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TRACKING PHONOLOGICAL VARIETIES IN THE MODERN KAZAKH LANGUAGE

Abstract. The phonological diversity and dialectal heterogeneity that define contemporary Kazakh speech across various geographical locations are thoroughly examined in this study work. The research fills a major vacuum in modern Kazakh linguistics, where the dynamic changes brought about by contemporary sociolinguistic elements are frequently not captured by classic dialectological descriptions from the mid-20th century. The researchers analyzed the speech patterns of 11 male informants divided into two age groups: 18–25 years and 50–60 years, using a multimodal technique that combines auditory-perceptual analysis with instrumental acoustic measurements via the Praat program. Key cities in Kazakhstan's northern (Pavlodar, Semey, Karaganda, Astana) and southern (Turkestan, Taldykorgan, Kyzylorda, Taraz) regions are represented by these players. In order to objectively record regional phonetic indicators, or «shibboleths», the study's main focus is on the investigation of vowel formants (F1 and F2) and fundamental frequency (F0). The substantial change in labial harmony is one of the study's main conclusions. This phonological characteristic is almost nonexistent in the spontaneous speech of the younger group (18–25 years old), indicating a slow deterioration of classical harmonic oppositions, while it is reasonably constant among the elder generation (50–60 years old). Additionally, compared to their Southern counterparts, Northern speakers - especially those in the older demographic - tend to have higher fundamental frequencies and a more fronted articulation of vowels, according to acoustic evidence.

Keywords: Kazakh language, phonological variability, dialectal differentiation, acoustic analysis, auditory analysis, labial harmony, sociophonetics.

Introduction

This study's interest in the phonetic variability of the current Kazakh language was not accidental, as problems pertaining to the phonetic aspects of its operation have not received enough attention up to this point. Since dialects are where the language's phonetic diversity is most clearly displayed, the issue of dialect differentiation is especially pertinent. Since there are currently few studies in Kazakh linguistics that offer a full picture of regional variations in pronunciation, there is an obvious need for a thorough description of the dialectal characteristics of modern Kazakh.

This has guided our effort to detect and characterize dialect-based phonetic variability by examining the phonetic characteristics of the speech of contemporary Kazakh speakers from four areas of Kazakhstan.

The study focuses on speakers of contemporary Kazakh.

The study focuses on the phonetic variety of current Kazakh dialect speakers' speech.

*** Cite us correctly:**

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The study's primary goal is to characterize the phonetic variety of contemporary Kazakh speakers from various parts of Kazakhstan.

In order to accomplish this goal, the primary goals are to identify and describe the phonetic characteristics of current Kazakh speakers' speech as well as to describe the steps and procedures of the experiment.

Numerous theoretical and practical elements define the current study's significance. Concerns about language functionality and variety have become especially significant in the light of the ongoing sociolinguistic transformations occurring in contemporary Kazakhstan. The phonetic variety of contemporary Kazakh speakers' speech in regional terms has not received enough attention, despite the availability of individual works devoted to Kazakh dialectology.

Intense standardization procedures, the impact of the literary norm, population mobility, urbanization, and the growth of linguistic domains are all features of the current stage of Kazakh language development. Regional phonetic characteristics either level off or, on the other hand, take on new manifestations under certain circumstances, necessitating their methodical scientific definition and documentation. There is a significant vacuum in contemporary Kazakh linguistics since there are not enough experimental phonetic research based on the examination of speakers' natural speech from various parts of Kazakhstan.

Furthermore, sociophonetics, dialectology, applied linguistics, teaching Kazakh, the creation of educational and lexicographic materials, automatic speech processing, and the preservation of linguistic heritage all depend on the study of modern Kazakh's phonological and phonetic variability.

The significance of this study and its contribution to the advancement of contemporary Kazakh linguistics is therefore determined by the necessity of a thorough examination of the phonetic variety of the speech of contemporary Kazakh speakers, taking into consideration geographical factors.

This research focuses on identifying and analyzing the phonetic and linguistic features of the northern and southern dialects of the Kazakh language. Conducted under the auspices of the Department of Language and Linguistic Science at York University (UK), this study offers a comprehensive examination of regional phonological variations.

Research methods and materials

Two complimentary phonetic analysis techniques were used within the current study framework: auditory (perceptual) and acoustic analysis. This allowed for a thorough and multidimensional examination of the sound realization of speech.

In order to pinpoint the particular aspects of vowel and consonant realization as well as the most prominent phonetic qualities of the subject matter, auditory analysis was utilized. Careful listening was part of the process, after which pertinent phonetic phenomena were recorded. The International Phonetic Alphabet (IPA) was used to transcribe the most prominent and typical phonetic segments, guaranteeing the precision and coherence of the data description.

The goal of acoustic analysis was to quantitatively compare and measure the primary acoustic properties of speech. Specifically, the fundamental frequency (F0) and the first two formants (F1 and F2) were measured, which made it feasible to describe vowel articulation and quality objectively and to identify potential regional and individual variances.

It was feasible to examine the characteristics of controlled and natural speech output since the experimental data included audio recordings of both read and spontaneous speech (Tables 1, 2).

