

VIII ● PHILOLOGY

UDC 378

Turumbetova L.A.

Egyptian University of Islamic Culture Nur-Mubarak, Almaty, Kazakhstan
E-mail: t.lyaila@mail.ru

Stages of the Development of Kazakh Mathematical Terminology

Abstract. The article focuses on the development stages of Kazakh mathematical terminology. It deals with the chronological scheme of formation of this terminology. The author gives a comprehensive description of the evolution of mathematical terminology of the Kazakh language. After getting independence by Kazakhstan, the pace of social, scientific and technological development, a radical increase of the amount of information has led to the introduction of large number of neologisms into vocabulary of Kazakh language. Special attention is paid to the international mathematical vocabulary, the borrowing process from the Russian language and through Russian language borrowing of international terms, prospects of the development of the Kazakh language and terminology of various fields of science, the importance of the process of globalization in spreading the scientific information. Intensification of the borrowing process and the development of foreign vocabulary promote the dynamics of lexical system of the Kazakh language. Scientific and technical terminologies replenish the vocabulary of the Kazakh language.

Key words: terminology, Kazakh language, term formation, the system of mathematical terminology, borrowings, specialized vocabulary.

Introduction

Today the language history cannot be completely understood without studying the phenomenon of language contact and mixing. The language contact often plays a very important role in the history of languages. The history of a language involves gradual evolution as well as sudden changes brought about by various types of language contact. A large number of words may be borrowed, particularly if one group acts as the source of new items of culture or environment for the other. Precisely this type of language contact accounts for the large number of Arabic loan words borrowed together with the new religion of Islam into such unrelated language as Kazakh.

All forms of human activity tend to give rise to a specialized vocabulary, which participants use in conjunction with the general vocabulary of whatever language they happen to speak. The historical development of a specialized branch of language, such as mathematical language, belongs to the history of mathematics and to the history of language.

The subject of the research of this paper is the terminology of the specific area of knowledge – mathematics in terms of its evolution. The language

of mathematics contains terms and symbols. Mathematics does not have millions of terms like chemistry or biology but even so the number of terms in use is very great. The origins of many mathematical terms are very complicated. Most terms have been subject to greater or less movement in the course of centuries. The present period of development of the Kazakh language is characterized by the emergence of a large number of new terms, reflecting the appearance of new phenomena of social, economic and political life, terms related to various fields of science, technology, production, culture, and art. With the development of globalization in the present era and increasing internationalization of social processes, the growth of international and cultural exchange is evident; expansion of the use of international words is natural. The role of international vocabulary is extremely important. The Latin, French, German have been at different times international languages. Since the Second World War English has been the most important scientific language.

Methods

Structural and semantic analysis; comparative-typological method; the method of continuous sam-

pling; general scientific methods such as analysis, synthesis, classification and generalization; comparative study of relations of mathematical terms of Kazakh and English languages; a comparative linguistic analysis of the terminology system are used.

The comparative analysis is particularly evident in the term system, as it can be in one subject area, and based on different terminological systems. A comprehensive description of the evolution of mathematical terminology in the Kazakh language in order to identify its linguistic features, which are obvious in the system of Kazakh mathematical terminology, is considered in correlation with the development of mathematics.

Main body

History of Kazakh Mathematical Terminology Development

The current development of terminological investigations requires serious analysis of the traditional views on the essence of the term and the basic principles of its operation. «Term studies explore the concepts and terminology systems of various branches of knowledge, taking into account terms expressing concepts, logical-linguistic organization of systems of concepts and terms» [1. P. 9]. The object of the research of this paper is the history of the development of mathematical terms in the modern Kazakh language. There are two approaches dealing with the evolution of terminology: descriptive and prescriptive. The descriptive approach observes and analyses the emergence of terms, the prescriptive approach constitutes an agreement by users to adopt a term for common and repeated use in given circumstances. The prescriptive approach comprises terminology unification and standardization. Terminology standardization usually involves a choice among competing terms. There are several factors that can influence on this choice, e.g. precision (one term might have greater clarity or transparency than others), appropriateness (a term may have disturbing connotations associated with it). The standardization of terminologies should be based on standardized principles and methods, which themselves should be based on the scientific theory. Terminology today has adopted an approach to collecting lexical data that is based on corpora. It has been recognized that one concept can correspond to a variety of linguistic representations, which can serve various communication needs.

