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Semantic Correspondences of Vowel Sounds in the Kazakh Language: An Experimental Analysis of Sound Symbolism

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***Abstract*—This paper explores the semantic-symbolic correspondences of vowel sounds in the Kazakh language. The aim of the study is to identify manifestations of sound symbolism in Kazakh through experimental and statistical methods. Associations between the vowel sounds A, Ä, İ, O, and Ū and ten semantic oppositions (large–small, white–black, light–dark, male–female, strong–weak) were assessed. A total of 67 Kazakh-speaking participants took part in a survey conducted via Google Forms using the semantic differential method. The data were processed in Jamovi software, calculating mean, standard deviation, and median values. The results indicate that the correspondence between sounds and meanings is non-random. For instance, the sounds "O" and "Ū" are associated with concepts such as "large", "strong", and "male", while "İ" and "Ä" are linked to "small", "weak", and "female". The sound "A" was rated highly for opposing meanings, revealing its universal nature. These findings demonstrate that sound symbolism in Kazakh is grounded in phonetic, cognitive, and cultural dimensions. The results offer deeper insight into the phonosemantic system of the Kazakh language and provide new empirical data illustrating the natural connection between language and thought.**

***Index Terms*—sound symbolism, Kazakh language, vowel sounds, semantic correspondence, experiment**

I. Introduction

In the 21st century, linguistic science has been enriched with new paradigms, expanding beyond traditional approaches to include anthropocentric, cognitive, and psycholinguistic perspectives. At the intersection of these approaches, the concept of sound symbolism has gained increasing scholarly attention. Sound symbolism refers to the study of natural, iconic connections between sounds and meanings. It investigates how phonetic signs contribute to meaning-making, focusing on their non-verbal, associative perception.

Although attempts to explain the nature of sound symbolism date back centuries, it remains a topic of debate across multiple disciplines. Khusainov (1988) links sound symbolism to the origins of language and cognition, while Ngai et al. (2024) note that it became a subject of scientific inquiry in the early 20th century. Shinohara et al. (2016) describe it as a form of cross-modal iconicity. In traditional linguistics, the connection between sounds and meanings was considered arbitrary, as posited by Ferdinand de Saussure and upheld by structuralism. However, sound symbolism challenges this view by providing empirical evidence of semantic functions of sounds.

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The theoretical foundations of sound symbolism emerged early in European linguistics. Pioneers such as Sapir (1929) and Whorf explored the semantic effects of phonetic forms. One of the first experimental studies in this area is Köhler's renowned "maluma–takete" experiment, which demonstrated the association of soft, rounded shapes with the sound "maluma" and sharp, angular shapes with "takete".

Many scholars agree that universal sensory correspondences underlie sound symbolism. Styles and Gawne (2017) suggest that shared perceptual mechanisms drive this phenomenon. According to Rovnaya (2018), Ramachandran and Hubbard (2001) replicated the "bouba–kiki" experiment across languages, confirming the iconic connection between sound and shape. Sidorov-Dorso (2013) proposed a model of synesthesia distinguishing between lower-level (acoustic, visual, olfactory) and higher-level (semantic) associations, reaffirming that the bouba–kiki effect yields consistent results across linguistic environments.

Today, sound symbolism is a multidisciplinary field, closely linked with psycholinguistics, cognitive linguistics, phonetics, semiotics, neurolinguistics, cultural linguistics, and synesthesia studies. Research shows that sounds are not only physical units but also carriers of symbolic and emotional-associative meaning. The interdependence of phonetic form and semantic content reveals a new layer of linguistic motivation.

Over the past decade, foundational studies on sound symbolism have expanded. Scholars such as Kawahara (2020), Svantesson (2017), and Shinohara and Kawahara (2010) have explored connections between sound and universal concepts like size, emotion, gender, shape, and color. Works by Feist (2013) and Winter and Perlman (2021) focused on English, while Imai and Kita (2008) demonstrated that sound iconicity supports verb learning in children. Johansson et al. (2020) proposed a semantic-phonetic typology of sound symbolism. Wichmann et al. (2010) sought traces of sound symbolism in basic vocabulary. Kawahara (2021) emphasized its phonetic foundations, Elsen (2017) classified natural and conventional links between sounds and objects, and Sidhu and Pexman (2019) investigated its role in the psychosemantics of personal names.