Table 1 – Materials received (spontaneous speech)

№	Item	Date received	Region	Audio file length (in s)
1	2	3	4	5
1	Voice sample 1	01/07/2024	Turkestan	64
2	Voice sample 2	05/07/2024	Taldykorgan	70

Continuation of Table 1

1	2	3	4	5
3	Voice sample 3	05/07/2024	Kyzylorda	79
4	Voice sample 4	15/07/2024	Taraz	60
5	Voice sample 5	16/07/2024	Turkestan	79
6	Voice sample 6	22/07/2024	Karaganda	71
7	Voice sample 7	23/07/2024	Pavlodar	54
8	Voice sample 8	23/07/2024	Astana	59
9	Voice sample 9	26/07/2024	Pavlodar	63
10	Voice sample 10	27/07/2024	Aksu	82
11	Voice sample 11	01/08/2024	Semey	56

Table 2 – Materials received (read speech)

№	Item	Date received	Region	Audio file length (in s)
1	2	3	4	5
1	Voice sample 1	01/07/2024	Turkestan	40
2	Voice sample 2	05/07/2024	Taldykorgan	35
3	Voice sample 3	05/07/2024	Kyzylorda	34
4	Voice sample 4	15/07/2024	Taraz	35
5	Voice sample 5	16/07/2024	Turkestan	36
6	Voice sample 6	22/07/2024	Karaganda	35
7	Voice sample 7	23/07/2024	Pavlodar	54
8	Voice sample 8	23/07/2024	Astana	60
9	Voice sample 9	26/07/2024	Aksu	36
10	Voice sample 10	27/07/2024	Semey	35
11	Voice sample 11	01/08/2024	Pavlodar	30

Results and discussion

The first dialectological studies of the Kazakh language were conducted in the 1930s and were reactivated only in the post-war period. As a result of dialectological expeditions carried out by the Institute of Language and Literature of the Academy of Sciences of Kazakhstan under the leadership of S.A. Amanzholov, Zh.D. Doskaraev, and N.T. Sauranbaev, rich empirical material was collected from southern, some western, and north-eastern regions. The main objective of the field studies of that period was the documentation of Kazakh dialects, followed by their classification and determination of their genesis. Based on these investigations, S.A. Amanzholov identified three territorial dialects: southern, western, and north-eastern. This classification was based on tribal affiliation corresponding to the ethnic composition of the three Kazakh zhuzes [1, p.99].

Later, Zh.D. Doskaraev and N.T. Sauranbaev proposed two major groups of dialects: south-eastern and north-western [2, pp.87–88], [3, p.49]. In contrast to S.A. Amanzholov, these scholars argued that permanent integrational processes (the mixing and merging of different tribes and clans, the formation of a unified nation, and the further development of this nation under conditions of nomadic pastoralism) led to the mixed settlement of representatives of the three main tribal groups. This, in turn, resulted in the assimilation of earlier tribal dialects. Based on collected dialectological data, they adopted a territorial rather than a tribal principle of classification. N.T. Sauranbaev explained dialectal variation in terms of the socio-economic and socio-cultural life of the Kazakh population of that period. According to the scholar, contact with neighbouring ethnic groups also played an important role in the emergence of dialectal differences [3, pp. 46–47].

The systematization of scholarly research on Kazakh dialects makes it possible to identify several main directions in which this issue has been developed. While S.A. Amanzholov [1, p.99],

N.T. Sauranbaev [3, p.49], and Zh.D. Doskaraev [2, pp.87–88] argue for the existence of dialectal divisions in Kazakh, G.G. Musabaev and G.D. Sanzeev maintain that Kazakh does not have dialects proper, but rather dialectal phenomena, which they interpret as deviations from standard speech and classify as forms of colloquial usage.

According to G.G. Musabaev, existing dialectal features in Kazakh cannot be considered true dialects, as they are residual and fossilized in nature. Zh.D. Doskaraev expresses a similar view, suggesting that dialectal phenomena emerged due to contact with related languages and have been preserved in Kazakh as archaic elements [2, p.85].

In the 1990s, researchers of Kazakh dialectology argued that, despite the presence of territorially conditioned phonetic, lexical, and limited grammatical variations, the Kazakh language remains monolithic and unified. These scattered variations do not impede mutual intelligibility and do not constitute separate languages spoken in different regions [4, p.7].

Subsequent dialectological research in Kazakhstan was conducted with significant time gaps by both Kazakh and Russian scholars. According to field studies carried out by Yu.V. Normanskaya and U. Issabekova in 2014, audio dictionaries of modern dialects of Zhambyl, Kyzylorda, Taldykorgan, Aksu, and Semey have been compiled [5, pp.177–214], as well as dialects of Uralsk, Astana, and Pavlodar [6, pp.138–152]. These audio materials are available at <http://lingvodoc.ispras.ru>. The results of research on Kazakh dialects are also reflected in the works of Yu.V. Normanskaya and N.G. Shaimerdenova [5]. A distinctive feature of these field studies is the analysis of the vowel system in translations of early Cyrillic texts into Kazakh, compared with modern dialects. The findings indicate that over the past century, significant changes have occurred in the vowel system, as evidenced by discrepancies between early translations and contemporary eastern, Zhambyl, and Kyzylorda dialects.

The speech features representing territorially specific but non-systematic fragments do not prevent mutual understanding among speakers of different regions; therefore, it is not appropriate to refer to them as dialects in a strict sense.

Moreover, such territorial variations within modern Kazakh do not constitute systematic oppositions with the standard language and are mostly limited to partial, relatively stable, and typical differences bordering on colloquial speech, preserved in the everyday spoken language of certain social groups (age, education). Today, due to the widespread use of the internet, social media, and mass media, a spontaneous process of leveling local varieties and their gradual erosion can be observed, alongside a tendency toward the stabilization of the norms of the standard literary language.