The evolution of the development of Kazakh mathematical terms can be divided into four stages. The first stage deals with the spread of Islam and Muslim culture. In XI–XVI centuries, Arabic and

Persian terms entered the Kazakh language. They were mathematical terms, terms of religion, medicine, law, geography, botany, social and political sciences. The number of Arabic and Persian terms in the mathematical terminology of the Kazakh language is quite high. Writings of al-Farabi in mathematics had a major impact on the work of scientists of the East and the development of mathematical terminology. Despite the paucity of evidence of this time, the elements of scientific terminology really existed in this period of the development of the Kazakh language. The second stage is associated with the Russian-Kazakh relations beginning from the second half of the XVIII century to the 20th years of the XX century. The words of the Russian language, related to the social and political life, economy, science, culture penetrated in two ways into the Kazakh language. The first way was through the spoken language, through the direct relationships and the second way was through written literature. Communication between Russian and Kazakh peoples led to the transition of lexical items from one language to another. The number of borrowings from the Russian language into the lexical system of Kazakh language significantly increased during this period. The word building of terms in Kazakh language began at the end of the nineteenth century.

Kazakh educators such as Ibrahim Altynsarin, Ahmet Baitursynov played an important role in the development of Kazakh terminology. Large changes in the socio-cultural life of the Kazakh people in the pre-revolutionary period and the period after great October revolution in 1917 gave rise to a huge number of new terms. A certain part of Kazakh mathematical terminology consists of borrowed terms under the influence of Russian language. The third stage, the formation and development of the national terminological system, began from 1925 and continued till the years of getting independence, till the collapse of the Soviet power. This period was of great significance. The terminological work was led by the People's Commissariat of Methodical Bureau of Kazakh SSR, by the Terminology Commission of the Council of Ministers of the Kazakh SSR. During this period, some work has been done to streamline the terminology of various branches of science. Principles and sources of their formation have been the subject of a large number of works devoted to creating of national terms. H.K. Zhubanov, S.K. Kenesbaev, A. Baitursynov, G.G. Musabaev, M.B. Balakaev, A. I. Iskakov, A.T. Kaydarov, S.A. Amanzholov, K.A. Ahanov made a valuable contribution to studies of terminological systems of modern Kazakh language.

The most fruitful work on the development of terminological systems of languages of the former USSR has been done in the second half of the 40's of the XX century. As a notable contribution to the development of Kazakh terminology, the Glossary of Kazakh Terms was published in 1948 in two volumes. Terms were for the first time systematized, and were given their interpretations. 12 Russian-Kazakh dictionaries, among them Russian-Kazakh dictionary of mathematical terms, were prepared at the Institute of Linguistics of the Academy of Sciences of the Kazakh SSR and published in the period from 1959 to 1962. The release of terminological dictionaries initiated the further research in this area. The Committee of scientific and technical terminology, the USSR Academy of Sciences and State Standard carried out the whole work.

The fourth stage is the period from 1991 until nowadays. In 1991, due to Kazakhstan's acquisition of independence, national terminology began rapidly to develop. In recent years, there have been many changes in this field. «Terminology of each of the national language is the result of practical and cognitive actions of the representatives of the nation, as all areas of social and professional activities are reflected in the name of special concepts» [2. P. 52].

