

Linguistic and Psychological Aspects of Universal Sound Symbolism Studies

Nikroshkina S.V.

Foreign Languages Department of Technical Faculties
Novosibirsk State Technical University (NSTU)
Novosibirsk, Russia
sofiascience@mail.ru

Abstract—The article deals with the problem of universality of sound symbolism. It aims to give a comprehensive account of theoretical and experimental research of iconicity within separate languages as well as cross-linguistic sound symbolism. The work provides results of psychological and psycholinguistic research into the phenomenon of sound symbolism.

Keywords—universal sound symbolism, iconicity, psycholinguistic experiment, synesthesia

I. INTRODUCTION

The nature of relationships between the sound shape of the word and its meaning is considered to be a critical peculiarity of a linguistic sign. The theory of a conventional character of a linguistic sign is based on a specific unique understanding of the connection of the sound part and the meaning of the word, on the recognition of an arbitrary, random, conventional nature of this relationship.

In due course, Ferdinand de Saussure's (надо ссылку на работу) conviction in the arbitrariness of a linguistic sign became open to question. Linguists started to conduct well-planned experiments in an attempt to establish the reality of sound symbolism. The experiments became more complex and accurate, the scientists tried to learn the boundaries of functioning of sound symbolism. It should be noted that sound symbolism has been studied from different angles. The sound symbolic use of voice pitch is examined in J. Ohala's research [1]. Associative memory and size-sound dependency are taken into consideration in G. Diffloth's [2], R.Ultan's [3] and M.Preziozi's [4] experiments. L. Bauer [5] examines the phenomenon of iconicity from the point of view of morphology.

II. METHODS AND MATERIALS

Contemporary linguistics and psychology have accumulated a great number of facts contradicting this theory that undoubtedly speak in support of the necessity of a different approach to this problem. Psycholinguistic experimental research gave the opportunity to lead the problem of arbitrariness of a linguistic sign to the next level. Psycholinguistics has various methods to apply and they are both authentic and purely psychological. The middle of the 20th century can be considered the period of a new stage of studies of the iconic potential of languages. Two main factors contributed to this development: a long period of commitment

to Saussure's theory and the emergence of such an integral discipline as psycholinguistics. The period of mere theoretical discussions was over. Sound symbolism has always been studied by various linguistic schools in Russia and abroad. The pioneers in experimental research of sound symbolism as a phenomenon were American psycholinguists. They conducted a series of well-planned experiments aimed at contradicting Ferdinand de Saussure's postulates.

All the research made in this field can be subdivided into several categories, though intersecting in some cases. The research aiming at defining the sound symbolic properties of one language can be referred to the first category. The experiments denoting to which extent separate English phonemes are sound symbolic or naturally appropriate can serve an example.

Sound symbolism within one separate language is a real driving force. It is widely studied in the contexts of phonetics by such researchers as P.Olejarczuk and M.Baese-Berk [6] who study acoustic processes in the Komo language; T.Cho and G. Docherty devoting their research to exploring laryngeal contrast in 19 languages [7]. The problem of sound perception is touched upon in J.Cabrelli's works [8]. Sound tones are studied by neurolinguists, such as B.D. Zinszer and P. Chen [9], T. Xia and L. Mo [10], R.G.Verdonschot and Y. Miyaoka [11].

Nevertheless, scientists cannot come to an agreement on the explanation of this phenomenon. Regarding the English language, there is experimental evidence that the recipients have a special feeling of correspondence of a sound combination, sound shape with the meaning of the word. Roger Brown came to the conclusion that native speakers of some language have a similar idea of the semantics of various phonetic sequences [12]. Later, the reality of sound symbolism was experimentally confirmed in German and French. In 1773 V. De Diego conducted similar research with the Spanish language and stressed that all Spanish words possess sensory and emotional coloring to some extent. He pointed out that the name "wagtail" more effectively reflects its movements than onomatopoeia *pimpim* [13].

There are numerous examples of sound symbolism in African languages: high-pitched words denote something small while low-pitched words stand for some large things in the Sudanese language. High-pitched sounds are also used to denote long distances and high speeds. Low-pitched sounds

depict approaching and slow movements. In the Chinese language sound symbolism depends on the visual contours of objects: there are separate particles denoting round shapes, flat or long things as well as particles showing pairs and rows of objects. This fact also coincides with tendencies observed in the languages of Native Americans.

