/otut/ отут	/murun/ мурун
Khakassian	/rüdün/ пүдүн	/kümüs/ күмүс	/kōmer/ көмер	/otys/ отыс	/purun/ пурун
Kumyk	/bütün/ бүтүн	/g'ümüş/ г'үмүш	/k'ōmür/ к'өмүр	/otuz/ отуз	/burun/ бурун
Tuvan	/rüdün/ пүдүн	/mōngün/ (мөңгүн)	/khōmür/ хөмүр	-	/dumchuk/ думчук
Uigur	/rütün/ пүтүн	/kümüş/ күмүш	/kōmür/ көмүр	/ottuz/ оттуз	/burun/ бурун
Shor	/rüdün/ пүдүн	/kümüş/ күмүш	/kōbür/ көбүр	/oduz/ одус	/purdu/ пурду
Turkmen	/büten/ бүтен	/kümüş/ күмүш	/kōmür/ көмүр	/otuz/ отуз	/burun/ бурун
Tatar	/boton/ бөтөн	/kōmesh/ көмеш	/kumer/ күмер	/otyz/ отыз	/borun/ борын
Bashkir	/bötön/ бөтөн	/kōmōsh/ көмөш	/kumer/ күмер	/otyz/ отыз	/boron/ борон

Source: adapted from [9].

During the period of theoretical synharmonic analysis of the 1970-1990s to the present, the sound structure of the Kazakh language was studied only with the application of the law of synharmonism. Phonological connections

between the law of vowel harmony and morphemes (roots, affixes) were studied: "the strongest rope that connects parts of speech is the harmony of the root and affix, and the strongest part of the rope that fastens parts of speech is the



The process of harmony in a language is determined by two criteria: the distribution of a certain property of vowels to the maximum extent possible, based on the phonological inventory, with the exception of morphological delimiters; maintaining lexical harmony by maintaining structure without introducing new vowel types. P. Kiparsky and K. Pajusalu [22] note that if the vowel analogue required for harmonization is not used in the phonological inventory, context-free neutralization occurs, and if this occurs due to language restrictions, then positional neutralization occurs. In this paper, context-free neutralization and positional neutralization are presented on the example of the Turkish language. Contextual neutrality is determined prosodic (use of a phoneme only in stressed or unstressed, initial or non-initial position) or harmonic context. The main features are non-marking, uniformity and asymmetry. It should be noted that the phonetic system of the Kazakh language is closely related to word-formation and morphological parameters.

M. Perea et al. [23] investigate the morphophonological phenomenon of vowel harmony in Finnish: back vowels ("a", "o" and "u") cannot be used in the same monomorphemic word together with front vowels ("ä", "ö" and "y"). Finnish speakers use vowel harmony to segment multi-lexemic compound words. This statement once again confirms the fact that speech segmentation in the form of affixes and syllables is a necessary condition for vowel harmony. E.P. Ahn and E. Chodroff [24], after extensive cross-linguistic phonetic research, develop the VoxCommunis Corpus, which includes acoustic pronunciation patterns and word-level alignments. The current version includes 36 languages that can be worked with phonetically. The study of the phonetic characteristics of sounds and the identification of phonemes in the speech stream can help to isolate syngems or allosyngems in Kazakh and other languages with high accuracy.

The theory of phonological coding allows selecting and activating phonological segments, study their organization at the level of verbal formulas and syllabic structures online, and use these models when planning speech in the future. J. Alderete and P.G. O'Seaghda [25] explore the problem of speech error patterns, form encoding and repeated syllable in non-Indo-European languages. With the help of machine technologies at the present stage, it is possible to implement the division of lexemes into syllables in the speech stream, a detailed study of sound characteristics in technical terms. The method of K. Jonge et al. [26] makes it possible to study the production of vowels, as well as the nature of the interaction of phonetic categories, with the help of which it is possible to compare the pronunciation of the same sounds in different languages. In their own research, the main definitions, features and patterns of the phonetic systems of the Kazakh, Turkish and English languages, as well as the features of their synharmonic or disharmonic system, were noted.