Cuskley et al. (2017) analyzed the phonological and visual dimensions of the "bouba/kiki" effect. Barton and Halberstadt (2018) studied social perceptions of sound symbolism. Auracher (2017) investigated associations between artificial words and animal shapes, while Imai et al. (2025) explained iconic resemblance between sound and meaning through articulatory motion. De Varda and Marelli (2025) explored auditory iconicity in spoken English, and Knoeferle et al. (2017) described the symbolic load of acoustic signals linked to size and shape.

Despite global attention, sound symbolism remains understudied in Turkic languages. Khassenov (2021) notes that only early efforts by Kornilov (1978) in Chuvash and Khusainov (1988) in Kazakh addressed this topic.

These works underscored the relevance of sound symbolism as a universal, interdisciplinary, and empirical research domain. Nevertheless, in Turkic linguistics—particularly in Kazakh—sound symbolism has not yet received sufficient attention. One of the first scholars to address sound–meaning relationships in Kazakh was Khusainov (1988), who described the conceptual nuances of specific sounds. In recent years, this line of research has seen a revival. For example, Khassenov (2021) emphasized the archetypal nature of Kazakh phonemes and their link to historical and cultural memory. He argued that symbolic associations between sounds, concepts, and images are rooted in Turkic worldview.

In Kazakh folklore, the semantic coloring of sounds also emerges. Concepts like "white" and "black" convey not only color but also ethical, social, and symbolic meanings (Khassenov, 2021). Understanding how specific sounds relate to such concepts in linguistic consciousness is central to sound symbolism. It is not merely a linguistic fact but a cognitive and psychological phenomenon.

The binary principle in the Turkic worldview (e.g., father–mother) may also influence the phonological system. Sartkozhauly (2007) linked vowel harmony to this dualistic cosmology, associating back vowels with masculinity and front vowels with femininity. This perspective implies that sound symbolism should be studied not only within linguistic systems but also in cultural and spiritual contexts.

Based on the above theoretical and interdisciplinary foundations, this study aims to examine the manifestations of sound symbolism in the Kazakh language. Specifically, it investigates the symbolic associations of selected vowels (A, Ä, İ, O, Ū) with semantic oppositions (e.g., large–small, light–dark, white–black, male–female, strong–weak). Why these vowels? The selection was based on linguistic and cultural rationales. A and O are universal and common across Turkic languages, belonging to open vowels frequently used to convey emotion and imagery. In contrast, Ä, İ, and Ū are unique to Kazakh and reflect national phonetic features. These sounds are rare or absent in other Turkic languages and are therefore seen as symbolic codes embedded in Kazakh linguistic consciousness.

The scientific relevance of this study lies in:

Conducting the first experimental and statistical analysis of sound symbolism in Kazakh;

Assessing the semantic coloring potential of vowel sounds;

Identifying universal sound–meaning correspondences in the Kazakh context;

Empirically demonstrating the interconnection between Turkic worldview and linguistic consciousness;

Characterizing the phonosemantic features of Kazakh through the symbolic potential of vowel sounds.

The findings confirm that the iconic link between sound and meaning exists in Kazakh, highlighting the semantic-associative functions of phonemes. This reinforces the natural bond between language and cognition and offers insight into phonosemantic regularities unique to Kazakh.

Thus, viewing sound symbolism through the lens of Kazakh linguistic structure and cultural cognition not only enriches our understanding of the symbolic capacity of the language but also opens avenues for explaining national cognitive models. Moreover, such studies have practical relevance for language education, psycholinguistics, neuroscience, onomasiology, and translation studies.