However, some experiments conducted with the purpose of denoting the link between the sound and the size of the object failed. The scientists could not prove that vocal phonemes can depict the size of an object symbolically.

Thus, the study of sound symbolism within one language clarified the nature of this phenomenon. Scientists did not come to a consensus as for what exactly is symbolic: words or separate phonemes. It can be assumed that the whole word is symbolic. If two words differ in only one sound, symbolic character may be changed, but it does not necessarily mean that in all the words possessing this opposition the difference in the symbolic effect is the same.

There is confirmation of the existence of some systematic similarity between groups of words in English, German, French and Spanish that are linked by some related objects and possess similar aspects of meaning, which cannot be explained in terms of etymology.

Research of sound symbolism in different languages is referred to the second category. A typical experiment in this field is conducted with the aim to evaluate the level of correctness of determining the sound shape of the words of an unknown language by the recipients with no knowledge of it as well as to recognize the meaning of foreign words. Cross-linguistic research is conducted in this field by A. Chen, L. Liu and R. Kager [14] and by K. Dziubalska-Kolaczyk [15]. Scientists working in this direction frequently try to solve the problem of the universal nature of sound symbolism.

The early stage of discussing the problem of sound symbolism was based on sporadic observations of evident connections between sound and shape. Nowadays experiments are planned differentially in order to research various types of sound symbolism which probably exist. It can be the symbolism of whole words as well as the symbolism which is peculiar of some groups of speech sounds or separate speech sounds, both vowels and consonants. Such experiments contradict the criticism claiming that the accordance of sounds and meanings in some language is purely its peculiar feature. It only demonstrates that the community of people speaking this language have a tendency to develop a habit of using definite sounds to denote some groups of notions and, as a result, sound symbolism is rather a cultural phenomenon than natural one.

However, there are numerous experiments proving that cross-linguistic sound symbolism is a reality and that native speakers of one language can estimate the iconic potential of the other language that is unknown to them. There is hardly any doubt that sound symbolism is manifested at cross-linguistic level, though the degree of its universality has not been specified yet. Probably, there are some separate languages or groups of languages which iconic force cannot be estimated by native speakers of other languages.

Eventually, the experiments became more precise. At the first stage, the recipients were given a compilation of words taken from different foreign languages and were asked to denote if their sound shape corresponded with their meaning. Such experiments cannot be considered valid because though the recipients were able to estimate the iconic potential of the words; this phenomenon may be conditioned by the choice of words.

At the next stage, the experiments acquired a different form designed by Tsuru [16]. American recipients with no knowledge of Japanese were given 36 pairs of Japanese antonyms. Their task was to select lexical-semantic equivalents. The pairs were recognized with the results above chance level. It gave the opportunity to put forward a hypothesis that Japanese sounds served as a clue to help the recipients. The data obtained during the experiment were argued: the researcher could randomly select the words somehow correlating with English phonemes. In other words, some matching of Japanese and English forms could lead to the results above chance level.

To eliminate such factors, Tsuru translated the same pairs of antonyms into Hungarian and Polish. The recipients taking part in the experiment possessed no knowledge of the languages mentioned. Nevertheless, the chance level was exceeded again.

Roger Brown suggested that English-speaking recipients used the real similarity of sound and meaning while determining the pairs of antonyms, which is comprehensible to all people. In its turn, it contributed to the development of all natural languages [12]. As a result, semantic rules of various languages do not seem arbitrary to us.

Similar experiments were conducted with the help of Chinese native speakers on the material of Hindi and Czech. It should be mentioned that even in *mal/mil* experiment the results did not exceed the chance level.