Linguist A. Gafos [27] considers three main sources used to create phonological patterns: production, perception. The author focuses on the fact that some specific features of consonant (non)identity at large distances can be explained using the mechanism of information storage (memory). The identity of sounds in the root and suffix morphemes of the Kazakh and Turkish

languages can be explained with the help of historical (diachronic) linguistics. The phonological phenomenon of vowel harmony in the Akan language is studied by S. Owusu and A. Kwasi [28] on the example of an experiment: native speakers of this language were asked to compose 20 sentences with English words, in which high vowels would follow low vowels. The results showed that the students carried over the vowel rule to the pronunciation of English words. The study showed that the phonological system of the native language influences the learning and perception of the phonological systems of other close or distant languages.

Thus, transformations at the junction of morphemes in the Kazakh and Turkish languages can be not only phonological, but also morphological (the form of the word changes in addition to sounds). Synharmonism during word formation affects the sound side of speech, which results in alternations of phonemes in different positions. This phenomenon also affects the syllabic structure of lexemes, and hence the speech flow itself, so technical improvements in terms of speech segmentation can help with questions of vowel harmony in a further scientific perspective.

## **Conclusions**

Since the patterns of vowel harmony in the Kazakh language are closely related to the patterns inherent in other Turkic languages, this research focused on the close connection between the Kazakh and Turkish phonological systems. In the course of assessing the nature of phonological and morphological changes, it turned out that the Kazakh and Turkish vowel harmony are close in terms of phonetic processes, but their use is different. For example, different sounds appeared in the Kazakh and Turkish languages in the form of suffixal morphemes and sounds entering into transformative or word-formation processes. As for the consonant vowel harmony, the Turkish language showed two types of changes: word-formation and morphological, while the second type of changes is not so pronounced in the Kazakh language. The English language showed a disharmonious sound structure, which is directly related to the large number of vowels, diphthongs and the peculiarities of their use. Despite this, some English lexemes fell under synharmonic rules. This also applied to words borrowed from other languages with their inherent synharmonism (Turkic, Mongolian, Finno-Ugric).

The study of vowel harmony in the Kazakh language went through four main stages: from the study of the sound system using auditory perception, intuitive synharmonic analysis of the sound system, asynchronous harmonic analysis, generally accepted for the study of Indo-European languages, to the consideration of phonological relationships between vowel phonemes and morphological changes at morphemic junctions (root and suffix, suffix and ending). Thus, the goals and objectives set at the beginning of this research were achieved, since a comparison was made between the Kazakh, Turkish and English languages in terms of vowel harmony. Priority tasks in the future will be as follows: assessment of the degree of vowel harmony in the Turkic, Mongolian, Finno-Ugric languages; the formation of ideas about the nature of harmony and disharmony in the Indo-

European languages; comparison of phonological systems of poorly studied and insufficiently studied languages; consideration of sound parameters in the analysis of the speech flow; identification of sounds in oral speech.

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## Conflict of Interest

None.