II. Methodology

A. Participants

A total of 67 individuals aged between 18 and 25 participated in the study. All participants were healthy, with normal vision and hearing, and were fluent speakers of the Kazakh language. No specific restrictions were imposed regarding participants' gender, ethnicity, or social status. However, the following inclusion criteria were required for participation: (1) absence of visual impairments, (2) normal color perception (i.e., non-color-blind), and (3) the ability to comprehend and accurately interpret sounds and words in the Kazakh language. Participation was entirely voluntary, and all participants were provided with a detailed explanation of the research procedure beforehand.

B. Materials

Five vowel sounds of the Kazakh language were selected as the primary stimuli: A, Ä, İ, O, and Ū. These vowels were chosen based on their phonetic properties, representing features such as openness vs. closeness, back vs. front, and rounded vs. unrounded articulation. The vowels were isolated from their phonemic environments and presented as independent acoustic units.

To assess the symbolic associations of these vowel sounds, ten pairs of antonymic semantic concepts were used:

Large
Small
White
Black
Light
Dark
Male
Female
Strong
Weak

These antonyms were selected as universal semantic categories to enable the identification of symbolic correspondences with the vowel sounds.

C. Procedure

The experimental study was conducted online via the Google Forms platform. Participants received comprehensive information about the research, along with instructions, and provided informed consent prior to beginning the study. The introductory instruction on the first page of the questionnaire read:

"This study aims to identify linguistic universals and correspondences between sounds and meanings. You are asked to evaluate the degree of correspondence between the presented vowel sounds and pairs of semantic concepts. Use a 5-point scale where 1 indicates a very weak match and 5 indicates a very strong match".

Each participant was presented with the vowel sounds and semantic pairs in random order. Using the semantic differential method, participants rated the perceived correspondence between each sound and concept pair. This method allows for the measurement of both linguistic and nonverbal associations. Each pair was rated on a scale from 1 to 5.

For example:

Sound "A" – Large: 4
Sound "İ" – Light: 2
Sound "O" – Black: 5

All responses were stored in the Google Forms database and later subjected to statistical analysis.

D. Data Analysis

The collected data were processed using the Jamovi statistical software. Initially, all responses were exported to a spreadsheet, and for each vowel–concept pair, the following statistical indicators were calculated: mean (M), median (Md), standard deviation (SD), and standard error (SE). These measures made it possible to quantitatively describe the degree of symbolic association between a specific vowel and a concept.

For instance, a high mean score (e.g., M = 3.33) for the sound "O" associated with the concept "large" suggests a strong symbolic match. Conversely, a lower mean score (e.g., M = 2.27) for the sound "İ" with the same concept indicates a weaker association.

As part of the extended analysis, the symbolic significance of certain sounds was interpreted in relation to their articulatory features and phonosemantic properties. Additionally, the findings were compared with previous research

results (e.g., Sapir, 1929; Ramachandran & Hubbard, 2001; Kawahara, 2021) to contextualize and validate the interpretations.

III. Results

The findings of the study clearly demonstrate that sound symbolism is manifested at the semantic level in the Kazakh language. Each vowel exhibited either consistent or unexpected correspondences with certain semantic oppositions. In this section, the collected data are analyzed using specific statistical measures and are followed by semantic interpretations. The results confirm that the symbolic associations between sounds and meanings are determined by articulatory, acoustic, and cultural-cognitive factors.

A. Association With the Concepts "Large" and "Small"

The vowel sound that demonstrated the strongest association with the concept "large" was "O" (Mean = 3.33) (Table 1). Phonetically, this is a back, open vowel with a rounded articulation, often linked to spatial largeness, roundness, and completeness. Acoustically, it is characterized by low frequency and broad resonance, which may contribute to its symbolic connection with largeness. This sound is commonly found in Kazakh words that relate to space or volume, such as ortalyq (central), oıpat (depression), and domalaq (round).

Table 1
Large

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Large"? [A]	66	3.09	3.50	1.67	0.206
…"Large"? [Ä]	66	2.29	2.00	1.30	0.160
…"Large"? [İ]	66	2.27	2.00	1.43	0.176
…"Large"? [O]	66	3.33	4.00	1.46	0.180
…"Large"? [Ū]	66	3.18	3.00	1.42	0.175

Following "O", the sound "Ū" showed a relatively strong association (Mean = 3.18). This vowel is also a back and rounded vowel with a constricted articulation. It is associated with mass, weight, and extensiveness, as evidenced in words like ūzyn (long), ūlǵaitu (to enlarge), and ūlt (nation).