Existing scholarly works devoted to the phonetic features of Kazakh speakers, including those by S.A. Amanzholov, Zh.D. Doskaraev, N.T. Sauranbaev, Sh. Sh. Sarybaev, S.K. Kenesbaev, and Zh.A. Aralbaev, mainly belong to the mid-20th century. Based on Amanzholov's classification of south-eastern and north-western groups, Zh.D. Doskaraev and N.T. Sauranbaev identified phonetic correspondences such as alternations [o]–[ü], [d]–[m], [ch]–[sh], [m]–[l], as well as elision and reduction phenomena characteristic of certain dialects.

Academician S.K. Kenesbaev, while analyzing the phonological system of standard Kazakh, also addressed certain phonetic phenomena typical of specific dialects [7, pp. 56-57]. Of particular interest is Sh.Sh. Sarybaev's work «On the unstable position of the sonorant [l] in Kazakh dialects», in which he distinguishes two lexical groups: loanwords and native Kazakh words [8, pp.130-132].

Sh.Sh. Aralbaev, in turn, classifies phonetic processes according to their territorial distribution into two groups: those widespread over a large area and those restricted to smaller regions. For example, the first group includes alternations such as [zh]–[j], [sh]–[ch], [d]–[l], while the second includes [s]–[sh], [z]–[zh], [zh]–[y], etc [9, p.93].

These studies represent an important stage in the historical development of Kazakh dialectology and in establishing principles of phonetic correspondences and divergences within the unified Kazakh language.

Research on the phonological system of modern Kazakh has increasingly attracted scholarly attention in recent decades, due to the intensive transformation of its sound system under both external language contact and internal processes of standardization. The contemporary linguistic situation is characterized by a high degree of variability caused by bilingualism, alphabet reforms, migration processes, and generational differences among speakers.

The quantity and status of vowel phonemes is one of the most contentious topics in Kazakh phonology. Eight vowel phonemes are identified by traditional descriptions that have their roots in classical Turkological investigations. There is no agreement, though, since many linguists suggest models with eight to eleven vowel phonemes [10], [11], [12], [13].

According to recent acoustic-phonetic research (A.McCollum et al.), there may be more phonological units or diphthong-like sequences, including /*ie*/, /*ɤ*:/, /*ɔ*:/, whose status fluctuates based on sociolinguistic variables and speech register. The reinterpretation of the high-mid vowel opposition receives special emphasis. A.McCollum and Washington claim that in modern spoken Kazakh, this distinction is increasingly realized through vowel length rather than height. According to experimental evidence, high vowels have a steady duration ratio of around 2.1:1, whereas mid vowels have traditionally tended to lengthen [13; 14].

The primary phonological process of Kazakh is typically thought to be vowel harmony. Recent research, however, shows that it is gradually changing. Specifically, McCollum's approach characterises labial harmony - which was previously defined as categorical - as a gradient process. It diminishes considerably at morpheme borders, particularly in affixes, but stays mostly stable inside roots.

Additionally, a hierarchy of harmony triggers has been found: long back vowels (/*ɔ*:/) seldom initiate harmonic processes, while front rounded vowels (/ɤ, ɤ:/) and the short back vowel (/ɔ/). These results suggest a weakening of traditional harmonic oppositions and a rearrangement of phonological traits.

There have also been modifications to Kazakh's consonant system. Under the influence of Arabic and Russian, borrowed phonemes like [f], [v], and [h] are gradually making their way into modern speech in addition to a conventional set of about 20 contrastive consonants. According to studies, native articulatory equivalents like [p], [w], and [q] frequently adapt and replace these sounds.

Regional phonetic indicators that serve as linguistic «shibboleths» are particularly intriguing. Post-alveolar fricatives can be realised as affricates in certain dialects by substituting [ch] for [sh]. This phenomena is particularly prevalent in the spoken language of Kazakhs in China, Mongolia, and Eastern Kazakhstan, according to S.Zj.Tazhibayeva and other academics, underscoring the significance of regional and cross-border influences in phonological variation [15, pp.89-90].

Depending on the circumstances of linguistic interaction, Kazakh's phonological structure changes considerably. Research on Chinese repatriate (kandas) speech reveals the persistence of antiquated elements, such as the usage of the traditional Ahmet Baitursynov alphabet (töte žazuw). As a sign of a conservative phonological system, their speech displays prothesis, which is the insertion of a vowel before the first /r/ or /l/ (e.g., ыразы instead of риза).

At the same time, non-native phonetic traits, such as palatalisation of consonants, are emerging in Kazakhstani young people's speech due to the impact of Russian. R.A. Pisati and C. Meluzzi claim that depalatalization processes are also seen, suggesting the fragility of phonological differences and the intricate interplay between internal and contact-induced variables [16, p.90].

As a result, the examination of recent literature reveals that the Kazakh language's phonological system is dynamically changing. The real language usage, which is marked by variability, gradient phonological processes, and spatially conditioned distinctions, is increasingly not reflected by traditional descriptions. This establishes the scientific significance of the current

work by requiring rigorous experimental investigation on the speech of various geographic and generational groups.

The literature study concludes that there is a considerable degree of phonological variety in modern Kazakh, which is brought about by both external impact from donor languages and internal growth, particularly the weakening of vowel harmony. Researchers stress that the distribution of phonological variations is significantly influenced by age and geographic variables. However, because of prolonged exposure to Russian, repatriates' speech frequently retains phonetic characteristics that have been largely lost in Kazakhstan's standard variation.

