

REPUBLIC OF AZERBAIJAN

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ABSTRACT

of the dissertation for the degree of Doctor of Science

**SCIENTIFIC STYLE IN 13th-16th CENTURIES
TURKIC LANGUAGES**

Specialty: 5710.01– Turkic languages

Field of science: Philology

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Baku – 2022

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INTRODUCTION

The actuality of the topic and the degree of the development.

Different stylistic directions conditioning the formation of literary language determine the criteria for the development of functional capabilities of a language. A comprehensive study of the historical development of the Turkic languages can be carried out by studying all its stylistic capacities. From this point of view, studying scientific works written in Turkic from different aspects allows determining both the boundaries of the historically expressive capacities of language and the level of development of scientific thinking of the peoples who are native speakers. Unfortunately, research on the historical functionality of Turkic languages is in short supply. Thus, due to the widespread promotion of examples of fictional style by particular native speakers, their transmission from generation to generation has led to their survival up to the present day and their involvement in research from various aspects. However, some examples representing other stylistic capacities - scientific works, official documents, and others were not protected well due to social, political and other reasons that afterward made them forgotten and overlooked as an object of study.

The formation of scientific language in any language is associated with both intra-linguistic and extralinguistic factors. As much as the level of development of language directs the development of scientific style, the widespread use of the dominant language in the regions where different fields of science originated and formed also affects the formation of scientific style in that field of science. Within the development and enrichment of the literary language, the scientific style differs from other functional language styles in its function. Therefore, the process of separating the scientific style from other literary language styles did not occur suddenly. If we look at the initial stage of the formation of the scientific style in all the world's languages, we'll see the same landscape: simple explanations prevailed in such works in which

the descriptive character was leading, slightly different from the writer's language, and sometimes sounded fantastic thoughts. There are remarkably affluent scientific works in these languages, and they have different stylistic features. Philosophical-scientific ideas in medieval Turkic poetry, writing of the first scientific books, and dictionaries in verse, give grounds to say that the scientific style gradually separated from the fictional style. Since the end of the 13th century, changing the socio-political situation, relative regional stability, and the care of the Turkic states for the language, the opening of madrasas in this language has led to the formation of a scientific style. Initially used in the dictionary and lexical-grammatical type works, the Turkic languages later gradually became the primary scientific language. The development of the Turkic languages, including the Azerbaijani literary language in the 13th-16th centuries, is based on a complex logical structure and has different features in different directions. Although the position of the classical style has increased under the influence of maximum normativeness in the literary language, the simplicity and fluency of the vernacular are observed in the works of prose, especially in the scientific style. Thus, the 13th-16th centuries are the period of creation of both books, both classical and complex comprehensible works, in fictional and scientific styles. The writing of the books in different fields, e.g., medicine, astronomy, and linguistics whose language was close to the widely spoken language, began in the same period. Thus, the 13th-16th centuries are the period of the emergence of classical and complex comprehensible works both in fictional and scientific style, as well as books on medicine, astronomy, linguistics, and so on fields written in a language close to the vernacular. The abundance of manuscripts associated with this period and the sufficient number of examples of scientific style among them are essential for observing the evolution of stylistic differentiation and normalization.

The study of the scientific style in Azerbaijani linguistics has been carried out not from the historical-comparative aspect but

within a single language. The studies called “Scientific style of the 19th century Azerbaijani literary language,”¹ by V.Adilov and “Scientific style of the Azerbaijani language in the early 20th century”² by A.Alizade analyze the development of the scientific style in the 19th century and earlier of the 20th century. N.Khudiyeu noted that in the historical chronology of the Azerbaijani language in the 16th century, the embryos of scientific style were followed and mentioned M.Fuzuli’s work as an example. The study of scientific works in different directions, from the historical aspect, depicts itself through the studies such as N. Hajizade’s “Abri Khaja ibn Adil,” “Ikhtiyarati-qavaidi-kuliyya” and its lexicon,” T.Abdullayev’s “The 16th-century Turkic work Khizir ibn Abdulhadi-al Bavaziji’s “Kavamilut-tabir” and its lexicon,” M.Naghisoylu’s “Ahmadi Tabrizi and his translation Asrarnamə,” “16th-century Azerbaijani translated work “Kavamilut-tabir,” “The art of translation in Medieval Azerbaijan.”³ However, the number of works written in the scientific style during the medieval period, especially in the 13th-16th centuries enables extensive research in

¹ Adilov, V. Z. XIX əsr Azərbaycan ədəbi dilinin elmi üslubu/ V. Z.Adilov. – Bakı: Nurlan, – 2002. –136 s.

² Əlizadə, A. C. XX əsrin əvvəllərində Azərbaycan ədəbi dilinin elmi üslubu: / filologiya elmləri doktoru dis./ – Bakı, 1997. – 307 s.; Əlizadə, A. C. XX əsrin əvvəllərində Azərbaycan ədəbi dilinin elmi üslubu/ A. C. Əlizadə. – Bakı: ARKTN Poliqrafiya , –1996. – 105 s.;Əlizadə, A. C. Azərbaycan ədəbi dilinin elmi üslubu (1901-1920- ci illər)/ A. C. Əlizadə. – Bakı: Ozan, –1997. – 106 s.

³ Abdullayev, T. Ə. XVI əsrin türkdilli əsəri Xızır ibn Abdulhadi-əl Bəvazicinin “Kəvamilüt-təbir” əsəri və onun leksikası:/ filologiya elmləri namizədi dis./ – Bakı, 1991. – 145 s.; Hacıyeva, N.N. “Əbri Xacə ibn Adilin “İxtiyarati- qəvaidi-kuliyyə” əsəri və onun leksikası:/ filologiya elmləri namizədi dis./ – Bakı, 1986. – 179 s.; Hacıyeva, N.N. Nəsirəddin Rəbğuzinin “Qisasül- Ənbiya əsəri və onun dili:/ filologiya elmləri doktoru dis./ – Bakı, 1995. – 453 s.; Nağısoylu, M. Z. Orta əsrlərdə Azərbaycanda tərcümə sənəti/ M. Z. Nağısoylu. – Bakı: Elm, – 2000. – 264 s.;Nağısoylu,M.Z. Əhmədi Təbrizi və onun Əsrarnamə tərcüməsi/ M. Z. Nağısoylu. – Bakı: Elm və təhsil, – 2012. – 260 s.; Nağısoylu, M.Z. Seçilmiş əsərləri [2 cilddə]/ M.Z.Nağısoylu. – Bakı: Elm, – c.1. – 2017. – 634 s; Nağısoylu, M.Z. Seçilmiş əsərləri [2 cilddə]/ M.Z.Nağısoylu. – Bakı: Elm, – c.2. – 2017. – 652 s.

this field. The expansion of the usage of Turkic languages in the 13th-14th centuries led to an increase in the number of bilingual and trilingual explanatory dictionaries and the emergence of new translations. Original scientific works on various micro-styles were written in the 15th-16th centuries. At this stage, Murad bin Ishaq's "Adviya-i-Mufrada," "Ad-durratul-mudiyya fil lugatit-turkiye" (14th century), Hekim Barakat's "Khulasa" (14th century), Ashik Pashazade's "Tavarikhi-ali-Osman" (15th century), Sabunjuoglu Sharafaddin's "Jarrahnameyi-Ilkhan," "Mujarrabname" (15th century), Piri Rais's "Kitabi-Bahriya" (15th century), Mahmud Shirvani's "Ilyasiyya," "Jovharname," "Tohfa-i Muradi," "Translation of Kitabu't-Tabih," "Sultaniye," "Kitab-i guzide-i ilmi-tib," "Murshid" (15th century), Mahmud bin Ghazi Manyas's "Ajabul-ujjab" (15th century), Takiyuddin's "Alat-i Rasadiyya," Bergamali Qadri's "Muyassiratul-ulum" (16th century), Sayyid Ali Rais's "Khulasatul-Heye" (16th century), Muvahhit Mustafa's "Tohfetuz-zaman" (16th century) and other works were written. The works written in this period in various fields of science provide affluent findings to determine the process of development of the scientific style, the directions of its formation, and the linguistic features of the literary language. The affluent linguistic facts once again prove that the scientific style in the Turkic languages has an older history. However, the development history, language features, and lexicon of the 13th-16th centuries' scientific style of the Turkic languages have not been studied systematically; and a comprehensive analysis of the process of literary normalization at the lexical and grammatical levels has not been conducted. All these aspects determine the significance of the topic.

Object and subject of the study. The object of study is 13th-16th centuries Turkic languages. The subject of study is the principal linguistic and stylistic features of works written in scientific style in these languages.

The goal and objectives of the study. The core purpose of the study is to determine linguistic features and the history of the

emergence and formation of the scientific style that is one of the major leading styles of Turkic literary languages. The scientific works of the period reflect the high level of development of the scientific style. Considering this issue, studying the interaction of scientific style, a functional style, with literary language, and the main aspects of normalization with linguistic facts are set as a goal. The following tasks have been determined to realize the main issues mentioned:

- Examining the historical development of Turkic languages and determining the criteria that stimulated the formation of scientific style;

- Identifying and analyzing scientific works reflecting the development of scientific style, one of the leading styles in Turkic languages;

- Investigating the interaction of scientific style with literary language in Turkic languages and the main aspects of its normalization through linguistic facts;

- Studying the development of scientific style within different micro-styles based on existing facts in Turkic languages;

- Determining the mechanism of reflection of language's different levels in works written in the scientific style;

- Revealing the interaction of Turkic languages with other languages and their manifestation at the lexical level based on the works written in the scientific style;

- Following the process of word formation in works written in the scientific style and studying its specific features comparatively;

- Determining the normativeness of literary languages of the period at the grammatical level based on the facts obtained from scientific works written in different Turkic languages;

- Determining the boundaries of the development of the syntactic structure in the 13th-16th centuries Turkic languages based on the sentence structures of scientific works written in prose;

- Classifying the types of sentences used in scientific works according to purpose and intonation, structure, and revealing stylistic differences that affect the syntactic structure;

- Interpreting the formulation of the scientific style that occurred in a way that affected the development of the literary language in the 13th-16th centuries Turkic languages based on the facts on all language.

Research methods. Historical-comparative, descriptive and statistical methods have been used in the work-out of the dissertation. The study examines the problems regarding scientific style from the diachronic and synchronous aspects.

Main provisions put forward for defense:

- Showing the history of the scientific style in a limited framework that is one of the main styles in Azerbaijani linguistics and Turkology has restricted the breadth of the historical functional capacities of the language. Therefore, researching the language of works written in the scientific style in the Turkic languages of the 13th-16th centuries from the diachronic and synchronous aspects, and also in the form of thematic, structural-semantic groups allows studying the historical vocabulary of Turkic languages and determining the functional capacities of languages while uncovering Turkic-language scientific heritage.

- The abundance of a language is measured by its wide range of usage. For a long time, opinions about the breadth of the functionality of the Turkic languages, including the Azerbaijani language date back only to the period after the 18th century, at best. Classic and folk speech style have been studied until this stage. However, studies shows that this division in the process of historical development at the level of literary language in Turkic languages doesn't justify itself.

- The sources of the formation of the scientific style in the Turkic languages are the Turkish thinkers that wrote their works in Arabic and Persian with a general Islamic approach following the requirements of the time. The findings indicate that the first scientific works in Turkic languages appeared as the translation of the works written by these thinkers into Turkic languages by their students or followers in the later stages.

- The scope of works written in Turkic languages in the 13th-16th centuries covers mathematics, astronomy, music, geography,

medicine, botany, linguistics, literature, history, and other science fields. This fact proves that the scientific style did not only appear but also formed at the level of micro-styles at this stage.

- The essential vocabulary of works in the scientific style conveys different features within micro-styles. Moreover, both the author's style and regional language features played an important role in changing the usage balance of borrowed and national words with the framework of both micro-styles and centuries.

- Terms or word combinations used in Turkic-language scientific works in the 13th-16th centuries became archaic because of historical evolution and sometimes changed under the influence of this and other dialects. This process of evolution manifests itself not only in linguistic examples of later periods but also in the works belonging to the centuries under study.

- Prose works, including scientific sources, are significant in examining the syntactic structure of the Turkic languages. Throughout the formation process of sentence structure, the gradual exposure of sentence types in Turkic languages to foreign elements and the fact that such sentence structure finds its way into the language through translated works convey a stylistic character. Such a feature of the style was balanced within the norms of literary language and weakened as the number of Turkic-language scientific works increased.

The scientific novelty of the study. In the dissertation, the history of formation, development, affluent language features, and specific features of the word-formation process of scientific style in the 13th-16th centuries Turkic languages have been comprehensively studied based on the scientific works of that period. This study is the first attempt to shed light on this issue. For the first time, the study examines the scientific style in the 13th-16th centuries' Turkic languages in the light of different micro-styles - linguistics, mathematics, medicine, music, astronomy, and others. These works' linguistic and stylistic features again prove that the scientific style has gained functionality in the Turkic languages since the 13th-16th

centuries. Along with the general functional differences of the scientific style, the linguistic and stylistic features of different areas fields have also been presented comparatively with the facts brought from the scientific works written during this period. The linguistic features of the works written in the scientific style in the 13th-16th centuries' Turkic languages have been analyzed within the lexical and the grammatical levels. The dissertation comprehensively analyzes the syntactic structure of works written in a scientific style, types of simple sentences in scientific works, formation manners of complex sentences, and other issues. The normativeness of the literary languages of the period at the grammatical level has been determined based on the facts from scientific works written in different Turkic languages. Moreover, the boundaries of the development directions of syntactic structure in Turkic languages have been identified based on the sentence structures of scientific works written in prose. The types of sentences used in scientific works have been classified by their purpose, intonation, and structure. Furthermore, the stylistic differences affecting the development of syntactic structure have been revealed. In the study, the scientific style has been interpreted using the findings based on all language levels formed in Turkic languages in the 13th-16th centuries.

The theoretical and practical significance of the study.