In contrast, the vowel "İ" (Mean = 2.27) showed the weakest association with "large". Being a front, high, and unrounded vowel, it is acoustically weaker, with short duration and narrow articulatory base. These features link it symbolically with smallness or diminutiveness. This is consistent with earlier findings by Sapir (1929) and Shinohara and Kawahara (2010), who observed similar associations in English phonemes.

The strongest association with the concept "small" was shown by the vowel "İ" (Mean = 3.50) (Table 2). Its articulatory features make it symbolic of delicateness, minuteness, and subtlety. This sound frequently occurs in Kazakh words such as kishi (small), jinishke (thin), nəzik (delicate), which are semantically linked to gentleness or weakness.

Table 2
Small

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Small"? [A]	66	2.08	2.00	1.27	0.156
…"Small"? [Ä]	66	2.85	3.00	1.57	0.193
…"Small"? [İ]	66	3.50	4.00	1.60	0.197
…"Small"? [O]	66	2.20	2.00	1.27	0.156
…"Small"? [Ū]	66	2.27	2.00	1.32	0.162

The vowel "Ä" (Mean = 2.85) also showed a relatively high correspondence with "small", likely due to its soft, melodic phonation. In contrast, the sound "A" had the lowest score (Mean = 2.08), reinforcing its broad, open, and semantically expansive nature.

B. Association With the Concepts "White" and "Black"

The highest degree of association with the concept "white" was assigned to the vowel "A" (Mean = 3.58) (Table 3). As an open, back vowel, it conveys a positive emotional tone and is symbolically linked with brightness, purity, and truth. In Kazakh, this sound frequently occurs in positively connoted words such as aqiqat (truth), aqjarqyn (cheerful), adal (honest), and aqköñil (kind-hearted).

Table 3
White

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "White"? [A]	66	3.58	4.00	1.61	0.198
…"White"? [Ä]	66	2.58	2.00	1.30	0.160
…"White"? [İ]	66	2.50	2.00	1.34	0.165
…"White"? [O]	66	2.47	2.00	1.42	0.174
…"White"? [Ū]	66	2.50	2.00	1.46	0.180

Surprisingly, the sound "A" also received the highest score for the concept "black" (Mean = 3.41) (Table 4). This unexpected outcome demonstrates the symbolic flexibility of the vowel. It suggests that the meaning attributed to a sound may depend on contextual factors. Furthermore, the Kazakh word qara (black) itself contains the vowel "A", which may have influenced participants' intuitive associations.

TABLE 4
BLACK

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Black"? [A]	66	3.41	4.00	1.50	0.184
…"Black"? [Ä]	66	2.18	2.00	1.31	0.161
…"Black"? [İ]	66	2.27	2.00	1.27	0.157
…"Black"? [O]	66	2.76	2.50	1.47	0.181
…"Black"? [Ū]	66	2.58	2.00	1.51	0.186

All other vowels—Ä, İ, O, Ū—showed only weak or moderate associations with both "white" and "black".

C. Association With the Concepts "Light" and "Dark"

Again, the highest score for the concept "light" was given to "A" (Mean = 3.58) (Table 5). The vowel's wide-open articulation and high intensity support its symbolic connection with brightness and radiance. It is frequently found in Kazakh words such as jarıq (light), jaz (summer), jadyranqy (joyful), and ashyq (open).

TABLE 5
LIGHT

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Light"? [A]	66	3.58	4.00	1.45	0.178
…"Light"? [Ä]	66	2.64	2.50	1.44	0.178
…"Light"? [İ]	66	2.41	2.00	1.37	0.169
…"Light"? [O]	66	2.83	3.00	1.44	0.178
…"Light"? [Ū]	66	2.67	3.00	1.41	0.173

Unexpectedly, the highest association with the concept "dark" was also given to the vowel "A" (Mean = 3.02). This paradox underscores the capacity of a single sound to be symbolically associated with contrasting meanings. It indicates that the vowel "A" may function as a polysemantic unit in poetic and expressive language, making it suitable for use in diverse symbolic contexts.