After getting independence, Kazakhstan has embarked on a new path of development, and the main priority is the formation of a sovereign democratic state of the world level. The pace of social, scientific and technological development, a radical increase of the amount of information has led to the introduction of large number of neologisms into vocabulary of Kazakh language. According to the «State program of functioning and development of languages», one of the most important tasks is the development of terminology base of the Kazakh language. For this purpose, the scientific publishing program to create a series of Kazakh-Russian and Russian-Kazakh terminological dictionaries was developed. The team of linguists and terminologists carefully examined more than 200 previously published dictionaries and selected the most appropriate present day terms. The real contribution to the development and expansion of the use of Kazakh language became the Kazakh-Russian, Russian-Kazakh terminology dictionaries in 31 volumes, edited by Professor A. Kusainov, released in 1999. Having carefully examined the terms of mathematics presented in this dictionary, the authors of the dictionary tried to find out adequate translations of terms into Kazakh language, and if the terms were international, they were accepted without changes.

The Changes in Kazakh Language Terminology Development Nowadays

The status of the Kazakh language is characterized by the process of active creation of words developing a huge layer of foreign vocabulary. Without modern economic, legal, scientific terminology in different branches of science, the Kazakh language cannot function as the official language at the appropriate level. Many borrowings from different languages filled up and entered the lexical structure of the Kazakh language. They are borrowings of new phenomena of the market economy, new technology, computer and information devices and technologies. It is here that there is an urgent need to designate many new realities and concepts. Intensification of the borrowing process and the development of foreign vocabulary indicates the openness of the lexical system of the Kazakh language and promotes the dynamics of language.

Scientific and technical terminology is one of the most important reservoirs, replenishing the vocabulary of the Kazakh language. Most significant for the present period of development of the Kazakh language is the emergence of a large number of neologisms, reflecting the appearance of new phenomena of social, economic and political life, new titles related to various fields of science, technology, production, culture, and art.

In the formation of the terms of mathematics in the Kazakh language, the borrowing process from the Russian language and through Russian language borrowing of international terms took place. For example, the word «*ratio*» was borrowed from Russian into Kazakh and Russian language borrowed the word from Latin. As a result, there are many common borrowings in the terminology of different languages. English was far from the dominant scientific language in 1900. The dominant language was German. Therefore, the story of the 20th century is not so much the rise of English as the serial collapse of German as the up-and-coming language of scientific communication. Nowadays English is a language of mathematics. Today more mathematical papers are written in English than in any other language. The most common English mathematical terms are adaptations of terms coined in other languages.

In the mathematical terminology of Kazakh and English languages common terms are: *the radius, tangent, logarithm, diagonal, hyperbole, integral theorem, algebra, algorithm, trapeze, secant, rhombus, radical, parallel, median, invariant, the hypotenuse, congruence, the operator, the potential*

proportion, conjunction, coordinate cone lemma, module, octahedron, the parallel, parabola, paraboloid, the perimeter of the pyramid, polynomial, resolution, etc. This list can be continued up to several pages. They give an overview of the mathematical concepts in the two compared languages. Over 50% of the terms that form the English mathematical terminology are the result of borrowing by over 500 years.

With the development of globalization in the present era and increasing internationalization of social processes, the growth of international and cultural exchange is evident; expansion of the use of international words is natural. The role of international vocabulary is extremely important. Any mathematical text, regardless of the language contains a large number of international terms. When comparing a dictionary compiled by K.B. Bektaev «Russian-Kazakh mathematical vocabulary» issued in 1986 and a dictionary called «Russian-Kazakh dictionary of mathematical terms» published by the Institute of Mathematics and Mechanics, Academy of Sciences in 1992 there are a lot of discrepancies in the name of the terms, particularly international terms. For example: international terms such as *formula, hypothesis, the hypotenuse, and the coefficient matrix* are given without translation into Kazakh in the dictionary compiled by K.B. Bektaev. In the dictionary, compiled by the Institute of Mathematics, all these terms are translated into Kazakh. Unfortunately, these types of translations of the terms do not lead to further understanding and promotion of Kazakh science globally. In the Kazakh-Russian, Russian-Kazakh terminology dictionary on mathematics, edited by Professor A. Kusainov, international terms are given without changes. If we identify the semantics of internationalisms, the only appropriate criterion could be their equivalence and clarity in the comparison of languages.