An experimental research of Kazakh speech across various age and geographic groups was carried out to confirm and improve the theoretical presumptions found in the literature review. The experiment's objectives were to find characteristics of phonological variance in modern Kazakh speech and investigate how age and geography affect phonological processes.

The selection of informants from various age and geographic categories received particular consideration in this study. This method makes it possible to examine present patterns in phonological variance in Kazakh speech in more detail.

The research shows that the phonological system of Kazakhstan is undergoing dynamic transformation. Current language practices, which are marked by variety and regional variances, are frequently not reflected in traditional descriptions. In order to record these contemporary tendencies, comprehensive experimental study involving speakers from many generations and geographical areas is required.

Eleven individuals (n=11) were chosen as informants: six men between the ages of 18 and 25 and five males between the ages of 50 and 60.

Three informants between the ages of 18 and 25 and two informants between the ages of 50 and 60 from the southern region (Taldykorgan, Taraz, Kyzylorda, Turkestan cities) and three informants between the ages of 18 and 25 and three from the northern region (Pavlodar, Semey, Karaganda, Astana cities).

The following factors were taken into account when choosing informants for the experiment: the informants must be free of speech disfluencies; they must be born and currently reside in either the northern or southern regions of Kazakhstan; and they must speak Kazakh as their primary language.

Four listeners – two females and two males – were enlisted for the perceptual analysis of spontaneous speech. In order to achieve a more balanced perception and interpretation of dialectal and phonetic variance in the speech data, listeners from various regional backgrounds were included.

The listeners were distributed as follows:

1. Two listeners from Kazakhstan northern areas Pavlodar and Semey
2. Two listeners from Kazakhstan southern regions Almaty and Kyzylorda.

During the auditory analysis, the listeners were given a number of tasks. They were first asked to identify dialectal features of the audio recordings. Secondly, they recognized the linguistic and phonetic elements in the informants' speech, focusing especially on regional speech traits and pronunciation patterns.

To ensure the reliability and validity of the experimental research, ethical considerations were given special attention throughout the inquiry. Before the research began, all participants were informed of the objectives and purpose of the data collection process. The informants were assured that the audio recordings would only be used for scientific and research purposes. Participants were also informed that all collected data would be kept private and that no personal information would be disclosed in a way that would violate their rights or interests.

The participants were also made aware that the researchers were more interested in the phonetic features of their speech than in the substance of their answers in order to lessen any potential anxiety or discomfort throughout the recording procedure. These actions helped to get

more genuine examples of spontaneous speech and helped to create a more natural communication environment.

The technical features of the experiment must be described once the ethical procedures and participant engagement have been outlined. The hardware and software used to gather and analyses the speech data are shown in the following table 3:

Table 3 – Equipment list

Software	Hardware
Praat (Version 6.2.23 (May 23d 2023))	HP LAPTOP-A66JGBS6 running Windows 11
ZOOM platform (https://zoom.us/)	Android/Apple smartphones
Recording apps (e.g.Voice Recorder, easy Voice Recorder, etc.)	Hoco W35 wireless headphones

Both read and spontaneous speech recordings were used in the experimental study. By comparing controlled pronunciation with more spontaneous speech output, these two formats allowed for the identification of phonetic variation under various speech situations.

The respondents were required to read aloud eleven Kazakh phrases as part of the read speech assignment. Several communicative sentence forms, including declarative, interrogative, and exclamatory phrases, were included in the stimulus material:

- | | |
|---|---|
| 1.Мен Өскеменде он жыл тұрдым. | 1.Men Öskemende on jyl türdym. |
| 2.Дүкенде_мен ешкімнен көмек сұрамаймын. | 2.Dükende men eşkımnen kömek sūramaimyn. |
| 3.Мешітке автобуспен бару керек пе? | 3.Meşıtkе avtobuspen baru kerek pe? |
| 4.Мен оған телефон арқылы шалдым. | 4.Men oğan telefon arqyly şaldym. |
| 5.Үлкен келінді сол жерден алдық. | 5.Ülken kelındı sol jerden aldyq. |
| 6.Шығыстың табиғаты әдемі! | 6.Şyğstyñ tabıǵaty ädemı! |
| 7.Кешке таман шығарады. | 7.Keşke taman şyǵarady. |
| 8.Малға шөп беріп жайлап келдім. | 8.Malǵa şöp berıp jailap keldim. |
| 9.Қазақ тілінен үйге қандай тапсырма берілгенін айтып жібересің бе? | 9.Qazaq tılınen üige qandai tapsyrma berilgenin aityp jiberesiñ be? |
| 10.Көктем келіп, күннің жылынғаны қандай тамаша! | 10.Köktem kelıp, künniñ jylynǵany qandai tamaşa! |
| 11.Дәмі тәтті етіп жасалған кәмпит. | 11.Dämi tätti etıp jasalǵan kämpit. |

The goal of this variation was to produce various phonetic and intonational contexts for speech feature analysis.

By using relatively controlled speech data from the read speech task, we were able to analyses how each participant spoke particular phonetic units in the same language settings. However, an extra stage of spontaneous speech recording was included to the experiment since read speech might not accurately represent real pronunciation patterns.

Each informant was asked to describe two images in order to get samples of spontaneous speech. By encouraging participants to speak in a less controlled and more natural manner, this activity allowed for the observation of phonetic and intonational characteristics that arise in normal conversation.

A maximum of one minute was assigned for each participant to describe the images. While still providing enough spontaneous speech information for auditory and phonetic analysis, the time constraint assisted in maintaining comparatively similar recording circumstances for all informants.