TABLE 6
DARK

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Dark"? [A]	66	3.02	3.00	1.53	0.189
…"Dark"? [Ä]	66	2.27	2.00	1.30	0.159
…"Dark"? [İ]	66	2.23	2.00	1.24	0.152
…"Dark"? [O]	66	2.88	3.00	1.51	0.186
…"Dark"? [Ū]	66	2.85	3.00	1.55	0.191

D. Association With the Concepts "Male" and "Female"

The strongest association with the concept "male" was observed with the vowel "Ū" (Mean = 2.82) (Table 7). This is a back, close, and constricted vowel produced in the posterior part of the mouth. In the context of Turkic worldview, it is symbolically linked with masculinity, heroism, and strength. As noted by Sartkozhauly (2007), back vowels are often associated with paternal or masculine origins in traditional thought.

TABLE 7
MALE

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Male"? [A]	66	2.55	2.00	1.44	0.177
…"Male"? [Ä]	66	2.42	2.00	1.33	0.163
…"Male"? [İ]	66	2.62	2.00	1.41	0.174
…"Male"? [O]	66	2.80	3.00	1.34	0.165
…"Male"? [Ū]	66	2.82	3.00	1.46	0.179

The vowel most strongly associated with the concept "female" was "Ä" (Mean = 3.44) (Table 8). Its soft, melodic, and front vowel qualities evoke a feminine emotional tone. In the Kazakh language, "Ä" appears in words such as ädemi (beautiful), äsem (graceful), äuezdi (melodic), and näzik (delicate), clearly reflecting its symbolic association with femininity.

TABLE 8
FEMALE

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Female"? [A]	66	2.67	2.00	1.41	0.173
…"Female"? [Ä]	66	3.44	4.00	1.57	0.193
…"Female"? [İ]	66	3.09	3.00	1.46	0.180
…"Female"? [O]	66	2.11	2.00	1.28	0.157
…"Female"? [Ū]	66	2.08	2.00	1.28	0.158

E. Association With the Concepts "Strong" and "Weak"

The vowels "O" and "Ū" received the highest and equal scores for the concept "strong" (Mean = 2.91) (Table 9). Both are back vowels with broad articulatory bases, acoustically heavy and resonant, often associated with power, force, and authority.

TABLE 9
STRONG

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Strong"? [A]	66	2.88	3.00	1.49	0.184
…"Strong"? [Ä]	66	2.48	2.00	1.38	0.170
…"Strong"? [İ]	66	2.77	2.50	1.54	0.189
…"Strong"? [O]	66	2.91	3.00	1.46	0.180
…"Strong"? [Ū]	66	2.91	3.00	1.46	0.180

Conversely, the vowels "Ä" (Mean = 3.47) and "İ" (Mean = 3.35) showed the strongest association with the concept "weak" (Table 10). Their phonosemantic profiles suggest softness, gentleness, and flexibility, confirming their connection with fragility or subtlety.

TABLE 10
WEAK

Question	N	Mean	Median	SD	SE
Which sounds are associated with the concept "Weak"? [A]	66	2.12	2.00	1.17	0.144
…"Weak"? [Ä]	66	3.47	4.00	1.44	0.177
…"Weak"? [İ]	66	3.35	4.00	1.54	0.190
…"Weak"? [O]	66	2.05	2.00	1.17	0.144
…"Weak"? [Ū]	66	2.09	2.00	1.29	0.158

IV. DISCUSSION

The results of this study demonstrate that sound symbolism functions as a significant linguistic and cognitive phenomenon in the Kazakh language. The consistent association of each vowel with specific semantic concepts confirms that vowels are not merely articulatory or acoustic units, but also symbolic signs capable of conveying meaning. This section interprets the findings in light of established linguistic theories and compares them with conclusions drawn by scholars in various fields.