The international scientific terminology borrowed in the same or similar lingual form and in the same meaning comes from Greek and Latin languages. The number of internationalisms in every language is very large; most of different scientific terms are internationalisms. Globalization as the constant historical process that does not depend on human beings' will assigns today special responsibility. It is clear that it is not possible to stop globalization process. This process is marked by the spread of English, the transmission of ideas across national borders that become standardized around the world. Through technological advancement, the process of sharing the values of one culture to another ultimately leads to the intensification of

connections between various populations from diverse cultures within the global, regional, and local level. The dominant role of the English language is extremely important in modern scientific communication. Most of the international scientific conferences around the world are held in English. Of particular note is the increasing scale of penetration of Americanisms into British English. The United States, as one of the leading countries in the development of science and technology plays a major role in the completion of the scientific and technical vocabulary. Options to create scientific and technical neologisms went mostly to American English, while British English includes already formed lexical items. Borrowings from Greek and Latin are used in the plural form of the language of origin in British texts. For example, *radius-radii, nucleus-nuclei, formula-formulae, matrix-matrices*. In the American scientific literature the plural of Latin and Greek terms are formed on the American model of plurality: *radiuses, formulas, matrixes*.

As terminological data constitute the core element of any domain-specific information and knowledge representation, the availability of and accessibility to these data are critical socio-economic factors. Countries and language communities understand the need to formulate systematic terminology policies in order to improve their competitiveness. This trend coincides with the requirement that today's accelerated globalization needs to be complemented by accelerated localization, i.e. translation and adaptation to comply with local cultural and linguistic norms. An ever-increasing body of empirical evidence indicates that there is a critical relationship between individuals' opportunity to use their mother tongue in a full range of cultural, scientific and commercial areas, and the socio-economic well-being of their respective language communities. People whose mother tongue is not developed from the point of view of terminology and special purpose languages (SPL) or who are denied the use of their mother tongue in education and training, for accessing information, or interacting in their workplaces, tend to be disadvantaged.

It must be acknowledged that terminology is undeniably the major constituting element of the Special Purpose Language. Terminology plays a crucial role wherever and whenever domain-specific information and knowledge is: generated (e.g. in research and development); used (e.g. in specialized texts); recorded and processed (e.g. in databases); passed on (via training and teaching); implemented (e.g. in technology and knowledge transfer); or translated and interpreted.

Consequently, a language community whose language has not developed scientific and technical terminologies is unavoidably forced to use some other, more developed foreign language for domain communication.

The development of knowledge societies is accelerated by the development of information and communication technologies, especially by the convergence of telecommunication and computer technology, with the tendency to merge mobile computing and communication. As information communicative technologies become more pervasive, there is an accentuated need for effective and efficient methods of using them. Here terminologies play a crucial role: terminological data are indispensable elements of domain-specific information and knowledge (covering a large share of content in general).

The political, social and economic situation in a country almost dictates different approaches to the development of a terminology policy. A terminology policy impacts virtually all professional life, education and training, the health system, etc., thus affecting everybody, young or old, who needs to understand or acquire specialized knowledge of some kind or other. In most cases, it will be wise to ensure the active participation of those institutions that are most dedicated in their commitment to language planning policies. As the terminology of each subject field or domain increases with each new invention, information is distributed and knowledge is acquired by means of terminology.

The process of terminology creation and adoption requires close collaboration among terminologists, subject specialists, linguists, translators, and educators. Coordinated efforts can be designed to avoid the evolution of conflicting term choices. Furthermore, we have to distinguish between different types of designations, not just terms (not to mention term elements). Besides, it is always difficult to distinguish words from terms, terms from non-elements or names from terms. The term formation depends on the functional role of designations in domain communication.