The general structure of the experimental investigation must be described after outlining the methods for gathering read and spontaneous speech. There were two primary phases of the experiment, each intended to meet particular scientific goals.

Informants participated in the experiment's initial phase, which was centered on gathering speech data via recordings of both read and spontaneous speech. All participants were given comprehensive instructions on the activities they were expected to do prior to the start of the trial. At this point, informants also completed questionnaires that included pertinent background data.

To guarantee uniform recording circumstances and reduce outside influence, the experiment was carried out one-on-one with each participant. Each audio file was given a number when the tasks were finished, and it was then moved to a computer for additional processing and analysis.

The quality of the recordings was given particular consideration. To minimize background noise and enhance the audio material's quality, the speech data were captured in a calm environment with little echo and reverberation. Participants utilized their smartphone audio recording feature during the experiment. To guarantee enough audio quality for ensuing phonetic analysis, the recording quality was standardized at 44.1 kHz with a 16-bit quantization rate.

After being recorded in WAV format, all audio recordings were forwarded to the researchers for processing. Participants completed the recordings under the researcher's supervision via the Zoom platform in order to guarantee proper task completion and consistent experimental settings. Instead than serving as the primary recording platform in this situation, Zoom served mostly as a monitoring and supervisory tool.

Recruiting listeners for a remote auditory analysis was the second step. After listening to the audio recordings, the listeners had a week to fill out an option-based questionnaire.

The study moved on to the acoustic analysis phase after the auditory analysis was finished. The objective assessment of phonetic characteristics in the gathered voice data was the main emphasis of this last stage. Specifically, formant frequencies and other acoustic characteristics were examined to provide quantitative proof of the auditory observations.

Vowel quality and geographical diversity in pronunciation were investigated using F1, F2, and F0 (frequency range) measures, which form the basis of the acoustic results. These measures supplement the listeners' perceptual assessments from the earlier phase of the experiment and offer a thorough audio depiction of speech variations among informants.

Praat signal processing software (Version 6.2.23, May 23, 2023), which is often used in phonetic research for the extraction and visualization of speech characteristics, was utilized to do the acoustic analysis.

F1&F2 measurements

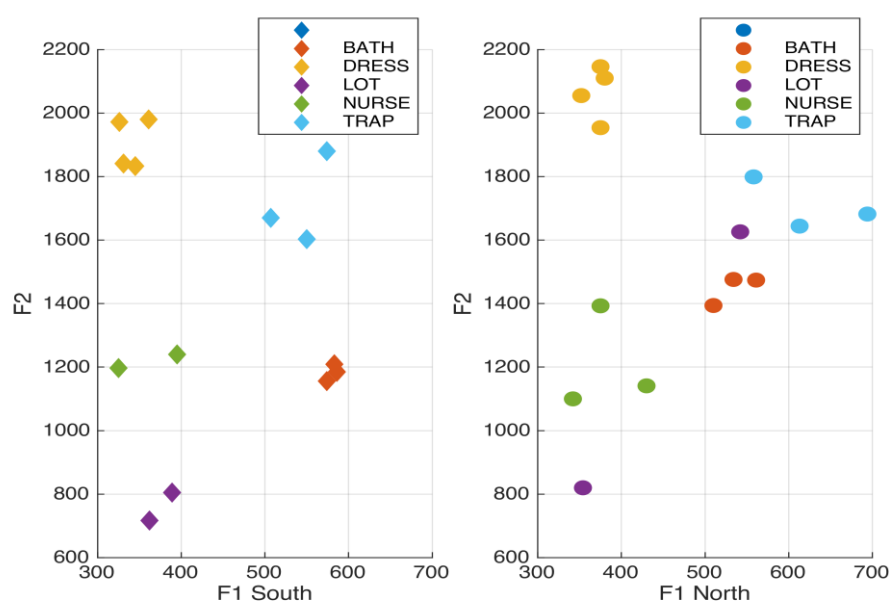


Figure 1 – Acoustic analysis of F1 and F2 measurements for southern and northern speakers (Age 18-25)

The above graph displays the F1 (first formant) and F2 (second formant) measurements for various vowel sounds made by speakers between the ages of 18 and 25 from the North (MN) and the South (MS). Different symbols and colors that correlate to lexical sets like BATH, TRAP, NURSE, DRESS, and LOT are used to symbolize each vowel sound (Figure 1).

Compared to Southern speakers, Northern speakers typically generate certain vowels with somewhat higher F2 values, indicating a more forward articulation. Subtle variations in speech patterns that contribute to unique regional accents are reflected in this regional variance.