We can make a less categorical suggestion concerning the universality of sound symbolism: the existence of universal phonetic symbolism is problematic as the phonetic symbolism of English-speaking community is attributable mainly to similar language training. The results of the experiments conducted on the material of the Chinese language showed that it would be very difficult to solve the problem of the reality and the existence of universal cross-linguistic sound symbolism. Moreover, if the answer to this question could be found, it would not be unequivocal. We can also suggest that there are some cultural connections of sound and meaning of the word along with purely phonetic ones. In contrast to the English and German languages in which the correlation of sound shape and the meaning of the word is phoneme-oriented and forms the common basis of the languages, in tonal languages as Chinese the meaning of the word depends on the pitch of the voice. Consequently, native speakers of tonal languages can have difficulties in estimating the correlation of words from nontonal languages. It can be assumed that iconicity is not equal in all languages and each language has its own iconic mechanism. It is well known that Korean monosyllabic words with the initial [p] or [t] are associated with big size objects while in the English language the situation is opposite. Phonemes [i] and [e] in Russian, English, Ukrainian and Moldavian are associated with the notions of "little", phonemes [o] and [a] with "large".

Back vowels symbolize something *big* while front vowels denote something *small*. Such rules give the opportunity to come to the conclusion of some universality of sound symbolism. It can be proved by the existence of such regularities.

Numerous experiments were devoted to the semantic potential of phonemes. Methods to denote the phonetic meaning of the word were created by linguists. The empirical material obtained by scientists is sometimes impossible to explain from the point of view of the existing theoretical knowledge. It makes scientists search for new, intensive ways of developing science, for fundamental change in explanatory scientific apparatus. Contemporary disciplines that exist on the borderline of conventional sciences contribute to the global process of integration of the knowledge into hybrid disciplines like psycholinguistics and phonosemantics. The objects of phonosemantics are sound symbolic and onomatopoeic words.

Further, some experiments were connected with the recognition of color shades. Japanese words *aka* (red) and *midori* (green) displayed some similar traits with the English words, but scientists cannot explain the phenomenon. Probably, native speakers of different languages associate "being green" and "being red" with some definite sounds. This fact can be proved by Newman's research which states that the degree of symbolization in the English language depends on the degree of the openness of the mouth and the position of the tongue while pronouncing vowels. Thus, English vowels [ai], [i] and [ei] can be ranged from "big" to "small" respectively.

The restricted context in the experiments can also facilitate the process of matching. The majority of the results was obtained with the help of the material of pairs of words or a selection of words.

Cross-linguistic sound symbolism was widely studied and observed in a number of scientific research. The processes of speech production and comprehension in endangered Pacific languages are highlighted by S. Chang and A. Harris [17]. Iconic properties of modern Greek language as well as ancient Greek, Portuguese and Brazilian sign language LIBRAS are discussed in M. Mertzani's experiments [18]. The sound symbolic potential in automatic text analysis in Russian, Ukrainian and Chinese poetry is demonstrated in J. Auracher and S. Albers' s research [19]. The authors claim that in poetry the ratio of plosive consonants to nasals predetermines its emotional coloring as well as the way it is perceived by readers. For instance, poems with frequent plosives (p, t, b, d) are likely to create a pleasant impression as compared to poems with frequent nasals (n, m) that predetermine an unpleasant impression. These findings are proved to be universal, they are independent of definite languages and language families.

The significance of this cross-linguistic scientific evidence proves that a range of features of a language sign are also specific to nonlanguage sign systems. In its turn, this fact demonstrates the necessity of reconsideration of the fundamentals of the general sign theory. What is more, the characteristics of a linguistic sign determined on the basis of some experiments allow treating it in connection with the problem of the reality of the unconscious mental, whereby they acquire a certain significance in terms of general psychological

theory. The unconscious is treated by psychologists as a set of psychic units, processes and mechanisms and the subject is not aware in their functioning and influence.

In connection with the problem of sound symbolism, one should mention a widely known psychological term synesthesia which is characterized by the occurrence of the sensations of one modality under the influence of the stimulus of another modality. The research of synesthesia by psychologists and sound symbolism by both linguists and psychologists has been conducted independently for a long time. Eventually, some researchers started to juxtapose the two notions and tried to analyze the nature of the phenomenon of sound symbolism. Later a thesis was proposed in the works of I.N. Gorelov explicitly: sound symbolism is conditioned psychophysiologically by the phenomenon of synesthesia [20].