Historically, the interconnection of Turkic languages has resulted in the fact that works written in these languages conveying more than one language or dialect feature. Therefore, diachronic and synchronous research conducted relating to any field of Turkic languages are noteworthy in terms of both Turkologically and studying languages from historical perspectives. In this regard, the dissertation creates a significant scientific basis for examining the functional capacities of the Turkic languages from a historical perspective.

The 13th-16th centuries are a notable stage in terms of the historical development of the Turkic languages. At this stage, among numerous works created in different Turkic languages, scientific pieces has exceptional importance. This stage was the timespan when

the works of Turkish thinkers who lived in previous centuries found their way to Turkic-speaking madrasas through translation and simultaneously happened with the expression of scientific thought in the native language. The preparation of theoretical and conceptual bases of the scientific vocabulary used at that stage and determining development criteria for stylistic capacities within the norms of literary language opens a new research direction in Azerbaijani linguistics from historical aspects. At the same time, this plays as a scientific source for directing research in historical lexicology and syntax from descriptive character to historical-comparative analysis. Generally, examples of fictional style have been taken into account in historical lexicological research. In Azerbaijani linguistics, however, a considerable part of the lexical component of the language has been overlooked. The study is significant regarding the containment of both national and the borrowing components of the terminological layer, a form of expression of scientific thought, in the dictionaries. The study is a significant lexical source for tracing the historical development of the scientific language and observing the internal borrowing process of the Turkic languages as the result of the interaction of languages. This study is also crucial for defining the influence of the Arabic and Persian languages on the Turkic languages from the sociolinguistic perspective and determining the development of scientific style within different micro-styles in Ottoman and Chagatai environments starting from the 16th century. Since the study work is the first scientific work on the comparative analysis of the history of scientific style in Turkic languages, it can be the principal theoretical foundation for the scientific works on the history of the development of the history of literary language in Azerbaijani linguistics. It also provides a theoretical basis for researching linguistic and stylistic features of individual scientific works. The study findings can be used in the historical-comparative examination and teaching of languages, scientific style and terminology of Azerbaijani and other Turkic nations at universities. This study can also be used to write historical lexicology and grammar textbooks and compile dictionaries.

Approbation and application of the research. The main provisions of the dissertation are depicted in the author's presentations at international and national scientific conferences, published articles, and monographs. Monographs entitled "Historical sources of scientific style in Turkic languages" and "Lexical-grammatical features of medieval Turkic scientific style" were published associated with the dissertation. There are 22 articles published in Azerbaijan and six articles abroad (one of them is in the Web of Science database). The author introduced research findings at 17 international and two domestic conferences.

The name of the organization that the dissertation prepared. The dissertation was prepared at the Department of Turkic Languages of the Institute of Linguistics named after Nasimi of the Azerbaijan National Academy of Sciences.

Total volume of the dissertation with characters, indicating the size of the structural sections of the dissertation separately. The dissertation consists of an introduction, four chapters, conclusion, and a bibliography. The introductory part of the dissertation consists of nine pages, the first chapter is 56 pages, the second chapter is 79 pages, the third chapter is 52 pages, the fourth chapter is 56 pages. The conclusion is eight pages, bibliography is 24 pages, and the abbreviations are two pages. The dissertation consists of 290 pages and 558 128 characters in total.

THE MAIN CONTENT OF THE RESEARCH

Introduction of the dissertation states the relevance of the topic, the degree of usage, identifies the object and subject, the goals and objectives, the methods, the main provisions for the defense of the research, the scientific novelty, theoretical and practical significance, approbation and applying of the research, gives information on the name of the organization where the dissertation work is performed, the volume of the structural units of the dissertation separately and the total volume with characters. The first chapter of the dissertation

entitled “**History of the formation of scientific style in the Turkic languages**” consists of four subchapters. The first subchapter entitled “**Turkic languages of medieval history and their linguistic features**” examines the changes in the historical development of Turkic languages and their linguistic features. The study of the development of Turkic languages allows to conclude that the separation of these languages from a single mother tongue took place in ancient times, which cannot be proved by known historical facts. It is noted that the division and naming of the history of the Turkic languages into certain stages were different, and based on various principles, which creates certain obstacles in the study of the historical development of modern Turkic languages.

M. Kashgari, who wrote the first linguistic ideas about Turkic languages, called dialects and accents of Turkic languages by names of “boy”. In the introduction of his work: *“I researched their countries, steppes, learned the languages and rhymes of Turks, Turkmen, Oghuz, Chigil, Yagma and Kyrgyz – in this sentence, the author presents Turkish, Turkmen, Oghuz names with different language notions in the language environment of that period. The Khaganian Turkic, which the author called an eloquent language and opposed to these languages, was used as a literary language in Central Asia after the Goy-Turkic and was the official language of one of the five great Turkic states - the Karakhanid state of that time. Along with the Seljuk Empire, the Idil Bulgarian state, the Ghaznavid and Uighur states, which were on the stage of history, there were small Turkic states in the Caucasus. During this period, Khaganian Turkic, Oghuz, Kipchak, Bulgarian, Uyghur language environments and “boy” languages under their influence attract attention. This shows that different language features are formed in each of them.*

In the 11th century, Oghuz was the main language that M. Kashgari compared to Khaganian Turkic. The source where the Oghuz name was first mentioned is the Orkhon monuments. Based on the historical settlement area of the Oghuzs, we can say that the Eastern and Western Oghuz was formed. In our opinion, the separation of the

Western Oghuz and the Eastern Oghuz took place earlier. The Western Oghuz, which is neighboring to the Kipchaks, has acquired different characteristics from the Eastern Oghuz under the influence of Kipchak language elements.

The division of language given by M. Kashgari and the linguonyms used by him in the 11th century were forgotten in the later stages. Only the word “turki”, “al-lughat-it-turkiyyun” is used in works written in Turkish or other languages related to Turkic languages. However, it is not correct to talk about the existence of a single “turki” language in this period. For example, the term “Turkic language” is used in the title of the work “Ad durratul-mudiyya fil-lughatit-turkiye” written in the 14th century. However, the linguistic facts and grammatical materials in the works written in different Anatolian and Middle Eastern regions show that the Turkic in the works is not the same as the Turkic, and the given linguistic facts are not simple differences in the degree of dialectical differences. This means that these works in the 14th century reflect the facts of different Turkic languages. These Turkic languages are the Old Anatolian Turkic - i.e., a branch of Western Oghuz, and the other is the Mamluk Kipchak – i.e., the Southern branch of the Kipchak language.

Kipchak, which is neighboring to the Oghuz language environment, is widespread in the region. Starting from the 12th-13th centuries, the Kipchaks played an active role in the political scene in Southern Egypt. Unlike the Seljuks, the Kipchaks created an environment for the creation of Turkish works, and encouraged authors to prepare Turkish translations of works in Arabic and Persian. All this has led to the growth of Oghuz-Kipchak language relations and the emergence of works with different linguistic features. Mamluk Kipchak is one of the medieval Turkic languages with the richest written examples. Mamluk Kipchak, in which various dictionaries, fictional works, scientific works on jurisprudence, archery, equestrianism etc. were written, has gradually developed since the first half of the 15th century. “Kitabul-idrak li lisanul-atrak”, “Kitabi-majmui tarcumani-turki va ajami and mogholi and farsi”, “Al-

qawaninul-kulliyya li-zabt`l-lughatit-turkiyya”, “Kitabul-afal”, “At-tohfetuz-zakiyya fi-l-lughatit-turkiyya”, “Kitabu bulghatul-mushtak fi lughatit-turk wal-kifchak”, “Rasuli lughati”, “Kitabul-khayl”, “Baytaratul-vazih” is one of the main works written in Mamluk Kipchak and reflects their characteristics as a literary language.

Kharezm Turkic, which was emerged as a literary and fictional language during the Kharezmshahs, was formed as a result of mixing Oghuz and Kipchak with Kalach, Uyghur, Pecheneg, Kimek, Kangli, Bayavut “boy” languages. Kharazm Turkic, which played a transitional role between Khaganian and Chagatai Turkic, was the only literary language of Central Asia in the 13th-15th centuries. The linguonym “Kharezm Turkic” is a term formed from the ruling dynasty or the name of the region. The main difference Kharezm Turkic from Khaganian Turkic is the predominance of Oghuz-Kipchak language features in it. It should be noted that as Kharazm Turkic conveying in itself different linguistic features as a transitional stage, this or that work written in this language was tried to be presented separately as a Kipchak, Chagatai, Oghuz language monument. Chagatai Turkic, a continuation of Kharezm Turkic, has been used as a literary language in Eastern Turkestan since the 15th century. Although the words “türki, türki dili, türkçə, türkçə dili” are used as linguonym in Chagatai language samples, as the name of the people the expression “çagatay ulusu” was used. When the notion of Chagatai Turkic first appeared, it was a linguonym that expressed the language differences that emerged within a specific framework as the language of the “çagatay ulusu”. The broad expression of this linguonym dates back to the time of the Timurids, who became a political force in the region. Chagatai, which functioned as a literary language in Central Asia during the Timurids, is also opposed to simple Turkish in “Shajareyi-turk”. It should be noted that numerous scientific and fictional works have been written in each of these languages, which proves that these languages have all-round functional capabilities as a literary language.

The history of formation and development of the scientific style in the Turkic languages is studied in the second subchapter entitled **“History of the formation of the scientific style in the Turkic languages”**. It is clear from research that linguists have different approaches on issues to the formation of styles in the Turkic languages in the Middle Ages. Thus, most researchers distinguish two styles of literary language: classical style and folk style. *“At first (mainly in the forming stage), stylistic differentiation was not clearly linear, but later main stylistic lines – according to stylistic lines of classical and folk literary language, the evolutionary process gradually began to gain certainty”*⁴.

In general, the history of the historical formation and development of the scientific style differs from other styles of Turkic languages. Thus, the regional relative stability in the 11th-12th centuries began to change from the 13th century. Although the disintegration of the Seljuk Empire led to the creation of small feudal states and their political independence, the Mongol invasions and the coming to power of the Hulagu weakened the influence of Arabic and Persian in the region, and as a result of the care of local authorities, the use of Turkish as a language of instruction led to the formation of a scientific style in this language. The Turkish language used in bilingual dictionaries played beginning role in the formation of the scientific style in this language. Following such dictionaries, scientific works written by Turkish authors in Arabic and Persian were translated into Turkish. However, these works were not translated literally, but were reworked on the basis of the original work, expanded with additions, and were of a commentary-translate type works. M. Naghisoylu writes about such translated works: *“In general, when evaluating the translations of the Middle Ages, the criteria and limit for modern translations should be set aside and in the period when these works appeared, the main specific features of this art should be taken as a basis. “In this matter, of course,*

⁴ Cahangirov, M. P. Milli təşəkkül mərhələsində Azərbaycan ədəbi dilinin aparıcı üslubları/ M. P. Cahangirov. – Bakı: Elm, – 1989. – s. 41

along with the degree of closeness to the original of any work taken as a translation, the facts such as whether the work is recognized as a translation or an original work in the Middle Ages, under what name (translation or original) is more popular should be taken into account”⁵. It should be noted that the works of the thinkers such as Hubeysh Tiflisi, Nasreddin Tusi and others’ work, who wrote in Arabic in previous centuries have been translated into Turkic languages, the translation gave impetus to the development not only fictional, but also scientific style. Later, the first original scientific works and treatises on medicine, astronomy, linguistics, literature, jurisprudence, and sharia etc. were written in Turkic languages.

Analyzing the history of literary language development, V. Adilov writes: *“It is known that the history of literary language development on the one hand is related to structural changes occurring in different levels of language, and on the one hand to the peculiarities of stylistic differentiation of literary language in a concrete historical period”⁶. For the the 13th-16th centuries Turkic languages, this process occurred actively. Stylistic differentiation not only ensures the internal development of literary languages, but also exacerbates interlingual differentiation. The development of styles on the basis of internal linguistic norms influences the formation of languages as a literary language.*

The expansion of the Turkic languages’ usage in the 13th-14th centuries led to an increase in the number of bilingual and trilingual explanatory dictionaries, and the emergence of new translated works. Various dictionaries, works on medicine, astronomy, linguistics, literary criticism written in Kharazm Turkic, Chagatai, Mamluk Kipchak in Egypt, Anatolia and Azerbaijan prove that examples belonging to the scientific-theoretical, scientific-textbook, scientific-

⁵ Nağısoylu, M.Z. Orta əsrlərdə Azərbaycanca tərcümə sənəti/ M. Z. Nağısoylu. – Bakı: Elm, – 2000. – s.16

⁶ Adilov, V.Z. XIX əsr Azərbaycan ədəbi dilinin elmi üslubu/ V. Z. Adilov. – Bakı: Nurlan, – 2002. –136 s. – s.6.

popular, scientific-technical branches of the scientific style have been written from the 14th-16th centuries.

The third subchapter of the first chapter is called **“Turkic scientific sources of Arabic and Persian-language in the development of scientific style”**. This subchapter examines Arabic and Persian works written by Turkish scholars, which are historical sources of Turkic-language scientific style. From the time when Islam found its way to Turkish society, Turkish scholars wrote in Arabic to spread their works to a wide audience. Scholars who lived in the 8th-11th centuries, such as Muhammad ibn Ali al-Maraghi, Abu Jafar Muhammad bin Musa al-Kharazmi, Al-Fargani, Abdulhamid bin Wasi bin Turk, Al-Farabi, Sahl al-Balkhi, Abu Rayhan al-Biruni, Bahmanyar ibn Marzban, Abu-t-Tayyib Nueym al-Urmavi have stimulated the development of science by writing works on various fields of science. Malik Mahmudov writes: *“These scholars were not confined to the national framework, on the one hand they studied walking the important cultural centers of the Muslim scholars of that time, and on the other hand, eagerly taught their knowledge to others”*⁷.