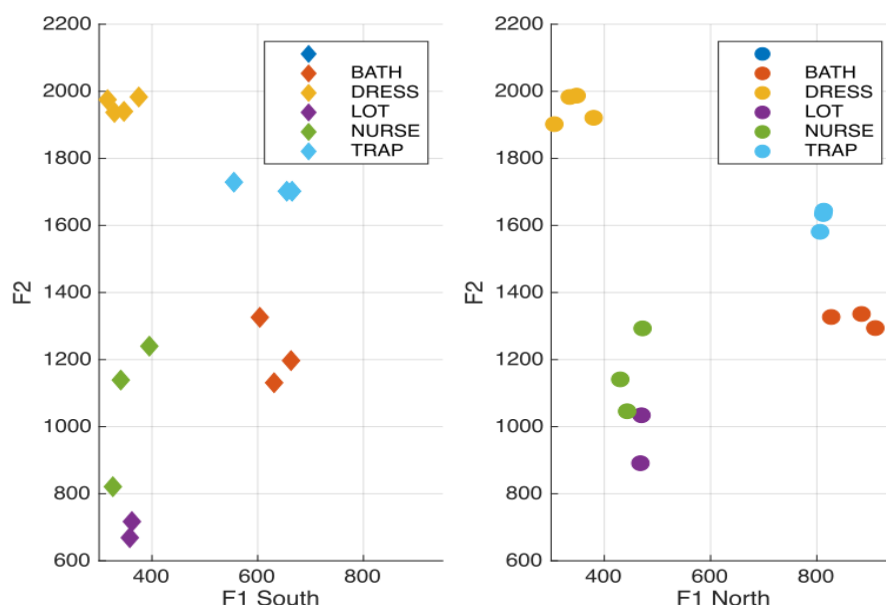


Figure 2 – Acoustic analysis of F1 and F2 measurements for southern and northern speakers (Age 50-60)

The above graphic, which covers speakers between the ages of 50 and 60, contrasts the first (F1) and second (F2) formant frequencies for a variety of vowel sounds as uttered by people from different locations (South vs. North). The plot, which focuses on the lexical sets BATH, TRAP, NURSE, DRESS, and LOT, sheds light on regional vowel variation (Figure 2).

The regional vowel differences between Southern (MS) and Northern (MN) speakers aged 50–60 are highlighted by the acoustic analysis based on the F1 and F2 measures. Northern vowels are more backward and vary in height, whereas Southern vowels are typically more fronted and somewhat higher.

Frequency range for aged 18-25

The frequency ranges of vowel formants in spontaneous speech for speakers from the north and south, ages 18 to 25, are shown in the table below (Table 4). These findings make it possible to compare regional variations in acoustic characteristics, with a particular emphasis on the distinctions between the northern and southern forms of Kazakh speech.

Table 4 – Frequency ranges for the voices of southern and northern speakers (18-25 age) in spontaneous speech

Voice	Frequency range (Hz)
South	
Voice 1	124
Voice 2	122
Voice 3	143

Continuation of Table 4

North	
Voice 1	137
Voice 2	142
Voice 3	101

Southern speakers in this age range have moderate diversity in their fundamental frequencies. The frequencies of Voice 1 and Voice 2 are quite comparable, at 124 Hz and 122 Hz, respectively, indicating that the two speakers' pitches are identical. In contrast to the other two voices, frequency of Voice 3 is substantially higher at 143 Hz, suggesting a higher pitch.

The fundamental frequencies vary more noticeably for speakers from the north. A clustering of higher-pitched voices is indicated by the comparatively high frequencies of Voice 1 and Voice 2, which are near in value at 137 Hz and 142 Hz, respectively. But compared to the other two voices, Voice 3 has a much lower frequency (101 Hz), indicating a far lower pitch.

There is more variation in pitch among the northern speakers, as seen by their wider frequency range. There appears to be less pitch variation among the southern speakers due to their limited range.

Average Frequency:

The average fundamental frequency for southern speakers can be calculated as:

$$\text{Average F0 (South)} = \frac{124 + 122 + 143}{3} = 129.67\text{Hz}$$

The average fundamental frequency for northern speakers can be calculated as:

$$\text{Average F0 (North)} = \frac{137 + 142 + 101}{3} = 126.67\text{Hz}$$

The average frequencies are relatively similar, with the average F0 of southern speakers being slightly higher (129.67 Hz) than that of northern speakers (126.67 Hz). This indicates that while the southern group leans somewhat higher, both groups have generally identical pitch levels.

Southern speakers often had a smaller pitch range and a somewhat higher average frequency than their northern counterparts, according to an examination of fundamental frequencies among younger speakers. Northern speakers have a wider range of fundamental frequencies, suggesting more pitch variation among this group, but having a somewhat lower average frequency.

Frequency range for aged 50-60

The average fundamental frequency for each recording was measured. The measures of these are shown in the Table 5:

Table 5 – Frequency ranges for the voices of southern speakers (50-60 age) in spontaneous speech

Frequency range (Hz)	Voice
South	
Voice 1	135
Voice 2	88
North	
Voice 1	151
Voice 2	110
Voice 3	148

Southern speakers' fundamental frequencies show a rather broad range. The frequency of Voice 1 is 135 Hz, which is somewhat higher than the frequency of Voice 2, which is 88 Hz. Pitch diversity among southern speakers is suggested by the 47 Hz difference, with Voice 1 exhibiting a higher pitch than Voice 2.

The three voices of the northern speakers exhibit a wider variety of basic frequencies. At 151 Hz, Voice 1 has the highest frequency, closely followed by Voice 3 at 148 Hz. The frequency of Voice 2 is much lower than that of the other two voices, at 110 Hz. This implies that although higher frequencies (Voice 1 and Voice 3) show some consistency, Voice 2 also shows a noticeable decline, suggesting variation within this group.

These results imply that younger informants' regional variations in pitch are less noticeable than those of older adults, with both the southern and northern groups showing comparable average frequencies but varying degrees of pitch variability.

Southern speakers' fundamental frequencies vary from 88 Hz to 135 Hz, which is 47 Hz. The frequencies for northern speakers cover 41 Hz, from 110 Hz to 151 Hz.

The northern speakers exhibit a wider overall range of frequencies, despite the fact that the range of frequencies is roughly similar (47 Hz for the southern group and 41 Hz for the northern group). The minimum and maximum frequencies of the voices of northern speakers are higher than those of southern speakers.