Conclusion

The terminology development is a natural, unavoidable phenomenon, a part of language development. A vast number of new terms are created every day in hundreds of languages all over the world. New terms are introduced into Kazakh language either to fill a gap, which is created by the introduction of a new concept, or to replace an existing, less efficient term. An increasing number of

terms penetrate the common lexicon, while the terminology problems have an impact on the development of language in general. At the present stage of the development of the society and languages, globalization plays a crucial role. Globalization, a kind of universalization, is reflected in all aspects of life: economic, political, ideological and cultural. English has the overwhelming influence; it is the language of the donor for all languages. Each specific language changes according to the transformative and innovative processes taken place in the society. Scientific achievements promote the formation of new words, the enrichment of the vocabulary of the national languages. Modern science cannot develop in isolation, regionally; it develops globally, combining the scientific and technological achievements of the international community. Because of the scientific and technological revolution, many languages have enriched their vocabulary, on the one hand, and the process of standardization and unification of their terminological fund takes place on the other hand. The democratization of the public life, the openness and accessibility of the latest achievements of the world science allow a huge number of people to obtain and share information. In the scientific sphere the written channel is the dominant channel of communication, therefore, the scientific literature is the most important mode of information transmission in the scientific community.

The remarkable developments in recent years towards global information and knowledge society have generated a significant evolution in the attitude of the government of Kazakhstan towards the development of state language and knowledge of Russian and English languages. In his Letter to the People of Kazakhstan, «A New Kazakhstan in a New World», the President of the country, Nursultan Nazarbayev emphasized: «Kazakhstan must be perceived throughout the world as a highly-educated country, whose population employs three languages.» [3.P.2]. In this regard it is essential to pay much attention to the development of Kazakh language as the state language, Russian as the language of international communication between 130 nationalities which live on the territory of Kazakhstan, and English as the language of successful integration into the global economy, and to view this as one of the top priorities of state language policy.

William Fierman, former director of the Center for Central Asian and Kazakh Studies of the University of Seattle (USA) considers the initiative of the President of the Republic of Kazakhstan for implementing linguistic triunity in the country as

a correct one, and it will promote the development of the state. «In contemporary Kazakhstan the Kazakh language must begin to play a greater role, particularly in the cities, as it has always prevailed in the villages. English has very quickly begun to occupy a significant place in Kazakhstan, which is a very positive trend.»[4. P.3]. The «Linguistic Trinity» project presumes the establishment of conditions for providing all citizens of the Republic of Kazakhstan with the opportunity to study English. The use of English has received a great boost because of globalization and new information technologies. It is the language of international business, the language of computers and the Internet. The fact that English is the de facto global language of science is not likely to change anytime soon optimizing communication among

members of the international community of scientists, and thus advancing scientific progress. English is considered as a passport for a secure future. It is probably the only language, which is spoken in all the continents of the world. «Rather than a process which leads to uniformity and homogeneity, globalization seems to create new, hybrid forms of culture and language: the results of global influences meeting local traditions, values and social contexts» [5, 33]. English was far from the dominant scientific language in 1900. The dominant language was German. So the story of the 20th century is not so much the rise of English as the serial collapse of German as the up-and-coming language of scientific communication.

National terminology policy must be linked to the overall development policy.

References

1. Golovin B.N., Kobrin R.Y. Linguistic Foundations of the Terms Doctrine. – M.: Higher School, 1987. – 104 p.
2. Zhamalbekkyzy K.A. Onomasiological Aspect of Kazakh Terminological Nomination: Author. dis ... Doctor of Philology Sciences. – Almaty, 2009. – p. 52.
3. Nazarbayev N.A. A New Kazakhstan in a New World. Letter from the President to the People of Kazakhstan. Astana, April 28, 2007, electronic resources: prosites-kazakhembus.homestead.com/news.
4. William Fierman. The Concept of Linguistic Trinity in Kazakhstan Is a Correct One and Will Promote the Country's Development. Opinion of an American academic. Kazinform, May 15, 2008. Electronic resources www.neotech.kz/izuchenie_eng_kz-eng.html.
5. Graddol D. The Future of English? – London: The British Council, 1997, p.33.