Turkish scholars who lived in the 12th-14th centuries, such as Aminad din at-Tabrizi, Sadullah al-Bardai, Shihabeddin Suhrawardi, Eyn al-Guzzat Miyanechi, Nasreddin Tusi, Shamsaddin as-Samarkandi, Qutbaddin ash-Shirazi, Yusuf ibn Ibrahim al-Ardabili, Gazizadeh, Ulughbey and Ali Gushchu played a leading role in the development of both religious and secular sciences. The scientific heritage of these authors proves once again that in the history of science, regardless of the language in which the works were written, many Turkish thinkers left their mark on history, and their works became the main source for the formation of scientific language, scientific style in Turkic languages.

The level of development of each language is determined by its stable grammar, rich vocabulary, comprehensive stylistic

⁷ Mahmudov, M. R. Ərəbcə yazmış azərbaycanlı şair və ədiblər. (VII-XII əsrlər)/ M.Mahmudov. – Bakı: Şərq-Qərb, – 2006. –s.79

differentiation. The primary factor of literary language is that it has stable phonetic, lexical and grammatical norms. This normalization, unification and standardization not only ensures the systematization of all layers of language, but also plays the role of language self-defense mechanism. The norm, which manifests itself in all spheres of language activity, attracts attention as the main criterion which directing to the historical development of the language system. Issues of reflecting the normative grammar of the Turkic-language scientific style of the 13th-16th centuries have been studied in the subchapter **“Normalization of the scientific style in the Turkic languages in the 13th-16th centuries”**. Language is a system that is evolving with its history and today, and the norm is the manifestation of models formed on the basis of experience gained in the process of its historical development. While the system reflects the dynamics and movement of the language, the norm provides for the fixation of the language on the basis of traditional forms. The system is a functional language, and the norm is a trace of the historical language in the functional language, a historically stabilized part, a system of rules that frames the functional language and does not allow it to move away from the “root”. However, the norm does not slow down the development of functional language, on the contrary, as the part that regulates the development of the norm, it adapts itself to dynamism, mobility and causes a gradual change. As A.Akhundov noted, *“Normative changes in language manifest themselves in different forms. However, all of these are reflected in the forms of the decrease and increase of the existing variants, and the pushing them beyond the boundaries of the literary language and so on. The fact that there are changes in literary norms does not mean that the literary norm does not tend to stabilize and strengthen. In fact, there are always two tendencies in the development of the norm: change and protection”*⁸. It is noted that changes in grammatical norms very rarely occur as a result of long evolution.

⁸ Axundov, A. Ümumi dilçilik/ A. Axundov.– Bakı: Maarif, – 1988. – s.115

At this stage, the normalization of the scientific style is observed in two directions:

1. General normalization of Turkic languages by stage;
2. Normalization of internal scientific style in each language.

General normalization is the main features that distinguishing languages from each other. Intra-linguistic normalization occurs in phonetic, morphological, lexical aspects and is important according to specific stages. *“In general, the norm of literary language and the landscape of functional style (especially the socio-ideological semantics of functional styles) are determined in the context of the current cultural-historical process (and by its substantial influence)”*⁹. Thus, a specific norm of each period is formed, and after a certain period of time, this norm becomes the language landscape of the period itself. For example, in the monuments of the 14th-16th centuries, the replacement of g in the word *degil/degül* in the modern Azerbaijani literary language with y and in Turkish Turkic with ğ is a phonetic norm variability. In the examples, such as *irmek* → *ermek*, *gice* → *gece*, *yir* → *yer*, the substitution *i* → *e*, in the word *fayide* → *fayda* falling *i*, the substitution *e* → *a*, in the words *altun*, *azuk*, *berü*, *dilkü*, *kaygu* the substitution of *u* and *ü* in the last syllable with *ı* and *i* is one of the historically variabilities occurring in phonetic norms. The fact that the suffixes *-egü* and *-ağı* in the words *biregü*, *buzacı*, *bileği* take the form *birey* in modern Turkish language and *buzov*, *bülöv* in modern Azerbaijani shows that there is a norm variability in the suffix. The pronoun *ol* used in Turkish Turkic and Azerbaijani languages in the form of *o*, the personal pronoun *olar* used in the form of *onlar*, the demonstrative pronoun *şol* take the form *şu* in Turkish Turkic and Uzbek, and its archaicization in the Azerbaijani language are linguistic features that reflect the historical changes in the language.

The second chapter of the dissertation **“Directions in the development of scientific style in the Turkic languages in the**

⁹ Cəfərov, N. Q. Azərbaycan türkcəsinin milliləşməsi tarixi/ N. Q.Cəfərov. – Bakı: – Azərbaycan Dövlət Kitab Palatası, – 1995. – s.10

Middle Ages” consists of seven subchapters. The subchapter entitled **“Development of scientific style in Turkic languages in the 13th-16th centuries”** examines the level of development of scientific style in this period, its differentiation within different micro-styles and language features. It is determined that in the Middle Ages, different scientific micro-styles of scientific style in Turkic languages on linguistics, literature, astronomy, medicine, mathematics etc. have been formed. According to the level of development, different divisions are observed within these micro-styles. For example, dictionaries, lexical-grammatical type and grammatical works have been written in the linguistic micro-style. Dictionary-grammar type works act in an intermediate position between the two directions, and in written grammar works the theory, analysis, reference to different authors prevail. Or, in the works of mathematical sciences, tables, various descriptions and methods of their use are given. In addition to works that reflect general knowledge in works on astronomy, the written language of migat works related to prayer times, of zijs where astronomical calculations are given, or “kitabi-usturlab” type works describing and sketching various astronomical devices differs from each other. In chronicles dealing with the rule of individual states or rulers is observed similarities in terms of style in works relating to the history of religion and the lives of the prophets.

One of the most important sources of the scientific style of the period, along with the works written by different authors in various fields of science, is to teach the language, to give definition the words in the works written in fictional style, and etc. dictionaries written for various reasons also played an important role. The first step in the development of linguistics in Turkic languages was taken in the field of lexicography, dictionaries related to various fields were published. In the subchapter entitled **“The role of lexicography in the development of scientific style”** the dictionaries written during this period have been analyzed, regional differences in Turkic lexicography have been studied. As noted, Mahmud Kashgari’s work “Dīwān Lughāt al-Turk”, written on the basis of the rules of Arabic

lexicography, giving definitions of Turkic words, laid the foundation for a new stage in the development of lexicography in the 11th century as the first dictionary. In the 11th century, Qatran Tabrizi wrote the first explanatory dictionary in Persian, after him, Azerbaijani scholars wrote Persian-Turkic dictionaries and Persian grammatical essays. In the 12th century, the dictionary named “Muqaddimatul-adab” written by Abul-Qasim Jarullah Mahmud bin Omar bin Muhammad bin Ahmad az-Zamakhshari al-Kharazmi in the years of 1127-1144, became the first work in the history to reflect the lexical structure of Kharazm Turkic. N. Yuje, who conducts a statistical analysis of the vocabulary of the work, writes that out of 3506 words, 2908 are Turkic and 598 are borrowed words¹⁰.

From the 13th century, a new stage in the history of the development of lexicography has begun. Dictionaries written in Kharazm Turkic, Mamluk Kipchak, Chagatai and Ottoman language environments reflect the features of different Turkic languages. The authors of the work also noted the explanatory words such as “Kipchak”, “Turkmen”, “Oghuz” etc. in front of the words in their dictionaries.

The most famous work of the late 13th and early 14th centuries, known as its author’s name “Ibn Muhanna Dictionary” is “Hilyat al-Insan and Halbat al-Lisan”. Comparing different copies of the work, B. Chobanzadeh came to the conclusion that, *“Since the Istanbul copy is older than other copies, there are more archaic words and word forms here. However, as in all copies, the features of the Azerbaijani Turkic language, taken comparably to other Turkic systematic languages, are clearly evident. Subsequent changes in the language of the copies in parallel with the development of the Azerbaijani Turkic language reinforce this idea”*¹¹

¹⁰Zemahşeri M. Mukaddimetul-edeb Hvarizm türkçesi ile tercümeli Şuşter nüshası/ M.Zemahşeri, yayımlayan. N.Yuce. – Ankara: TDK yayınları, – 2014. – səh.24-25.

¹¹ Çobanzadə, B. V. Seçilmiş əsərləri [6 cildə] / B. V.Çobanzadə. – Bakı: Şərq-Qərb, – c.2. – 2007. – s.141-142.

Fakhraddin ibn-Hindushah Nakhchivani and his son Shamsaddin Muhammad ibn Hindushah Nakhchivani have a special place among the famous Azerbaijani lexicographers who lived in the 13th-14th centuries. Their “As-sihah al-Ajamiyya” and “Sihahul-furs” dictionaries are large-scale works reflecting the structure of the 14th century dictionary of Azerbaijani and Persian languages. In “As-sihah al-Ajamiyya” the Turkic equivalent of 5117 Persian words is given. Examining the dictionary structure of the work, M. Naghisoylu writes: *“There are a number of words that are archaic for both modern Persian and modern Azerbaijani, as well as a number of lexemes that contain the ethnographic landscape of the period. These examples are also important in terms of studying the 14th century Azerbaijani-Turkish prose language, especially its scientific style”*¹².

Prominent thinker, poet and scientist with extensive scientific creativity, Alisher Navoi’s work entitled “Muhakimatul-lughateyn” (Persian-Turkish dictionary) was written in 1499 in order to prove that the eloquence and expressive power of the 15th Chagatai Turkic is not inferior to Persian, and in some cases even superior.

The 15th-16th centuries are the period of the highest development stage of the classical branch of literature in the Turkic languages, as well as the diversification of the scientific style and the formation of various micro-styles (astronomy, medicine, jurisprudence, logic, etc.). “Tohfeyi-Hussam” written in Persian-Turkish, Lutfullah Halimi’s “Lughati-Halimi” (1446-1468), Mehmed ibn Yahyayi Konavi’s “Shadiya” (1484), Lami`i-Chalabi’s “Lughati-Manzuma”, Imamzadeh Vali, Yusuf Imadi’s “Ilmi-lughat”, Shahidi Ibrahim Dede’s “Tohfeyi-Shahidi”, “Nisarul-mulk” (1467-1468), Rustam Mowlavi’s “Tohfatul-ahvan” (1458) and “Vasilatul maqasid ila ahsanul-marasid” (1483), Nematullah Ahmad al-Rumi’s “Lughati-Nematullah”, Hasan al-Qarahisari’s “Shamilul-lughet” (1504) and other dictionaries contain not only examples of fictional style of the

¹² Nağisoylu, M.Z. İlkin Azərbaycan- türk sözlükləri haqqında // – Tehran: R.Mövləvi. Vəsılətül - Məqasid ila Əhsənül mərasid.– 2018. – s.14.

period, but also the vocabulary of works related to scientific style. Different dictionaries written in the 13th-16th centuries show that they are distinguished from each other for the purpose of compiling such works in different regions. While Persian-Turkish dictionaries were written in Anatolia, Arabic-Persian-Turkish and Turkish-Arabic dictionaries were compiled in Egypt. The rules of compiling dictionaries also differ by centuries. This means that lexicography has been widely diversified and developed, both over the centuries and by regions. Unlike lexicography, the tradition of writing linguistic works has gradually developed. This trend, which began with the writing of lexical and grammatical works, entered a phase of stagnation after the work of Bergamali Gadri and A. Navoi's "Muhakimatul-lughateyn". These successive stages in the development of linguistics have been studied in the subchapter entitled "Development of the scientific style on linguistics in the 13th-16th centuries Turkic languages". In particular, the linguistic features of the Turks living in Anatolia, the Near East and the Middle East have been analyzed in the linguistic works of the period since the 13th century. One of such works is "Ad-durratul-mudiyya, fil-lugat`it-turkiyya"¹³. Although it was written with the intention of teaching Arabic, the work "Ad-durratul-mudiyya, fil-lugatit-turkiyya" contains grammatical information and sentence examples about the categories of plural, possession, negation, tense, infinitive, adjective, adverb, pronouns available in Turkic languages, extensive information on the grammar of the Turkic languages is given. There are various manuscripts under this name and different opinions about them in history. One of the works of the same name was written in the Kipchak environment and the only copy is in Florence. The other was written by Ishaq bin Murad in Anatolia. It should be noted that both works are thematic dictionaries and are divided into sections, babs and chapters. The Kipchak dictionary has twenty-four sections, and Ishaq bin Murad's work has nine sections.

¹³ İshak bin Murad. Ed-dürretul- mudiyye fil- lugatit- türkiyye/ İshak bin Murad, hazırlayan. B.Atsız Gökdağ, S.Türkmen.– Ankara: Akçağ, – 2004. – 182 s.

One of the interesting facts observed in the Kipchak version is that words with the letter “ç” are written with the letter “ş”: neçün-neşün (s.47), açmadum-aşmadum (s.51), gerçek- kerşek (s.51), and içme- ant işme (s.52), haçan- haşan kelmiş sen (s.55)¹⁴. This sound transition occurs both at the beginning of the word (şağır (çağır), şakal (çakal), şakmak (çakmak), şırak (çırak), şerü baş (çeru başı), etc.), between the words (axşa, aşmadum (açmadım), balşık etc.) occurs at the end of the word (ağaş, iş (iç), hiş (hiç)). In general, the transition ç-ş is one of the main phonetic features of distinction between the Oghuz and Kipchak languages. In the monuments, spelling of some words with ش others with چ, pronounced with “ç” in Oguz is not a feature of the influence of another language, but a phonetic feature of the language itself.

Another phonetic difference in the work is that – at the beginning of the word the letters u, ü, o, ö are written with او , not with و . R. Toparlı read these words with the letter “v”. For example, *on-van* (DMq.s.38), *Sən vaynar sən* (Oynarsın) (DMq.s.48); *Sən volturup laf vurur sən*. (Oturub söz atırsan) (DMq. P.51); It should be noted that this feature is not due to a secretary’s mistake or any other reason. Because on the same page, the word “on doqquz” is written in the form of -van taquz (وان طاقوز) with و, and “otuz” is written with اُ and اُطوز. Research based on the text material of both works shows that Ishaq bin Murad, using the Kipchak dictionary, prepared a treatise based on the linguistic features of Anatolian Turkic.