Contemporary psychology is not able to give a sufficient theory of this phenomenon as its study has not left the stage of primary description yet. In A. Peron's psychological dictionary we find the following definition: "Synaesthesia. The term, characterizing the sensory experience of some individuals whose sensations, corresponding a definite sensation areas are associated with the sensations of other sensation area and systematically occur during the emergence of the last-mentioned." [21].

Such a definition gave R. Brown ground to claim that sound symbolism should not be reduced to the study of synesthesia, since such research usually led to significant individual discrepancies [3]. A more acceptable is a broad understanding of synesthesia found, for instance, in the works by A.V. Puzirov [22]. Synesthesia is interpreted by him as a phenomenon of perception when the effect corresponding to a given stimulus and specific to a given sense organ is accompanied by some other sensation or an image of a different modality. For example, auditory sensations are transferred to visual. However, synesthesia is limited to sensory environment in these formulations. It should be stressed that sound symbolic nomination acts not only in sensory but also in emotional sphere. In this context a number of studies conducted by Tbilisi psychologists under the leadership of D.N. Uznadze are of great interest [23]. The core item of Uznadze's research was the experimental theory of suggestion. Along with this research, D.N. Uznadze and his colleagues studied the problem of nomination and word coinage with the understanding of meaningless sound combinations.

In 1924 the experiment of visual onomatopoeia was carried out under his supervision. The scientists presented a set of senseless, abstract, invented graphic images to ten German-speaking recipients. They were to select a name, a designation from the list of meaningless sound combinations (izakuzh, juberif, lakozu and others) for each image and give a report on introspection.

Each image was given to the respondent for 5 seconds and it was explained that the image was a certain magic sign and had a name, which was to be selected from meaningless three-syllable sound combinations. Recipients aged 19 to 37 took part in the experiment.

Some images remotely resembled familiar objects and the recipients selected the word having similarity to the commonly accepted name. In other cases the recipients selected the name with the same Gestalt or a form, as the image. D.N. Uznadze noticed that the degree of the coincidence of the names chosen from the list of meaningless sound complexes for the nomination of the content was so high that it could not be attributed to the accident. It appeared that the recipients experienced the meaningless sound combinations as function carriers of a certain name. Moreover, this experience was accompanied by a significant individual sustainability. This fact is reflected in the coincidence of the choice of individual recipients as well as in the high degree of coincidence of reactions obtained from one and the same recipients at different times [23]. The recipients' introspections show that at first the images seemed absolutely meaningless. They tried to link them to some real objects and suddenly an image of some objects emerged in their minds .

Later the same recipients pointed out that having connected the given image to the object, they had pictures in front of their eyes .When they were considering the words given, it seemed to them that they were appropriate.

Evidently, if the recipient was to choose the name for the content, the act of comparison between the sound complex and the perceived content takes place in his or her mind, during which the respondent evaluates the sound combination as appropriate or inappropriate , suitable or unsuitable to the content. D.N.Uznadze came to the conclusion that in this case he contends with the unconscious transferring sensations[23].

Consequently, D.N. Uznadze's research proved not only the fact that the use of a sound combination with the purpose of nomination cannot be considered a random phenomenon. It confirms the reality of iconicity as well as the hypothesis of the fact that sound combinations are experienced by respondents emotionally.

The experiments conducted by R.Davis proved this hypothesis [24]. This researcher pointed out that the cultural and educational differences between the recipients did not influence the results.

In the cases when the recipients chose one and the same sound combinations as the names for one and the same contents (such cases exceeded 89%), they pointed out that the basis for their choice was different. Psychologists came to the conclusion that the real basis of the choice is not always realized by the recipients. The specific feature for all the cases is that the sound combination occurs in the recipients' minds suddenly. While creating a motivated word, the process of selection proceeds consciously. The process of the formation of a sound combination does not obey the control of consciousness, herewith its occurrence in the consciousness is sometimes preceded by the appearance of some separate sounds. The recipients point out that they have a feeling that these very sounds should definitely be included into the signified sound combination. Psychologists claim that the formation into the complete sound combination happens outside of consciousness. Only a shaped, created sound combination as a result of this process is available to the consciousness.