Average Frequency

The average fundamental frequency for southern speakers can be calculated as:

$$\text{Average F0 (South)} = \frac{135 + 88}{2} = 111.5 \text{ Hz}$$

The average fundamental frequency for northern speakers can be calculated as:

$$\text{Average F0 (North)} = \frac{151 + 110 + 148}{3} = 136.3 \text{ Hz}$$

This indicates that speakers in the north typically have a higher fundamental frequency (136.3 Hz) than those in the south (111.5 Hz). This may suggest that older persons' pitch patterns vary by area.

According to the data, speakers from the north typically have higher fundamental frequencies than those from the south. Furthermore, the northern group exhibits a wider variety of frequencies, particularly when the third voice is taken into account. These results point to possible geographical variations in older individuals' speech patterns, with northern speakers perhaps having a propensity for higher pitch in spontaneous speaking.

Results of auditory analysis

The following prominent phonetic characteristics have been found by auditory analysis:

1. Compared to speakers aged 50–60, informants from the northern and southern areas aged 18–25 do not exhibit instances of labial harmony in their speech. In spoken Kazakh, the phoneme [e] in the second syllable of several nouns is pronounced as [ø]. The vowel phoneme [e] transforms to [ø] or [ʏ] in the following syllable if the first syllable contains the vowels [ø] and [ʏ]. These phonetic modifications are typically connected to labial harmony (labial harmony, labial attraction) in the Kazakh language. In two-syllable words, labial harmony of vowels is evident and becomes weaker by the third syllable. For instance, the following words exhibit labial harmony of vowels: *өлөң* /øləŋ/ *өлең* /ølen/ (*song*), *дүкенде* /dykende/ – *дөкөндө* /dykyndy/ (in the supermarket), *сүретте* /syrete/ – *сөрөтө* /syryty/.

2. In the speech of southern and northern speakers of both age groups, the phoneme [ʒ] is pronounced as [d͡ʒ] in some cases. For example: *жыл* [d͡ʒəl/ /, *жер* /[d͡ʒer/.

3. The results of auditory observations showed a divergence in the sound forms [ʃ] and [t͡ʃ] in the speech of an informant from Taldykorgan. For example: *ойыншық* /ojɲʃəq/ – *ойынчық* /ojnt͡ʃəq/.

The sound [tʃ] occurs after the nasal [n], for example, *қиыншылық* /qɪnʃələq/ < *қиынчылық* /qɪntʃələq/.

S. Omarbekov suggests that the sound [tʃ] is most commonly found in the dialects of the East Kazakhstan, Almaty, and Zhambyl regions [17, pp.48-58].

4. The presence of [j], [ɜ], [j] in a syllable with the phoneme [a] makes it sound like [æ] (e.g., *шай* /ʃæi/ (tea) - *жай* /zæi/ (just)). In other words, the phoneme [a] is palatalized in the position between [j] and [ɜ]. However, the phoneme [a] does not undergo palatalization when combined with [ɜ] in the speech of young informants. For example: *жайлап* /zɑjlap/.

Non-phonetic features for both groups

1. Univerbation appears in the form of contracted compound verbs. The characteristic of univerbation is manifested in the following: dropping of the gerund ending -(l,ə) p and the replacement of the phoneme [ɜ] at the beginning of the auxiliary verb with the phoneme [b] or [v]. As a result, two words merge into one. For example: *ойнап жатыр* /oɪnap zətər/ – *ойнаватыр* /oɪnavatər/, *ұйықтап жатыр* /oɪqtap zətər/ – *ұйықтаватыр* /oɪqtavatər/.

2. Code-switching is characteristic of informants from the northern and southern regions, where Kazakh endings are added to Russian words. For example: *стена-лар-да* /stena-lar-da/ (on the wall), *комната-да* /komnata-da/ (in the room).

Auditory analysis by listeners

1. Dropping a letter in the middle of a word: this was observed by the listeners. 2. Univerbation: Univerbation suggests a propensity for speech resource economy. 3. Shibboleths of southern and western regional accents: the listeners thought that some speech

Samples that were characteristic of the southern dialect belonged to the western dialect. This suggests that these dialects are similar, making it challenging for non-specialists to tell them apart.

4. Pronunciation of the phoneme [ɲ]: it was observed that in certain instances, the sound [ɲ] was pronounced as [ŋ]. The speaker's place of origin may be indicated by this phonetic characteristic.

5. Assigning a speaker from the Karaganda region to the southern dialect: although the Karaganda region is not physically located in the south, listeners categorized speakers from this region as belonging to the southern dialect. This would suggest that the southern dialect and the linguistic characteristics of the Karaganda region are comparable.

6. Labial harmony

7. Substitution of the phoneme [ʃ] with [tʃ].

8. Substitution of the phoneme [ʃ] with [ç]: The listeners also noted the substitution of the phoneme [ʃ] with [ç], as evidenced in the pronunciation of words such as 'үш' /ʏʃ/ - 'үш' /ʏç/ (three) and 'кешкі' /keʃki/ - 'кешкі' /keçki/ (evening).

Non-phonetic features

1. Lexical features as the main focus of the auditors: In the course of the speech analysis, the listeners paid more attention to lexical or grammatical features than to phonetic ones. For example, auditors noted that words such as 'әйел' - /æjjel/ (wife) and 'күйеу' - /kyjæw/ (husband) are more commonly used in northern Kazakhstan, while their synonyms 'жұбайы' /ʒubajə/ (spouse) and 'зайыбы' /zɑjəbə/ (spouse) are used in the south.