Among the medieval Turkic grammar works of the Middle Ages, Bergamali Qadri’s work “Muyassiratul-Ulum” written in 1530 was the first book written belonging to Ottoman Turkish language. Commenting on the parts of speech in the “Faslun fi taksimi’l-kalimati” section of the work, the author then gave a classification of the change of words by different categories.. Auxiliary parts of speech are analyzed in the section “faslun fi’l-hurūf” in accordance with traditional Arabic grammar. Here, B. Qadri gave the case suffixes of

¹⁴ Toparlı, R. Ed-durretul-mudiyye, fil-lugatit-turkiye/ R.Toparlı. – Ankara: TDK yayınları, – 2003. – 126 s.

noun -da/de, -dan/den as postposition. This work by B. Qadri, as the first Turkic grammar is an invaluable source for studying the linguistic features of the 16th century Ottoman language.

The linguistic features and terminological lexicon of medical works of the period are analyzed in the subchapter entitled **“Development of scientific style related to medicine in Turkic languages in the 13th-16th centuries”**. It is no coincidence that medical works are the majority of among the first scientific works written in Turkic. It is clarified that in the early days, medical works were translations of Ibn Sina and others’ writings in other languages, as well as extended commentaries. Geredeli Ishaq bin Murad’s “Adviyayi-Mufrada” was the first work in this field written in 1389-1390¹⁵. At the end of the work, the Persian-Turkish equivalent of 249 terms is given. One of the 14th century works on medicine is Hakim Barakat’s “Tohfeyi-Mubarizi”. The author first prepared the work in Arabic under the name “Lubabu`n-nuhāb”, then translated it into Persian and Turkish.

In the 15th century, the Azerbaijani scientist and thinker Mahmud Shirvani, along with such works as “Ilyasiyya”, “Sultaniye”, “Jovharname”, “Tohfeyi-Muradi”, wrote the widest spectacular work of his period, “Murshid” that dedicated to eye diseases. The first book of “Murshid”, consisting of three books, consists of an introduction, 6 babs and 27 chapters, the second book consists of 17 babs and 110 chapters, and the third book consists of 3 babs and 18 chapters.

During the centuries conducting of research on medicine have led to the formation of the vocabulary of this science, the emergence of stable medical terminology. For example, in the 14th century medical books, 160 terms related to diseases were used in the “Khulasa”, and 120 eye diseases were described in the work “Murshid” belonging to the 15th century. Along the change of terms and expressions over the centuries, the acquisition of new meanings

¹⁵ İshak bin Murad. Edviye-i-Mufrede/ İshak bin Murad, hazırlayan: M.Canpolat, Z.Önler. – Ankara: TDK yayınları, – 2016. – 346 s.

or, being expressed by other words, the development of this field of science, is associated with the fact that the notions of the Turkic peoples in different regions are expressed in different words. Thus, in the monuments of the 14th-16th centuries, only terms about wounds with boil and their types were developed. Əsərdə müəllif ərəb mənşəli *dubeyle* (iltihablı şiş, çiban), *xıyarek* (qasıq bəzlərinin iltihablanması ilə meydana çıxan bir çiban), *taxliyye* (bədəndə çıxan iltihablı çiban və cizvələr), *hanāzīr* və onun türkçə qarşılığı olan *toñuz başı* kimi terminlərlə çibanın müxtəlif növlərini vermişdir. The term “quş quyruğu” is mentioned in one of the types of boils in the “Kitabul-bulghat” and Abu Hayya’s “Kitabul-idrak” dictionaries. In his work, Dr. Barakat mentions the name of the disease, which manifests itself in the form of boils and tumors, and connects the name of the disease with the city of Balkh. In the work, the author gave various types of boils in terms of Arabic origin, such as *dubeyle* (inflamed tumor, boil), *xıyarek* (a boil caused by inflammation of the groin glands), *taxliyye* (inflamed boil and scratches on the body), *hanāzīr* and its Turkish equivalent *toñuz başı*. Akhi Chalabi’s translation named “Tarjamatul-mujaz fit-tibb” uses borrowed terms such as *busur*, *bəsərə*, *maşera*, *xanazır*, *sərətən* in relating to tumors¹⁶.

Among the plant names in the works of this period, words of Arabic, Persian and Greek origin are also found. For example, in “Adviyyayi- mufrada” the plant oleander is named in three languages: ağ ağacı, dıflī, xarzehre. “Ağ ağacı aña fārsice xarzehre ve arabca dıflī derler, anı döğüp yāsemīn yağına qatarlar, daxı saça sakala dürteler dökülmekde saklaya”¹⁷. Parallels such as *Ayt* (Turkic origin - *pencegüşt* (Persian origin), *bābādyā* (Persian origin) - *bābunec* (Arabic origin), *baldırı qara* (Turkic origin) - *persiyāvşan* (Persian origin), *beg bōrki- şahtere* (Persian origin), *uruz oti* (Turkic origin) - *büstānefrüz*

¹⁶ Aydın, Ç. Ahî Çelebi.Tercemetü'l-mûcez fit-tibb(giriş, inceleme, söz dizimi, metin [1b-70a varakları arası] -dizinler): /yüksek lisans tezi/- Bolu, 2016. – 655 s.

¹⁷ İshak bin Murad. Edviye-i-Mufrede/ İshak bin Murad, hazırlayan: M.Canpolat, Z.Önler. – Ankara: TDK yayınları, – 2016. – s. 21

(Persian origin), *çetlemük* (Turkic origin) - *butm* (Arabic origin), *oğ-lan aşu* (Turkic origin) - *cāvşīr* (Arabic origin)- *gāvşīr* (Persian origin) are abundant in the 14th-15th centuries medical books. Terms of Arabic and Persian origin, which are parallel to national terms, are closely related to the long-term universality of scientific language in the Middle Ages.

The development of scientific style's branch related to mathematics is analyzed in the subchapter entitled **“Development of scientific style related to mathematics in Turkic languages in the 13th-16th centuries”**. It is noted that the vocabulary of scientific works of the period on mathematics has wide spectrum. In these works, the terms expressing mathematical notions can be grouped in terms of source as follows: terms borrowed from Arabic and Persian, hybrid terms, national terms. The Arabic borrowings used in this field are more numerous than the Persian borrowings. It should be noted that it is also observed that the terms consisting of some words and elements prevail. For example, numerous terms have been formed, such as, by the word “*ədəd*” *ədədi-baki* (remainder, number), *ədədi-mütədaxilə* (integers), by the particle “*ba*” *ba-istilah*, *ba-keylecatın*, *ba-küsür*; *ərəb mənşəli* “*bəədə*” hissəcikli “*bəədə-z-zərb* (after multiplication), *bəədət-təsnif* (after dividing in half); by the particle “*bi*” “*bi-hədd* (too, many), *bi-hesab*; by the particle “*bila*” *bila-zərbın* (without multiplying) *bila-etibar* (valueless); by the word “*zərb*” *zərbi-muhazət* (front to front multiplication), *zərbi-musəlləs* (triangular multiplication); by the word “*mənzil*” *mənzili-dehum*, *mənzili-həştom*, *mənzili-həftom*.

Hybrid mathematical terms are formed by combining Turkic, Arabic and Persian words. For example, such expressions as “*add ider ol*”, “*add itmelü ol*” from Arabic origin verb add-to count; from the word *cəm* “*cəm eylə*”, “*cəm ider ol*”, “*cümlə ider olmak*”, “*cümlə ol*” (to be complete); from the word “*zərb*” *zərb eylə* (*vur*), *zərb edər ol*, *zərb olın*, *zərb olmalu ol*, from the word *hasil* *hasil it*, *hasil ol*; from the word *istixrac* *istixrac eylə*, *istixrac edə bilmək*, *istixrac it*, *istixrac*

ol, istixrac olun” have been formed. In such combinations, the verbs *it, ol, et, olun, eylə* are used as a part.

In medieval works, numbers and words expressing notions related to numbers are of Turkic origin. Mathematical terms of Turkic origin include the following: *bir, alım, altıncı, altmış, altmışar, beş/biş, beşər/bişər, biñ, biñ kəz biñ, biñ kəz yüz biñ, bir buçuk, birər, birlər, on, on biñ, on biñ kez yüz biñlər (billions), on kəz yüz biñlər (thousands), on tokuzar* etc.

The works written during this period reflect the expression of mathematical thinking in the Turkic languages.

The history of development of music theory in Turkic languages and its lexicon are studied in the subchapter of the second chapter **“Formation of music scientific language in Turkic languages in 13th-16th centuries”**. The history of music and related terms to it in Turkic languages is ancient. However, since the 15th century, music-related works have become more widespread. F.Shirvani, Shukrullah Ahmadoglu, Ladikli Mehmed Chalabi, Kirshahirli Yusif were famous musicologists of the time. It should be noted that during this period, music as a science was included in the list of mathematical sciences according to Farabi’s division. Writing books on music theory in Turkic languages has given impetus to the development of music science and the enrichment of the vocabulary of the language through new notions. In general, we can group the musical terms given in medieval works on music as follows:

1. Terms used related to theory of music: These include music genres, note division, and the concepts of *bud, iqa, tənəffür* and etc. notions. In the musical works of the period, the origin and meaning, the explanation of the notions that they expressed of musical terms such as *izafət, tarh, fasl, dövr, dairə, şəd, muğam, pərdə, guşə, iqa, vətəd, fasilə, fasilə-i suğra, fasilə-i kubra, tayy, tadif* was reflected.

2. Terms related to musical instruments: Musical instruments are divided into wind, string, and leather instruments, which are played during religious and military ceremonies and palace entertainments. In the 15th-16th centuries, along with historical musical instruments such

as *davul*, *qopuz*, *boru*, *tütək* musical instruments such as *çağana*, *çalpare*, *erganun*, *kös*, *dünbelek* are mentioned. *Daf*, *davul*, *dairə*, *dünbələk*, *kös* are instruments that similar to each other covered with leather. Musical instruments such as *çartar*, *nüzhə*, *şəşxana*, *şəştar* were made by musicians in the Middle Ages.

In the Middle Ages, the science of astronomy developed rapidly. During this period, a number of scientific works in this field were written in Turkic languages. These works and the developmental features of this micro-branch of scientific style are studied in the subchapter entitled **“Formation of scientific style related to medieval astronomy”**. In the Middle Ages, astronomy had a wide range of branches. From this point of view, the content and writing style of the written works are also different from each other. These works reflected both astronomical calculations and the procedure for making some astronomical devices. *Musattar*, *mujanna*, *mukantara*, *jeybul-gaib*, *mujayyab*, *jeybul-evtar*, *serrajiya*, *usturlab*, *rub*, *shaxs / shaxis* (gnomon), *mabsuta*, *munharifa* etc. astronomical instruments were used in the observatories and temples of the time.

Scientific information related to astronomy is also reflected in the Orkhon-Yenisei monuments. The Turks, who expressed the eastern and western directions in their speech as “*kün tuğsıki*”, “*kün batsıgi*” in the form of sunrise and sunset, called the universe by the term “*evren*” derived from the word “*evürmək*”. The root of the word is in the form of “*ebir*” (to turn) in Orkhon monuments¹⁸. The constellations have historically been called “*ükək*”¹⁹. M. Kashgari did not refer to the word “*ükək*” as a celestial body, but noted the meaning of the tower on the walls of the fortress. In “*Divan*”, this word mentioning its another meaning is given as a coffin, a chest²⁰. In our opinion, the root of the word is the verb “*üg*”. M. Kashgari used this verb in the form of “*ol yarmak ügdi*”- he crumpled the money.

¹⁸ Tekin, T. *Orhon Yazıtları/ T.Tekin*. – Ankara: TDK yayınları, – 2008. – s.58

¹⁹ Hacib, Y.H. *Kutadgu Bilig/ Y.H.Hacib*. – İstanbul: Kabalci yayınevi, – 2008. – s.138

²⁰ Kaşgarlı, M. *Divanu-luğat-it-türk/ M.Kaşgarlı*, hazırlayan: A.B Ercilasun, Z.Akkoyunlu. –Ankara: TDK yayınları, – 2014. – s.134

“Ügmək” means to crumple, to knot, to turn into a ball. The word “ügək” or “ükək” means a ball, a pile. The combination of the stars in the sky as a ball is also called “ükək”. We can note that the expression “qala bürcləri” (castle towers) is derived from this meaning. The word “ükək” is used in Rabguzi’s work “Qisasul-Anbiya” and in Ibn Muhanna’s dictionary “Hilat al-insan, halbat al-lisan” in the meaning of a tower²¹. In the of the Quran belonging to the 12th-13th centuries, the word “ükür” was used in the meaning of a group, a bunch and in our opinion, this word has the same root with the word “ükək”. The word “üküş” from the same root is used in the interpretation (Tafsir) to mean “many”, and the word “üküşləşmək” is used in the interpretation (Tafsir) to mean “to increase”²². In Heratli Tali Imani’s work “Badai al-Lughat”, the word “öküşmək” (اوکماک) means “to gather”, and the word “ökülğan” (اوکولگان) means “gathered”²³. The word “ükək” was not used in later scientific works, as in the works of the 14th-16th centuries the word “ükək” was replaced by the word “bürc”.

The word “könək” is the name of a water pot made of leather in the 11th century Turks. In M. Kashgari’s work, only the leather pot meaning of the word has reflected²⁴. In Ibn Muhanna’s dictionary too, “könek” is mentioned as a name of zodiac sign²⁵. In Rabguzi’s work “Qisas al-Anbiya”, the name of this zodiac sign is in the form of “koğa”. And, in “Badai al-Lughat”, the word in the form of “qobqa” (قوبقا) means both a water pot and the name of a zodiac sign. In Alisher Navoi’s work “Leyli and Majnun” the name of this zodiac sign is in the form of *Qobğa*. This is mentioned in the dictionary of Niyazi who

²¹ İbn Muhenna lugati/ hazırlayan: A. Battal. – Ankara: TDK yayınları, – 1997. – 105 s. – s.81

²² Боровков, А.К. Лексика среднеазиатского тefsira XII-XIII вв/ А.Боровков. – Москва: Изд-во Восточной литературы. – 1963. – 338 с.