## References

- [1] Kenzhigozhina K, Nurmuhametova K, Berkutbayeva M, Meiramova A, Kapesova T. Phonetic features of spoken English and Kazakh languages (theoretical and experimental research). *XLing*. 2020;13(2):166-175.
- [2] Dzhusupova UT. Prosodica of the Turkic Word. *Eur J Human Soc Sci*. 2022;7:160-164.
- [3] Guven S, Friedmann N. Vowel dyslexia in Turkish: A window to the complex structure of the sublexical route. *PLoS One*. 2021;16(3):e0249016.
- [4] Shende AM. Importance of Phonetics in English Language. *UGC Care Group I List J*. 2022;12(1):530-534.
- [5] Eratalay S. On G > V Change And /G/ Falling in Turkish. *Int J Lang Liter Cult Stud*. 2021;4(1):141-152.
- [6] Darkulova KN, Aulbekova ZhS, Kemelova JB. Synharmonism as a means of prosodic organization of the syntagm. *Mod Probl Sci Educ*. 2013;6:6-11.
- [7] Baitursynov A. *Language education*. Almaty: Ridna Mova; 1992.
- [8] Zhubanov K. *Studies in the Kazakh language*. Almaty: Gylym; 1999.
- [9] Kopbosynov BK, Boranbayev SR. Study of the Law of Synharmonism in the Kazakh Language. *Iasau Univ Habar*. 2022;4(126):19-28.
- [10] Kuanyshbai M, Akhaeva AS. *Researches of the scientist K. Zhubanov on phonetics*. Taraz: M.Kh. Dulaty Taraz Regional University; 2023.
- [11] Demir N. Vowel harmony in Laz Turkish. *Proceed Worksh Turkic Lang Cont Turk*. 2020;5(1):56-60.
- [12] Uiz F. *Phonology in a Nutshell*. Agadir: University of Ibn Zohr; 2022.
- [13] Turkish Language Class. *Consonant Harmony*; 2022. <https://turkishonline.eu/consonant-harmony-in-the-turkish-language/>
- [14] Radlov VV. *Experience of dictionaries of Turkic dialects*. Moscow: Oriental Literature Publishing House; 1963.
- [15] Batmanov I. *The phonetic system of the modern Kyrgyz language*. Kazan: Kirgizgosizdat; 1946.
- [16] McCollum AG, Chen S. Illustration of the IPA Kazakh. *J Int Phon Assoc*. 2021;45:221-228.
- [17] Derin M, Harada T. *Universal Dependencies for Old Turkish*; 2021. <https://aclanthology.org/2021.udw-1.11.pdf>
- [18] Stachowski M. Proto-Slavic palatal consonants and Proto-Turkic vowel harmony. *Slav Yearb*. 2020; LXIX:121-132.
- [19] Unal AD. *Speech Sounds of Turkish and English: Comparison and Contrast*. Anadolu: Anadolu University; 2018.
- [20] Varol M. *The Influence of Turkish Sound System on English Pronunciation*. Florida: The Florida State University; 2012.
- [21] Martin A, White J. Vowel harmony and disharmony are not equivalent in learning. *Ling Inquir*. 2019;52(1):1-20.
- [22] Kiparsky P, Pajusalu K. Towards a Typology of Disharmony. *Ling Rev*. 2003;20(2-4):217-241.
- [23] Perea M, Hyona J, Marcet A. Does vowel harmony affect visual word recognition? Evidence from Finnish. *J Expe Psych Learn Memor Cogn*. 2022;48(12):2004-2014.
- [24] Ahn EP, Chodroff E. VoxCommunis: A Corpus for Cross-linguistic Phonetic Analysis. *Proceed 13th Conf Lang Resour Eval*. 2022;6:5286-5294.
- [25] Alderete J, O'Seaghdha PG. Language generality in phonological encoding: Moving beyond Indo-European languages. *Lang Ling*. 2022;16(7):e12469.
- [26] Jonge K, Maxwell O, Zhao H. Learning on the Field: L2 Turkish Vowel Production by L1 American English-Speaking NGOs in Turkey. *Lang*. 2022;7(4):252-257.
- [27] Gafos A. Consonant harmony, disharmony, memory and time scales. *Proceed Soc Comp Ling*. 2021;4(19):1-19.
- [28] Owusu S, Kwasi A. The Influence of Akan Vowel Harmony on Pronunciation of Native Akan Speakers of English. *Int J Engl Lang Ling Res*. 2021;9(7):1-10.

## **Визначення, закономірності та історія вивчення гармонії голосних у казахській мові**

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### **Анотація**

**Актуальність.** Оскільки фонологічні зміни на стику морфем, зокрема в системі консонантизму, є недостатньо вивченими. Формування уявлення про сингармонійні процеси є актуальним у сучасній лінгвістичній науці.

**Мета.** Метою дослідження було вивчення звукових параметрів, фонологічних особливостей та сингармонізму на прикладі казахської, турецької та англійської мов.

**Методологія.** Для досягнення мети дослідження було використано такі методи: зіставний, структурний, фонетичний, аналітичний та синтетичний.

**Результати.** У статті представлено визначення, закономірності та чотири етапи в історії вивчення гармонії голосних у казахській мові. Для визначення рівня лабіальної гармонії казахських голосних наведено таблицю порівняння з іншими тюркськими мовами. У роботі відзначено основні фонологічні зміни на стику корневих і афіксальних морфем та їх вираження у звуковій площині, оцінено вплив фонетики на інші мовні рівні. Сформовано уявлення про чотири основні тембри в казахській мові: м'який, твердий, округлий і неокруглий, особливості голосного і приголосного сингармонізму. Розглянуто методи вдосконалення ідентифікації параметрів звуку та формування фонетичних моделей мовлення з використанням машинних технологій.

**Висновки.** У дослідженні зроблено висновок, що хоча казахська і турецька мови мають схожість у моделях гармонії голосних, вони відрізняються у застосуванні, а англійська мова демонструє здебільшого дисгармонійну звукову структуру, за деякими винятками в запозичених словах.

**Ключові слова:** голосні та приголосні; фонема; звукова система; афікс; морфемне з'єднання.