While Ferdinand de Saussure emphasized the arbitrary and conventional nature of linguistic signs, sound symbolism has developed in a direction that challenges this view. Our study confirms that vowels in the Kazakh language can exhibit consistent associations with specific semantic domains. For example, the vowels "O" and "Ū" were closely linked with concepts like large, strong, and male, while "Ä" and "İ" corresponded to small, weak, and female.

Sapir (1929) famously demonstrated that the invented English words mal (broad-sounding) and mil (thin-sounding) were intuitively matched with the meanings large and small, respectively. Our results affirm the cross-linguistic and possibly universal nature of such associations, extending Sapir's conclusions to Kazakh.

The semantic associations of sounds are often explained by their articulatory and acoustic characteristics. Kawahara (2021), connecting sound symbolism with phonetics, emphasized the relevance of parameters such as open/closed, back/front, and tongue position in sound–meaning relationships. Back vowels, which tend to have lower frequencies and broader resonance, are associated with meanings such as strength, largeness, and heaviness. This was confirmed in our study by the high ratings of "O" and "Ū".

Conversely, front vowels have higher frequency, shorter duration, and weaker resonance. For instance, the vowel "İ" received high scores for the concepts small (Mean = 3.50) and weak (Mean = 3.35), confirming its symbolic linkage to delicateness. These results are consistent with Shinohara and Kawahara (2010), who also found that front vowels in Japanese and English were associated with smallness and weakness.

The associations between sounds and meanings are not purely phonetic; they are also rooted in cognition. Ramachandran and Hubbard (2001), through the bouba–kiki effect, demonstrated the link between sounds and visual shapes and showed that such correspondences are processed at the neurological level. They distinguished between

lower-level (phonetic-visual) and higher-level (semantic-conceptual) sound–meaning connections.

Similar patterns emerged in our study: the vowel "O" was perceived as round, wide, and full—associations that linked it to largeness and weight. In contrast, "İ" and "Ä" were associated with narrow, linear forms, evoking meanings such as fragility and smallness. These results suggest that participants' responses were shaped by cognitive rather than purely linguistic associations.

Understanding sound symbolism in Kazakh also requires accounting for the Turkic worldview. Sartkozhauly (2007) linked the vowel harmony system to the dual principles of patriarchal and matriarchal origins in Turkic cosmology. In his interpretation, back vowels represent the masculine principle, while front vowels represent the feminine. Our findings support this: the concepts of male were associated with "Ū" and "O", while female was strongly associated with "Ä".

Additionally, Khassenov (2021) emphasized the archetypal meanings of vowels in Kazakh, relating them to cultural memory. The vowel "Ä", for example, appears in words like näzik (delicate), säni (elegant), and äuezdi (melodic), reinforcing its symbolic association with femininity. These associations reflect not only linguistic patterns but also deeper layers of cultural consciousness.

Such culturally grounded symbolic meanings elevate sounds from merely phonological units to cognitive-cultural signs. For instance, while the vowel "Ä" may universally be associated with softness due to its acoustic qualities, in Kazakh it accumulates additional cultural and aesthetic significance through words like säni (beauty), näzik (delicacy), ädemi (graceful), and äuen (melody). In this way, universal phonetic effects are transformed into culturally specific semantic values.

This shift from phonetic to semantic representation highlights how sounds operate not only within linguistic systems, but also within broader cultural and cognitive frameworks.

The vowel "A" produced particularly intriguing results. It was associated with both white (Mean = 3.58) and light (Mean = 3.58), but also with black (Mean = 3.41) and dark (Mean = 3.02). This indicates that "A" functions as a universal and polysemous vowel, capable of conveying both positive and negative symbolic meanings.

This phenomenon aligns with Elsen's (2017) typology of sound symbolism, which distinguishes between natural iconicity (based on perceptual features) and conventional iconicity (based on cultural agreement). The vowel "A" is open, emotionally expressive, and phonetically neutral enough to be associated with diverse and even opposing meanings.