III. RESULTS

The qualitative and quantitative analysis of experimental data and psychological research allow us to come to some conclusions.

1. In the selection of the name the recipients are not free in their choice and they are not indifferent to which sound combination is used for the designation of the content. Thus, the sound combination is experienced as a carrier of a definite name. Herewith, the recipients often refuse from the sound combinations created by them on the basis of semantic and associative relations in favor of meaningless.

2. A sound combination is perceptible as having a differentiated structure. Some sounds are put forward to the forefront, others make the background.

3. The content under nomination influences the two aspects:
the sound combination that the recipients perceive as relevant or adequate

the sound combination which is regarded by the recipients as inappropriate.

4. The experiencing of a sound combination happens unconsciously without any mediating links.

5. Two factors are characterized with bilateral conditionality:

a) the experiencing of a sound combination perceived with the intention of nomination of the content (on one hand, it is determined by the character and the degree of the influence of a content; on the other hand - by the sound structure of the sound combination itself).

b) the experiencing of the content under nomination (it is determined by the peculiarity of the content itself and the sound structure of the sound combination chosen as a name).

Thus, the process of nomination is not mechanic in its essence. Mutual assimilation and mutual adjustment of the sound combination and the sound content under nomination occurs. This process continues even after the completion of nomination procedure. Psychologists claim that this process cannot be controlled by consciousness. In other words, it makes a referral to the unconscious mental.

The research by D.I.Uznadze was continued by other scientists. Their research also confirm the existence of a universal sound symbolism. Baidurashvili and his colleagues verified in their studies that the iconicity is not limited by intra-linguistic representation but reaches the cross-linguistic level.

In the numerous experiments held by S.V.Nikroshkina [25], the recipients were able to identify the pairs of antonyms of an unknown language in the quantity which only in some experiments exceed the probable quantity of random coincidence. The author also points out the "sensual tone" in her research. Probably, the positive or negative emotional coloring (pleasant/ unpleasant, agreeable/ not agreeable) due to its "universality" can act as a mediator during the transfer of the qualities of sensations [25].

In the experiments by A.G. Baidurashvili [26] except for 3-5% of cases the recipients (Georgians) were sure that they selected lexical-semantic conformance with the words from the Japanese language which is unknown to them. Moreover, in 70-80 % of cases their confidence correlated with the factual correctness of recognition greatly. At primary stage of the experiment the recipients were presented antonymous pairs, during the second stage the researchers chose 20 words which the recipients identified correctly, so the degree of their mutual conformance was highly accessible. The researchers also selected 20 words and the degree of their identification was at the random match level (the mutual conformance of a sound shape and the meaning was less accessible). Then they conducted the experiments with each group of words separately. In the first case 10 out of 20 words were given with their equivalents, and the remaining 10 with nonequivalent ones, and vice versa, the words that were given together with their equivalents during the first stage of the experiment were presented with nonequivalent meanings during the second stage. The level of recognition of the meaning of the words exceeded the level of randomness.

IV. CONCLUSION

Such results let the researchers come to the conclusion that the recipients in the conditions of mutual juxtaposition of words of the unknown language nevertheless get very complete information about their mutual accordancy that confirms the validity of sound symbolism. The recipients were absolutely sure in the correctness of their choice and in the majority of cases the words were identified accurately. As in the psychological experiments mentioned above, the recipients could not answer the question what they were guided by in their choice. It should be noted, that their choice proved correct in the cases when it was made on the basis of the first impression.