²³ Боровков, А.К. Бадаи-ал лугат. Словарь Тали Имани Гератского/ А.Боровков. – Москва: Изд.-во Восточной литературы. – 1961. – с.101.

²⁴ Kaşgarlı, M. Divanü-luğat-it-türk/ M.Kaşgarlı, hazırlayan: A.B Ercilasun, Z.Akkoyunlu. –Ankara: TDK yayınları, – 2014. – s.169

²⁵ İbn Muhenna lugati. Hazırlayan: Abdullah Battal, Ankara 1997,s.46

lived in the 16th: “*qobğa- pınardan su çıkaracak kovaya derler ki, “Mecnun u Leyli” de Miracda burcı- delvi murad ediniüp yazarlar*”²⁶. However, belonging to 14th century the work “Ajaibi-Makhlûqat” which written in the Ottoman language environment, the name of this zodiac sign was used as “delv”. “*Delv: Zuhal’üñ evidür*”²⁷. “*Delvdür ki aña sākibü’l-māi vü dāli dañi dërler*”²⁸.

In addition to the names of the zodiac signs in the Turkic languages, it’s observed giving different names in the naming of the planets. The planet Jupiter is called in a different way from each other Oñay, Garagush and Erentuz in two works belonging to the 11th century Garakhani Turkic language, and in the 14th century the word “Müşteri” of Arabic origin replaced them. While the planet Mercury is called Arzutilek in “Qutadghu Bilig”, it’s called Utarid in the 14th-16th centuries monuments “Ajaibi Makhlûqat”, “Khulasatul-Hey’e” and others. The expression “*kalemi -utaridi-rakam*” used in Ottoman works means “pen that writes like Utarid”. Saturn, known as Sekentir in the 11th century, was called Zuhal yıldızı in the 14th and 16th centuries.

Apparently, some ancient astronomical terms of Turkic origin have been forgotten over time and have been replaced by either borrowings from Arabic and Persian, or other words belonging to the Turkic languages.

Chapter III of the dissertation is entitled “**Lexical features of the scientific style in the 13th-16th centuries Turkic languages**”. In the first subchapter of this chapter, entitled “**Sources of the lexicon of scientific style in the 13th-16th centuries Turkic languages**”, the sources of the lexicon of scientific style are classified according to the main sources. In the research, this lexicon is divided into national and borrowed terms by origin. The predominance of terms of Arabic and

²⁶ Niyazi. El- luğatu- Nevaiyye vel- istiḥadatu-l- cağatiyye/ Niyazi. hazırlayan: M. Kaçalın. – Ankara: TDK yayınları, – 2011. – 1300 s.

²⁷ Göl, O. Ali Bin Abdurrahman. Acaibul- mahlukat: /yüksek lisans tezi / – Sakarya, 2008. – s.57

²⁸ Cengiz, M. Hulasatul Heye:/ yüksek lisans tezi/ – Ankara, 2010. – s.77

Persian origin in the ancient Turkic lexical layer in various fields of science, especially in medicine and natural sciences, and in religious and humanitarian sciences has been determined. In the 13th-16th centuries the terminological lexicon of scientific works was formed on the basis of various sources. Thus, in scientific works of the period, along with terms of **Turkic** origin such as *yulduz*, *tumağu*, *tamar*, *qoşuq*, *ad*, *ağac*, *bulut*, *qırlağuc*, *qırağu*, *bağa yarpağı*, *burçaq*, *dağ-lağu*, *öykən*, *sayruluk*, *ozmaq*, **Arabic** origin such as *batnul- hut* (page 28 of the month), *benatun-naş* (name of star), *cibal* (mountains), *itri-ful*, *hudad*, *dəvali*, *şatrul-ğıbb*, *sui-mizac*, **Persian** origin such as *fələn-cəmüşk*, *hunni- siyavuşan* (medicine made from a type of tree), *ladan* (medicinal ointment made from a healing herb), *mum- ruğan*, *reg-bənd* (bandage, tampon), **Greek** origin such as *fuluniya*, *asarun*, *ay-ric*, *malixulya*, *saqmuniya*, *masariqa*, *zuseriyya*, *ziyanitis*, *baselik*, *qıstındus*, hybrid language units such as *masariqa tamarı*, *toxməkan yaprağının suyu* (f+t), *dəvali tamarı* (ə+t), *namazboz* (f+t), *tendüriüstlik* (f+t), *hokka süñügi* (ə+t) were used. In terms of this, the terminological lexicon has been divided into three parts according to their origin. National terms, borrowed terms, hybrid terms have been investigated with rich linguistic facts.

The lexical structure of the scientific style in the 13th-16th centuries is analyzed in the subchapter of the III chapter called “**National lexical structure of the scientific style**”. It is noted that national terms are the core of the scientific style in the Turkic languages, and their percentage of use is different according to scientific fields. Native terminology as a part of the people’s language is a special language layer with deep roots, having comprehensive usability and forming on the basis of different word-formation constructions. When looking through historical sources, it is clear that native terminology, in fact, has ethnocultural character as an example of a nation’s primary scientific thinking. Thus, ethno-cultural linguistic units, which we can call prototerms, become terms in the later stages as a result of the development of certain professions and arts, their integration into some field of science and art. For example, the word “göz” (eye) is used in the terms as *göz ağrısı*, *göz pınarı*, *ak*

düşmüş göz, göz canı, göz dönüğü, göz bigarı in the medical monuments of the 13th-16th centuries. Relating to the word “göz” the names of diseases such as *seder* (blackout), *sebel* (blurry and hazy vision), *tavuk karağusu/ tavuk karağısı*, *verdinec* are common in medical works of the time. However, there are some terms that are used in the same way both in the 11th-12th centuries monuments and in the 13th-16th scientific works: *demregü*, *dumağu/ dumağı/ tumağı*, *baş bert*, *içegü*, *eyegü*, *öyken*, *sünük*, *sınu*, *sayrulık*, *dağlağı*, *yaqu* and so on.

There are terms and notions of Turkic origin used in dictionaries and scientific works of the period, which later left the active lexicon of the language. For example, star names such as Temür Qazıq, Yitiken, İki bozat, Çolban, Yağız Sığın, Aruqtaq, Aq aygır have been used in Kipchak dictionaries “Kitabi-bulghat-mushtag”, “Tohfetüz-zakiyye”, “Durratul-mudiyye” and so on. However, in the language environment Ottoman Turkic and Chagatai, these names have been replaced by Arabic equivalents. In general, Kipchak dictionaries are one of the most important sources reflecting the specific, forgotten vocabulary for the next period. For example, given in these dictionaries most of the terms such as *tönartkə* (tree trunk), *özən* (the root of the tree, the trunk of the tree), *yəgən* (reed), *yüldirək*, *yağız* (copper), *qara yarmuq* (copper coin), *yaz* (yellow copper), *özən/say* (river), *çarlaq*, *otuv* (island), *borğu*, *tuç börğu*, *kövriük*, *qırtıq*, *tabil*, *il* (peace), *çalış* (close combat), *sançış* (war), *qonuş* (looting after the war) reflected only in Kipchak works after “Dīwān Lughāt al-Turk”.

Fields where the words of Turkic origin are least used are fields of mathematics, literature and music. In general, when looking at the vocabulary of works written in the 13th-16th centuries Turkic scientific style, quite a number of national terms have been used in the terminological base. The tendency of use these terms differs sharply both according to the stage at which the work has been written and to the field of science to which the work belongs. Although the tendency to find equivalent to the terms was more active in the 13th-14th centuries, it's observed that in the 15th-16th centuries the national terms used in Turkic languages have replaced by borrowed terms.

In the subchapter entitled **“Word formation in a lexical-semantic way”** the semantic development of words as a result of historical development in language, the process of word formation by lexical-semantic way is analyzed with rich linguistic facts. It’s noted that naming a terminological language unit, it is especially important to take into account semantic aspect of the word. *“Thus, the main aspect, researchers observe in terms is that the theoretical understanding of scientific and technical facts finding its reflection. As a result of this, with the terminological naming there appears a close connection between the notions becoming a term of this or another field of knowledge”*²⁹. For example, the root of the term “ısıtma” (fever) is the verb ısıtmaq (to heat) used in the work 14th century monument “Khulase”. Fever, which is the main symptom of various diseases, is called just so in the Turkic language of the time. Relating to this word, terms such as “ısıtma nevbeti”, “göyündürücü ısıtma”, “ğıbb ısıtması”, “balğam ısıtması”, “rıb ısıtması”, “ısıtma ditremegi” have also been used. In all these terms, being a symptom of a disease the fact of heating is taken as the main feature in naming. While explaining “göyündürücü ısıtma” and “balğam ısıtması”, Dr. Barakat notes the different symptoms and writes that they are named in Arabic with two separate terms - muhrıqa and dayır³⁰. However, in the naming of terms in the Turkic language, a more important feature of the notion was taken into account, and auxiliary features were reflected in the term as a distinguishing sign of diseases. In the formation of scientific terms, semantic changes in common words have been one of the main methods of term formation. For example, although the word “yar” was used in ancient Turkic in the meaning of “irin, çirk” (pus, dirt) in Old Anatolian Turkic it was also used both as a meaning of a geographical term “uçurum” (precipice), and “tüpürcək” (saliva). Both meanings are found in the 16th century scientific works. *“Amma balğam nişanları bəñiz ağılığı ağızdan yar*

²⁹ Sadıqova, S.A. Azərbaycan dilinin terminologiyası/ S.A.Sadıqova. – Bakı: Elm, – 2011. – s.21

³⁰ Bereket, H. Hulasa/ H. Bereket, hazırlayan. B. Erdağı Doğuer. – Ankara: 2016. – 623 s.

çoq aqmaq və çoq uyqu” (27a.7)³¹; “*Dərya kənarında bir bütük qaladır gün doğusu canibində bir yüksək yarıñ altına vaqi olmuşdur*” (195 a 12)³². Piri Reis used the word *yar* in the meaning of “qaya” (rock): “*Ol burunun yanında bir aq yar var. Ol yarıñ üstündə bir burç var*”³³. The naming of scientific notions mainly as semantic derivatives of common words has led to the use of the same word in different meanings in works belonging to different centuries. In fact, semantic differentiation is the distinction of shade which arises in meaning according to the situation. This distinction is reflected in the form of semantic narrowing or expansion. In the 13th-16th centuries Turkic languages, the scientific style is distinguished by the richness of word formation in the lexical-semantic way in the formation of terms in the fields of linguistics, literature, music, astronomy, geography, medicine.

In the subchapter entitled “**Word formation in a morphological way**”, word formation is analyzed by morphological method, which is the most productive means of word formation in Turkic languages at that time. One of the ways to form notions related to the development of scientific language in the 13th-16th centuries Turkic languages is the formation of new words by adding suffixes to words. In scientific works, the suffixes that appear in the formation of terms are grouped as follows: suffixes that forming nouns from nouns, suffixes that forming nouns from verbs.

In the 13th-16th centuries works belonging to the scientific style, many names of professions forming by the suffix -ç¹ have been used. For example, *bazarcı, satıcı, halvacı, tegirmenci, yetci (butcher), ötmekci, taşçı, demürçi, furuncı, eyerci (saddler), kılıççı, kirişçi, okcı, yaycı, kalkancı, közgüci, qayışçı, bardaqçı*, etc. In the 15th century Chagatai Turkic, two functions of the suffix -ç₁, -ç₂ attract attention: 1.

³¹ Bereket, H. Tuhfei- Mübarizi/ H. Bereket, hazırlayan. B. Erdağı Doğuer. – Ankara: TDK yayınları, – 2013. – 486 s.

³² Türker, Ç. Muvakkit Mustafa ve Tuhfetuz-zaman:/doktora tezi/. – Çanakkale, 2016, – 728 s.

³³ Piri Reis. Kitabı- Bahriye / Piri Reis, editör: Ertuğrul Zekai Ökte. – Ankara: – Türkiye Kültür ve Turizm Bakanlığı yayınları, – 1988. – s.1551.

It forms words denoting position. 2. It forms words denoting profession. In Chagatai Turkic, the words forming by this suffix such as *arbağçı* (magician), *çağğunçı* (thief), *kimeçi* (sailor), *körümçi* (astrologer), *taqaçı* (farrier), *tapuğçı*, *kavğunçı*, etc attract attention with their activity.

The suffix **-vul** used in Chagatai Turkic came from Mongolian. Words such as *hirevül*, *aravul*, *çağdavul*, *yangavul*, *sözevül*, *tapavul*, *kitpevül*, *yasavul*, *bökevül*, *şığavul*, *daqavul* have been formed in Chagatai Turkic with this noun-forming suffix from a noun. The most common suffix that forms nouns from verbs in Turkic languages is **-ma(q)**, **-mә(k)**. In the monuments of the time, words with these suffixes such as *göyündürmә*, *burma* (catapult), *çalma* (bandage), *qıyma*, *yarma*, *sağıslama*, *sürmә*, *dikmә*, *tölmә* (to pay the debt), *yaltrımağ* (lightning), *yaşmaq* have been used. In the scientific works of the time, new words have also been formed through the suffixes **-ıcı/-ici** (*kaşandurici*, *aluçı*, *ırlayıcı*, *kütüçi* (shepherd), *tögüci*); **-man** (*talışman*, *azman*, *tegirmen*, *çekmen*), **-t** (*büget* (water dam), *qurut*, *keçüt*, *yoğurt*), **-daş** (*boydaş*, *tendeş*), **-duruq** (*burunduruq*, *sakalduruq*, *ağızduruq*), **-esi** (*dürtesi*, *içesi*). Some of these words have completely lost their activity in modern Turkic languages, have become archaic, or have undergone certain changes.