2. Code-switching as a sign of a northern regional accent: Speakers from Kazakhstan's northern areas were known for code-switching, particularly the usage of Russian interjections. This occurrence shows that the Russian language has a significant effect in these regions and is a useful signal for auditors to ascertain the speakers' geographical origin.

Limitations:

1. Lexical sets: During the analysis of vowels, a question arose regarding the development of lexical sets for the Kazakh language. Since the Kazakh language includes vowels in word roots that are not typical for English (such as ы, і, ү, ұ), the lexical sets developed by J. Wells are not suitable for the Kazakh language [18, pp. 20-22].

2. Listeners: Rather than phonetic elements, listeners in this study concentrated more on the lexical or grammatical parts of the informants' speech. There were some technical issues because the recordings were done remotely. Some informants, in particular, had bad internet connections.

3. Data collection: Material must be gathered in rural regions for next research. Rural areas frequently have distinctive dialects and accents that may be different from metropolitan ones. Learning about various dialects contributes to the preservation of linguistic variety that may be lost as a result of urbanization.

4. Data collection method: Interviews offer the chance to collect dialects and accents in their natural settings, which aids in understanding how accents are employed in everyday speech and how they may vary according on the topic of discussion, the conversation partner, or the circumstance.

Conclusion

The study concludes that there is considerable phonological variation in contemporary Kazakh speech, which is influenced by both generational and geographical factors. According to acoustic analysis, Northern speakers, especially those in the older age group, often have higher fundamental frequencies and more forward vowel articulation than Southern speakers. The decline of labial harmony, which is almost nonexistent in the speech of informants between the ages of 18 and 25 but is evident in the speech of those between the ages of 50 and 60, is a significant finding. Additionally, social processes such as universion and code-switching, particularly in the North, demonstrate the dynamic nature of the language in contemporary society. These findings emphasize the need for further research in rural regions to preserve linguistic variation before standardization eliminates regional differences entirely

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Қазіргі қазақ тіліндегі фонологиялық варианттарды қадағалау

Аңдатпа. Бұл ғылыми мақалада қазіргі қазақ тілінің фонологиялық вариативтілігі мен диалектілік саралануы кешенді түрде зерттеледі. Жұмыстың өзектілігі қазіргі қазақ лингвистикасындағы аймақтық ерекшеліктерді жаңаша пайымдау қажеттілігімен байланысты, өйткені XX ғасырдың ортасындағы классикалық зерттеулер бүгінгі жаһандану мен урбанизация жағдайындағы тілдік өзгерістерді толық қамти алмайды. Зерттеу барысында екі жас ерекшелігі тобына (18–25 және 50–60 жас) бөлінген 11 ер адамның сөйлеу тіліне эксперименттік-фонетикалық талдау жасалды. Информанттар Қазақстанның Солтүстік (Павлодар, Семей, Қарағанды, Астана қалалары) және Оңтүстік (Түркістан, Талдықорған, Қызылорда, Тараз қалалары) өңірлерінің өкілдері болып табылады. Зерттеу әдістемесі аудитивті (перцептивті) және акустикалық талдау тәсілдерін біріктіреді. Praat бағдарламасының көмегімен дауысты дыбыстардың форманттары (F1, F2) мен негізгі жиілігі (F0) өлшенді. Талдау нәтижелері еріндік үндестіктің (лабиалды гармония) трансформацияға ұшырағанын көрсетті: бұл құбылыс ересек буын өкілдерінде сақталғанымен, 18–25 жас аралығындағы жастардың сөйлеу тілінде дерлік кездеспейді. Акустикалық мәліметтер солтүстік өңір сөйлеушілерінің оңтүстіктіктерге қарағанда негізгі дауыс жиілігінің жоғары екенін және кейбір дауысты дыбыстардың анағұрлым алдыңғы қатарда артикуляцияланатынын растады.

Кілт сөздер: қазақ тілі, фонологиялық вариативтілік, диалектілік саралану, акустикалық талдау, перцептивті талдау, еріндік үндестік, социофонетика.

Отслеживание фонологических вариантов в современном казахском языке

Аннотация. Данная научная статья посвящена комплексному исследованию фонологической вариативности и диалектной дифференциации в современном казахском языке. Актуальность работы обусловлена необходимостью обновления существующих диалектологических данных, большинство из которых базируется на исследованиях середины XX века и не учитывает интенсивные трансформации звуковой системы под влиянием глобализации и урбанизации. В рамках исследования был проведен экспериментально-фонетический анализ речи 11 информантов-мужчин, разделенных на две возрастные группы: молодежь (18–25 лет) и представители старшего поколения (50–60 лет). География исследования охватила ключевые города северного (Павлодар, Семей, Караганда, Астана) и южного (Туркестан, Талдықорған, Кызылорда, Тараз) регионов Казахстана. Методология исследования сочетает в себе аудитивный (перцептивный) и акустический методы. С помощью специализированного программного обеспечения Praat были измерены такие параметры, как частота основного тона (F0) и формантные характеристики гласных (F1 и F2). Результаты анализа выявили глубокие различия в реализации губной гармонии: если у старшего поколения этот процесс носит системный характер, то в речи молодежи он практически нивелируется, превращаясь в градиентный процесс. Акустические данные подтвердили, что для северного региона характерна более высокая основная частота голоса и более передняя артикуляция определенных гласных по сравнению с южными говорами.

Ключевые слова: казахский язык, фонологическая вариативность, диалектная дифференциация, акустический анализ, перцептивный анализ, губная гармония, социофонетика.

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