References

- [1] J. Ohala, "The frequency codes underlies the sound symbolic use of voice pitch," in *Sound Symbolism*, Cambridge University Press, 1994, pp. 325-342.
- [2] G. Diffloth, "I:big, a: small," in *Sound Symbolism*, Cambridge University Press, 1994, pp. 107-114.
- [3] R. Ultan, "Size-sound symbolism, Universals of human language," Vol. 2, *Phonology*. Stanford, CA: Stanford University Press, 1978, pp. 527-568.
- [4] M. Preziosi, "Remembering that big things sound big: sound symbolism and associative memory," in *Cognitive Research: Principles and Implications*, 2017, pp. 2-10.
- [5] L. Bauer, "No phonetic iconicity in evaluative morphology," *Studia Linguistica*, vol. 50, pp. 189-206, 1996.
- [6] P. Olejarczuk and M. Baese-Berk, "Acoustic correlates of anticipatory and progressive [ATR] harmony processes in Ethiopian Komo," *Journal of Phonetics*, vol. 74, pp. 18-41, May 2019.
- [7] T. Cho and G. Docherty, "Voice onset time and beyond: Exploring laryngeal contrast in 19 languages," *Journal of Phonetics*, vol. 72, pp. 52-65, January 2019.
- [8] J.Cabrelli Amaro and I. Martinez, "Data for Influence of L 2 English phonotactics in L 1 Brazilian Portuguese illusory vowel perception," *Journal of Phonetics*, p. 21, January 2019.
- [9] B.D. Zinszer, P. Chen, H. Wu, H. Shu and D. Li, "Second language experience modulates neural specialization for first language lexical tones," *Journal of Neurolinguistics*, vol. 33, pp. 50-66, February 2015.
- [10] T. Xia and L. Mo, "Bi-lateralized Whorfian effect in color perception: evidence from Chinese Sign Language," *Journal of Neurolinguistics*, vol. 49, pp. 189-201, February 2019.
- [11] .G.Verdonschot and Y. Miyaoka, "The fundamental phonological unit of Japanese word production: An EEG study using the picture-word interference paradigm," *Journal of Neurolinguistics*, vol. 51, pp. 184-193, August 2019.
- [12] R.W. Brown, "Words and Things," New York: The Free Press, 1958.
- [13] V.G.De Diego, "Lectures on the Spanish Language," Madrid: Editorial Gredos, 1973.
- [14] Chen, L. Liu and R. Kager, "Cross-linguistic perception of Mandarin tone sandhi," *Language Sciences*, vol. 48, pp. 62-69, March 2015.
- [15] K. Dziubalska-Kolaczyk, "Explaining phonotactics using NAD," *Language Sciences*, vol. 46, iss. PA, pp. 6-17, 1 November 2014.
- [16] S.Tsuru and H.S.Fries, "Sound and Meaning," *Journal of General Psychology*, vol. 8, pp. 281-284, 1933.
- [17] S. Chang and A. Harris, "The Large Cognitive Implications of Small Languages," *International Journal of Cognitive Linguistics*, vol. 1, pp. 11-44, 2011.
- [18] M. Mertzani, "Iconicity in signed and Spoken Languages. Cases in Greek and LIBRAS," *Deafness Cognition and Language Research Centre Seminar*. London, 3 July 2015, pp. 11-23.
- [19] J. Auracher, S. Albers, Y. Zhai, G. Gareeva and T. Stavnychuk, "P is for Happiness, N is for Sadness: Universals in Sound Iconicity to Detect Emotions in Poetry," *Discourse Processes: A Multidisciplinary Journal*, vol. 48, No. 1, pp. 1-25, 2011.
- [20] I.N. Gorelov, "The Basics of Psycholinguistics," Moscow, 1998, p. 224.
- [21] A. Pieron, "Psychological Dictionary," Retrieved from: <http://psi.webzone.ru/st/142000.htm>
- [22] A.V. Puzirov, "A Linguistic Individuality in the Aspect of Substrate Approach," in *Language Consciousness: Formation and Functioning*, Moscow: Nauka, 1998.
- [23] D.N. Uznadze, "Psychological Research," Moscow: Nauka, 1966.
- [24] R. Davis, "The Fitness of Names to Drawings. A cross-cultural Study in Tanganyika," *British Journal of Psychology*, vol. 52, 1961.
- [25] S.V. Nikroshkina, "Experimental Research of Universal Sound Symbolism on the Material of Languages with Different Structures: Russian, Chinese, Armenian and English," Biysk, Russia, 2010, p. 210.
- [26] A.G.Baidurashvili, "Some Characteristic Peculiarities of a Speech Sign in the Aspect of the Reality of Unconscious Mental," in *Unconscious Mental: Nature, Functions, Methods of Research*, Tbilisi, Metzniereba, 1978, pp. 187-198.