The results of this study may have practical applications in language education, neurolinguistics, early language acquisition, branding, and advertising. For example, Imai et al. (2008) showed that sound symbolism facilitates children's verb learning. This mechanism may also be significant for developing Kazakh-language learning methodologies. Furthermore, sound symbolism may enhance emotional and aesthetic impact in poetry, names, and literary texts.

This study focused on five vowels and ten semantic oppositions. While this provides initial insights, it does not cover the full phonological and semantic richness of the Kazakh language. Future studies could expand the scope to include both vowels and consonants and develop comprehensive phonosemantic fields. Comparative studies incorporating gender, age, regional variation, and social status may also reveal individual or group-based differences in sound-symbolic perception.

In conclusion, this research confirms that sound symbolism in Kazakh reflects distinct linguistic, cognitive, and cultural realities. Vowels are not only phonetic units but also meaning-generating symbolic signs. Their perception is shaped by phonetic, visual, and cultural experiences. Studies in this area promise to enrich our understanding of Kazakh's semiotic and cognitive-linguistic potential.

V. Conclusion

This study investigated the phenomenon of sound symbolism in the Kazakh language from an experimental and statistical perspective, with the aim of identifying the semantic potential of vowel sounds. The results demonstrate that the associations between sounds and specific semantic concepts are not random but are grounded in natural, articulatory, and cognitive characteristics.

Throughout the study, the vowels "O" and "Ū" were predominantly associated with semantic fields such as large, strong, and male—suggesting heaviness and depth. In contrast, the vowels "İ" and "Ä" were consistently matched with small, weak, and female, reflecting delicacy and lightness. The vowel "A" was particularly notable for its simultaneous association with opposing semantic concepts such as white–black and light–dark, underscoring its universal and polyfunctional character.

These findings confirm that sound symbolism in Kazakh is rooted in phonetic structure while also being interwoven with national worldview. The Turkic conceptual duality—associating back vowels with masculinity and front vowels with femininity—helps explain the cultural-symbolic roles of sounds. Moreover, the iconic link between sound and meaning appears to rely on the participants' cognitive and associative processing, illustrating the interaction between phonetic form and mental representation.

This research constitutes a significant step toward understanding the phonosemantic potential of the Kazakh language. Demonstrating the symbolic function of sounds through experimental data contributes to the development of

anthropocentric linguistics and provides a solid foundation for further inquiry in fields such as linguistic cultural studies, psycholinguistics, and cognitive linguistics.

Future research that expands the scope of sound symbolism to include consonants, morphemes, speech registers, and literary texts will allow for the creation of a more complete map of phonosemantic devices in the Kazakh language.

REFERENCES

[1] Auracher, J. (2017). Sound iconicity of abstract concepts: Place of articulation is implicitly associated with abstract concepts of size and social dominance. *PLOS One*, *12*(11), e0187196. https://doi.org/10.1371/journal.pone.0187196

[2] Barton, D. N., & Halberstadt, J. (2018). A social Bouba/Kiki effect: A bias for people whose names match their faces. *Psychonomic Bulletin & Review*, *25*, 1013–1020.

[3] Cuskley, C., Simner, J., & Kirby, S. (2017). Phonological and orthographic influences in the bouba–kiki effect. *Psychological Research*, *81*, 119–130.

[4] de Varda, A. G., & Marelli, M. (2025). Cracking arbitrariness: A data-driven study of auditory iconicity in spoken English. *Psychonomic Bulletin & Review*, 1–18. https://doi.org/10.3758/s13423-025-02346-z

[5] Elsen, H. (2017). The two meanings of sound symbolism. *Open Linguistics*, *3*(1), 491–499. https://doi.org/10.1515/opli-2017-0032

[6] Feist, J. (2013). "Sound symbolism" in English. *Journal of Pragmatics*, *45*(1), 104–118.

[7] Imai, M., Kita, S., Nagumo, M., & Okada, H. (2008). Sound symbolism facilitates early verb learning. *Cognition*, *109*(1), 54–65.