Since works written in a scientific style are the expression of a complex way of thinking in writing and speech, a certain part of the words expressing notions are compound linguistic units. Linguistic features of such terminological units are studied in the subchapter entitled **“Word formation in a syntactic way”**. When looking at the monuments of the 13th-14th centuries, syntactic word formation has been used in a slightly different way than in the previous stages. If up to this stage, it's mainly observed the combination of words of Turkic origin, starting from the end of the 12th century, at the same time, compound combinations with borrowed construction attract attention in the monuments. In terms of this, the formation of terms in the form of compound words and word-combinations are common in the scientific style in the 13th-16th centuries. *“This was primarily due to the fact that at the initial stage of the formation of scientific*

terminology, the formation of terms by other methods was not fully systematized. In particular, the slow systematization of the morphological method (a method that has a main position in the terminology of modern sciences) has played a key role in directing the center of gravity to the syntactic method for term formation”³⁴. The terms formed by a syntactic way in the scientific works of the time can be divided into several groups:

1. Terms in the form of word-combination. The process of combining words in Turkic languages is situational or permanent. The fact that the parts of such situational combinations together gain lexical stability by expressing a new notion changes their essence, and they become stable lexical combinations. The transformation of words into stable lexical combinations in Turkic languages manifests itself in two aspects: phraseological combinations and terminological combinations. Language units in the form of terminological combinations are active in the examples of 13th-16th centuries Turkic-language scientific style. For example: *atəş parəsi* (skin disease manifesting itself in the form of inflamed boils), *dağlağı dəmiri* (medical instrument), *sıtma ditremegi*, *sıtma nevbeti*, *tavuk karağusu*, *toñuz başı* (type of boil), *oñurğa iligi*, *qan qurşı*, *qan uyuşmağı*, *incik kemiği*, *göz kapağı* and so on. Although such combinations are structurally similar to syntactic combinations, they are distinguished in terms of their usage as lexical compounds, expressing a single notion. For example, samples using in the work “*Ad-durratul mudiyya fil lughatir-turkiyye*” being 14th century Kipchak language, such as *temür kömlek* (armor), *qara yarmuq* (copper coin), *geyik sığır* (wild cow), *keşi münüzü* (plant), *sarı quş* (owl), *şerü baş* (commander), *yir qanat* (bat), it is possible to observe the internal semantic unity between the parts. In each of the examples, two words have combined to express a new notion.

In general, terms in the form of word-combinations used in sources, written in the Turkic languages in the 13th-16th centuries can

³⁴ Adilov, V. Z. XIX əsr Azərbaycan ədəbi dilinin elmi üslubu/ V. Z. Adilov. – Bakı: Nurlan, – 2002. –s. 35

be divided into the following groups: The first type of attributive word combinations. For example: “*Arabca ana cemrə derlər, qızıl yeldür sarılığ*ı dəxi olur”. (25a)³⁵; “*Aq zəc (dəmir sulfat) ki dadında biraz ekşilik vardır*” (P18a.3); The second type of attributive word combinations. For example, “*Diş ağrısına bunlar yarar ebem gömeci, ilğun yemişi, at südi, beg börki...*” (41 a.5). Or, “ağu ağacı” is the name of the oleander plant in 14th century medical books: “*Ağ*u ağacı aña *farsicə xarzəhrə və ərəbcə difli derlər*” (6b.2)³⁶.

2. *Izafat* combinations. In the scientific works of the 13th-16th centuries, *izafat* combinations are active. This trend is particularly strong in the exact sciences. For example, *atveli-əyyam* (the longest day), *bəhri-məscur* (the sea that is supposed to be in the sky), *daireyi-hindiyə* (sundial), *xətti-nisfi-nahar* (meridian), *Netabin-nəqş* (name of the star) etc. *Izafats* used in the monuments of the period have been grouped in two ways:

1. adjectival *izafat* constructions: *unnabı-cürcani*, *nemeki-enderani*, *ənbəri-xam*, *aqsayı-məşriq*, *aqsayı-məğrib*, *zuhveyi-kübra*, *bədiri-istiqlal*, *nəsxı-əsgər* (Marrikh), *nəsgı-ək*bər (Zuhal) etc.

2. substantive *izafat* constructions: *sufuful-harnup*, *sufuful-buzur*, *cəvərişi-kündür*, *abdus-səlam*, *bəzril-basal*, *bəzril-cırcır*, *dəryayi-mühit*, *biladi-Rus* etc.

When looking at the general structure of works, word combinations and constructions in the form of syntactic combinations prevail.

In the subchapter “**Borrowed terms in the 13th-16th centuries Turkic languages**” borrowed terms in scientific style, their origin and lexical-semantic features are determined. It is noted that within the framework of the scientific universality of the Middle Ages, the abundance of borrowings in Eastern languages attracts attention. Starting from the first Turkic-language works, Arabic and Persian borrowings, and at some points words of Greek and Latin, Indian and

³⁵ Bereket, H. Tuhfei- Mübarizi/ H. Bereket, hazırlayan. B. Erdağı Doğuer. – Ankara: TDK yayınları, – 2013. – 486 s.

³⁶ İshak bin Murad. Edviye-i-Mufrede/ İshak bin Murad, hazırlayan: M.Canpolat, Z.Önler. – Ankara: TDK yayınları, – 2016. – 346 s.

a small amount of Chinese origin have been used. In particular, terms of izafat constructions have been used widely. For example, some izafat terms *relating to mathematics* such as ədədi-küsür, xaneyi-‘aşeratı-miatı-uluf (system of billions), ədədi- səhih, ədədi- zayid, adla’i cəm, əhvali- cəm, cəmi- küsurı ma’al-küsür, cümləyi-kübra (minuend), cümləyi-suğra (subtrahend), *relating to botany* darı-fulful, lisanul-həməl (plantain), cevzi- buya, huzazı- məkki, müşki taraması, *relating to medicine* reg-bənd (bandage used to prevent bleeding), zatur-riyə (pneumonia), sufulı-safra (a body with a lot of bile), zulqul-məad (stomach disease), zatül- cənb (inflammation of the lung membrane), *relating to literature* bəhri-münsərih, asləmi-musabbağ, arizu amik, beytul-qəzəl, dairəyi-müctəlibə, beyti-mərhun and so on.

It’s determined that the active statistics of borrowings that are available in the scientific style samples are also different for centuries. The vocabulary of “Tohfeyi-Mubarizi”, one of the first medical works of the 14th century, consists of 2045 words. 575 of these words belong to Arabic, 158 to Persian and 26 to Greek. This shows that there is 37% of borrowings in the vocabulary. Only 57 words are borrowings out of 736 words used in the work “Ad-durratul-mudiyya fil-lughatit-turkiyya” written by Ishak bin Murad in the 14th century. If looking at the vocabulary of the 15th century physician-scientist Mahmud Shirvani’s book written based on Baghdadi’s “Kitabut-Tabih”, we can see that out of 1876 words used, 524 words are Arabic, 225 words are Persian and 13 words are Greek, 1 word is Italian, 1 word is borrowed from Chinese. 1112 words are of Turkic origin. It should be noted that among the borrowings are names of dishes or medical concepts that are based on Ottoman but Arabic and Persian words. 85% of terms used in the work “Tohfatur-zaman” written in 1547 is borrowed. In the work “Majmaul-Kavaid” written relating to mathematics, borrowings also prevail. The auxiliary verbs etmək, eyləmək, olmaq, bolmaq, qılmaq, yapmaq etc., the case and predicative suffixes belonging to the Turkic language, which eliminate the difficulty of these words in the texts, partially weaken the syntactic structure that is alien to the syntactic system of the language, and make the text readable. In the 13th-16th centuries Turkic languages, no matter the

classicization, the tendency to borrowings and patterns how high in religious scientific literature, mathematics, literature and linguistics, simple words are dominated in works relating to natural sciences, such as geography, astronomy, medicine and history.

The fourth chapter of the dissertation entitled **“Grammatical features of scientific style in the 13th-16th centuries Turkic languages”** is devoted to the study of morphological-syntactic features of scientific works. In the subchapter entitled **“Grammatical categories in scientific works”**, the categories of number, possessiveness, case are analyzed, and the different features between their means of expression in the regional Turkic languages of the period are compared. The usage rules of categories of number, possessiveness, case, explanations given about them in grammar works and their specific interlingual features of usage reflect the linguistic features of the period.

In Turkic-speaking monuments belonging to the 13th-16th centuries, the main means of expression of the category of number is the suffix -lar. In the work “Muyassiratul-ulum” written in the 16th century, the author also added the notion of duality to the category of number in Turkic languages: “*Əgər ər olsa bir ər isə müfrədi- müzəkkəri-mühatab iki ər isə təsniyə-i müzəkkəri- muhatab, üç ər və ya daha artuq isə cəmi-müzəkkəri-muhatab*” (MU.57.1-3). And in the work “At-tohfatur-zakiyya fil-lughat-it-türkiye” about the duality, it has been explained such as “*türkiy dildə ikkilik yoq, ikkilik manası bu dildə ikki sözünün özünü qullaş yolu bilən ifadalanadı*”³⁷. Although the suffix -lar is the main sign of plurality in Chagatai Turkic, the Arabic and Persian pluralities are also reflected in the words such as səyyarat (planets), ənbiya (prophets), ətbaq (layers), ətibba (doctors). In the work “Muhakimatul-lughateyn” in the word combinations, the agreement according to number is distinguished by different features. In the sentence “*yana yazı quşlarıdın toğdaq və toğdari.... dik quşlarını atları yokdur*” although both parts of combination *quşlarını atları* are

³⁷ Муталлибов, С.М. Ат-тухфатуз-закіяту фил-лугатит туркия/ С. Муталлибов. – Тошкент: ФАН нашриети, – 1968. – с.106

used in plural, on the same page with it, in the sentence “və canvarların unidin bir at kişnemegine şihe at koyuvturlar (B18 b)³⁸ in the combination *canvarlarning unidi*, one of the parts is used in singular, the other part is used in plural.

One of the general grammatical categories is the category of possessiveness, which plays an important role in the formation of the whole grammatical structure, although mainly related to the noun. *“The category of possessiveness, which expresses the relations between two words, such as belonging, possession, denotes the attributive relationship between the owner and the belonging thing or subject and object”*³⁹. In the scientific works of the 13th-16th centuries, this category was mainly expressed morphological, morphological-syntactic and syntactic methods, i.e. the addition of the suffix of possessiveness and in the form of word combinations. For example: *“Bu mənim ardım, arqam, ol mənim tayancım”* (130 -4); *“fulanning bernesı kesılmes bizdin, tüşti yüzün (35-5); “Bir yanğa evürdiler başların, egdiler başlarını_ (107-7)”*⁴⁰. As can be seen, sometimes possessiveness is expressed by adding a suffix to the end of the word within a sentence, and sometimes in the form of a combination with the personal pronoun. However, in the work “Ad durratul-mudiyya”, it is explained that the category of possessiveness is formed only by morphological methods. Although the author writes that a silent meem is added at the end of the word, in all the examples he gives, the sign damma has been put on the letters before the “m”: başım-بَاشِمٌ, gözüm - كُزْمٌ, atum - أَتَمٌ, qardaşum - قَرْدَشَمٌ”. This shows that in the Anatolian Turkic of the period, the labialized variant of the suffix is active. In Chagatai Turkic, the suffix was used in accordance with the harmony of both the lips and the palate. For example, in Niyazi’s work “Al-lughatun-Navaiyya val- istishhadatu`l- jaghatiyya” it is possible to see

³⁸ Nevayi, A. Muhakemetul- luğateyn / A.Nevayi, haz. F.S.Barutçu Önder. – Ankara: TDK yayınları, – 1996. – 244 s.

³⁹ Tanrıverdi, Ə. Azərbaycan dilinin tarixi qrammatikası/ Ə.Tanrıverdi. – Bakı: Elm və təhsil, – 2014. – s.189

⁴⁰ Zemahşeri M. Mukaddimetul-edeb Hvarizm türkçesi ile tercümelı Şuşter nüshası / M. Zemahşeri, yayımlayan. N. Yuce. – Ankara: TDK yayınları, – 2014. – 227s.

that the first person singular of the category of possessiveness is formed with the suffixes -m, -im, -im, -um, -um: “*Ey közüüm yaruğlıq istersen*”; “*Çaq könglüüm xublar köngli ara taptı şikəst*”⁴¹ etc. In Kipchak Turkic, as well as in Chagatai Turkic, there were variants of the suffix used with -ı/i, and -u/ü.

In the scientific works of the period, the second person singular is expressed by saghir nun. Ishaq bin Murad states that the suffix is written with a silent kahf كـ. However, in the examples damma sign is used before saghir nun: qardaşuñ- قَرْدَشُكْ, atuñ - اْتُكْ, közüñ- كُزُكْ, başuñ- بَاشُكْ etc. In Chagatai and Kipchak works, the suffix is used in accordance with the harmony of the lips and palate, although there are some exceptions.

Plural forms of suffixes of possessiveness are formed in the first person with the suffixes -mız, -muz, in the second person -ñız, -ñuz, in the third person -ları/ləri. In the first and second person, -ı- and -u- are added as a connector vowel between suffixes and words. No rules have been applied in the writing of suffixes, in different works the vowels of the suffix have been shown both in hereke and in letters: میز, یگوز, یگوز, کوز, وگوز, وموز, میز, میمیز, میز, میز etc.

There is almost no extensive theoretical information about the category of possessiveness in the linguistic works of the time. At some points, even the suffix of possessiveness is confused with the suffixes of genitive case and predicative.

In the subchapter “**Types of sentences in the 13th-16th centuries Turkic-language scientific works**” the types of sentences according to the purpose and intonation, features of their usage in scientific works are studied. Various sentence models have been used in scientific texts in order to express ideas, including the grammatical and syntactic structure of the language. Since such sentences reflect the knowledge that is the product of thinking, here the concrete expression of the idea and the accuracy of the information show itself. A. Alizade writes: “*That is, the logical sequence, the intensity of*

⁴¹ Niyazi. El- luğatu- Nevaiyye vel- istişhadatu-l- cağatiyye/ Niyazi. hazırlayan: M.Kaçalin. – Ankara: TDK yayınları, – 2011. – s.795-796

syntactic constructions with precision, following of a certain sequence of words are the characteristic features of the scientific style"⁴².

Declarative sentences were widely used in scientific works of the time. Declarative sentences which conveying descriptive character are the main means of expression of simple ideas. It is observed that the word order is preserved in the sentences in accordance with the norms of the literary language, that is, in these sentences, firstly, the subject, then the predicative is used. In translated works, especially in commentary type translations, this order is often broken by the influence of the original text. For example: In the sentence "*İsmi-mənsub tərkihi- taqıydıdır, mənsubun ileyh mənasındur, yəni aña nisbət olunmuş diməkdur*"⁴³ word order is correct. In the sentence which given in the same work "*Nisbət bir əmri axara nəzərən gözətməgə dirlər ikisiniün beynində nevan bir münasəbət olmağla. Məsələ bağı iki vəchlə təsəvür eyləriüz, bir nisbətsiz bir də nisbətlə*" the syntactic structure of the Turkic languages is not followed, the word order is broken.

Interrogative sentences, on the other hand, are less useful in the language of scientific works because they are used for communication purposes to learn or clarify an idea during the communication. Interrogative sentences are sometimes used in dictionaries as an explanatory points, and sometimes in works based on explanations in the form of answers to questions, depending on the author's style. Interrogative sentences can be divided into two groups according to their characteristics of formation: 1. Sentences formed by interrogative pronouns. For example: *Bu ilmni neyüçün Aruz didilər*⁴⁴; *Bevliün yedi nesneyile renc ne dürlüdüür?*; *Otlar kaç dürlüdüür?*⁴⁵; 2. Sentences

⁴² Əlizadə, A. C. XX əsrin əvvəllərində Azərbaycan ədəbi dilinin elmi üslubu/ A. C. Əlizadə. – Bakı: ARKTN Poliqrafiya, –1996. – s.69

⁴³ Bergamalı, K. Muessiretul-ulum/ K. Bergamalı, hazırlayan. E.Karabacak. – Ankara: TDK yayınları, – 2009. – s.34

⁴⁴ Nevayi, A. Mızanül-evzan / A.Nevayi, hazırlayan. K.Eraslan. – Ankara: TDK yayınları, – 2015. – s.13

⁴⁵ Bereket, H. Tuhfei- Mübarizi/ H. Bereket, hazırlayan. B. Erdağı Doğuer. – Ankara: TDK yayınları, – 2013. – s.67,25.

formed by particles. Particles such as *məgər*, *bəs*, *-mı⁴* are active making up interrogative sentences.

The types of sentences used in the scientific works of the time differ from each other in various aspects. Since the main feature of the scientific style is the delivery of facts that reflect scientific knowledge, in such texts, not interrogative and exclamation sentences, but declarative and imperative sentences prevail over them.

The section **“Tendencies in the development of sentence structure in a scientific style”** of the fourth chapter analyzes the stages of sentence structure formation according to the types of sentences used in scientific works in Turkic languages and the development of the syntactic system from simple to complex. The following tendencies are observed in the development of composite sentences in the sentence structure of Turkic-language scientific works of 13th-16th centuries:

1. Sentences formed on the basis of constructions that are a specific feature of the sentence structure of Turkic languages.
2. Compound sentences formed by the conjunction “*və*” (and).
3. Complex sentences formed by the conjunction *-ki*.

The sentences reflected in the works written in the 13th-16th centuries scientific style give grounds to say that all three types of composite sentence structures were active. From this point of view, the sentence structure of Turkic-language scientific works in the 13th-16th centuries is multifaceted. In such works, simple sentence structure is more replaced by sentence types which are inside each other. In this case, the verbal constructions are distinguished by their leading position in the sentence structure. The subchapter entitled **“Development of verbal constructions and sentence structure in scientific works”** reflects the role of such sentence types in the scientific style, the frequency of their usage in the works and their approach in terms of historical grammar. It should be noted that the predominance of such sentences in the works of the period is due to the criteria for the formation of composite sentence structure. The first examples of the expression of a complex idea in a sentence are also reflected in the Orkhon-Yenisei monuments. In the written

monuments of the later period, the complex idea continued to be conveyed to the reader with a long, mixed, extended sentence structure. For example: “*Anuñ səbəbi şol ğaliz buhardur kim, dimağa varur*” (19a1)⁴⁶; “*İskəndəri-Zülqarneyn şəhri-məzkuru xarap bulup imarət eylədi, dirlər.*”⁴⁷; “*Bilgil iy tabib kim bizə vacibdür ki, dağun aməlindən öñdin keyfiyyətini və mənfəətini və mazərrətini və qanqı mizacda istimal etmək gərəkdür bildirävüz*”⁴⁸ etc. In each of the examples given from the scientific works, the concrete description of scientific ideas is expressed in a complex, or rather in a broad, comprehensive way. Some experts consider the ability to express complex ideas within a sentence as just sentence extension function, while others consider the constructions to be equivalent to a subordinate clause. Certainly, the approach to the issue should be not only from a modern point of view, but also from the point of view of historical development. Thus, historically, time-expressing feature of participles and adverbial participles suffixes shows that they develop from the finite form to the non-finite form. The notion of time, which is one of the two main features of the verb, is also reflected in today’s participles and adverbial participles. The similarity of meaning between participles, adverbial participles with the tense suffixes of the verb -ib⁴, -miş⁴, -ar², -acaq², and the homonymy of these suffixes in historical monuments show that participles and adverbial participles include themselves the notion of time. For example, belonging to the 14th century in the work “Ad-Durratul Mudiyya” in the sentence “*Kelip ne yizder sen?*” (19a); *Sen volturup laf vurur san* (Oturub söz atırsan)(20b); etc, it manifests itself in a prominent way.

G.Abdurrahmanov, who researches on the process of complication in the development of sentences in Turkic languages, writes about the functionality of participles and adverbial participles

⁴⁶ Bereket, H. Hulasa/ H. Bereket, hazırlayan. B. Erdağı Doğuer. – Ankara: 2016. – 623 s.

⁴⁷ Piri Reis. Kitabı- Bahriye / Piri Reis, editör: Ertuğrul Zekai Ökte. – Ankara: – Türkiye Kültür ve Turizm Bakanlığı yayınları, – 1988. – s.148

⁴⁸ Sabuncuoğlu, Ş. Cerrahiyetü'l-Haniyye [2 ciltte] / Şerafeddin Sabuncuoğlu, hazırlayan: İlder Uzel, – Ankara: TTK yayınları, – c.1. – 1992. – s.140.

in a sentence: “*The development of subordinating conjunctions and finite forms of the verb (verbum finitum) led to a gradual decrease of the independence of the participle, the adverbial participle, and the conditional form of the verb. And this, in turn, caused them to weaken*”⁴⁹. In general, although the extent of the functionality of the participle, the adverbial participle within the sentence in the form of constructions leads to different opinions, we can unequivocally say that in scientific works some verbal constructions in the form of subordinate clause acted as a part forming of a basis of the initial Turkic complex sentence structure.

K. Abdullayev writes: “*The formal aspect of syntactic analysis allows us to accept the sentences that containing impersonal construction in it as a simple sentence. But the semantic aspect of syntactic analysis leads to take of these constructions as analogues, equivalents, or pragmatic variants of subordinate clauses. We have to admit these two cases at the same time*”⁵⁰. Such sentences forms polypredicateness as analogues of subordinate clauses and are similar to subordinate clause construction in terms of content.

Also, in the works written in a scientific style in the Middle Ages, it’s observed the cases that a simple multi-component sentence becomes a substantive and adjectival complex within another simple sentence. In this case, by creating constructions that tend to be substantivized from the predicates, and in fact the attributive suffixes form sentences based on adjoining relation by the way of sequence or enumeration. For example, it is written in Shirvanli Mahmud’s work “Tercüme-yi-İbni Kesir”: “*Kendüyi añña tapar suretinde gösterüp katına varıcaq Mengü Temuri süñüleyüp mecruh kıldı*”⁵¹ nümunəsi daxilində bir neçə sadə cümlənin birləşməsi özünü göstərir: 1.Kendüyi

⁴⁹ Абдурахманов, Г.А. Синтаксис осложненного предложения (К некоторым спорным вопросам синтаксиса тюркских языков// – Москва: Структура и история тюркских языков, – 1971. – с.141.

⁵⁰ Abdulla, K. M. Azərbaycan dilinin sintaksisinin nəzəri problemləri / K. M. Abdulla. – Bakı: MTM – İnnovation, – 2016. – s. 195.

⁵¹ Şirvanlı, M. Tarihi ibni- Kesir tercümesi/ M.Şirvanlı, hazırlayan: A. Özkan. – Ankara: TDK yayınları, – 2009. – s.398.

aña tapan suretinde göstərib (di). 2.Katına varıcaq (di). 3.Meñgü Temüri süñüleyüp(di).4.Mengü Temüri mecruh kıldı. As a result of the transformation, these sentences are combined in the form of constructions that reflect the characteristics of manner and time. However, the difference between this example from the others is that here the first part acts as an equivalent of the adverbial clause of time. Rather, two complex semantic constructed sentences have combined separately here, based on a two-stage transformation.

In general, the verbal constructions or transformations used to express a complex idea in a sentence structure in Turkic languages, regardless how naming them, attract attention as a special means in the development of a complex sentence. Such sentences are called “mürəkkəbləşmiş” sadə cümlə, budaq cümləli tabeli mürəkkəb cümlə, karmaşık birleşik cümle, iç-içe bileşik cümle in various sources.

The development of a composite sentence in 13th-16th century Turkic-language scientific works is characterized in the subchapter entitled “**Composite sentence in scientific style**”. Various types of composite sentences that manifest themselves for the expression of a complex idea, or for the transliteration of a foreign language pattern as a result of the process of literal translation in the early stages are main features that distinguish the scientific style of the period from the fictional style. The use of sequential sentence chains and the combination of such sentences with the conjunctions *və*, *kim*, *şöylə kim* are key indicators of a composite sentence structure. For example: “*Baraş bir rəncdür kim, tenüñ dərısı ala ala ağarur, şöylə kim əgər iynəyilə dürtərlərisə ol aq yeri su çıkar qan yerine (115a 1-2)⁵²*”; “*Amma Türki ve Farsi ve Hindi əsl tillərinin mənşəidür ki Nuh peyğəmbər salavahullahı aleyhining üç oğlığa kim Yafəs və Sam və Hamdur, yetişür (B5a14)⁵³*”. As can be seen from the sentences given in various scientific works, in the 13th-16th centuries a composite

⁵² Bereket, H. Hulasa/ H. Bereket, hazırlayan. B. Erdağı Doğuer. – Ankara: 2016. – 623 s.

⁵³ Nevayi, A. Muhakemetul- luğateyn / A.Nevayi, haz. F.S.Barutçu Önder. – Ankara: TDK yayınları, – 1996. – 244 s.

sentence structure have been fully formed in the Turkic languages, and kinds of sentence of each type have been used.

Compound sentences formed as a result of two or more sentences combining by coordinating relation are distinguished by their activity in the 13th-16th centuries scientific works, especially in the examples of medicine and history. In the work “Majmaul-Kavaid”, although this sentence “*Fəhm itməgə bu qədər təsvir kafidür, bakisi dəxi ala haza qıyas olına, amma mənzili-əftümdə ki, xane-i aşərati-miatı ulufdur, yəni on kəz yüz biñ xanəsidür anda siyaqatılə bu şəkl yazılmışdır*”⁵⁴(8a,1-4) is called a compound sentence in traditional linguistics, the content that it expresses and structural extent don’t fit into the framework of a known sentence. Because here two sentences are combined with both adjoining and one more sentence is combined with contrasting relation. From this point of view, K.Abdulla writes about a compound sentence: “*In the Azerbaijani language, as well as in a number of developed Turkic languages, a compound sentence actually behaves not as a composite syntactic complex, but as a constructed syntactic complex*”⁵⁵. Calling these syntactic constructions as sentence intonation-based microtext examples, M.Musaoglu writes: “*Mentioned examples of microtext are language-speech fragments that don’t have specific constructed members, differentiated according to context and discourse ... Because they “soften” the linguistic contrasting between simple sentences of monopredicative and semi-predicative structure and real text samples with special complex polypredicative units and as a whole, play the role of transition from one of these to another*”⁵⁶.

Components of CSU, which are completed sentences, separately, in scientific texts, express a more general idea within a framework. Although the association of parts of the component is

⁵⁴ Özçelik, S. Muhyeddin Muhammed’in Mecma’ü’-l Kavâ’id adlı eseri: / doktora tezi/ – İstanbul, – 2009. – 402 s.

⁵⁵ Abdulla, K. M. Azərbaycan dilinin sintaksisinin nəzəri problemləri / K. M. Abdulla. – Bakı: MTM – İnnovation, – 2016. – s.159

⁵⁶ Musayev, M. M. Türk ədəbi dillərində mürəkkəb cümlə sintaksisi/ M. M. Musayev. – Bakı: Kitab aləmi, – 2010. – s.82

initially in the framework of inviolability, associativity leads to a change in semantic boundaries. Let's have a look at the section on the explanation of the subject being 16th century example in the work "Muyassirat al-Ulum". *"Zeyd babası qayimdür disək /mübtədanuñ xəbəri cümleyi-ismiyyə olur /yəni Zeyd mübtəda olur/babası mübtədayi-sani olur/ qayimdur mübtədayi-saninün xəbəri olur/mübtədayi sani xəbərilə mübtədayi əvvəlün xəbəri olur.* (M.U. 127:6-9). As can be seen, each component within the structure creates a whole by polishing the informative value that conveying separately in the framework of the hyperthermia. This occurs as a result of semantic and structural relations between the components. The component "Zeyd babası kayimdir" that presented in the first part of the CSU forms the semantic basis of hyperthermia as a whole. Separately, "Yəni Zeyd mübtəda olur", "Babası mübtədayi-sani olur". "Kayimdur mübtədayi saninin xəbəri olur". "Mübtədayi sani xəbərilə mübtədayi əvvəlün xəbəri olur" the semantic basis that connecting the parts of is the idea that "Zeyd babası kayimdür". This semantic relation is polished in the form of a single unit with the text-forming structural communicative means. By repeating the particle "olur" at the end of each component, it also structurally connects the sentences that have their own framework. The verb "olur", which is used as a constituent factor of the CSU, reduces the independence of the parts and allows the assessment of a single hyperthermia in the framework of a structure. In fact, the particle "olur" also acts as a creator of syntactic parallelism in CSU.