[8] Imai, M., Kita, S., Akita, K., Saji, N., Ohba, M., & Namatame, M. (2025). Does sound symbolism need sound? The role of articulatory movement in detecting iconicity between sound and meaning. *The Journal of the Acoustical Society of America*, *157*(1), 137–148.

[9] Johansson, E., Anikin, N., Carling, A., & Holmer, A. (2020). The typology of sound symbolism: Defining macro-concepts via their semantic and phonetic features. *Linguistic Typology*, *24*(2), 253–310.

[10] Kawahara, S. (2020). Sound symbolism and theoretical phonology. *Language and Linguistics Compass*, *14*(8), e12372. https://doi.org/10.1111/lnc3.12372

[11] Kawahara, S. (2021). *Phonetic bases of sound symbolism: A review.* PsyArXiv Preprints. https://doi.org/10.31234/osf.io/wq7um

[12] Khassenov, B., Adilova, A., & Rapisheva, Z. (2022). Colour symbolism in Turkic culture: A new look in the reconstruction of colour designation. *Pertanika Journal of Social Sciences & Humanities*, *30*(4), 1753–1766.

[13] Khassenov, B. (2021). *Archetypal features of Kazakh speech sounds*. Karaganda.

[14] Khusainov, K. S. (1988). *Sound iconicity in the Kazakh language*. Almaty.

[15] Knoeferle, K., Li, J., Maggioni, E., & Spence, C. (2017). What drives sound symbolism? Different acoustic cues underlie sound-size and sound-shape mappings. *Scientific Reports*, *7*(1), 5562. https://doi.org/10.1038/s41598-017-05932-6

[16] Kornilov, G. E. (1979). The theory of imitatives and Chuvash dialect data. In *Dialects and Toponymy of the Volga Region* (pp. 23–66).

[17] Ngai, C. H., Kilpatrick, A. J., & Ćwiek, A. (2024). Sound symbolism in Japanese names: Machine learning approaches to gender classification. *PLOS One*, *19*(3). https://doi.org/10.1371/journal.pone.0297440

[18] Rovnaya, T. V. (2018). *The influence of linguistic shock and phonosemantics on the perception of a foreign language.* Moscow.

[19] Sapir, E. (1929). A study in phonetic symbolism. *J Exp Psychol.*, *12*, 225–239.

[20] Sartkozhauly, Q. (2007). *The genesis of ancient Turkic script.* Astana.

[21] Shinohara, K., & Kawahara, S. (2010, August). A cross-linguistic study of sound symbolism: The images of size. In *Proceedings of the Annual Meeting of the Berkeley Linguistics Society* (pp. 396–410).

[22] Shinohara, K., Yamauchi, N., Kawahara, S., & Tanaka, H. (2016). Takete and maluma in action: A cross-modal relationship between gestures and sounds. *PLOS One*, *11*(9). https://doi.org/10.1371/journal.pone.0163525

[23] Sidhu, D. M., & Pexman, P. M. (2019). The sound symbolism of names. *Current Directions in Psychological Science*, *28*(4), 398–402.

[24] Sidorov-Dorso, A. V. (2013). Modern research on naturally developing. *Voprosy Psikhologii*, *4*, 147–158.

[25] Styles, S. J., & Gawne, L. (2017). When does maluma/takete fail? Two key failures and a meta-analysis suggest that phonology and phonotactics matter. *i-Perception*, *8*(4), 1-17. https://doi.org/10.1177/2041669517724807

[26] Svantesson, J. O. (2017). Sound symbolism: The role of word sound in meaning. *Wiley Interdisciplinary Reviews: Cognitive Science*, *8*(5). https://doi.org/10.1002/wcs.1441

[27] Wichmann, S., Holman, E. W., & Brown, C. H. (2010). Sound symbolism in basic vocabulary. *Entropy*, *12*(4), 844–858.

[28] Winter, B., & Perlman, M. (2021). Size sound symbolism in the English lexicon. *Glossa: A Journal of General Linguistics*, *6*(1), 1-13. https://doi.org/10.5334/gjgl.1646

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