In scientific works, contrasting relation is the comparison or being contrasted of parts included in the syntactic construction, i.e, the opposing opinions are brought to attention inside a whole. For example: *"Asvan Said vilayətünüñ ahir şəhridür amma kiçirek şəhirdür, mamurdur...At ve balıq ve geyikler çokdur, hurmalıklar ziyadedür, amma ekinlik yoqdur, gidaları taşradan gelür* (TZ.162a, 203) ”.

When analyzing the complex syntactic structure of the 13th-16th centuries monuments, it becomes clear that in the works of the period of CSU or parts of microtext are the most frequently applied style of

expression. The fact that these are not compound sentences, but called CSU, is due to the fact that the structure expressing a completed idea is wider than the sentence boundaries.

The main scientific and theoretical results obtained from the research can be summarized as follows:

1. Differentiation and integration of Turkic languages covers many centuries, and in this process the formation and re-merging of different Turkic literary languages is observed. Language examples that reflect this development are also major historical sources demonstrating the functional capabilities of languages. Among these works there are many examples of scientific style. These works are a clear example of the development of scientific style in medieval Turkic languages.

2. The history of the formation and development of the scientific style that being one of the leading styles in the Turkic languages, is distinguished by its specificity. An important role in the emergence and formation of the scientific style was played by the writing of explanatory dictionaries in the Turkic languages from the 13th-16th centuries, as well as medical, music, science, mathematics and other scientific works. It is clear from the historical facts that these works, in addition to reflecting the history of the development of science, are based on specific norms in the expression and sequence of a way of thinking, the choice of lexical means of language.

3. Norm and functional language form an archetype. The system of functional languages and norms at different stages of language development, although sometimes of a different nature, has an internal balance as a whole. From this point of view, the normativeness of the scientific style manifests itself in two directions. The scientific style, which develops according to the general normalization of the Turkic languages according to stage, is also subject to normalization according to the internal features of each language. Although the general normalization is based on the general development criteria of the Turkic languages in the 13th-16th centuries, the internal normalization occurs from the phonetic, lexical and morphological aspects.

4. Research shows that the development of the scientific style in the Turkic languages took place in the 13th-16th centuries in accordance with the rules of language, and there formed examples of the scientific style linguistically perfect with rich linguistic features. Relating to the field of science such as medicine, grammar, astronomy, music, history, mathematics, science, etc. both translation and writing of original works have led to the formation of various branches of scientific style. The fact that the scientific style has different characteristics according to different micro-styles is the main indicator that the internal divisions of the style are completely realized.

5. In 13th-16th centuries Turkic languages lexicography has been one of the main characteristic branches of scientific style. In addition to reflecting the lexical landscape of the period, lexicography is a rich source that covers fictional examples, grammatical information, and traditions related to the daily life of the people, etc. Lexicographic examples allow to determine the vocabulary of the language, as well as its interaction with other leading languages of the time, the level of language expression capabilities. Studies show that in the 13th-16th centuries the number of Turkish explanatory dictionaries increased and the differences in the content of dictionaries became regional.

6. The works on linguistics written in the 13th-16th centuries Turkic languages had different features in the 13th-16th and 15th-16th centuries. At the initial stage, dictionary-grammar typed works with grammatical information added to the end of dictionaries were later replaced by translation-textbook typed works. At the same time, the 15th-16th centuries were the period of writing grammar works in the form of questionnaires written by European missionaries who came as travelers. All these works reflect the level of development of grammar at that time. It should be noted that the traces of Arabic grammar are clearly observed in the scientific grammars written on linguistics, and at some points even parallels are sought for non-Turkish grammatical concepts such as dual, gender, which is in fact due to the development of science of the time.

7. Starting from the 14th century, the writing of Turkic medical

works led to the development of scientific terminology in this field. In particular, numerous works on medical science written in the Anatolian environment reflect the level of development of medical science. Among the micro-styles of the period, works related to the field of medicine are distinguished by the simplicity of writing style, comprehensibility and the abundance of use of national terms. In the late 14th and early 15th centuries, medical works covered general knowledge in terms of content, while in the second half of the 15th and 16th centuries the writing of works covering various fields of medicine (eye diseases, surgery) reflected the development of scientific knowledge and the acceleration of intra-scientific division.

8. Scientific works on mathematics written in the Turkic languages in the Middle Ages belong to the end of the 13th-14th centuries. However, the strong influence of the vocabulary of Arabic and Persian is felt in these works. Arabic and Persian borrowings, hybrid terms and national terms formed by combining them with Turkish words show that the lexical composition of mathematical works is wide-ranging. In mathematics, numbers and words expressing notions related to numbers are of Turkish origin, and they have been also used in parallel with their Arabic and Persian equivalents. The works written during this period are a clear example of the expression of mathematical thinking in the Turkic languages.

9. In the medieval scientific environment, music was considered as one of mathematical science according to A. Farabi's division and relating to this, many works were written in this field. Although these works were first written in Arabic, the works of such authors as A. Farabi, N. Tusi, S. Urmavi were translated into Turkish from the 15th century and laid the foundation of Turkic-language music science by writing comments and borders on them. Works on music theory have been written since this period, and they were written mainly in the Anatolian environment. Under the influence of Arabic and Persian works used as sources for these works, the adoption of musical terms from these languages as they are, has become a tradition.

10. The science of astronomy, which developed in Turkestan from the 13th-14th centuries, became popular in the Anatolian

environment in the late 14th century. From the works of the Middle Ages, it is clear that astronomy has quite wide branches. Books on the science of Miqat, works dealing on general knowledge of nature, such as “Ajaibi-makhlugat”, “Acebul-uccab”, works on dream interpretations, or works on individual astronomical devices have different linguistic features. The names and terms used by the authors in the works written in different Turkic-speaking regions are different. In the works written in Turkestan in the 11th-12th centuries, the names of planets and stars were of Turkish origin, and in the 14th-16th centuries Anatolian environment, terms of Arabic origin prevailed.

11. When looking at the dictionary of the works written in the scientific style of the time, it becomes clear that in the works written in the 14th century, most of the words and expressions used in the old Turkic language remained the same, Arabic and Persian borrowings were followed at the level of general borrowings. However, in the 15th-16th centuries, the use of borrowed terms increased. In particular, in works relating to the field of religious and exact sciences, it is sometimes observed that only verbs are of Turkic origin in the sentence. In addition to traditional Arabic and Persian borrowings, terms of Greek and Latin origin have been used in medical and astronomical works. In addition to preserving the ancient lexical layer in Kipchak and Kharazm Turkic dictionaries of the 13th-14th centuries, since Chagatai and Ottoman-written dictionaries of the 15th-16th centuries mainly reflecting the lexical structure of the literary language, the advantage of the borrowings shows that the lexical fund has changed because of centuries and regional influences.

12. Changes in the lexical-semantic field of words in the examples of scientific style belonging to the 13th-16th centuries, especially in the works of different fields of science, conveying homonymous meaning of the same words reflects the development of the semantic field of words. This is observed not only in national words, but also in borrowed terms. In the scientific works of the period, the main directions of word formation by lexical-semantic method occurred as a result of the processes of narrowing of meaning, extension of meaning, transfer of meaning.

13. Morphological method is the most productive form of word formation in scientific works written in Turkic languages of 13th-16th centuries. In the 13th-16th centuries, the humanitarian and natural sciences, as well as in the fields of science astronomy, mathematics, music, etc., morphological word formation has developed on the basis of a common vocabulary. The activity of such terms, the process of replacing borrowed words with national derivative words is more noticeable in the 13th-14th centuries. Although it is observed in the works of this period that borrowed words are replaced by derivative words, in the 15th-16th centuries it was preferred to accept borrowings as they are, or to use them within word combinations.

14. The part of lexical structure of scientific works of the period consists of language units used in the form of combinations. Such units include both word combinations formed in accordance with the grammatical structure of the Turkic languages, as well as forms and constructions of izafat under the influence of the lexical layer of the Arabic and Persian languages. Combinations belonging to the Turkic languages in the works on medicine, history, prevail, but in the works on religion and literature, mathematics, izafat constructions prevail. In terms of chronology, the predominance of izafat combinations in scientific works belonging to the 15th-16th centuries is noteworthy. Thus, the syntactic method, which is one of the main methods of word formation in the formation of the terminological base of the scientific style, reflects both the internal linguistic features of the Turkic languages and the influence of the Arabic and Persian languages.

15. Moving from the 13th towards the 16th century, the close contact of Turkic languages such as Kipchak, Ottoman, Chagatai, Azerbaijani, etc. with the Arabic and Persian languages also influenced the vocabulary of the scientific works of the period. While writing works in Turkic was already a political and social requirement of the time, the use of borrowed terms was the result of a unified Islamic thinking born of the religious, cultural and scientific unity of the time. The appearance of original author's works written by Turkish authors in Arabic and Persian in the 11th-12th centuries and their translations in the 13th -14th centuries, comments, borders on

comments, the preparation of bilingual and trilingual dictionaries reflects in itself the fact that Turkic languages are the leading language. Increasing of the trend of classicization in the 15th century was shown itself with changes in the vocabulary. However, no matter how many borrowings, the grammatical structure of the Turkic language had the power to polish these words within the text. As a result, these borrowings have acquired nothing but the property of being a lexical unit within the text.

16. Although general grammatical categories are distinguished by their stability throughout the history of the development of Turkic languages, regional and periodic changes in their means of expression are determined by written works. From this point of view, the language of Turkic-language scientific works belonging to the 13th-16th centuries is one of the most important sources reflecting the differences in the possibilities of expression of grammatical structure in the Oghuz, Kipchak and Karlug environment. The rules of using the categories of plurality, possession, case, person in the scientific works of the period, the explanations given about them in the grammar works and their specific features of interlingual development both draw attention to the linguistic features of the period and reflect the expert approach to theoretical issues. As a result of the research, it is clear that the main differences in the means of expression of grammatical categories are at the graphic and phonetic levels.

17. The types of sentences used in the scientific works of the time differ from each other in various aspects. These features reflect the syntactic structure of various Turkic languages in the 13th-16th centuries. Since the main feature of the scientific style is the delivery of facts that reflect scientific knowledge, in such texts, declarative and imperative sentences prevail over interrogative and exclamation sentences.

18. In the syntactic structure of Turkic-language scientific works of the 13th-16th centuries, composite sentence structures predominate. Composite sentences used in the works of the period can be summarized in 3 groups: 1. Sentences formed on the basis of constructions; 2. Sentences formed with the help of the conjunction *və*

(and); 3. Composite sentences structurally subordinate-main sentence. All three composite sentence structures have a different usage frequency in the works. In the 16th century Chagatai, subordinate sentences with conjunction “ki” predominate, and in medical works written in the 14th century Ottoman environment, sentences that contain constructions or are arranged sequentially with conjunctions and give the impression of a small text predominate.

19. In the scientific works of the time, verbal constructions or various auxiliary words attract attention as one of the constructive means in a composite sentence. While studying the syntactic structure of the works of the period, it was determined that such sentences expressing complexity from the functional semantic point of view were one of the leading sentence structures in the historical development of Turkic languages. Before the composite sentence model of inflected languages acquired functionality, sentences with construction or transform that functioned as such sentence types were developed in parallel with them in later stages. These sentence structures still hold a leading position in most modern Turkic literary languages, especially in oral speech. As for what kind of sentence they belong to from the grammatical point of view, in our opinion, in this case, not universal grammatical rules, but the features corresponding to the grammatical structure of the Turkic languages should be taken as a basis.

20. During the analysis of the complex syntactic structure of the 13th-16th centuries monuments, it becomes clear that in the works of the period, compound composite sentences have a complex syntactic integrity. The reason why these sentences are not called compound composite sentences, but the complex syntactic whole, is due to the fact that boundaries of expressing complete thought of such structures are even wider than a sentence. Since medieval manuscripts of a scientific style do not have punctuation between components, the boundary between ideas can be defined by intonation or conjunction within the text. At the same time, it is clear that the boundaries of a composite sentence are not sufficient when explaining a particular scientific idea. In particular, in works on medicine, geography, and

astronomy, while expressing an idea the author's consecutive interpretations go beyond the sentence's border, and as a result, small pieces of text are formed, which convey the idea to the reader more accurately and broadly.

21. It is clear from the research that the development of the scientific style in the Turkic languages in the 13th-16th centuries differs from the previous periods and marks the beginning of a stage among the functional styles of the literary language, which is distinguished by its distinctive features. At this stage, the attitude of the creative forces to the national language and its capabilities is of a professional nature. This affects the process of formation and normalization of the scientific style as a continuation and development of the scientific and cultural renaissance.

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The defense will be held on 20 September in 2022 at 11⁰⁰ at the meeting of the Dissertation council – ED 1.06 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at Azerbaijan National Academy of Sciences, the Institute of Linguistics named after Nasimi.

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Dissertation is accessible at the Library of Azerbaijan National Academy of Sciences, The Institute of Linguistics named after Nasimi.

Electronic versions of dissertation and its abstract are available on the official website of the Institute of Linguistics named after Nasimi, Azerbaijan National Academy of Sciences.

Abstract was sent to the required addresses on 5 in “July 2022”.

Signed for print: 1.07.2022
Paper format: 60x84 16¹
Volume: 109 486
Number of hard copies: 20